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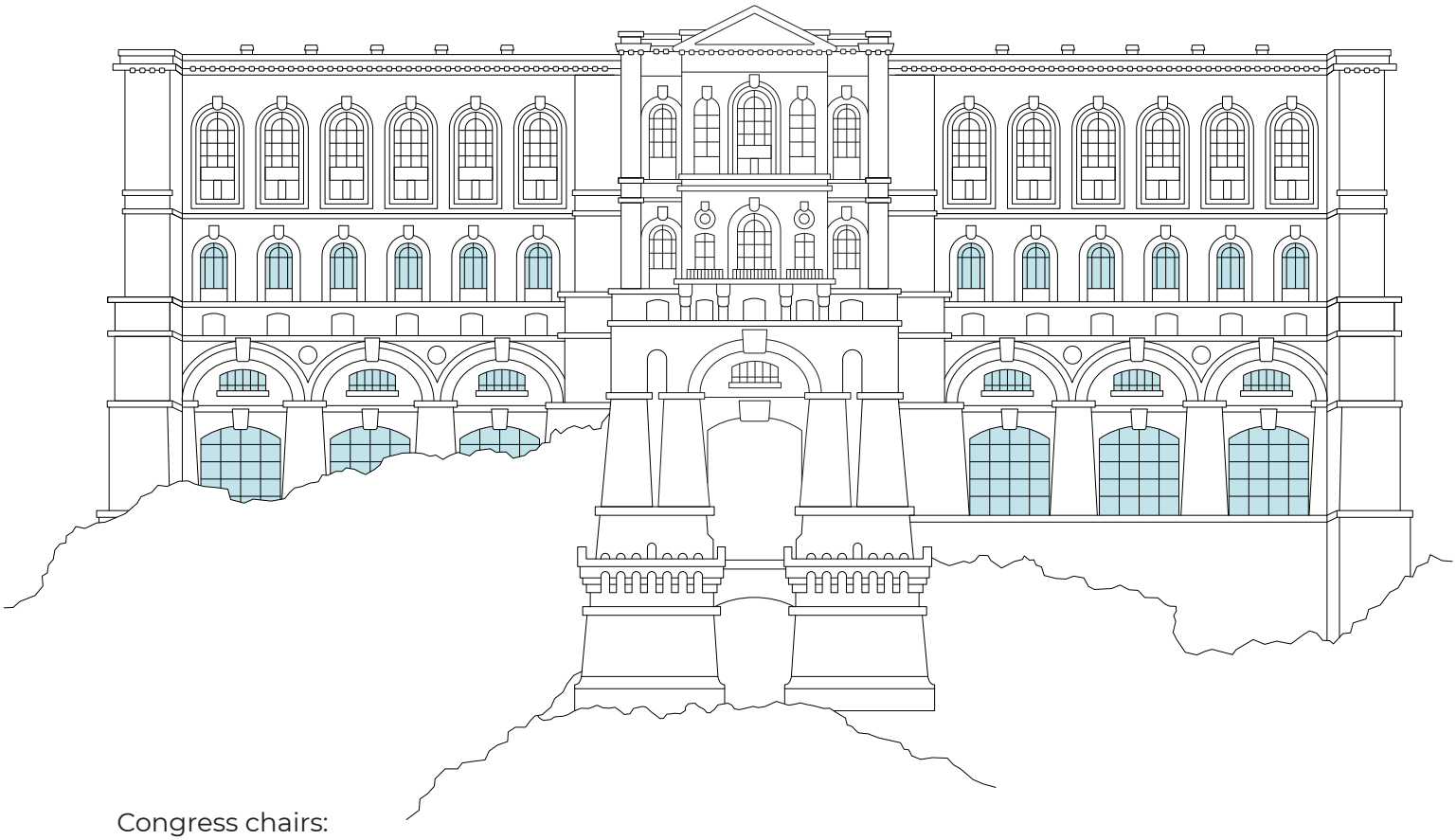
Congress **Scientific** Report

MONACO

THE IMPACT OF TIME IN IMPLANT DENTISTRY

18▸20 Sept. 2025



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THE OSSEO ALLIANCE

Congress **Scientific** Report

32nd EAO Annual Scientific Meeting
Monaco, 18–20 September 2025

Authored by the Congress Scientific Report Subcommittee 2025

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The EAO Annual Meeting in Monaco brought together a programme strongly centred on the clinical and biological implications of time in implant dentistry. This year's Congress Scientific Report aims to capture the essential messages of the 15 scientific sessions and plenaries, integrating evidence, clinical protocols and areas of ongoing controversy.

As in recent years, this report has been prepared by a dedicated group of clinician-delegates who attended every session with the sole purpose of delivering an accurate, unbiased and practice-oriented summary for the wider EAO community. Our intention is to facilitate critical reading, highlight clinically relevant pathways, and underscore the areas where time exerts the greatest influence—planning, surgical execution, biomaterials, digital workflows and long-term maintenance.

We hope that this document provides a clear overview of the scientific content presented in Monaco and serves as a useful tool for clinicians aiming to incorporate the latest evidence into their daily practice.

Contents

Acknowledgements

The EAO would like to gratefully acknowledge the substantial work carried out by the Congress Scientific Report Subcommittee. The Board of Directors also wishes to thank all session chairs and speakers for their collaboration and for granting permission to summarise and illustrate their presentations.

Methodology

The preparation of this report followed the process outlined below:

1. A team of dentist delegates volunteered to prepare the Congress Scientific Report and attended all sessions included in this edition during the EAO's 2025 Annual Meeting in Monaco.
2. Each delegate submitted a draft summary of the presentations they covered. These drafts were then reviewed and edited by the EAO's copywriting team.
3. Edited contributions were returned to the authors with questions or requests for clarification.
4. Once the authors provided their responses, the editors finalised the texts and forwarded them to the respective speakers together with a selection of slides proposed by the authors.
5. Each speaker was invited to review the content and provide feedback before publication.

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EAO Congress Scientific Report; Monaco 2025, Session 1

Treatment planning for full arch reconstructions: reducing times, improving outcomes?

Nitzan Bichacho

Biological and mechanical considerations for full arch implant reconstructions

The speaker opened with a quote from Dr Michael D Wise: 'Every dental treatment is going to fail sometime' (1995), observing that good dentistry delays failures as long as possible, while poor dentistry accelerates them. He explained that his presentation would discuss four biological and mechanical considerations with regard to full arch reconstructions:

- biological insights and implementation
- managing the interfaces
- prosthetic and mechanical concepts
- workflow – full arch

Once an implant is exposed to the oral cavity, the body's defence mechanism is responsible for creating what was previously called the biologic width, and is now known as the supracrestal tissue attachment. This needs to be a minimum of three millimetres high, so if the implant is placed too superficially, the bone will resorb in order to obtain this 3mm. However, if the implant is placed infracrestally it will still be at the top of the implant abutment interface, even if the bone resorbs. To achieve this it's necessary to have a very stable and tight connection with a non-compressive neck design. Moving from the bone-to implant interface, the speaker went to speak about the implant-abutment and crown-mucosa interfaces (the contour of the crown has a particularly important impact on the surrounding peri-implant envelope).

We must have minimum of 3 mm of mucosal height above the implant platform, plus a minimum 3 mm thickness of mucosa buccally to the prosthetic platform. These are key criteria for the long-term stability of the tissues, and are very important for cases involving both single and multiple implants.

Turning to the implant crown, the speaker noted that the deep contour (subcritical contour) is the most important one. It connects with the implant head, close to the bone. The rule of thumb is that the deep contour must be as slim as possible to provide space for a wide band of connective tissue around it. The cervical contour must be customised to support the papilla and the free mucosal margin.

The goal of these measures is to achieve long-term stability, combined with excellent function for the patient. However, there is a problem when using two-piece abutments, as they feature a screw that goes through the crown via a chimney and into the abutment. This chimney can't be completely sealed, and as a result oral contaminants will penetrate it and will go on to contaminate the interface between the implant and abutment. Bone cannot survive in the vicinity of this contamination and will resorb.

We also know that too many insertions and removals of the transmucosal components will lead to some mucosal recession. The one time abutment concept has been developed to solve this. Multi-unit examples are monoblock and have no chimney, as the screw is part of the abutment itself. They are designed with necks that are as slim as possible at the implant head, meaning there is space for a thick band of connective tissue around them. There is a new type of transmucosal abutment that is also monoblock and can use multiple implants or also hold a single crown. They enable the delivery of customised tissue-level implants by moving the prosthetic platform away from the bone-implant interface.

Turning to multiple implants the speaker described a situation where he may want to place connected (splinted) crowns on two adjacent implants. However, as placing two implants completely parallel is impossible, one of the two crowns will inevitably not have a passive fit. This will lead to friction and tensile forces, resulting in issues such as screw breakage or bone resorption due to strain. Instead, clinicians can use multi-unit implants with extension levels, enabling restoration in cases with up to 24° shift between implants.

Transmucosal abutments are a must for full-arch reconstructions. Because implants don't have a periodontal ligament, all the occlusal forces are directed to the bone, so occlusal considerations are particularly important. Prostheses have been grouped into five categories based on their characteristics: RP5, RP4, FP3, FP2 and FP1. FP3 is probably the most common option for full-arch cases.

The speaker briefly introduced occlusal schemes for FP1, FP2 and FP3. These must feature:

- axial loading on the implants
- control of the vertical dimension of occlusion
- bilateral contacts in CR, with shallow cusps and group function

Special factors apply to splinted prostheses:

- MUAs must be screw-retained
- dissipating forces around all implants
- a rigid cross-arch splint
- titanium framework and zirconia crowns (full zirconia is a risk)

In FP3 scenarios, maintenance is problematic both for the patient and the clinician. Oral hygiene is very important, and one of the most efficient tools is the oral irrigator.

The speaker turned to a case involving full-arch restoration and stressed that such cases must be biologically driven, with adequate bone and quality of bone present, along with sufficient soft tissue volume and suitable occlusal load distribution. This is in contrast with anterior restorations, which need to be planned restoratively. In full-arch cases, the biology is more important.

The advantages of immediate loading in full-arch are as follows:

- more dynamic healing
- bone responds to controlled functional microstrain (Wolff´s law)
- faster angiogenesis
- faster woven bone

By contrast, there is a risk of fibrous encapsulation where there is overload or instability. As a result, there are some criteria for immediate loading that need to be respected:

- primary stability >35 Ncm. ISQ > 65
- type I-III bone with adequate volume
- implant design: tapered, with active-aggressive threads
- occlusal considerations: avoid micro movement >1000µm; no parafunction
- splinting of all implants, no cantilevers
- avoid bruxers, non-controlled diabetics, smokers
- controlled dietary habits for at least two months: soft diet, limited chewing function

Carrying out these cases involves gathering a large amount of data from different digital sources. These are then merged to enable static computer-assisted implant surgery, ideally with guides placed on fixed teeth, rather than mucosa or bone.

The speaker concluded by reminding the audience of his opening observation that every dental treatment is going to fail sometime, and it is our responsibility to maximise restoration longevity through a combination of biological respect and technical precision.

Ramón Gómez Meda

Digitally enhanced treatment planning for full arch reconstructions: where are the limits today?

The factors limiting digitally enhanced treatment for full arch reconstructions are as follows:

- the health and age of the patient, along with variables such as whether they have diabetes; are a smoker; or are undergoing bisphosphonate treatment
- bone quality and quantity
- soft tissue thickness and presence of keratinised gingiva
- biomechanics: implant distribution and parafunction

The factors determining whether an FP3 will be an option, rather than an overdenture, are:

- vertical dimension
- the position of the transition area
- is lip support necessary?
- is bone reduction required?

In patients with better conditions an FP1 may be suitable. Factors indicating this approach include younger patients with high aesthetic demands (for instance a high lip line), and for whom bone and soft tissue reconstruction will be acceptable.

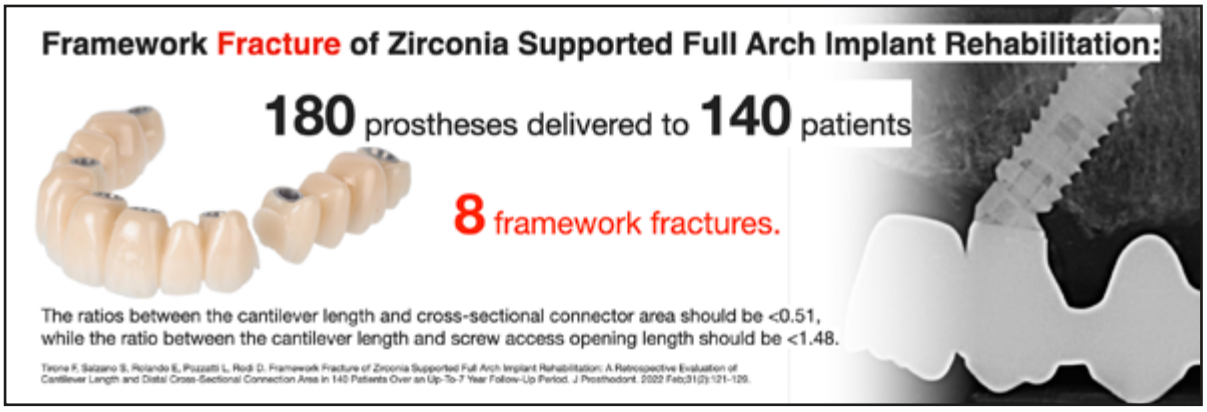
Turning to biomechanics, the speaker noted that the less bone there is, the more implant he needs.

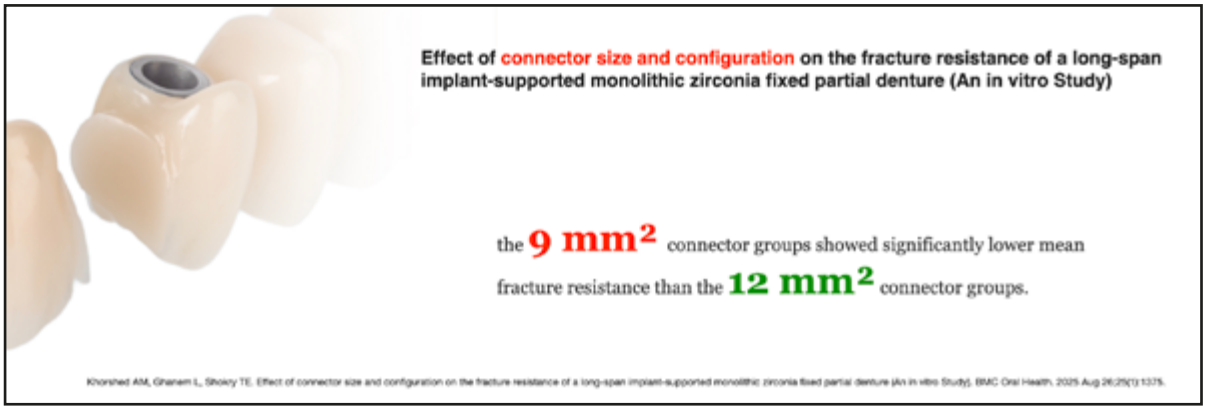
There are limitations to the digital workflow:

- the challenge of scanning edentulous arches (soft-tissue and cross-arch distortions)
- capturing implant positions (IOS vs photogrammetry)
- face/virtual articulator/biomechanics (which are often under-modelled digitally)
- guided surgery for immediate full-arch (accuracy and safety margins)
- framework fabrication and materials (fit; misfit; complications)

Talking in more detail about scanning challenges, he recommended either photogrammetry or segmenting the arch. Intraoral scans alone are often insufficiently accurate for full-arch procedures. Combining them with photogrammetry means that a precise digital model can be created, without the need for plaster models or an articulator. Instead, everything is digital and the framework or provisional can be manufactured directly without Ti bases.

There are scanbody systems on the market that are less precise than photogrammetry, but which are suitable for producing good quality temporary restorations. The restorations can then be cemented, and the scans combined with other techniques to finalise the case.



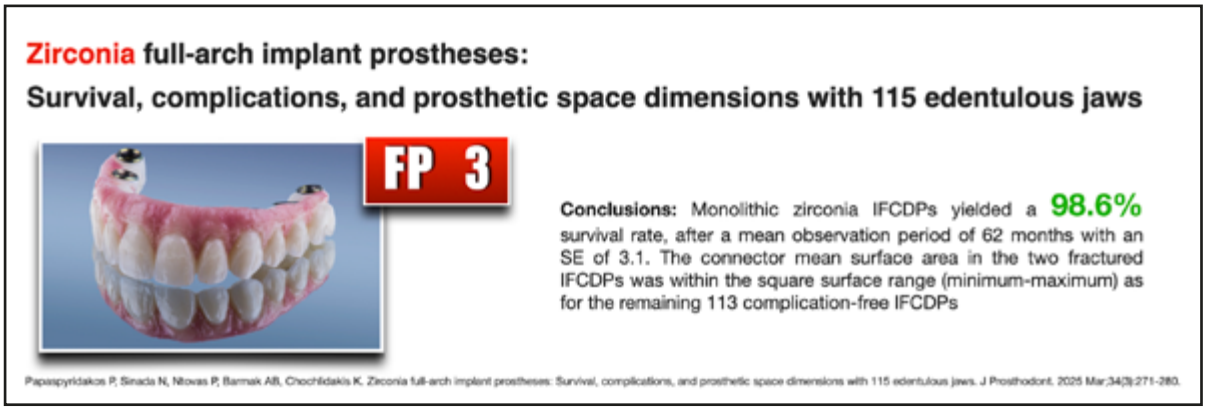


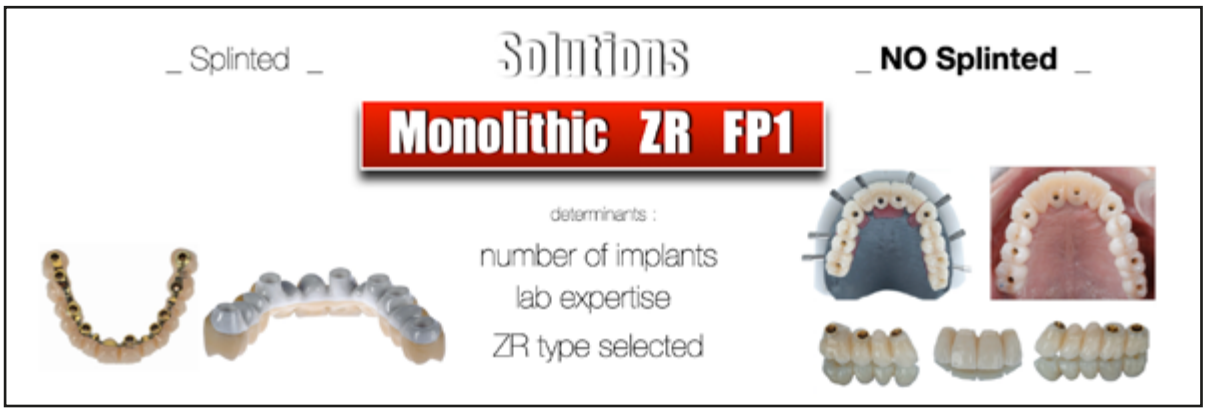
In terms of materials, the speaker talked about PFM, PMMA, and also zirconia, although fractures are a potential problem with the latter. The risk of these can be overcome in FP1 cases by including a titanium framework, or using a very strong zirconia framework (he described an example with a strength of almost 2000 megapascals). This is hot-bonded with full-thickness monolithic zirconia, thereby avoiding fracturing of the framework or chipping, while getting the desired aesthetic result. Separately, he noted there isn't normally a problem with zirconia in FP3 cases because the connectors are much larger.

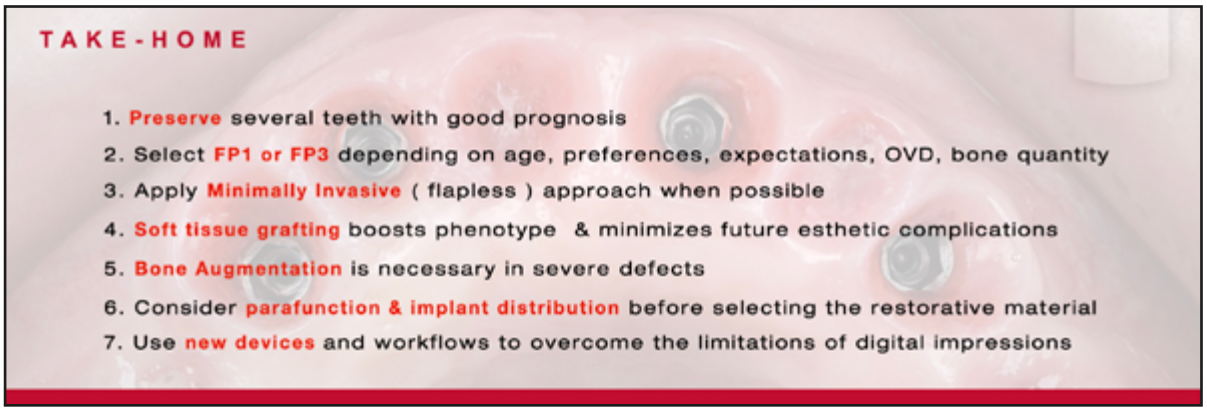
The decision underpinning which material to use will depend of the number of implants; the presence/absence of splinting; the lab expertise and the type of zirconia you want to use.

The take-home messages were:

- preserve as many teeth with a good prognosis as possible
- select FP1 or FP3 depending on age, preferences, expectations, OVD and bone quantity
- apply a minimally invasive (flapless) approach when possible
- soft tissue grafting boosts the phenotype and minimises future aesthetic complications
- for severe defects, bone augmentation is necessary
- consider parafunction and implant distribution before selecting the restorative material
- use new devices and workflows to overcome the limitations of digital impressions







Florin Cofar

AI in full-arch implant planning

The speaker began by saying that the simplest definition of AI is automation. We use it to make things faster and to solve complex problems. He then placed AI in the context of a full arch reconstruction case.

Technology only exists if it can solve problems. In the case shared with the audience, the first question was how do we handle the mock-up? A prosthetically driven approach wasn't possible because everything was extruded and there wasn't scope to make additive mock-ups. However, smile design could be carried out from an image of the patient using AI. This process can create static images as well as an AI-generated before and after video. Approaches like these have the additional benefit of helping to get the buy-in of the patient.

This is a very powerful tool. It's not just randomly developing images, but rather the practitioner has full control over the smile and its design. The only thing the AI does is enhance the motion and the photorealism: at the same time the design is preserved.

Having acknowledged the power of AI as a communication tool, the speaker asked whether planning treatment on the basis of a single picture was too shallow an approach. The answer, he said, was obvious: of course it is. He added that 'behind the curtain' there was a very complex planning process. Starting with the illustration and video, it's then necessary to move to prosthetic design, then implant planning. Each of those will involve another software package. The processes will often be carried out by different people too, requiring a lot of coordination.

The speaker went on to talk about new possibilities and a new class of software/technology called Blueprint. He used the German philosophical term gestalt, meaning that the whole is more than the sum of the parts, to encapsulate the benefits of working in digital. The ability to merge a CBCT with an IOS provides exponentially more data.

There are two major superpowers in digital dentistry: the ability to put things together in layers, and the fact that you can't break anything. It's the only part of the treatment process where you can try something out, then press Command/Control Z (undo) if you don't like it, and there are no consequences for the patient. Once you exit the digital stage, these superpowers are lost.

Another important thing that AI offers is segmentation: this makes it possible to look at structures, rather than layers, providing a virtual anatomical model. This is relevant because when planning a full arch case the starting point is prosthetic design. Normally we're looking at a scan, which is a single, outer surface. Ironically it's the surface that's the most inconsistent in the process because it is going to undergo changes, such as removal of the teeth and tissue modifications based on the new prosthetic that will support them.

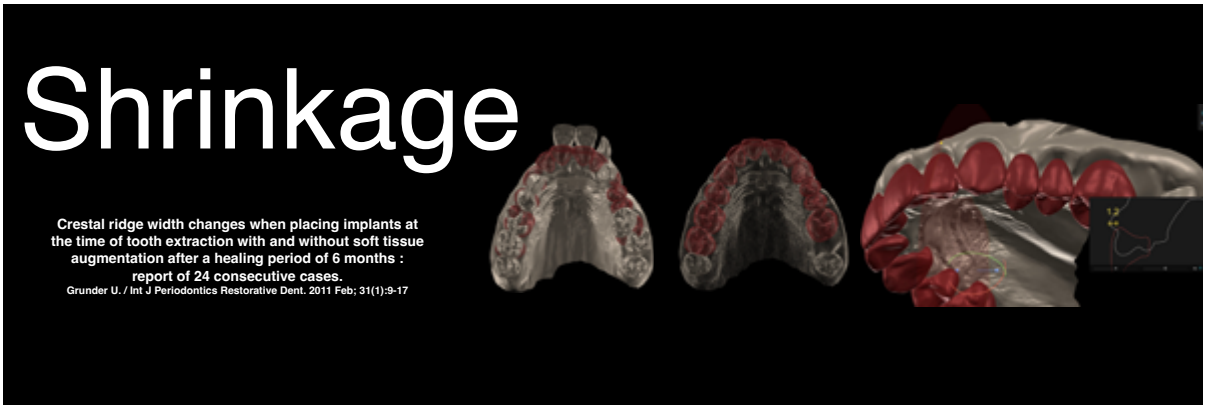
The alternative is to use a virtual anatomical model: in this technology the files are added, then the software aligns, segments and combines them, creating the possibility of working on a completely different canvas. At this point, instead of using the outer surface to plan the case, we can use the patient's bone and face. This is vital, because what's really important is to position the tooth where it makes sense both aesthetically and functionally, and also to check that this cascades into a realistic implant position.

The third problem in these cases is how we handle the occlusion. The speaker focused on the tools available to address this:

- vertical dimension: start from the uppers and take lip sealing into account (both the teeth and the lips should touch). This is fundamental for good breathing and to avoid muscle strain. It can be checked using palatal splints
- motion data can be generated but is helped by using a wider volume of CBCT data that contains both the teeth and condyles, providing a really clear picture

By putting all this data together, it may transpire that a case that looks impossible for an FP1 might in fact be suitable for treatment this way.

The speaker then turned to implant distribution. He described how he took a critical thinking approach to this, avoiding the tendency of dentists to zoom in, and instead thinking like an engineer and zooming out. He asserted that the real problem isn't precision, but that with current technology it's not possible to capture elasticity. As a result, he prefers to segment, and place the implants in such a way that the case is converted from a full arch into three- or four-unit bridges. We know from the literature that the shorter the bridge, the greater the longevity.



He concluded by saying that many in the audience would be saying that they were limited by their technicians and the techniques they used. Countering this, he described a process called signature design that enables anything to be designed in any software, then imported and combined with a picture and scan of the patient and used to create a photorealistic image/video. This is achievable in cases when a mock-up isn't possible, resulting in realistic before and after videos. AI is unique as it allows different technologies to be combined, offering powerful creative freedom in treatment planning.

EAO Congress Scientific Report; Monaco 2025, Session 2

Importance of age and timing in implant prosthodontics

This session explored four practical questions that are central to decision-making in anterior single-tooth implant therapy in young adults:

- Does craniofacial development ever truly stop?
- Do all individuals share the same risk?
- At what age is implant treatment recommended?
- What should clinicians expect in the long term?

Across the three talks, the speakers underlined the contrast between high long-term implant survival and the progressive aesthetic and technical demands placed on the restoration, partly as a result of lifelong craniofacial growth. They also emphasised the importance of appropriate prosthetic design and good collaboration between the clinic and the lab.

Nicole Winitsky

Successful implant treatment in the young adult

Dr Winitsky discussed what the concept of 'long-term outcome' means for single anterior implants, emphasising that success must extend beyond osseointegration to include aesthetic predictability over decades[1–3]. She reviewed survival data that showed consistently high implant survival rates (>95% after 15–39 years), with an accompanying progressive decline in crown survival (≈89% at 10 years, 77–80% at 15–20 years, 61% at almost 40 years)[4–10] (Figure 1).

Her own 17-year follow-up of patients treated at a mean age of 21 reported implant survival of 96% and crown survival of 80%. Notably, 50% of patients developed biological or technical complications, most of them not requiring intervention. Despite this, marginal bone loss was minimal (≈0.1 mm) and probing depths averaged 4 mm, indicating stable peri-implant tissues (Figure 2, Figure 3)[8].

Figure 1: Survival rates: implants and crowns

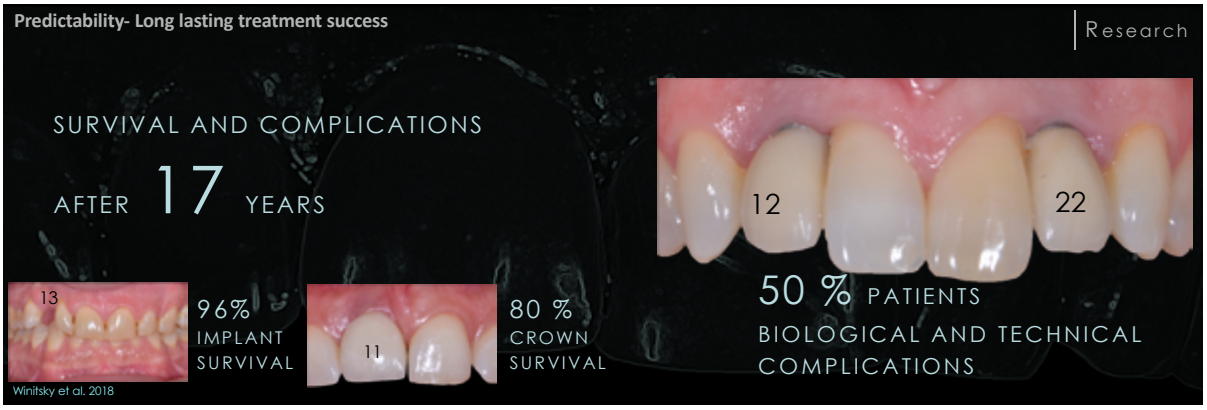


Figure 2: Predictable long lasting treatment success

Infraposition emerged as a key phenomenon. The average vertical displacement of the tooth adjacent to the implant was ≈1.0 mm after average follow-up of 17 years (equivalent to 0.05 mm/year), with 30–35% of patients exceeding 1.0 mm.[11,12] All implants showed some degree of infraposition in the long term. This was more pronounced in lateral incisors and canines than centrals (Figure 4).

Perception differed significantly between patients and clinicians: 63% of patients rated aesthetics as satisfactory (VAS up to 80/100), compared with only 20% of dentists.[8] It is therefore important that clinicians communicate the dynamic, evolving nature of these cases without raising unnecessary concern, since patient satisfaction remains high even with measurable change.

Potential modifiers such as age, sex or facial type did not consistently predict infraposition. However, less infraposition was found when lower anterior facial height (LAFH) was <70 mm; in cases involving trauma-related tooth loss; and in central incisors compared with laterals or canines[8,11]. These hypotheses require further validation before being used to guide individual treatment decisions.

Two key recommendations were highlighted: whenever possible, anterior implant placement should be delayed in young adults and resin-bonded bridges considered instead. If an implant is placed, screw-retained crowns should be used to facilitate maintenance and replacement.

Key points:

- Long-term implant survival rates remain high (>95%), while crown survival decreases with time.
- Infraposition is universal and clinically relevant in ~30–35% of cases after 15–20 years.
- Lower anterior facial height, trauma-related tooth loss and implant position may be relevant as predictors of infraposition of single anterior implants over time.
- Single anterior implant placement should be delayed when feasible. If an implant is placed, screw-retained restorations are preferred.

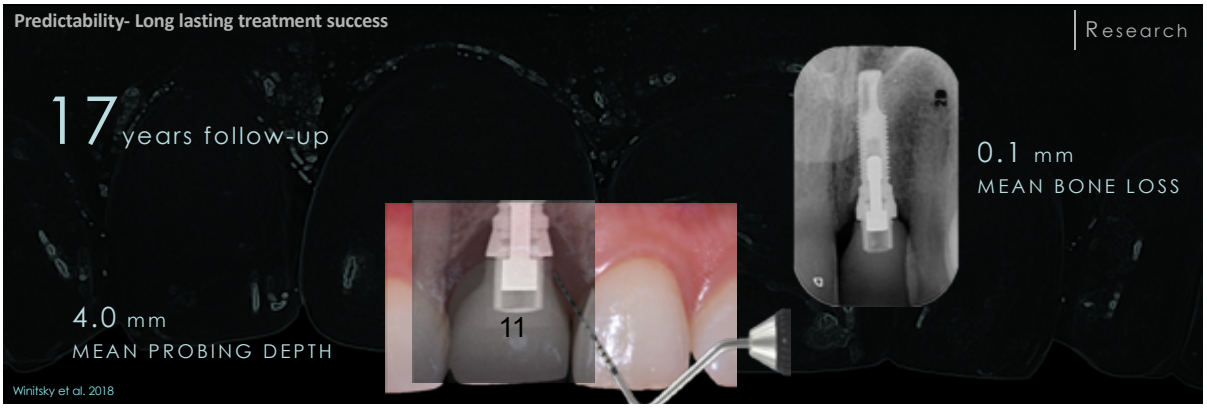


Figure 3: Mean probing depth and bone loss at 17 years follow up

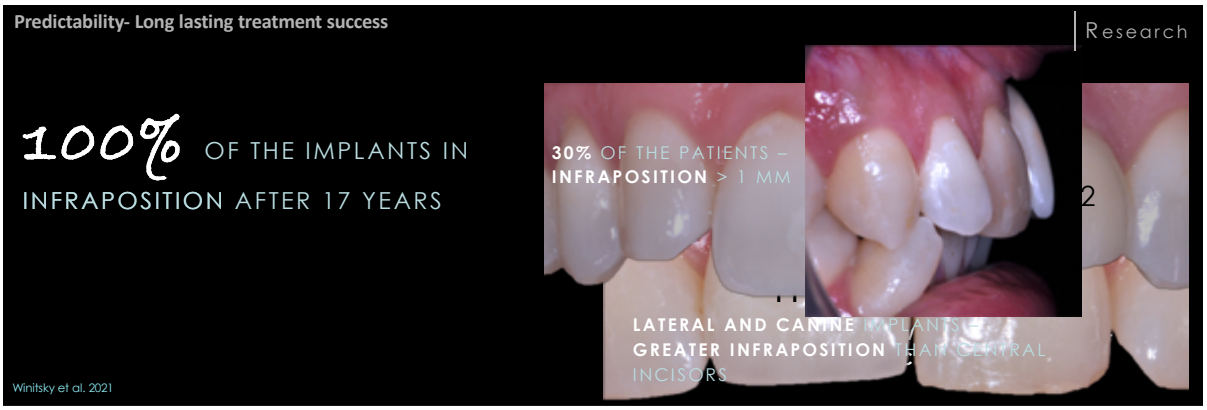


Figure 4: Changes after seventeen years follow up

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Asa Sjöholm

Solutions when timing failed in young patients

The speaker described how prosthetic predictability relies on a combination of close communication between the clinic and the laboratory, along with sound structural design. This is particularly important when conditions are challenging, such as in cases involving limited vertical space, high smile lines, or unfavourable screw access.

She presented three cases where implant positioning had led to compromised prosthetic solutions. Three strategies were highlighted to address these: the use of angled screws, increasing the cervical bulk, and supported veneering porcelain. For aggressive emergence profiles, Ms Sjöholm advocated smooth, convex, highly polished surfaces to reduce plaque retention and minimise cervical stress (Figure 1).

For zirconia-based restorations, she emphasised the importance of respecting the minimum restorative thickness (≈1 mm), as doing so was associated with fewer veneer fractures and chips. Framework reinforcement and extending support of the veneering porcelain up to the incisal edge were also considered essential (Figures 2–3).

Finally, Ms Sjöholm underlined the importance of a post-delivery feedback loop, with standardised photographs and follow-up notes that are shared between the clinic and the laboratory. These are essential to build up learning and reduce long-term complications.

Key points:

- Strong clinic–laboratory communication is essential to deliver complex prosthetic cases successfully.
- Maintain at least 1 mm thickness in zirconia restorations; use convex and polished emergence profiles.
- Reinforce the framework and extend veneer support to the incisal edge.
- Use angulated abutments when needed and plan cervical masking early.

Figure 1: Practical solutions in compromised prosthetic cases

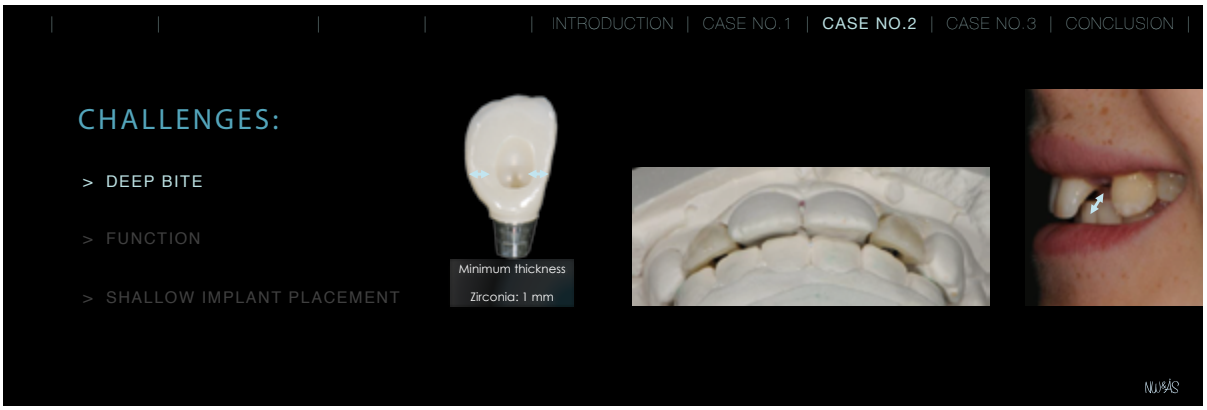

Figure 2: Considerations for zirconia restorations

Figure 3: Supported veneering porcelain design

Eric Van Dooren

Retreatment of successful integrated single tooth implants due to craniofacial growth

Dr Van Dooren began by highlighting that craniofacial growth persists throughout life, with aesthetic consequences, particularly in women. Even successful implants may become aesthetically compromised due to tissue thinning, bone resorption, and altered gingival architecture.[1]

He proposed classifying cases as 'hard' or 'easy,' depending on whether they require bone, soft tissue and prosthetic intervention, or only prosthetic modification. The aim is to simplify as many situations as possible through reproducible protocols, even sometimes choosing conventional fixed prostheses instead of implants (Figure 1).

For unfavourable angulations, he recommended angulated abutments, although when divergence exceeds 30–35° or there are multiple risk factors, explantation and palatal repositioning is advised. Slightly subcrestal placement in the anterior maxilla will help preserve the emergence profile and mask screw access in high smile lines (Figure 2).

Figure 1: Different approaches depending on the complexity of the case

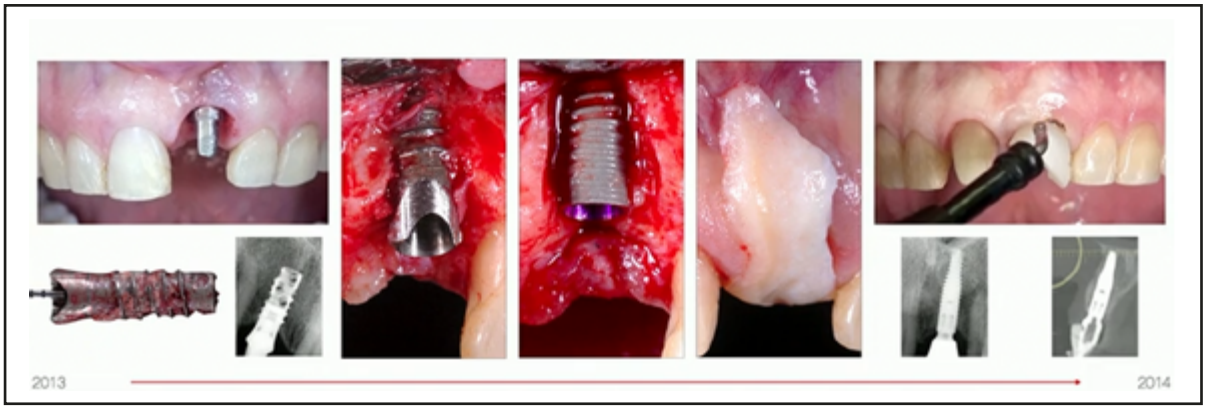

Figure 2: Soft tissue, bone and prosthetic approach

Complex aesthetic problems, especially in thin biotypes, often require connective tissue grafting. Conservative options, such as orthodontic extrusion, may be preferable in selected cases. Dr Van Dooren also introduced the concept of pressure-based soft tissue management, where provisional contours modulate vertical gingival levels: decompression moves margins apically, convexity elevates them (Figure 3).[2]

He also highlighted that the distal papilla usually has an involvement with the adjacent tooth, and resolving this is complex in terms of effort, time and money. As a result a fixed prosthetic solution such as a Maryland Bridge, with a simple connective tissue graft, may be a better option in these situations.

For cases that only require prosthodontic intervention, a prosthetic adjustment of approximately 1–1.5 mm is feasible by following a sequence involving initial supra-gingival decompression followed by healing and progressive contouring.[2]

Despite interventions to try and prevent it, papilla shrinkage of ~1.5 mm was reported in long-term follow-ups. In response to this, the speaker advocated life-cycle planning, including explicitly communicating to the patient that adjustments or prosthetic remakes may be required as facial growth and ageing continue (Figure 4).[3]

Key points:

- Craniofacial growth is a lifelong process, and aesthetics remains vulnerable regardless of implant survival.
- Palatal and slightly subcrestal placement is preferable in the anterior maxilla.
- Thin biotypes require connective tissue grafting. Orthodontic extrusion or simpler prosthetic solutions should also be considered.
- Explantation or repositioning may be necessary in cases involving angulation of >30°, or where there is cumulative risk.
- It is essential to anticipate the need for future maintenance and reintervention.

Figure 3: Soft tissue and prosthetic approach 11 years follow-up

Figure 4: Prosthodontic approach

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EAO Congress Scientific Report; Monaco 2025, Session 3

Timing of implant placement – when is immediate, early or late the better option?

Mariano Sanz

When an immediate implant?

There has been ongoing discussion for two decades about the best surgical protocol to adopt following an extraction, based on the scientific evidence. The speaker began by presenting a consensus article by Dr Mauricio Tonetti from the European Workshop in Periodontology, looking at the different options available following the extraction of a tooth. This documented five possibilities, and he explained that he would focus on the first: immediate implant placement, describing this as potentially the ideal surgical protocol, since the length and number of surgeries is reduced, and the width and height of the alveolar bone are expected to be preserved. He then went on to discuss dimensional changes in more detail.

The speaker described a series of historical studies he had been involved with assessing the oral and lingual dimensional changes that occurred when a single immediate implant was placed. As part of these, the space between the bone and the implant was measured, as well as changes to the vertical bone. The authors observed that bone loss occurred both vertically and horizontally, although the amount of loss was much lower in some patients, leading to very heterogeneous results.

Given the variability of the results, a multivariate analysis was carried out to try and identify the critical factors underpinning bone loss. This illustrated that the most significant loss occurred when the implant was in close contact with the vestibular wall and there was no gap to fill. In these cases the loss of the buccal bone plate was much greater.

The evidence also illustrated that in cases with a very thin buccal bone plate, significantly less vertical bone dimension was lost if the implant was placed more palatally, in order to leave a gap between the implant and the bone.

Based on these results, the group began to establish surgical protocols, including placing the implant more palatally to separate it from the buccal bone and minimise the loss of bone thickness and height. They then designed a randomised controlled trial to determine whether they needed to graft the gap. In many cases there was only a small difference between the grafted and non-grafted cases, although this difference was still significant. However, in sites with a buccal thickness of less than or equal to 1 mm, there was a reduction of 15% in the horizontal buccal crest dimension in the grafted group, compared with 48% in the control group. This led to the conclusion that grafting is essential in cases with thin buccal bone plates. Another conclusion from the studies was that in cases where the implant is placed more than 5mm from the bone plate, bone loss does not occur, even in the absence of grafting.

The speaker then turned to the topic of aesthetics in immediate implants and how these are evaluated. He presented an RCT involving more than 134 patients, coordinated by Dr Maurizio Tonetti, in which aesthetics were compared in cases involving immediate and late implant placement. Aesthetic outcomes differed significantly between the two scenarios, and were significantly better in the late-placement cases, based on pink and white aesthetic scores. However, these variations occurred because the surgeons had not taken the soft tissue into consideration.

Based on the data, tissue management was added to the surgical protocol, with the recommendation to place a connective tissue graft at the time of implant placement. Following this modification, aesthetic results improved to reach a level similar to that of late implants.

More recently, the speaker's group has been assessing whether a collagen matrix is a suitable alternative to a connective tissue graft. Similar results have been achieved in both scenarios, although it was observed that the most important factor was immediate provisionalisation, as supported by studies carried out by Dr Jan Cosyn.

By combining all the protocols described in the presentation, including connective tissue grafting and immediate provisionalisation, the aesthetics achieved (measured in terms of papilla scores and white aesthetics) in immediate implant cases were essentially the same, and in fact slightly better in terms of papilla maintenance, than in late placement cases.

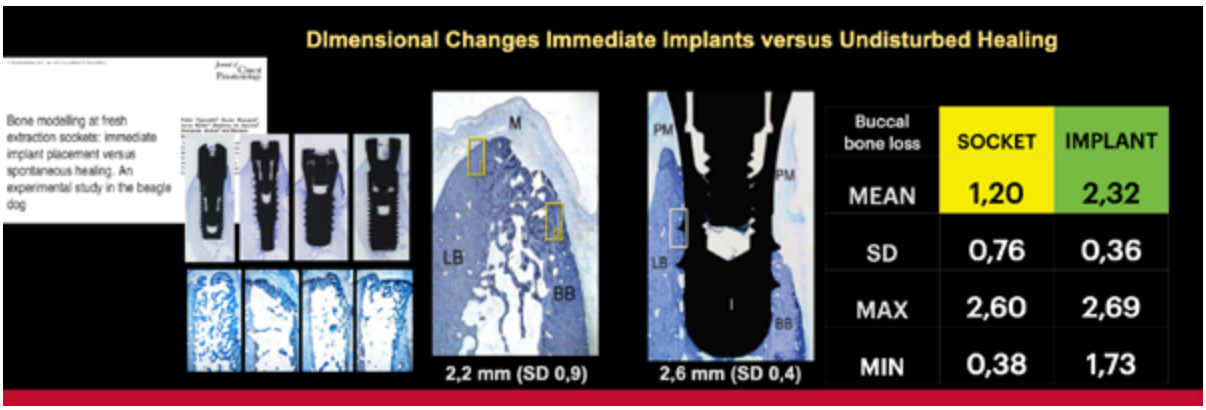
When considering whether to place an immediate implant, the decision-making process is the same as that used for other types of implant. It involves making a thorough assessment of the site dimensions and giving careful consideration to the implant position. Guided surgery should be used to ensure the implant is placed in the ideal location. Furthermore, it's very important to leave a gap between the implant and the bone ('the bigger the better'), and to graft within the gap in cases with a thin buccal wall. The use of a connective tissue graft or collagen matrix is key to preserving the soft tissue and, finally, immediate provisionalisation is essential.

Conclusion

Immediate implant placement offers a number of advantages:

- treatment time is reduced
- the amount of surgery is reduced
- the width and height of the alveolar bone are preserved
- the ideal implant position can be achieved
- the aesthetics are improved

In summary, a successful outcome doesn't just relate to immediate implant placement, but involves an entire protocol. This includes determining the ideal position of the implant; leaving sufficient space between the implant and the buccal bone wall; and carrying out a soft tissue graft followed by an immediate provisional restoration.


Dimensional Changes Immediate Implants versus Undisturbed Healing
Bone modelling at fresh extraction sockets: immediate implant placement versus spontaneous healing. An experimental study in the beagle dog
M
LB
BB
2,2 mm (SD 0,9)
PM
LB
BB
2,6 mm (SD 0,4)
Buccal bone loss
SOCKET
IMPLANT
MEAN
1,20
2,32
SD
0,76
0,36
MAX
2,60
2,69
MIN
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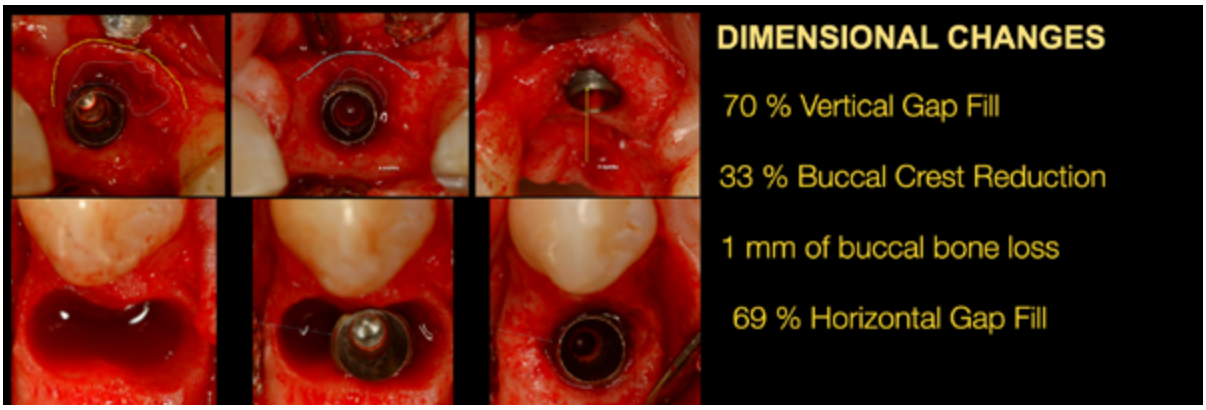
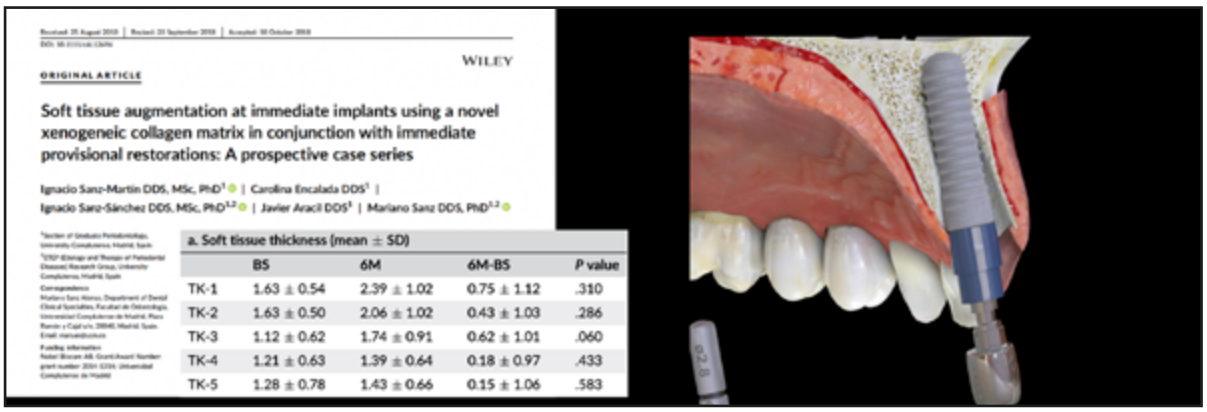

DIMENSIONAL CHANGES
70 % Vertical Gap Fill
33 % Buccal Crest Reduction
1 mm of buccal bone loss
69 % Horizontal Gap Fill


CLINICAL ORAL IMPLANTS RESEARCH
Bone dimensional variations at implants placed in fresh extraction sockets: a multilevel multivariate analysis



WILEY

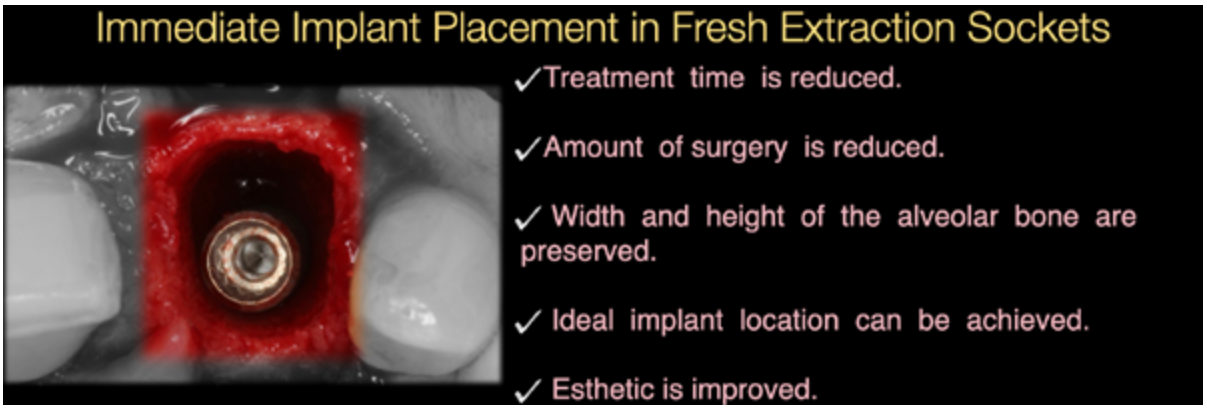
ORIGINAL ARTICLE

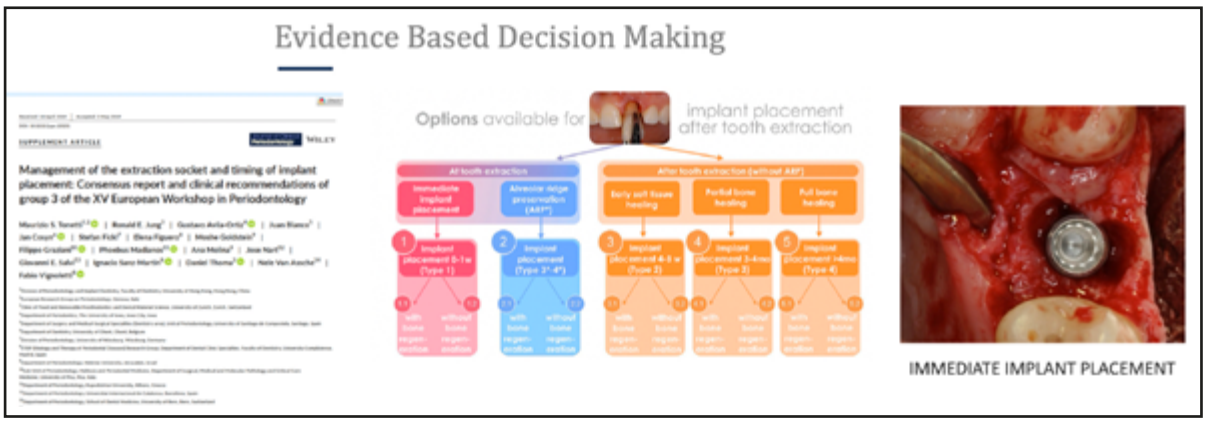
Soft tissue augmentation at immediate implants using a novel xenogeneic collagen matrix in conjunction with immediate provisional restorations: A prospective case series

Ignacio Sanz-Martin DDS, MSc, PhD[1] | Carolina Encalada DDS[1] | Ignacio Sanz-Sánchez DDS, MSc, PhD[1,2] | Javier Aracil DDS[1] | Mariano Sanz DDS, PhD[1,2]

a. Soft tissue thickness (mean ± SD)

	BS	6M	6M-BS	*P* value
TK-1	1.63 ± 0.54	2.39 ± 1.02	0.75 ± 1.12	.310
TK-2	1.63 ± 0.50	2.06 ± 1.02	0.43 ± 1.03	.286
TK-3	1.12 ± 0.62	1.74 ± 0.91	0.62 ± 1.01	.060
TK-4	1.21 ± 0.63	1.39 ± 0.64	0.18 ± 0.97	.433
TK-5	1.28 ± 0.78	1.43 ± 0.66	0.15 ± 1.06	.583





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Anina Zürcher

When early implant placement?

The speaker began by outlining four reasons why she would consider early implant placement:

1. **To better manage hard and soft tissues**. If defects are present it may not possible to address these at the same time as implant placement.
2. **If the patient wants to speed up treatment, but an immediate implant is not possible**.
3. **When a patient has been referred following a recent extraction and socket preservation was not carried out**.
4. **If the clinician has a choice and their preference is for early placement**.

She then turned to the subject of how frequently early implants are placed. To answer this, she discussed a retrospective study by Professor Jan Cosyn on the feasibility of the approach. This looked at 100 cases and reviewed when immediate, early or delayed placement was feasible. It concluded that early implant placement was or would have been possible in 58 of the patients. However, the figure is open to debate. The speaker noted that Ronald Jung had reviewed the same cases and was confident he could have placed an early implement in 90 of them.

The presentation then moved on to the topic of how patients perceive early placement. Dr Zürcher observed that patients don't really care about clinical perspectives, and instead their focus is on factors such as comfort; the pain they may experience; the length of the treatment time; the number of appointments they need to attend; and aesthetics.

To formally answer the question of patient perception, the speaker's group and Professor Jan Cosyn's group conducted a joint multicentre study into levels of satisfaction with early implant placement. This included a question in which patients were asked to rate their satisfaction on a scale of 0 (very unhappy) to 10 (very happy) at the time of crown delivery. The score was over 9 out of 10, indicating very high satisfaction levels. Another parameter that was evaluated was how difficult the surgical technique was for the practitioner. Clinicians were asked to score the surgical intervention from very easy to very difficult at four different stages: tooth extraction, flap elevation, implant placement, and wound closure. In aggregate, the results indicated that they found early implant placement a moderately difficult procedure.

Dr Zürcher then presented a clinical case involving a young woman who needed treatment following a roller-skating accident. She suffered a dental trauma, and after initial endodontic treatment had been well for a period of time. A few years later she returned to the clinic with a fractured tooth and a fistula. On the basis of this it was reasonable to assume there was not much buccal bone remaining. She expressed a preference for shorter treatment time and fewer surgical interventions. She had a high smile line, meaning it wasn't an easy case.

The combination of the clinical situation and the patient's expectations led the team to opt for early implant placement. The tooth was extracted, followed by spontaneous healing for 8 weeks. At that point the soft tissues had healed well, but there was a clear loss of buccal volume. The procedure continued with a flap elevation, which revealed a huge 2-wall buccal bone dehiscence. The implant was placed with good primary stability, along with an 'L'-shaped bone graft (covering the buccal and occlusal face). A resorbable membrane was placed and the flap was closed. All the following stages of the treatment focused on maintaining the volume that had been built up.

The study the speaker referred to previously also looked at buccal contour changes following tooth extraction, with an evaluation at five months. This showed that in early implant placement cases there was a loss of around 1 mm.

Returning to the case of young woman, five months later a small amount of buccal bone loss was evident (as expected). The abutment connection was attached and the implant impression taken, then the provisional stage started. Over two or three sessions, this enabled an ideal emergence profile to be created. At that point the speaker was ready to take a second implant impression, and after several try-in sessions, the crown was finalised and delivered.

Having achieved an excellent aesthetic result, the speaker then noted that the goal was for this to last a lifetime, and she asked 'What can we expect?'. She referred to a retrospective study involving patients who had all had an implant combined with GBR. After 14 years, their average pink aesthetic score was 7.7, and their white aesthetic scores averaged 8.5 – both very good. Volumetric changes to the buccal contour were also negligible. Finally, the patients still rated their happiness at over 9 out of 10.

Take-home messages:

1. Early implant placement results in high levels of patient satisfaction.
2. Early implant placement is considered a moderately difficult procedure at all stages of surgery.
3. Yes, early implant placement is associated with buccal contour changes
4. But, these buccal contour changes remain stable over the years.

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Ignacio Sanz Martin

Ridge preservation strategies

The speaker began by explaining that his presentation would discuss ridge preservation strategies and aim to illustrate how these can benefit patients. He discussed the evolution of the technique over the previous two decades. Fifteen to twenty years ago, practitioners relied on apical X-rays and 40-micron histological slices for their clinical decision-making. However, this only provided a fraction of the desired information, and it was impossible to comprehend what was happening three-dimensionally in the alveolus.

The work of the speaker's group, along with that of Professor Jan Cosyn and colleagues, has since given us a better understanding of the interaction between soft and hard tissues. It is now possible to superimpose DICOM and STL files to create a 3D picture of what happens around the tooth following extraction. This has changed the way that we approach patients when we extract a tooth.

Professor Cosyn's systematic review on immediate vs delayed placement for single-tooth replacement was presented at the 15th EFP workshop. It concluded that as sophisticated as the immediate implant is, and as good as it is for patients, it has some limitations. One of the most significant is that the risk of early implant failure is 2% to 5% higher.

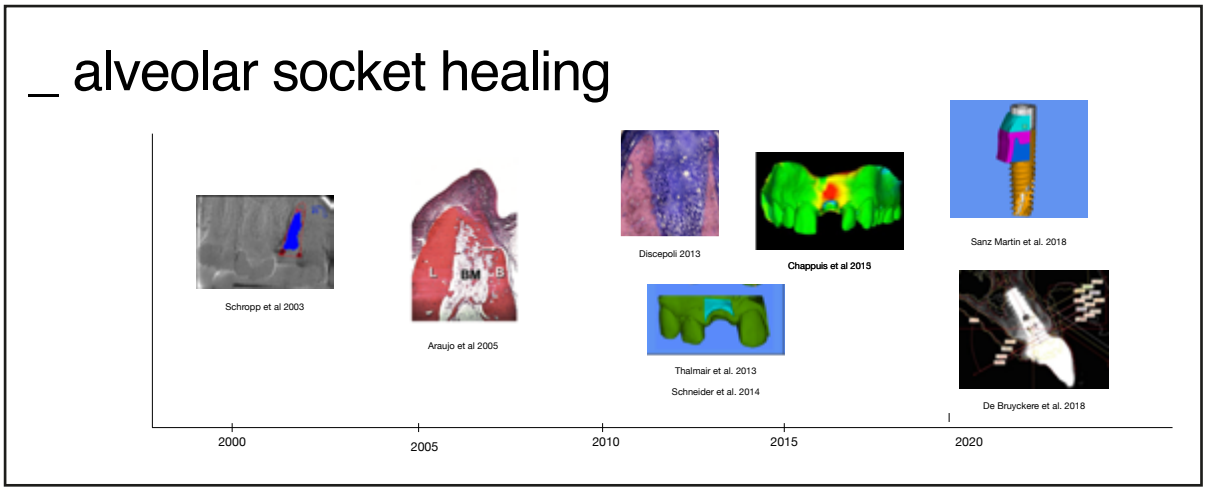
The speaker added that after two decades of evolution, a series of controllable parameters had been identified that enable better results to be obtained when immediate implants are placed. These include filling the gap; performing a flapless procedure; and placing a provisional restoration or healing abutment that supports the soft tissue. Each of them can have a clinical impact equating to between 0.5–1 mm of tissue preservation. Placing or not placing a provisional alone can affect the amount of tissue by almost 1mm.

He divided the rest of his presentation into three parts:

1. The scientific evidence
2. The indications
3. Clinical application

1. The scientific evidence

Next he presented a case involving root resorption necessitating the extraction of the tooth. This was followed by unassisted healing (blood clot alone). Based on Tan et al.'s meta-analysis (2012), it's known that such a procedure will lead to 2–4 mm of hard tissue collapse, plus a loss of 1–2 mm of soft tissue both horizontally and vertically.



On the other hand, if socket filling is performed, with the addition of biomaterial plus a membrane on the buccal aspect, followed by closure using a free gingival graft, the outcome is very different. This is confirmed by the review of Ávila (2019) which notes that following ridge preservation strategies, bone loss is reduced to around 1–2 mm of horizontal collapse and 1mm of vertical loss – a halving of what occurs if no preservation technique is carried out.

One of the interesting things about the Ávila review is that there are two types of interventions: ridge preservation and ridge reconstruction. The former can of course only be performed if there is something to preserve. Reconstruction occurs in cases where there is no buccal plate, in which case it's necessary to attempt to rebuild. However, most cases involve preservation rather than reconstruction.

The probability of having to perform complex advanced procedures, including vertical and lateral bone augmentation, is drastically reduced (by 15–20%) when ridge preservation is performed. This is regardless of whether posterior or anterior teeth are being extracted.

The speaker then discussed the role of socket filling (with a biomaterial) and socket sealing (using a connective tissue graft or free gingival graft). Evidence from a meta-regression and network meta-analysis by Dr Julio Roig Martins supports both techniques. He compared approaches including unassisted healing (such as open healing without a barrier) with assisted healing, like flap advancement or open healing with a barrier. The results clearly favoured approaches that seal the socket, with better results in terms of preserving the hard tissue in particular.

2. The indications

Turning to the indications, the speaker asked when we should perform ridge preservation along with immediate implant placement. To answer this, he compared the benefits with the risks. He made the point that immediate implant placement, although faster and involving less surgery, has a greater risk of failure. However, he set this against the risk of not placing the implant immediately and the associated tissue collapse. The processes involved in restoring the tissues – bone augmentation and soft tissue augmentation – are associated with greater morbidity. This led him to express a preference for not losing what we have, instead of losing it and then trying to play 'the catch-up game'.

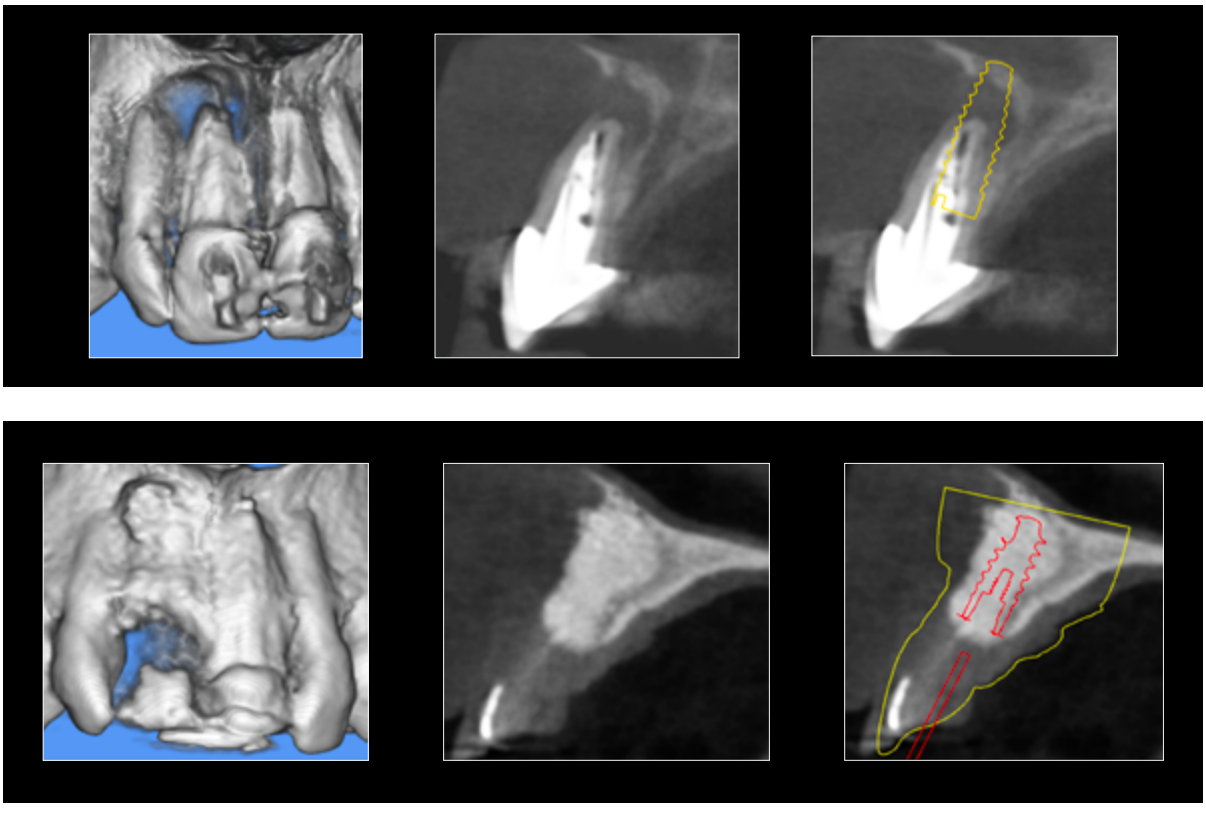
Case selection plays an important part in the decision-making process. This was illustrated using two cases with major dehiscences, where placing an immediate implant would not be appropriate.

In a third case, there was sufficient bone to place an immediate implant, but the crown would have been very high in relation to the adjacent teeth because of the vertical bone loss associated with the hopeless tooth. As a result, an immediate implant wasn't indicated in this case either. Instead, performing a ridge preservation procedure first, then placing the implant later, was the sensible approach.

3. Clinical application

In the final part of the presentation, the speaker turned to how ridge preservation procedures can be performed in practice. He shared a case featuring a substantial amount of bone loss, including a large apical defect, concluding that this was too risky for immediate implant placement. Instead, he chose to remove the existing crown, make an apical incision, clean the socket and use a collagen matrix to stabilise the blood clot. A connective tissue graft was added, and finally the wound was sealed with a pontic.

The case was re-evaluated after three months, with a biologically oriented preparation technique carried out on the adjacent central incisor. A further CBCT scan was taken, showing a dramatic improvement in the situation, allowing straightforward implant placement via a flapless procedure. The case showed stable results at two-year follow-up.



A final case involved a patient with two full-coverage crowns in position 1.1 and 1.2, one with apical lesions following two failed apicoectomies. The decision was taken to extract the incisor, at which point it was clear that there was not enough bone to provide primary stability of the implant. Following extraction, it was therefore vital to support the tissues in order to prevent them from collapsing.

The speaker once again reiterated the concept of not letting everything collapse and then playing catch-up, but instead stabilising the tissues from the outset in order to minimise loss. In this case, the socket was filled with biomaterial, and a connective tissue graft was performed using the tunnelling technique. A simple provisional was used to maintain the soft tissues. Because of the size of the defect, the implant was placed after a delay of six months using minimally invasive surgery. No further bone augmentation was required.

Conclusions

1. When immediate implantation is not possible, ridge preservation techniques will attenuate the changes that occur after tooth extraction.
2. Ridge reconstruction techniques will simplify the treatments and reduce the need for extensive GBR procedures.
3. Sealing socket strategies appear to improve the outcomes of ridge preservation and reconstruction.

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EAO Congress Scientific Report; Monaco 2025, Session 4

Freehand or guided surgery – when to do what?

João Pitta

Freehand implant placement. Is it still adequate?

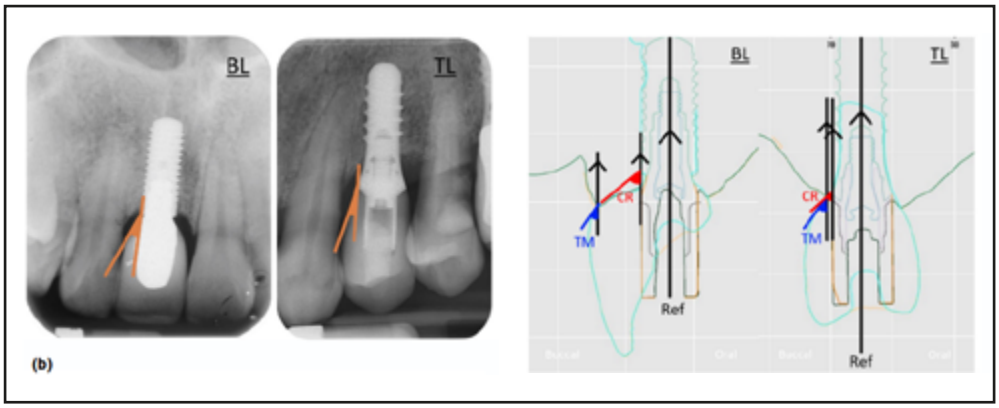
For a successful long-term outcome, achieving osseointegration is not enough. It's crucial to properly evaluate both the pink and white aesthetics, and, of course, the 3D implant position. Good final results require successful osseointegration, along with favourable prosthetic and aesthetic outcomes.

The rules for implant positioning

Achieving the correct 3D position

One major reason for focusing on the correct 3D position is its influence on the emergence profile. Pelekos et al.[1] demonstrated a clear link between the emergence profile and factors like dental plaque accumulation and bleeding on probing.

Another critical factor is the emergence angle, which can directly impact marginal bone loss. Studies suggest significant variations in bone loss based on the size of the angle, with the greatest loss seen at angles of over 400.[2]



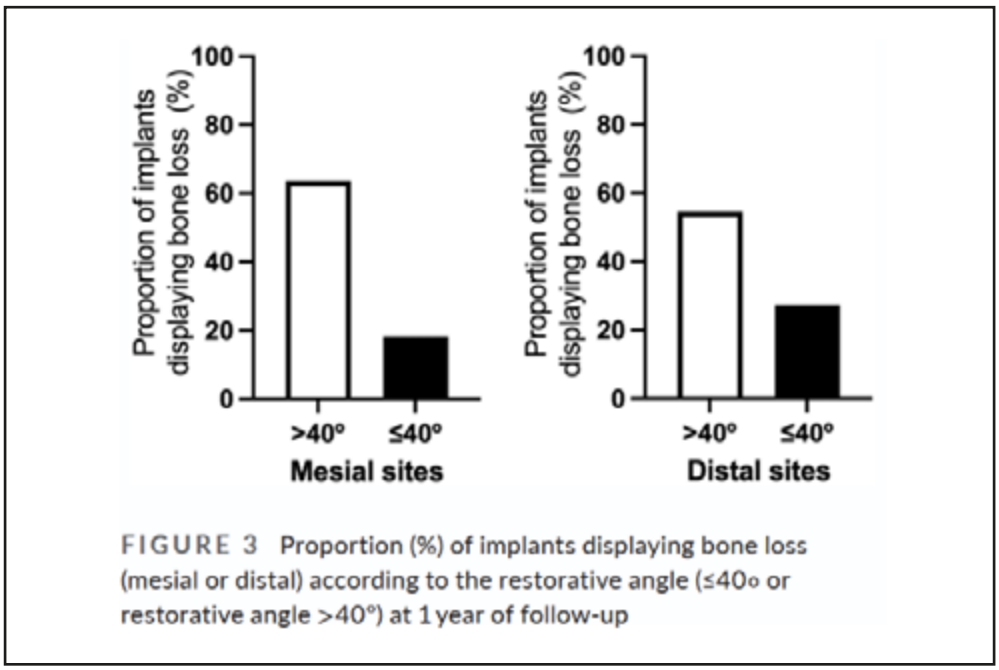
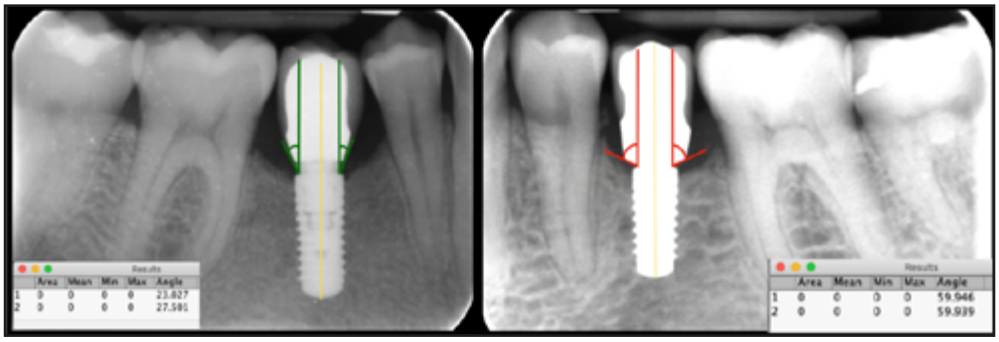


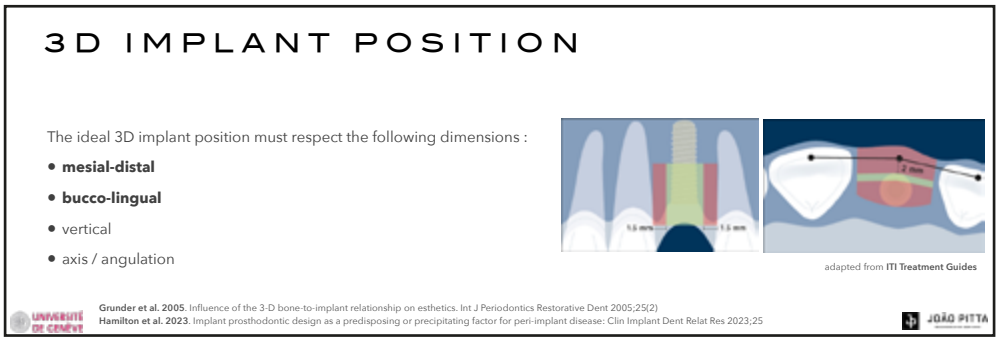
FIGURE 3 Proportion (%) of implants displaying bone loss (mesial or distal) according to the restorative angle (≤40o or restorative angle >40°) at 1 year of follow-up

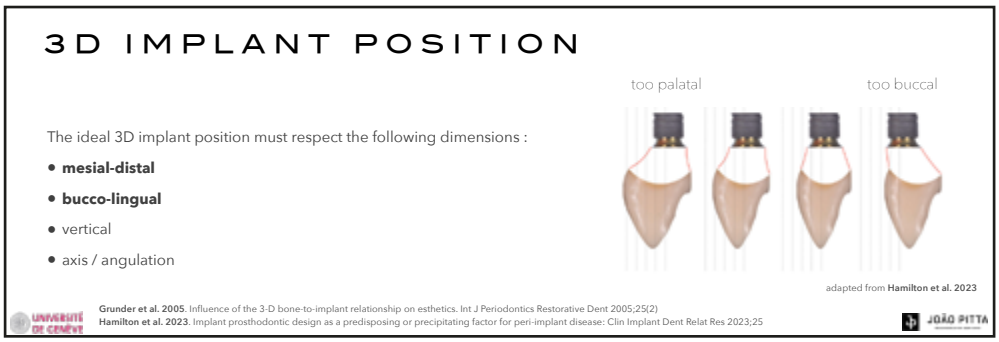
Furthermore, a systematic review indicated that an emergence profile greater than 300, or a convex profile, significantly increased the risk of peri-implantitis.[3]

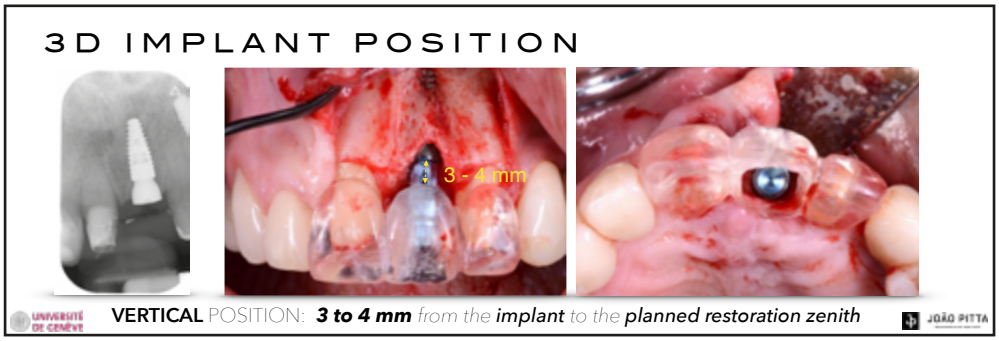
The ideal 3D position for a single implant is defined as:[4]

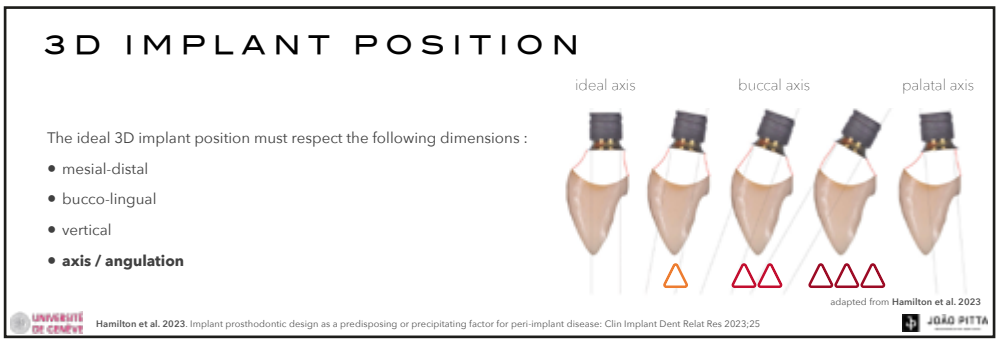
- Mesiodistal: at least 1.5 mm clearance.
- Buccolingual: approximately 2 mm from the line connecting the incisal edges of the two adjacent teeth.
- Vertical: 3–4 mm below the planned restoration zenith.
- Angulation: the correct axis/angle can often be managed using angled screw systems. However, a severely angled screw-access channel can result in the wall of the restoration becoming too thin.









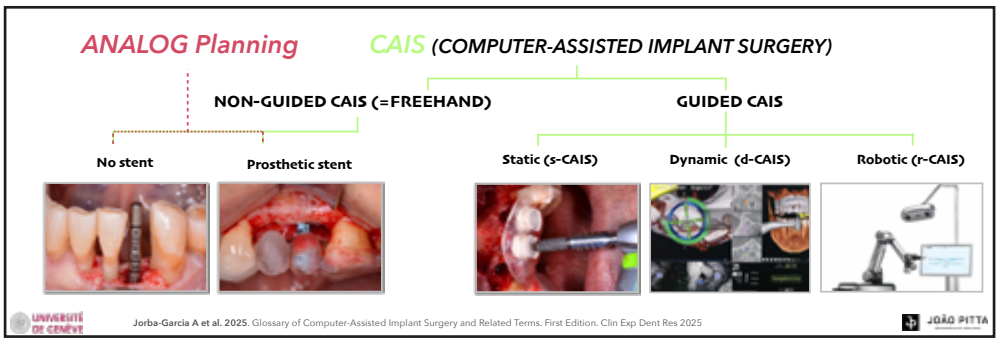


What is freehand and why should we consider using it?

When discussing guided surgery, it is first necessary to briefly categorise the different types of guided procedures that are available.[5] The speaker used a paper entitled 'Glossary of computer-assisted implant surgery and related terms' to illustrate these.

He then highlighted the benefits of freehand implant placement, noting that it requires less time for digital planning, involves less radiation, and has lower initial diagnostic costs. However, these advantages often come with increased surgical time, greater apical deviations, and a higher rate of cement-retained restorations.[6]

More recent clinical studies have consistently demonstrated that freehand surgery leads to increased angular, coronal and apical deviation, resulting in lower overall accuracy compared to guided surgery.[7,8]



When to go freehand?

Based on his clinical experience, the speaker outlined scenarios where he still favours the freehand approach:

- Simple/straightforward cases: single-tooth replacements, with adjacent teeth, in a non-aesthetic area, performed with a full-thickness flap (open flap), and involving delayed implant placement.
- Specific local conditions (e.g. narrow crest).
- Patient factors: such as limited mouth opening.
- Cases involving removable dentures (locators and similar).

In the aesthetic zone, given the difficulty of achieving an ideal straight screw-access channel,[9] the speaker expressed a preference for guided surgery to prevent aesthetic and prosthetic complications.

In some situations, a prosthetic stent is used to assist the placement, either fabricated in the lab or printed directly from the plan.

Summary

Is freehand implant placement still an acceptable method?

- Yes, but thorough prior planning is essential.
- It is best reserved for simple and predictable cases.
- It is an alternative when there are limited options for guided surgery.

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Wiebe Derksen

Static guided surgery: indications and benefits

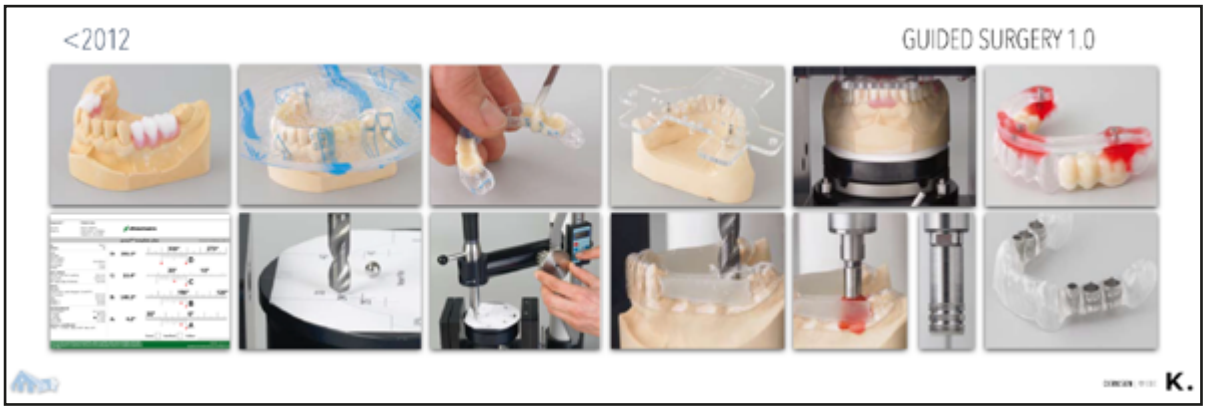
Guided surgery began in a hybrid analogue and digital world which was reliant on manual processes. The speaker referred to this as Guided surgery 1.0. With the advent of CBCT and intraoral scanners (IOS), the workflow became fully digital, incorporating design software. This digital phase was dubbed Guided surgery 2.0.

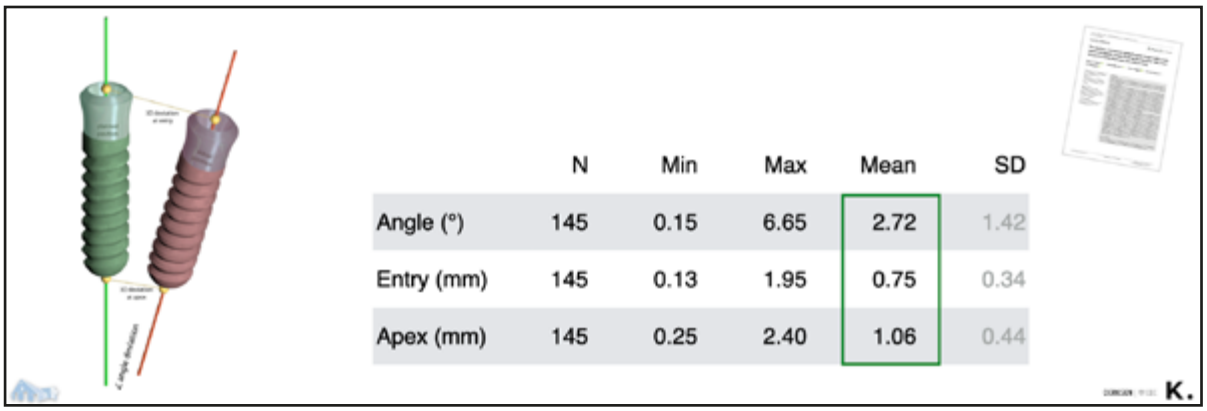
The speaker talked through a paper he had authored1 that evaluated the accuracy of tooth-supported implant guides. All implants in the study were restored with a straight screw channel. The conclusion of this cohort study was that while guided surgery isn't perfect, it facilitates ideal prosthetic position for an adequate final restoration.

The evolution towards Guided surgery 3.0

For the speaker, a significant drawback of Guided surgery 2.0 is the time required for planning. However, with the advent of AI, the prosthetically driven implant and tooth position can be determined quickly, and the guide design generated in seconds. The clinician simply needs to check and approve the plan. The speaker defined this phase as Guided surgery 3.0.

He then introduced a critical concept: the ALADA principle ('as low as diagnostically achievable'). Based on this principle, if a diagnostic tool like a CBCT won't change your clinical treatment approach, it is unnecessary. Therefore, in straightforward cases with no aesthetic compromises and sufficient keratinised tissue, a CBCT followed by guided surgery may not be required.





	N	Min	Max	Mean	SD
Angle (°)	145	0.15	6.65	2.72	1.42
Entry (mm)	145	0.13	1.95	0.75	0.34
Apex (mm)	145	0.25	2.40	1.06	0.44

When to go guided

If a CBCT is taken, the speaker recommends using it to its full extent to:

- Determine the prosthetically driven implant position: the ITI Consensus 20232 made clinical recommendations that abutments should be selected during the pre-surgical planning phase, with final selection occurring after soft tissue maturation.
- Achieve ideal implant planning: the final crown and implant position may require modifications to the planned implant placement.
- Address surgical or anatomical challenges.

The core decision: if no limitations are found in these areas, freehand surgery is appropriate. If there are any limitations, go guided.

Cost and time considerations for guided surgery

There are clear reasons to use guided surgery, including achieving ideal prosthetically driven implant positioning; managing surgical and anatomical challenges; and immediate loading. However, in immediate loading cases it also has clear time and cost impacts:

- Planning and preparation time: Approximately 90 minutes.
- Not suitable for urgent implants on the day of intake.
- Higher costs (CBCT and the guide itself).
- Potential issues with the provisional crown (difficult fitting or luting procedures).

The speaker noted that guided placement and a prefabricated temporary restoration is about 45 minutes faster for the patient than if an immediate implant is placed freehand and a restoration is made after surgery.

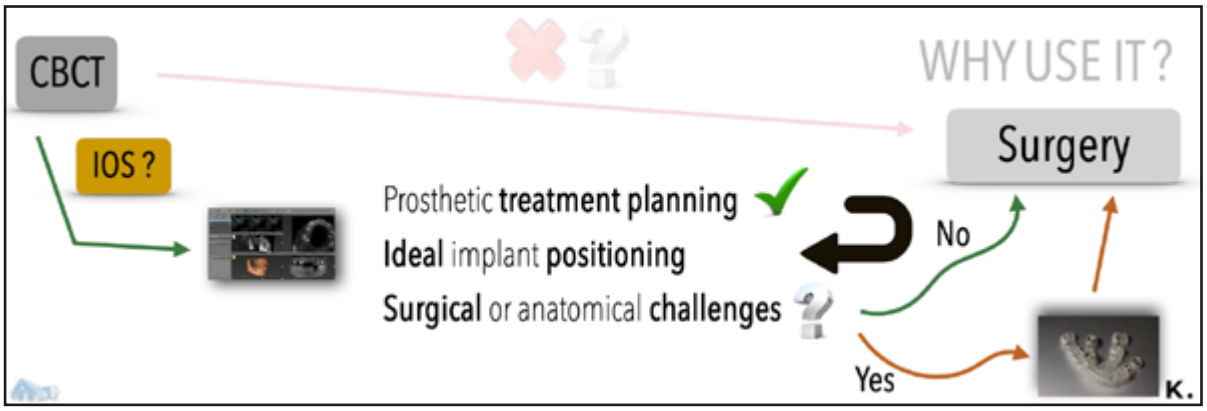
Nevertheless, he advocated for an alternative workflow where an intraoperative digital impression is taken immediately after freehand surgery, allowing a perfect temporary crown to be milled and placed in under an hour (although this requires in-house CAD-CAM facilities or a readily accessible dental laboratory).

Anterior bridges

The speaker then turned to anterior bridges, stressing the importance of either placing these on tissue-level implants, or bone-level implants with multi-unit abutments to better absorb the error of misfit and tension. He added that an extra level of complexity arises because these implants (or abutments) already have their emergence profile incorporated, meaning that 3D placement is even more critical. As a result, these cases are particularly suitable for guided surgery.

Conclusion

1. Guided surgery is not perfect.
2. Be cautious about taking a CBCT for every case; adhere to the ALADA principle.
3. If you obtain a CBCT, use it to its full extent.
4. The decision on whether to use a guide or not should be made after the planning phase.
5. Guided surgery is a tool, not a goal.



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Tali Chackartchi

The limitations of static and dynamic surgical guides

Artificial intelligence is now a part of our daily lives, and naturally it's integrated into implantology too. Digital tools promise high accuracy, often citing a target deviation of less than 1 mm.[1,2] However, we still need to meticulously supervise all these digital aids.

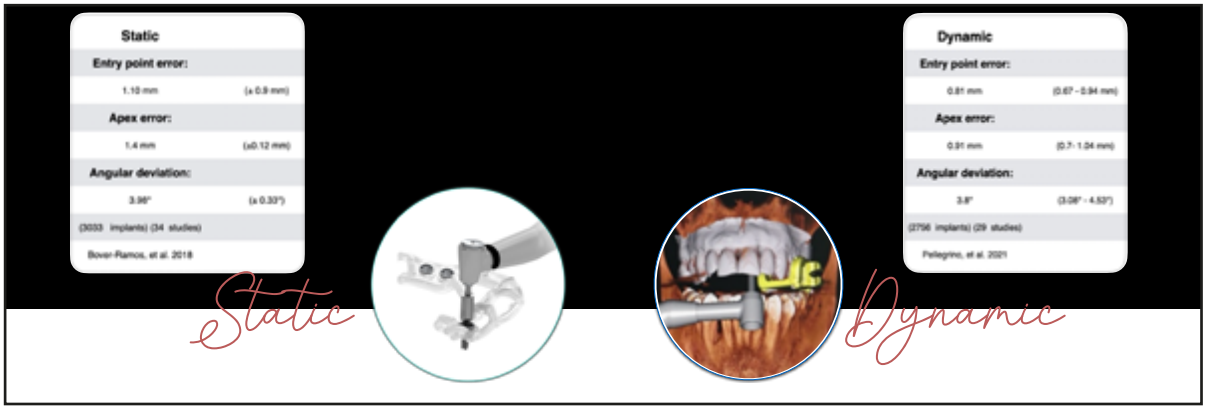
The key advantages of incorporating digital tools into our workflow are opportunities for case simulation; better assessment of anatomical limitations; definition of prosthetic requirements; evaluation of treatment options; and arriving at the optimal treatment plan.

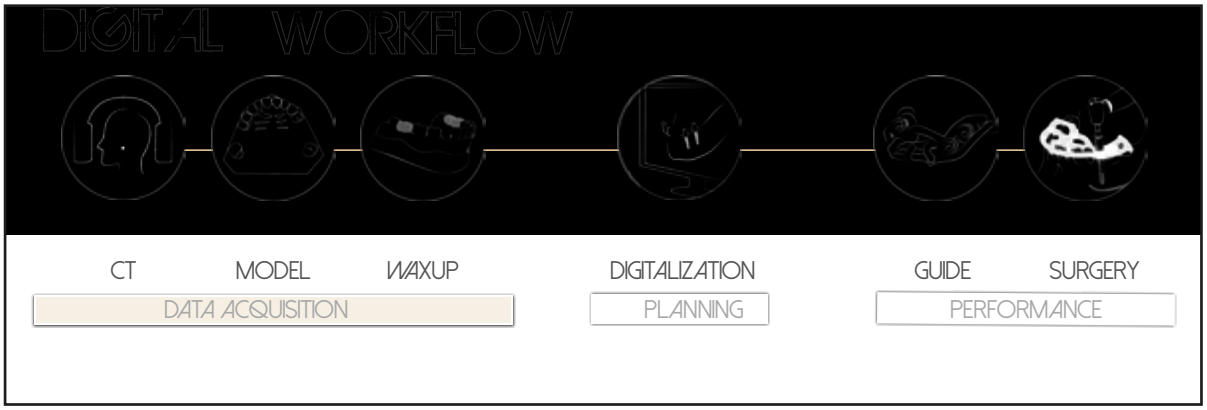
When utilising computer-supported implant planning and guided surgery, experience is crucial to ensure the actual surgical outcome matches the planned results.

The speaker proposed a powerful maxim: don't use digital tools if you can't perform the procedure competently freehand. The digital system should be used to make a better version of you, not to compensate for a lack of basic skill.

The accuracy achieved with static and dynamic navigation is quite similar, but only when the procedure is carried out by an experienced clinician; otherwise, the deviation can be dramatic.

The single most important factor during any computer-assisted surgery is controlling the calibration across all steps: data acquisition, planning and surgical performance.

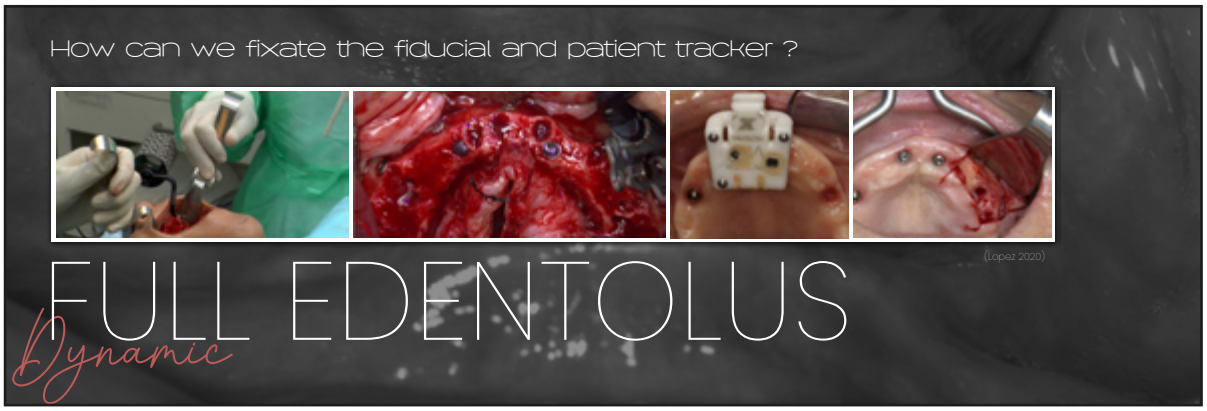




Dynamic navigation

Several steps are crucial for dynamic navigation:

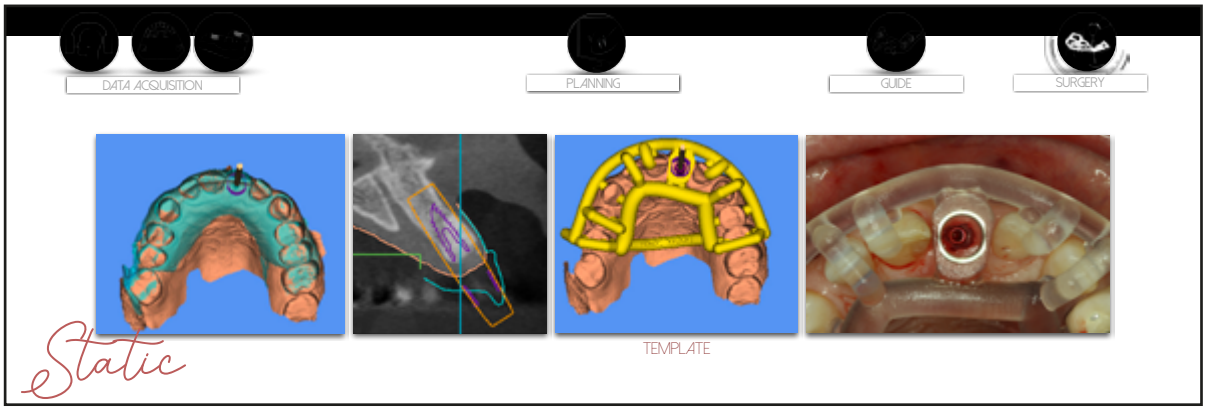
1. Tracker stability: ensuring the radiopaque fiducial marker and the jaw-attached patient tracker are secured rigidly and do not shift during the procedure.
2. Ergonomics and line of sight: managing the physical space around the dental chair, which is often crowded with equipment. It is essential to prevent any blockage of the camera's line of sight.
3. Visual focus: the need to watch the monitor during drilling with most navigation systems, rather than focusing on the patient's mouth.
4. Edentulous challenges: in edentulous arches, the main challenge is precisely fixing the fiducial and patient tracker to a stable base.[3]

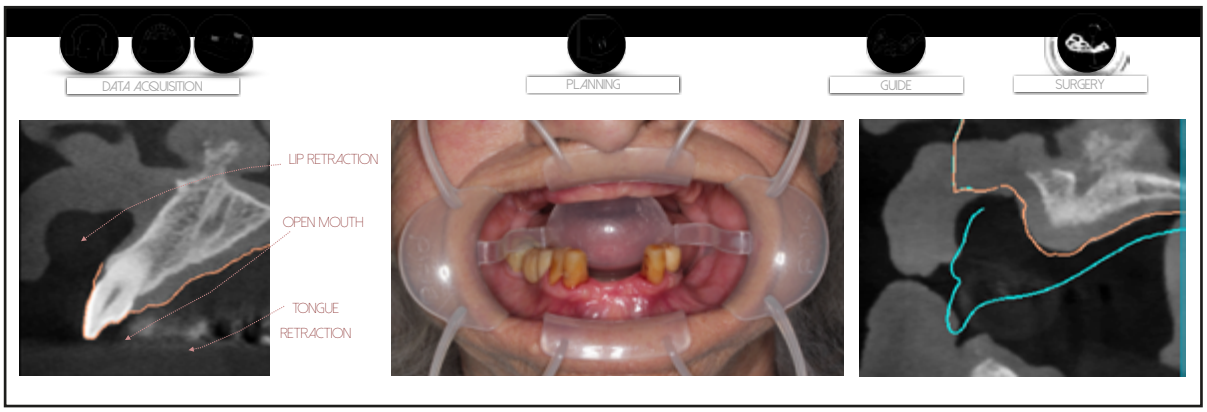


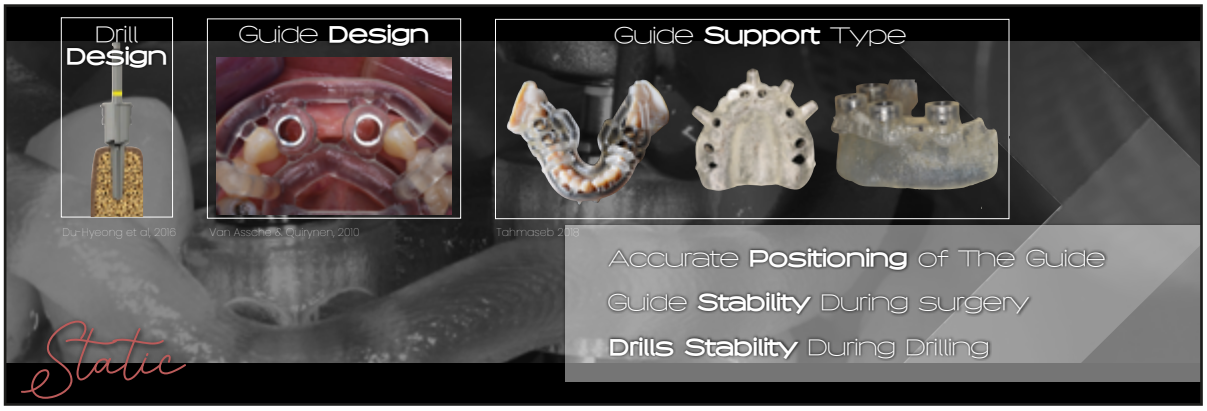
Static guided surgery

The key challenges for static guided surgery are:

1. Data acquisition quality: the method of data acquisition is highly relevant. It's crucial to retract the soft tissue as much as possible during the CBCT to ensure accurate alignment/superimposition not just on the teeth, but also on the underlying soft tissue/mucosa.
2. Guide generation: the surgical template is generated from the digital model (STL file) aligned to the teeth (or mucosa/bone).
3. Intraoperative control: during surgery, accurate seating of the guide, as well as maintaining the stability of both the guide and the drills, are essential.
4. Guide design factors: the drill system,[4] guide design,[5] and the type of guide support[6] (e.g. tooth, mucosa, or bone-supported) are all important factors affecting accuracy.
5. Edentulous cases: in fully edentulous cases, the challenge lies in the data acquisition process, which requires the insertion of radiopaque markers during the CBCT scan.







Conclusions[7]

Dynamic navigation	Static guided surgery
Requires robust registration and tracking.	Intraoperative changes are difficult (requires a new guide).
Vulnerable to line-of-sight obstructions.	Accuracy depends heavily on quality of data acquisition.
Vulnerable to fiducial and patient tracker shift.	Accuracy depends heavily on guide support (stability).
Has a noticeable display delay (lag).	Requires more pre-operative lab time.
Offers better access since no guide is in place.	Results in shorter surgical time.
Learning curve and team training are necessary.	Sensitive to guide misfit or instability.

The presenter also introduced other emerging technologies, such as robotic arms and augmented reality (AR), which may provide future alternatives to the current static and dynamic guided systems.

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EAO Congress Scientific Report; Monaco 2025, Session 5

Going beyond the limits – are you ready?

Robert Nölken

Immediate implant placement in compromised sites

The speaker began by stating that the most important goals in implant treatment are the maintenance of bone and soft tissue. In cases involving immediate implant placement, the aim is to support the peri-implant osseous structures circumferentially, and to provide perfect soft tissue support.

An increasing number of patients now expect highly aesthetic rehabilitations in a very short time, combined with minimally invasive treatment. These expectations apply to both single and multiple tooth replacements. Immediate implant placement and restoration offer several advantages:

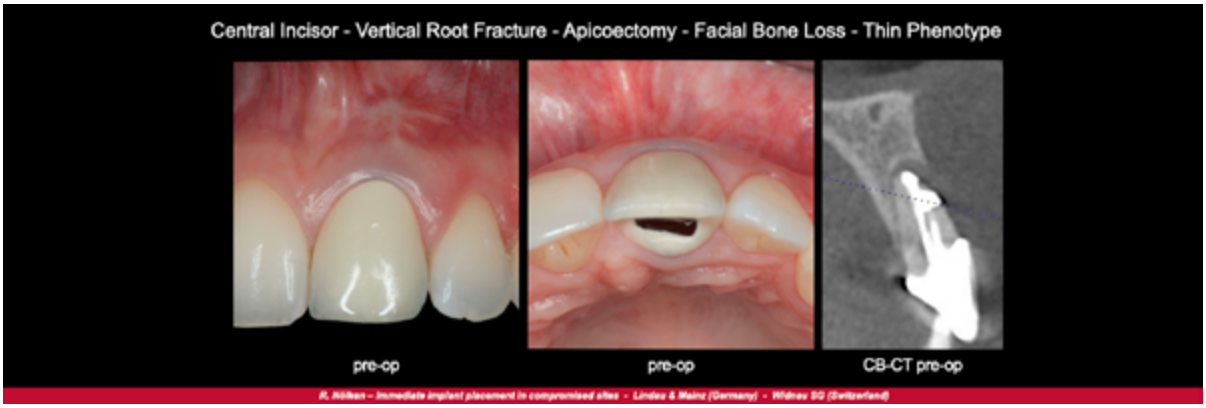
- reduced treatment time
- fewer appointments
- a less invasive treatment protocol
- no need for a removable prosthesis
- better maintenance and support of hard and soft tissue structures.[1]

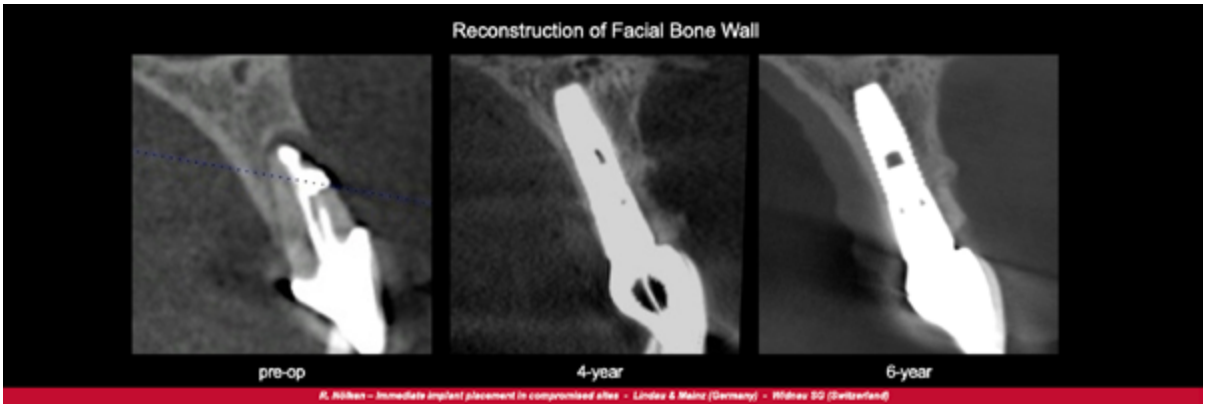
Professor Nölken then asked whether it is acceptable to place an implant immediately in sites with total loss of the facial bony wall, posing the following questions, which he went on to answer during the course of his presentation:

- Is it possible to reconstruct recession type defects at the same time as immediate implant placement?
- Can we use the concept of immediate insertion and reconstruction in sites with severe peri-implantitis?
- Is the concept of immediate implant placement predictable in molar sites?
- How can we treat molar extraction sites with severe recession and loss of attached gingiva?

Next, he shared a case involving a vertical tooth fracture, and asked what happens to the alveolar process in a situation like this. While placing an implant immediately after extraction of the tooth would be ideal, the site would not meet the criteria typically required for an implant because of the resorption of the facial bony lamella.[1,2]

This prompted the question 'Are we allowed to place an implant immediately in sites with total loss of the facial bone wall?'. Professor Nölken explained that traditionally, complete loss of the facial bone plate was considered to be a contraindication for immediate implant placement due to the risk of graft resorption and soft tissue collapse. However, in 2003 he described a flapless technique for simultaneous reconstruction of missing facial bone





walls during IIP. The method involved atraumatic extraction under the microscope; careful palatal implant positioning; and filling of the 2–4 mm facial gap with autogenous particulate bone harvested from the mandibular ramus.

In an initial series of 18 cases, only one implant was lost, and cone-beam CT confirmed complete facial bone reconstruction. Long-term follow-up of up to 13 years has demonstrated stable bone levels that are close to or slightly coronal to the implant shoulder. Later, Covani (2008) compared flapless surgery versus flap elevation in single-rooted teeth with complete buccal defects, concluding that IIP with simultaneous grafting can be performed predictably, regardless of flap design[3]. De la Rosa (2014) further supported this concept using cortical lamina grafts, also confirming stability with cone-beam CT.[4]

A retrospective study by Nölken (2023) including 60 implants in 55 patients with total facial wall loss revealed survival rates above 95%. Mean buccal wall thickness was 1.7–1.9 mm, with vertical bone gain of 1–2 mm. These findings collectively suggest that IIP with flapless autogenous bone grafting is feasible, even in severely compromised sockets.[5]

Long-term results therefore prove the success of the flapless immediate insertion concept in combination with simultaneous autogenous bone grafting in sites with total loss of the facial bone wall. Additional connective tissue grafting leads to improved aesthetics and reduced recession, but also to a thinner facial bone wall.

Is it possible to reconstruct recession type defects at the same time as immediate implant placement?

Recession-type defects represent an aesthetic and functional challenge, since marginal tissue levels are often deficient at the time of extraction. Several studies have evaluated the efficacy of connective tissue grafting (CTG) in combination with IIP.

In Nölken's cohort, patients with recessions of 1–3 mm who were treated without CTG achieved a mean reduction of 0.9 mm, with complete recession coverage in 31% of sites. In contrast, those who received a CTG achieved a mean reduction of 1.8 mm and complete coverage in 50% of cases. A CTG also increased the width of the keratinised mucosa and enhanced vertical buccal bone regeneration.

Severe recession defects (3–8 mm) were managed using a combination of tunneling techniques, autogenous bone chips, a CTG harvested from the palate, and under-contoured temporary restorations. At 10–12 years, these cases showed stable peri-implant bone; an increase in the width of the keratinised mucosa of 2–3 mm; and maintenance of soft tissue levels. The influence of implant positioning was also significant: implants placed palatally and slightly apical to the target soft tissue level yield superior results.[8]

Therefore, recession-type defects can be reconstructed simultaneously with IIP, particularly when combined with a CTG, although clinicians must anticipate thinner reconstructed buccal walls in grafted sites.

Can we use the concept of immediate insertion and reconstruction in sites with severe peri-implantitis?

Peri-implantitis is often considered a contraindication for immediate placement, due to contamination and bone loss. However, Professor Nölken presented a case series in which implants with advanced peri-implantitis were explanted atraumatically and replaced in the same session. The technique required implant removal with a torque wrench; debridement under the microscope; strict palatal placement of the new implant; and grafting of the facial defect with autogenous bone.

Immediate provisionalisation allowed the mucosal contours and papillary architecture to be maintained. Follow-up demonstrated the re-establishment of thick buccal bone walls and stable peri-implant soft tissue. In some cases, a CTG wasn't necessary to achieve a satisfactory result.

The key determinants of success were atraumatic removal; flapless protocols to preserve blood supply; and immediate defect reconstruction. These findings extend the indications of IIP to selected peri-implantitis cases, reducing morbidity and avoiding staged approaches.[6,7]

Is the concept of immediate implant placement predictable in molar sites?

Molar extraction sites are complex due to factors including multiple roots, septal bone deficiency, and frequent proximity to the maxillary sinus or mandibular canal. Despite these challenges, a retrospective analysis of 346 immediate molar implants in 256 patients with up to 16 years follow-up revealed a survival rate of 99.7% (Kaplan–Meier).

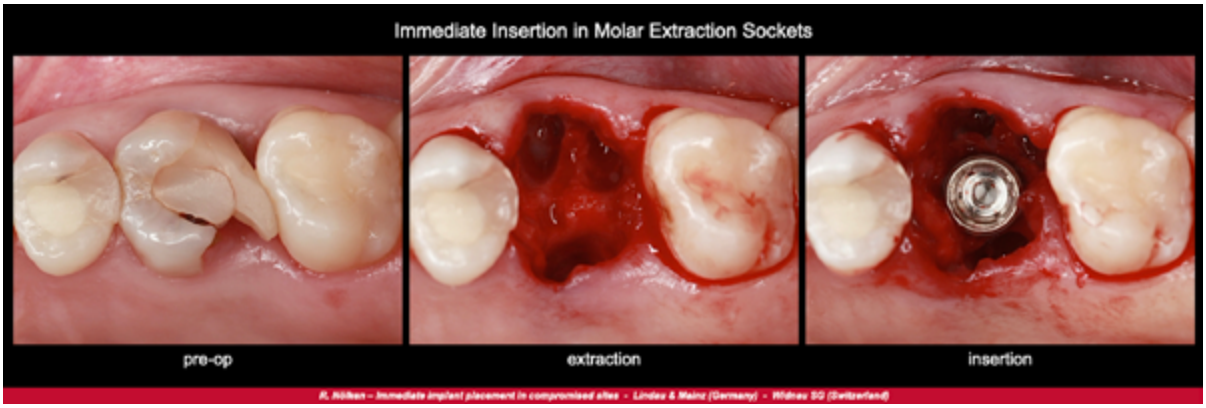
The protocol involved flapless extraction, cleaning of the socket, and central placement of the implant. Peri-implant defects were grafted with autogenous bone chips, covered by wide healing abutments (6.5 mm diameter) or CAD/CAM socket seal abutments fabricated in composite or zirconia. PRF membranes were also tested, but showed no benefit and were associated with higher complication rates.

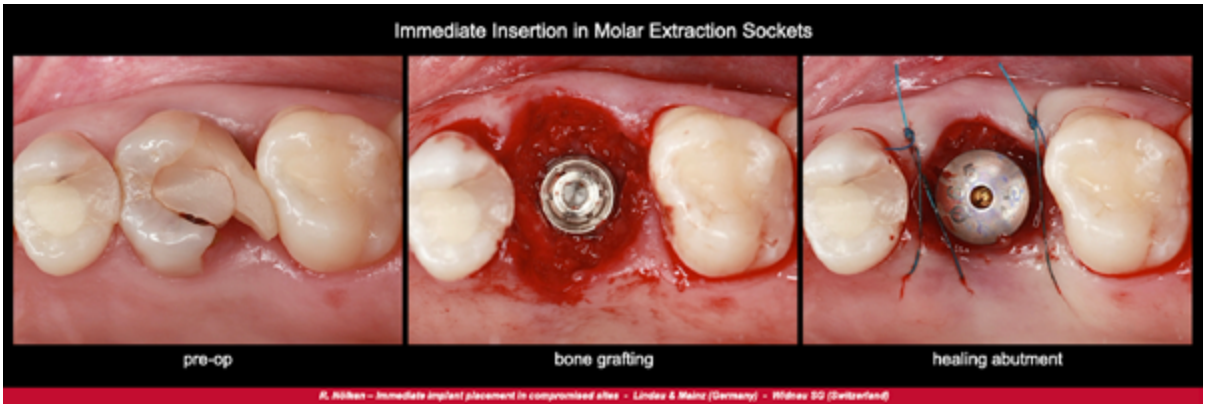
Marginal bone resorption was minimal (mean 0.77 mm). Interproximal bone was maintained at or slightly coronal to the implant shoulder. Long-term stability of the peri-implant soft tissue and papillae was consistently observed. These outcomes suggest that IIP in molar sites, when combined with autogenous bone grafting and socket seal abutments, is a highly predictable procedure.[9]

How can we treat molar extraction sites with severe recession and loss of attached gingiva?

In more complex molar sites with simultaneous soft tissue deficiencies, combined approaches are necessary. Professor Nölken described a protocol involving tunneling of buccal tissues, harvesting of a CTG from the palate, and lateral advanced flap procedures. Immediate implant placement was performed slightly palatally to allow space for grafting, and defects were filled with autogenous bone.

Clinical results included recovery of 3 mm or more of keratinised mucosa within five months; a significant reduction of the initial recession; and stable peri-implant bone levels. Socket seal abutments supported transmucosal healing and maintained the emergence profile, reducing the risk of collapse.





These strategies show that even severely compromised molar extraction sites can be rehabilitated in a single session with predictable long-term outcomes.

Conclusions

The evidence presented demonstrates that immediate implant placement and restoration are feasible and predictable, even in highly compromised scenarios, provided certain criteria are met. These include:

- The use of minimally invasive techniques
- Correct three-dimensional implant positioning
- Autogenous bone grafting
- Soft tissue management

Long-term follow-up studies confirm high survival rates (>95%), stable marginal bone levels, and improved aesthetic outcomes.

Key factors for success include:

- Microscope-assisted atraumatic extraction.
- Flapless protocols to preserve vascular supply.
- Palatal implant positioning to create space for grafting.
- Use of autogenous bone as the primary grafting material.
- A CTG for improved soft tissue stability and recession coverage.
- Immediate provisionalisation with under-contoured restorations or socket seal abutments.

This body of evidence supports the expansion of IIP indications to cases previously considered unsuitable, including complete buccal wall loss, recession-type defects, peri-implantitis, and molar extraction sites.

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Istvan Urban

Vertical ridge augmentation: the comprehensive use of hard and soft tissue augmentation techniques for implant site preparation

This presentation summarised the accumulated evidence and technical innovations that have made it possible to address clinical situations that were considered unmanageable until only a few years ago.

Foundations and clinical evidence

Professor Istvan Urban began by explaining that guided bone regeneration (GBR) has evolved from an experimental procedure into a well-established technique supported by abundant scientific literature. Long-term follow-up of GBR-treated cases demonstrates minimal bone loss – less than half a millimetre over periods of up to 20 years – with steadily declining complication rates.[1]

Recent comparative studies have confirmed that both titanium-reinforced non-resorbable membranes and titanium meshes covered with collagen membranes provide predictable results in terms of vertical bone gain and implant stability, along with acceptable complication rates.[2] Moreover, systematic reviews show that GBR yields an average vertical gain of 4.1 mm, combined with a lower complication rate than block grafts or distraction osteogenesis. The overall complication rate was 2.3% for vertical ridge augmentation and 1.8% for the global application of the 'sausage technique'.[3]

Biological modification of poor recipient sites

An innovative element of the lecture was the introduction of strategies to convert biologically unfavourable recipient sites into favourable environments. The application of microdoses of bone morphogenetic proteins (BMP-2) in the adjacent soft tissue stimulates the osteogenic response and enhances regeneration, demonstrating that success depends not only on the amount of grafted bone, but also on its interaction with the soft tissues (Figure 1).[4]

Surgical management of extreme defects

In the posterior mandible, where the proximity of the inferior alveolar nerve presents a critical challenge, Professor Urban emphasised the importance of the lingual flap technique that he has developed. This allows progressive tissue mobilisation and controlled periosteal stretching, achieving flap coverage without compromising vestibular function. In cases involving nerve exposure, he demonstrated how the nerve can be protected with partial-thickness flaps and the placement of grafts directly over the canal, covered by islands of soft tissue (Figures 2, 3 and 4).

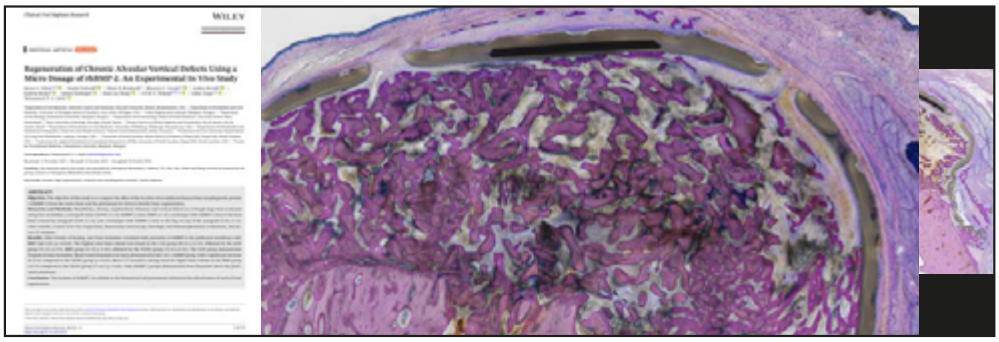

Figure 1

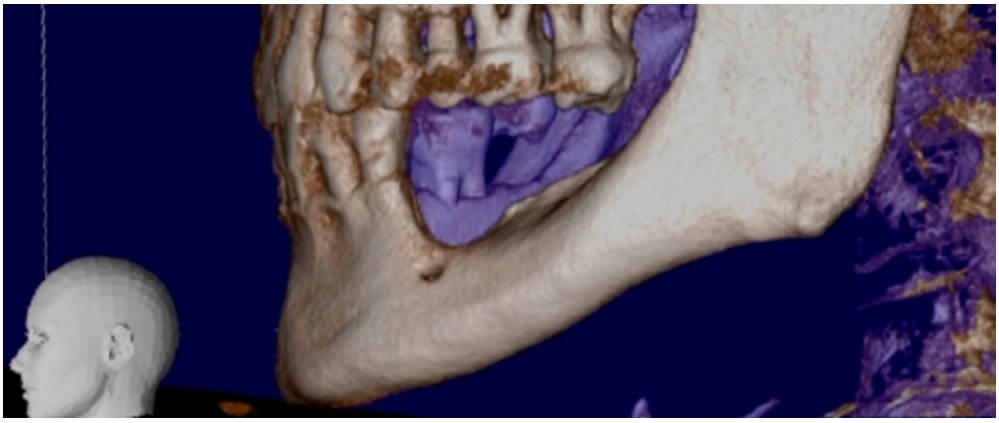

Figure 2: Posterior mandible, initial defect

For cases in the anterior maxilla, characterised by scars and extremely short flaps, he highlighted the role of periosteoplasty and the suborbicularis flap, which significantly extend flap length and allow primary closure over large-volume grafts. The use of perforated membranes, which promote biological communication with the soft tissues, accelerates new bone formation.

In posterior maxillary defects with sinus involvement, he described controlled elevation of the sinus membrane and placement of bone grafts to achieve stable regeneration that provides a basis for rehabilitations that are both functional and aesthetic (Figures 5 and 6).

Soft tissue reconstruction

Professor Urban stressed that the long-term stability of implants requires a complete ring of keratinised tissue around prosthetic abutments. To achieve this, he recommended several techniques: free gingival strip grafts; double connective tissue grafts harvested from the palate and tuberosity; labial micrografts to improve aesthetics; and collagen matrices as an alternative or adjunct (Figures 7, 8 and 9).

In anterior regions with high aesthetic demands, he advocated the use of thin microsurgical grafts to ensure a harmonious chromatic and textural transition between native tissue and the graft.

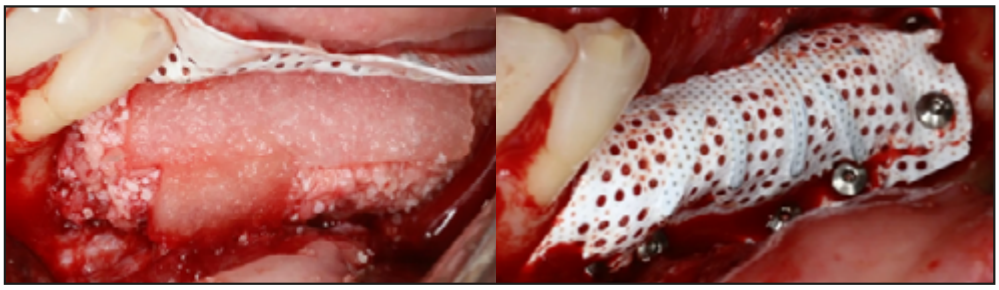

Figure 3

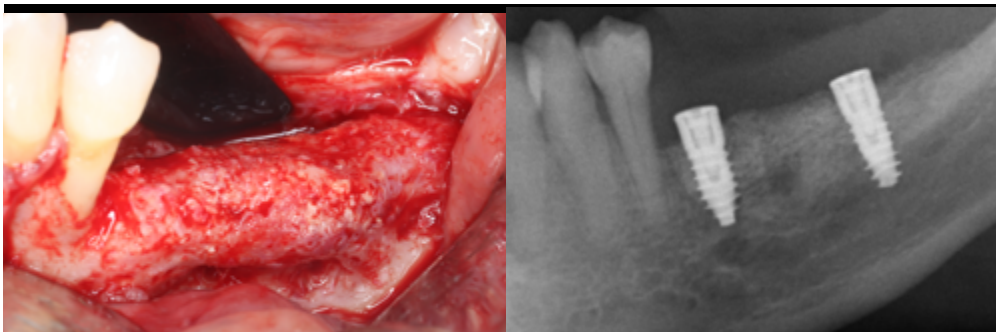

Figure 4

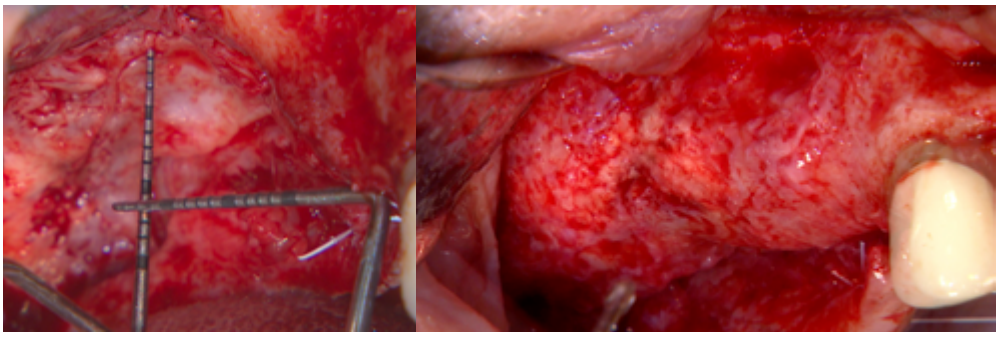

Figure 5

Figure 6

Reference clinical cases

Extreme cases were presented, including those involving patients with multiple implant failures, severe facial trauma and tumor resections. Many had undergone more than ten unsuccessful surgeries. The combination of advanced microsurgical techniques, particulate autogenous grafts and biomaterials enabled stable three-dimensional regenerations to be achieved. Long-term follow-up confirmed minimal bone changes, and implant survival rates that were comparable with those achieved in native bone.[1]

Figure 7: Anterior maxillary defect (baseline)

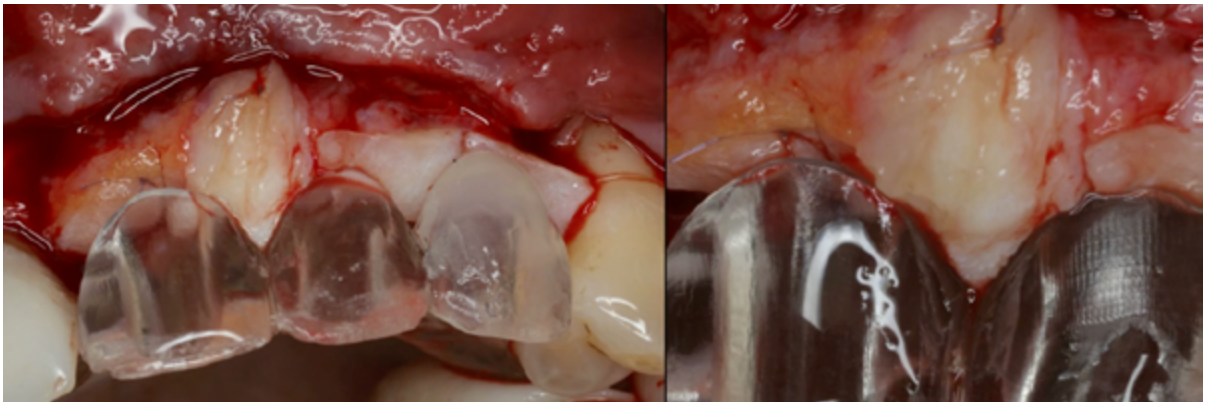

Figure 8

Figure 9: Anterior maxillary defect, final result

Conclusions

Professor Urban concluded by saying that bone regeneration in extreme cases is now a safe, reproducible and biologically grounded procedure. Success relies on three pillars: microsurgical precision in flap management; proper use of membranes and biomaterials; and simultaneous reconstruction of bone and soft tissues. Current techniques are moving towards less invasive, standardised procedures that reduce complications and enhance predictability.

Thanks to these advances, modern implantology can now provide reliable solutions even in defects that were once considered irreversible. This provides the opportunity to restore not only masticatory function but also aesthetics and enhanced quality of life.

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EAO Congress Scientific Report; Monaco 2025, Session 6

When is hard and soft tissue augmentation indicated in immediate, early and delayed implant placement?

Daniele Cardaropoli

Tissue augmentation in conjunction with immediate implant placement

This presentation addressed the role of hard and soft tissue augmentation in the context of immediate post-extraction implant placement. The focus in such cases has traditionally been on bone augmentation, but has now shifted to a greater emphasis on peri-implant soft tissues, where the main risk is recession.

Several studies have shown that approximately 20% of patients undergoing immediate implants experience suboptimal aesthetic outcomes due to buccal soft tissue recession after an observation period of ≥3 years.[1]

A Cochrane systematic review[2] concluded that immediate and immediate-delayed implants may carry a higher risk of failure and complications compared with late-delayed implants. However, aesthetic results might be superior when implants are placed immediately after extraction.

Several clinical cases were presented, with the first relating to a maxillary central incisor in a young patient (Figure 1). An atraumatic extraction was carried out, followed by immediate implant placement. The gap between the bone and implant was grafted with bovine bone collagen. A provisional abutment was placed, with a screw-retained immediate provisional crown, followed by radiographic confirmation. At the 3-month follow-up the provisional crown was unscrewed and disconnected, revealing a stable emergence profile.

In cases involving more complex scenarios, such as adjacent implants, the speaker illustrated how symmetrical shaping of the emergence profile can be achieved through customised provisionalisation. Where treatment involves immediate implant placement followed by immediate restoration, the aim is to obtain an abundance of soft tissue, because of the role this plays in

Figure 1: Initial condition

ensuring that underlying bone levels remain stable long-term. These soft tissues are also essential to the final aesthetic outcome. 1-year follow-up demonstrated stable margins and papillae, while continued follow-ups (to 10 years) confirmed the stability of both soft and hard tissues (Figure 2).

Although immediate implant placement increases the risk of soft tissue recession, in this case recessions appeared around natural teeth, rather than the implant restoration. This was caused by the patient's thin phenotype. Conversely, at the implant site surgical management had led to the creation of a thick phenotype.

In immediate implant cases, the gap between the implant and the buccal bone plate has to be grafted to avoid loss of buccal bone, with spontaneous rather than guided healing of the post extraction socket, and to compensate for marginal bone remodelling (alveolar ridge preservation).[6]

Alveolar ridge atrophy following extraction is well-documented, and can lead to a significant loss of volume. The socket preservation technique, which combines biomaterials and a membrane, has been shown to reduce this loss by up to 93%, compared with spontaneous healing.[5]

The 2024 Turin Consensus Conference 'Concepts of treatment for the post-extraction site'[6] established that case selection plays a key role. The ideal case features an intact site, with a good buccal bone plate and soft tissues, and an absence of large or deep gingival recessions.

To ensure good primary stability, the implant must be placed using a 3D-guided approach that is both surgically and prosthetically driven within the available triangle of bone (Figure 3). Biological requirements include a gap of more than 2 mm to the buccal bone plate, with the implant platform be placed at least 3.5 mm from the emergence profile. Alveolar ridge preservation should also be considered in immediate implant placement cases.

Figure 2: 10-year follow-up

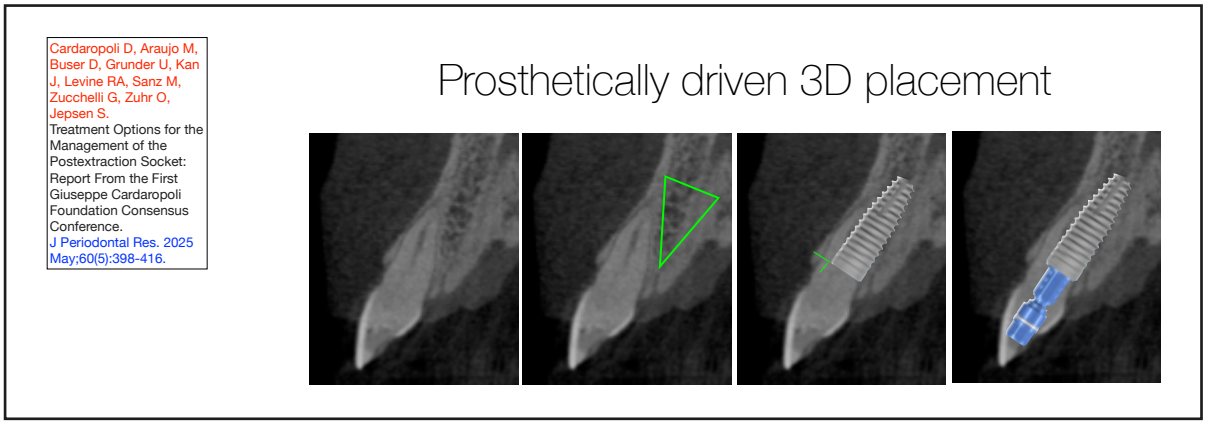

Figure 3

The speaker described a new procedure for gap grafting that involves introducing grafting material into the gap prior to implant placement, in order to avoid empty spaces around the implant surface (Figure 4).

In cases involving a thin phenotype, increasing the thickness of the buccal soft tissue at the time of implant placement is recommended using a palatal de-epithelialised CTG. This should ideally be flapless, thereby maintaining the original architecture of the soft tissue. The buccal gap should always be grafted with bone substitutes, such as a bovine bone mineral xenograft. An immediate screw-retained provisional restoration will then guide the healing of the soft tissues. After six months, once they have stabilised, a permanent restoration can be placed, and at that point conversion to a thick phenotype should have been achieved.

Turning to the surgical approach, guided surgery was presented as the current standard, as it offers the possibility to integrate DICOM files with surface scans in order to plan the ideal implant position prosthetically, surgically and biologically, even in flapless cases. For thin biotypes in particular, performing buccal grafting prior to implant placement is recommended.

Conclusions

The speaker emphasised the importance of preserving the buccal cortical plate and using an immediate provisional to shape the peri-implant soft tissues, as well as respecting biological healing timelines. He stressed the differences between immediate, early-delayed, and late-delayed implant cases, even though the lecture focused on immediate placement.

To summarise, Dr Cardaropoli emphasised that immediate implant placement should be reserved for carefully selected cases. Key requirements include:

- an intact buccal cortical plate
- atraumatic flapless extraction
- regeneration of the buccal gap
- prosthetically guided placement, with immediate provisionalisation when possible, and the use of connective tissue grafts in thin biotypes.

Guided surgery will help ensure accurate 3D positioning, leading to improved long-term aesthetic outcomes.

Key practical points:

- ~20% risk of recession at 3 years in immediate implant cases
- wait ≥6 months after soft tissue grafting
- perform buccal grafting before implant placement
- maintain minimum distances of 2 mm from the buccal plate, and 3.5 mm apically to the soft tissue profile
- consider the use of immediate provisionalisation to shape tissues
- differentiate biologically-driven versus purely surgically-driven planning

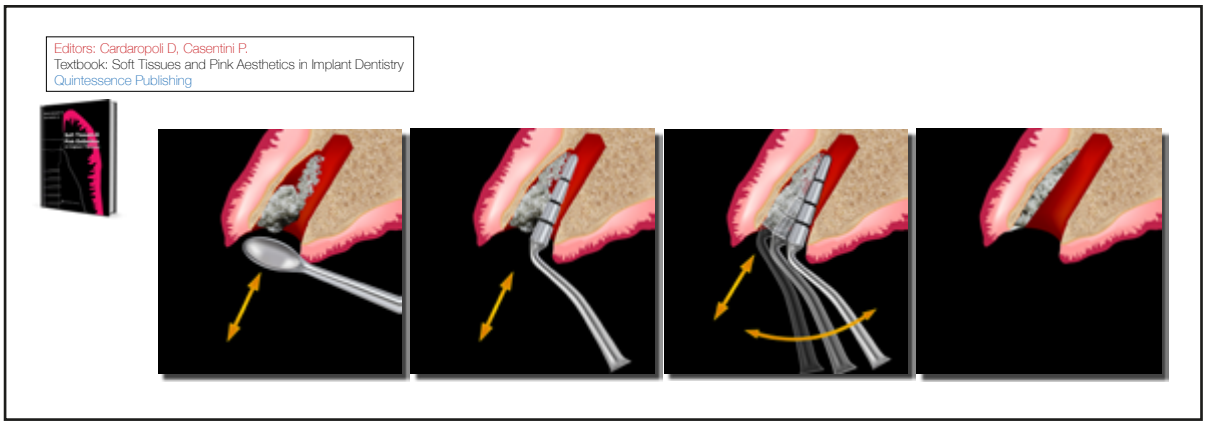

Figure 4

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Nadja Nänni

Tissue augmentation in conjunction with early implant placement

Early implant placement is defined as treatment that is performed 6 to 8 weeks after tooth extraction, when soft tissue healing (4–8 weeks) and partial bone healing (12–16 weeks) have occurred. Following extraction, the alveolar bone undergoes an inevitable physiological remodelling process, resulting in both horizontal and vertical bone loss. This is more pronounced in the buccal wall than in the palatal. These dimensional changes justify the use of alveolar ridge preservation and guided bone regeneration (GBR) strategies to optimise the future implant site.

A randomised controlled trial (RCT) involving 35 patients compared two ridge preservation techniques with spontaneous healing. The findings showed that implant placement after 6–8 weeks provides more favourable conditions for soft tissues, because by this time they have become thicker and more stable, thus facilitating incision, wound closure and suturing following bone reconstruction.

Another study compared two GBR groups to see if differences were observed when either a resorbable or a non-resorbable membrane was used. After six months, both membranes achieved successful defect resolution and horizontal bone gain, although slightly better results were reported with non-resorbable membranes. Soft tissue outcomes were similar between both groups, indicating that the membrane type does not lead to significant volume changes.

Clinical decision tree

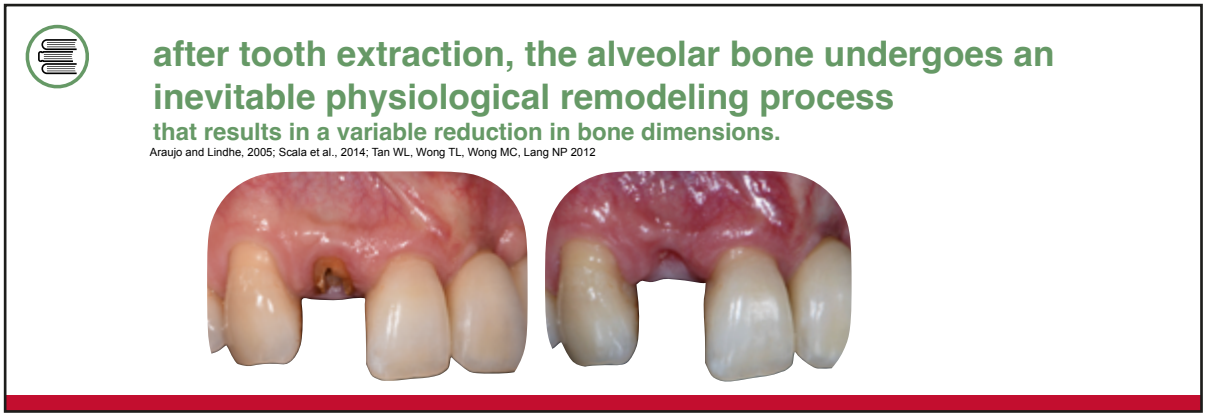
Professor Nänni presented a clinical decision tree to guide the timing of implant placement:

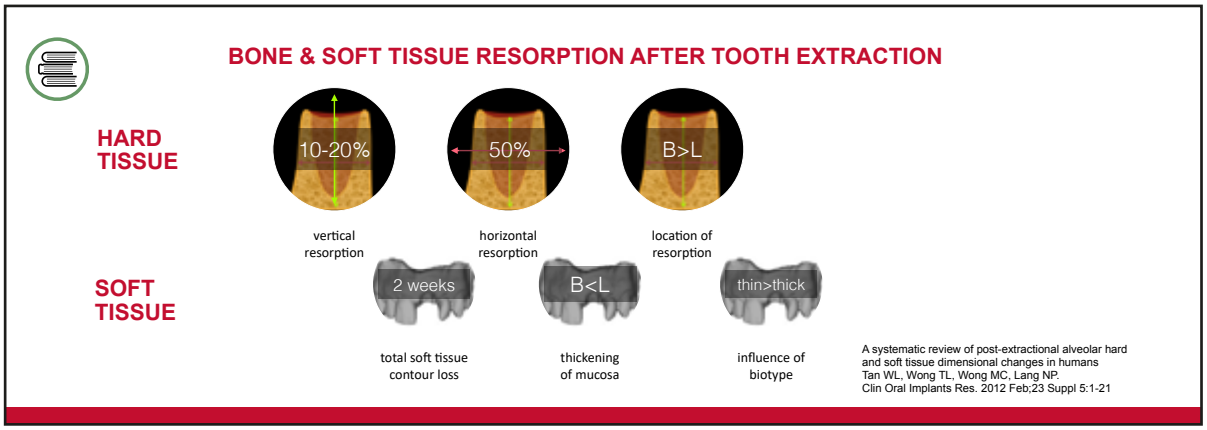
1. Assess soft tissue healing 6–8 weeks after tooth extraction.
2. Evaluate bone volume using CBCT and clinical probing.
3. If a residual bone defect is present, perform GBR using a resorbable or non-resorbable membrane.
4. Place the implant with primary closure and verify primary stability.
5. Re-entry at 6 months to assess the contour and, if necessary, perform soft tissue augmentation using a connective tissue graft or collagen substitute prior to abutment connection.

Benefits and disadvantages of early implant placement

Benefits:

- Takes advantage of the biological window in which soft tissues are mature but bone is still non-mature.
- Comes with improved soft tissue quantity and quality compared to IP, thus facilitating wound closure and suturing.





Potential disadvantages:

- Requires a second surgery for re-entry.
- Risk of partial alveolar ridge resorption if the waiting period is extended.
- Demands precise three-dimensional assessment via CBCT and digital planning.

Conclusions

Early implant placement, defined as being performed 6–8 weeks after extraction, provides time for tissue regeneration and is associated with long-term aesthetic stability. Non-resorbable membranes offer a slight advantage in horizontal bone gain, with no significant differences in soft tissue outcomes. Decision-tree-based planning enhances predictability and facilitates the selection of the most suitable GBR technique.

The early implant placement protocol represents a balance between immediate and delayed approaches, providing predictable outcomes in both bone and aesthetic terms. At the time of re-entry and abutment connection, evaluation of contour and volume provides opportunities for soft tissue enhancement through either an autogenous connective tissue graft or a collagen substitute, depending on the clinical case.

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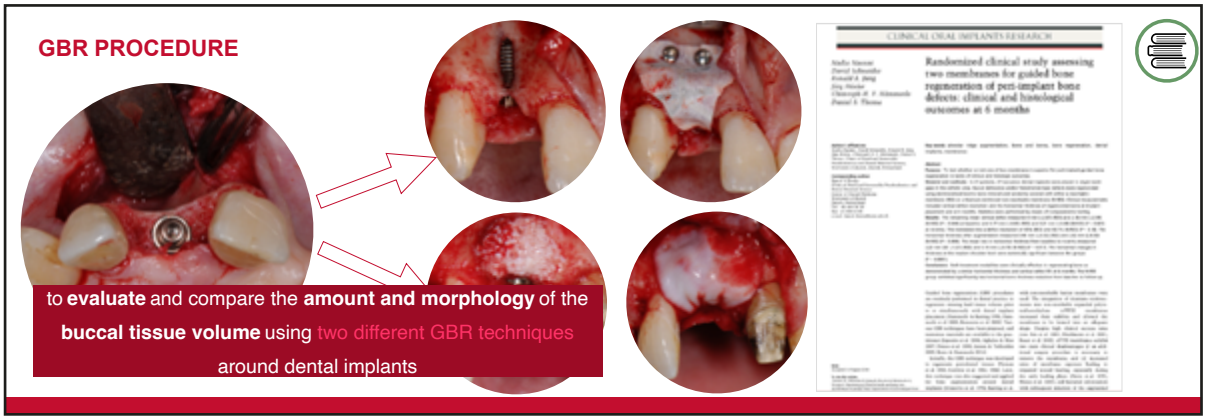
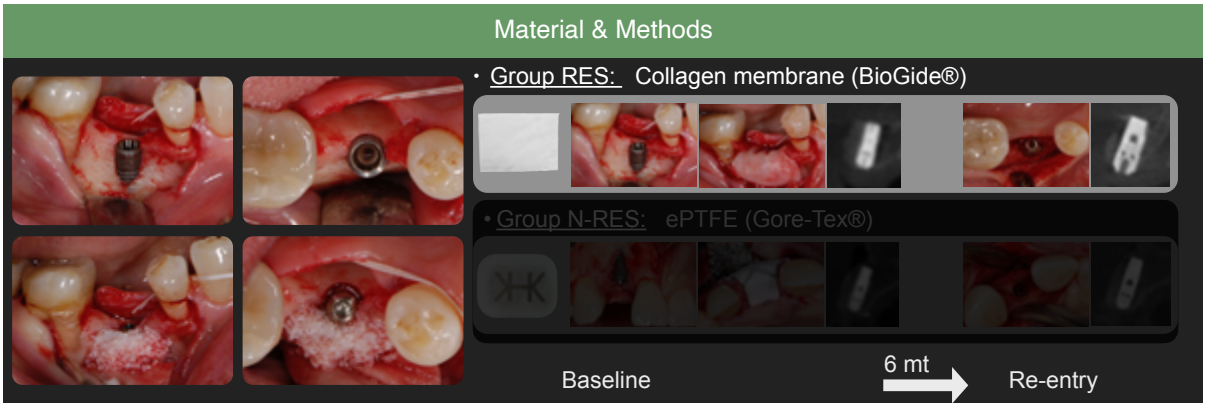




Simon Storgård Jensen

Tissue augmentation in conjunction with delayed implant placement

Delayed implant placement refers to treatment that is performed following full bone and soft tissue healing, typically more than 12–16 weeks after tooth extraction. This approach is indicated in clinical situations where the biological environment is not immediately favourable for implant placement. Indications include:

- Growing adolescents, where implant placement must be postponed until skeletal maturity is achieved
- Cases where an implant cannot be placed due to acute infection
- Patients with uncontrolled periodontitis or other infections
- Patients with traumatic dental injuries awaiting final prognosis
- Patients suffering from conditions that may temporarily increase the risk of implant failure
- Medically compromised patients, such as those with poorly controlled diabetes or who are undergoing chemotherapy.
- Sites with severe bone deficiency requiring advanced bone augmentation before implant placement, without which the implant cannot be placed with primary stability in the correct 3D position
- Financial reasons
- Patient presents as 'healed' at the clinic

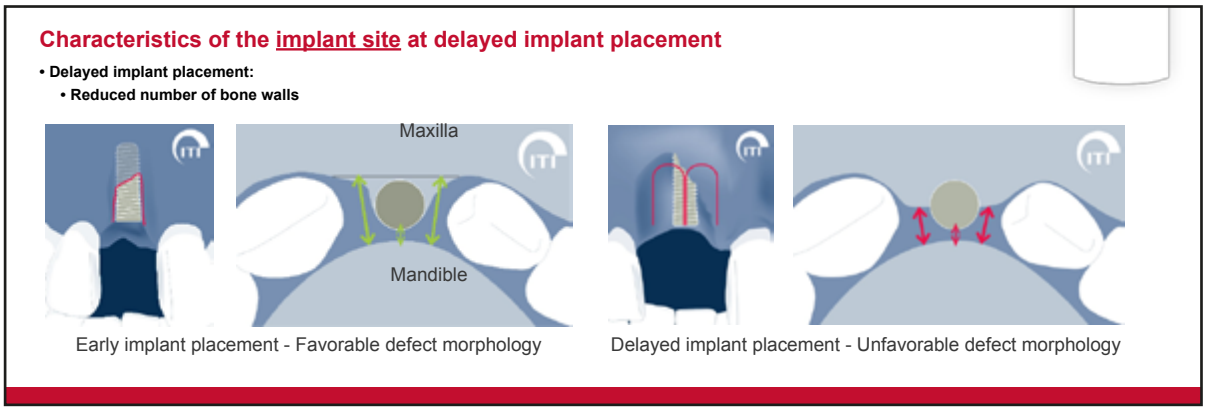
Although perforation of the cortical plate has not been shown to have significant negative effects, submerged healing is recommended in complex cases involving large bone atrophy or advanced regenerative procedures.

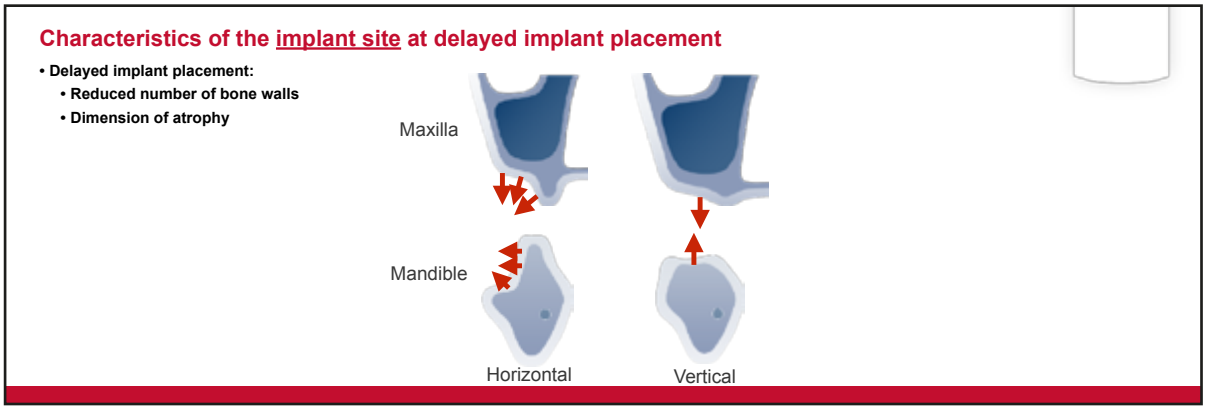
Multiple studies support the rationale for delayed implant placement, emphasising the predictability and stability of osseointegration when performed after complete tissue maturation. In cases requiring guided bone regeneration (GBR) or block grafting, delayed placement allows full integration of the grafted bone and remodelling before implant insertion.

A buccal bone wall of 1.5 mm and a palatal wall of 1 mm is recommended to preserve long-term function, peri-implant health and favourable aesthetics.

The speaker shared a clinical case illustrating delayed implant placement following extensive bone augmentation. A 6-month healing period ensured optimal bone and soft tissue maturation prior to implant insertion. The treatment sequence was as follows:

1. Autogenous bone block grafting combined with xenograft particles.
2. Submerged healing for 6 months.
3. Implant placement with simultaneous connective tissue grafting.
4. Radiographic and clinical evaluation to confirm stability and aesthetics.





Conclusions

Consensus statements highlight delayed implant placement as the treatment of choice in cases requiring extensive augmentation or involving medical delays. Proper digital planning, CBCT evaluation and staged protocols are required to ensure optimal results.

- Delayed placement offers high predictability and stability in compromised sites.
- Submerged healing minimises exposure risk and promotes complete graft maturation.
- Sequential augmentation optimises both function and aesthetics.

However, sites where implants are placed using a delayed protocol are characterised by reduced osseous healing potential:

- Increased alveolar atrophy
- Few bone walls

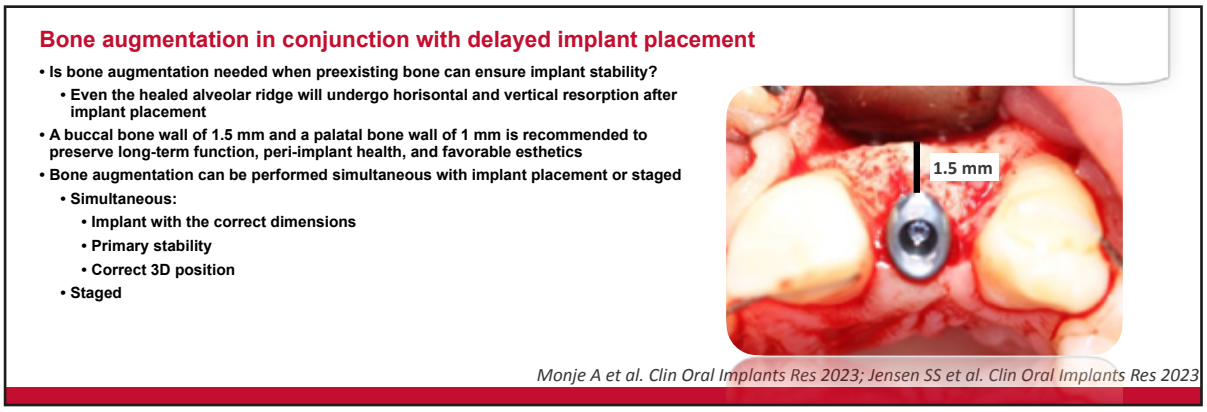
Simultaneous or staged bone augmentation is most often indicated and a buccal bone wall of 1.5mm is recommended.

Soft tissue augmentation should be considered in the following scenarios:

- Soft tissue deficiency
- Thin phenotype
- Aesthetic priority
- Compromised plaque control and brushing discomfort

Autogenous grafting materials are indicated in complex cases with reduced healing potential.

Delayed implant placement represents a predictable, biologically driven protocol, especially for patients with systemic risks, severe bone deficiencies, or who are undergoing ongoing growth. Long-term implant stability and aesthetics can be achieved through appropriate timing.



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EAO Congress Scientific Report; Monaco 2025, Session 7

When is immediate provisionalisation indicated in the aesthetic zone?

Thomas De Bruyckere

Provisionalisation in immediate implant placement

Why immediate provisionalisation?

The objectives of immediate provisionalisation are to guide and support peri-implant tissues from the very first day, while simultaneously sealing the socket, protecting the underlying regeneration chamber and stabilising the wound. Immediate provisionalisation also provides a psychological benefit for the patient. In type I sockets it results in superior aesthetic outcomes compared with delayed provisionalisation, with approximately 0.87 mm less midfacial recession (Pitman et al., 2022)[1]. Without it, immediate implant placement does not take full clinical advantage of the accelerated protocol.

The speaker highlighted three key principles that apply to any immediate provisionalisation protocol:

- sufficient primary stability must be achieved
- the transmucosal surface must remain pristine
- non-occlusal loading should always be ensured

Morphology of the provisional crown

The morphology of the provisional crown is a biological tool for tissue management. The transmucosal part should differ from that of the extracted tooth (Su et al., 2010). It was originally divided into critical and subcritical contours, and subsequently refined into the Esthetic Biological Contour (EBC) concept, which distinguishes three functional zones (Gomez-Meda et al., 2021)[2]:

- **crest zone:** the deepest portion, corresponding to the gingival height of the abutment; this requires a narrow emergence angle and a minimum height of 3 mm.
- **bounded zone:** equivalent to the subcritical contour; in immediate provisionals it should be concave.
- **aesthetic zone:** the most superficial, equivalent to the critical contour; defines the position and curvature of the mucosal margin.

Indirect workflow for immediate provisionalisation

In the indirect approach, the crown is fabricated in the laboratory. The speaker presented a case that involved a central incisor affected by trauma. Three scans were taken: a preoperative intraoral scan, a scan of the emergence profile, and a scan recording the implant position using a scanbody. Following regenerative procedures (hard and soft tissue grafting) and connection of a healing abutment, the patient left without a provisional. The next day, the provisional crown was delivered and its transmucosal profile carefully adjusted (Figure 1).

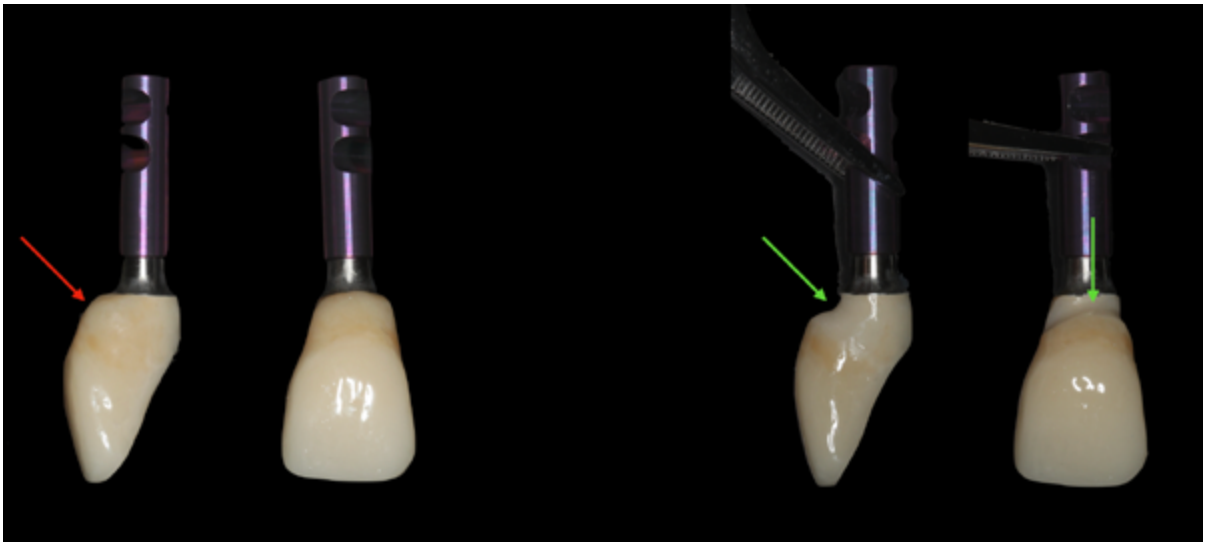


Figure 1

1 Pitman J, Seyssens L, Christiaens V, Cosyn J. *Immediate implant placement with or without immediate provisionalization: A systematic review and meta-analysis.* J Clin Periodontol. 2022;49(10):1012-23. DOI:10.1111/jcpe.13686.

2 Gomez-Meda R, Esquivel J, Blatz MB. *The esthetic biological contour concept for implant restoration emergence profile design.* J Esthet Restor Dent. 2021;33(1):173-84. DOI:10.1111/jerd.12714.

Direct workflow for immediate provisionalisation

The direct approach involves a chairside procedure in which a prefabricated crown is adapted immediately after surgery. A clinical case was presented involving a hopeless central incisor with a recurrent fistula that had previously been treated with apical surgery. After deciding on immediate implant placement, a fully digital workflow was initiated. This encompassed the virtual extraction of tooth 11, STL superimposition with the implant plan, and the design of a temporary crown with palatal positioning wings. A PMMA shell was milled and tried-in during surgery (Figure 2). Minor wing trimming ensured appropriate seating, the intaglio was sandblasted, and the shell relined onto a temporary abutment (Ti-base) with composite. Outside the mouth, the gaps were filled, the wings removed, and the crown polished. Before reinsertion, the transmucosal area was cleaned with phosphoric acid and saline. The final provisional showed a slightly bulkier palatal contour, but this was accepted for structural strength.

In another case, the intact natural crown of the extracted tooth was reused as a provisional after modification to fit over the abutment. The intaglio was etched and relined with composite. The use of a positioning stent was recommended to ensure accurate placement.

Conclusions

- Immediate provisionalisation is a key element of immediate implant placement, guiding peri-implant tissues from day one and providing both functional and aesthetic benefits when primary stability is achieved.
- Transmucosal morphology must be respected, with careful attention to the three critical zones, as their design determines soft tissue health, stability, and long-term integration.
- Workflow selection should be based on clinical circumstances: the indirect approach reduces chairside time but depends on good laboratory support, while the direct approach ensures the patient leaves with a fixed provisional immediately.

Figure 2

Nicos Donos

Immediate provisionalisation in delayed implant placement

The speaker began by comparing the clinical journey from implant placement to implant restoration to a metro journey between two destinations. Along the way, the clinician must pass through several stops and junctions that may impact the treatment plan. These include the type of loading, timing of provisionalisation, need for regeneration, and even the way outcomes are assessed – including patient-reported outcomes and maintenance protocols.

A systematic review by Gallucci et al. demonstrated that the choice of loading protocol significantly influences the outcome of immediate implants.[1] However, before considering immediate provisionalisation, clinicians must ensure the absence of medical contraindications, that risk factors are controlled, and there is sufficient primary stability (Figure 1). If these conditions have not been met, the conventional approach remains the predictable option.

Regarding timing options, there are still some scenarios where there is a lack of scientific or clinical evidence (Figure 2).[3] Of the nine possible loading options, the speaker focused on protocol 4A – late placement with immediate restoration/loading – as redefined in the latest EAO Consensus.[2]

Clinicians must decide between three main strategies:

- Immediate loading: defined as the restoration being connected within a week of implant placement (out of occlusion).
- Early loading: between one week and two months.
- Conventional loading: more than two months after implant placement.

However, there is a blurred line between 'immediate loading', 'immediate provisionalisation' and 'immediate restoration', which are often used inconsistently. Several systematic reviews[3,4] found that immediate loading protocols may slightly increase implant failure risk compared to conventional loading, though survival rates remain high in both groups. A number of long-term studies[5] – including randomised trials – comparing immediate non-occluding provisionals with conventional three-month loading have shown no significant differences in survival, marginal bone loss, aesthetics or patient satisfaction. At five- and ten-year follow-ups, the small differences observed early in healing had disappeared, confirming comparable outcomes.[6,7] Finally, a recent systematic review addressing the same comparison came to the same conclusion: immediate provisionalisation of single implants does not compromise the aesthetic outcomes in short- and medium-term follow-ups.[8]

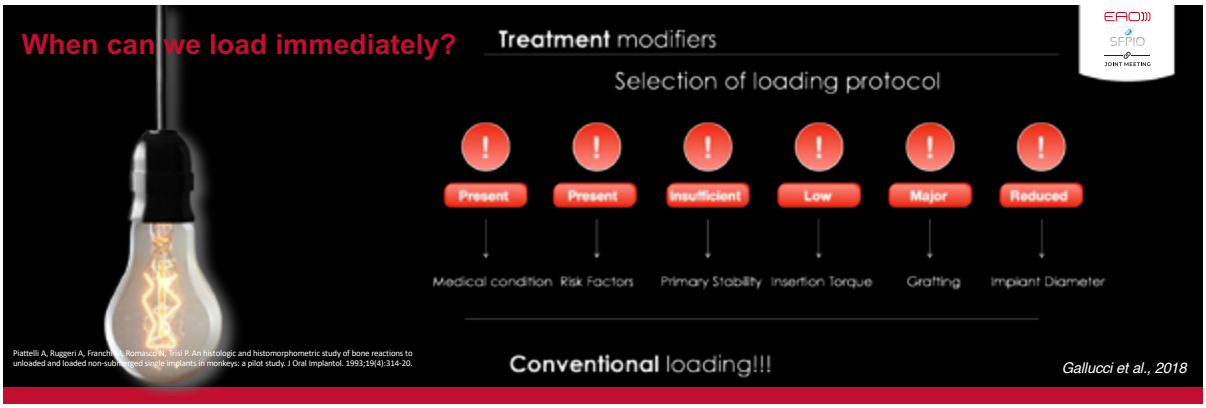


Figure 1

1 Gallucci GO, Hamilton A, Zhou W, Buser D, Chen S. *Implant placement and loading protocols in partially edentulous patients: A systematic review.* Clin Oral Implants Res. 2018;29 Suppl 16:106-34. DOI:10.1111/clr.13276

2 Donos N, Asche NV, Akbar AN, Francisco H, Gonzales O, Gotfredsen K, Haas R, Happe A, Leow N, Navarro JM, Ornekol T, Payer M, Renouard F, Schliephake H. *Impact of timing of dental implant placement and loading: Summary and consensus statements of group 1-The 6th EAO Consensus Conference 2021.* Clin Oral Implants Res. 2021;32 Suppl 21:85-92. DOI:10.1111/clr.13809

3 Sanz-Sánchez I, Sanz-Martín I, Figuero E, Sanz M. *Clinical efficacy of immediate implant loading protocols compared to conventional loading depending on the type of the restoration: a systematic review.* Clin Oral Implants Res. 2015;26(8):964-82. DOI:10.1111/clr.12428

4 Chen J, Cai M, Yang J, Aldhohrah T, Wang Y. *Immediate versus early or conventional loading dental implants with fixed prostheses: A systematic review and meta-analysis of randomized controlled clinical trials.* J Prosthet Dent. 2019;122(6):516-36. DOI:10.1016/j.prosdent.2019.05.013

5 den Hartog L, Raghoebar GM, Stellingsma K, Vissink A, Meijer HJ. *Immediate Loading of Anterior Single-Tooth Implants Placed in Healed Sites: Five-Year Results of a Randomized Clinical Trial.* Int J Prosthodont. 2016;29(6):584-91. DOI:10.11607/ijp.4993

6 Donos N, Horvath A, Mezzomo LA, Dedi D, Calciolari E, Mardas N. *The role of immediate provisional restorations on implants with a hydrophilic surface: A randomised, single-blind controlled clinical trial.* Clin Oral Implants Res. 2018;29(1):55-66. DOI:10.1111/clr.13038

7 Merli M, Merli M, Mariotti G, Pagliaro U, Moscatelli M, Nieri M. *Immediate versus early non-occlusal loading of dental implants placed flapless in partially edentulous patients: A 10-year randomized clinical trial.* J Clin Periodontol. 2020;47(5):621-29. DOI:10.1111/jcpe.13279

8 Francisco H, Marques D, Pinto C, Aiquel L, Caramês J. *Is the timing of implant placement and loading influencing esthetic outcomes in single-tooth implants?-A systematic review.* Clin Oral Implants Res. 2021;32 Suppl 21:28-55. DOI:10.1111/clr.13811

The speaker introduced the concepts of ClinROs (clinician-reported outcomes) and PROs (patient-reported outcomes), emphasising that these measures are not always correlated.[9] This raises an important question: are we overtreating by performing complex procedures that patients do not actually perceive as beneficial?

Another issue discussed was the effect of loading on grafted sites. Overall, immediate or early loading does not appear to compromise bone regeneration, although further research is needed regarding abutment design and transmucosal contour.

Clinicians should also ensure an accurate abutment–crown fit, since microgaps can lead to biofilm accumulation and biological complications in the medium term.

Conclusions

- The literature is heterogeneous due to persistent terminological confusion.
- Immediate provisionalisation is a viable and predictable option that is comparable to conventional loading protocols.
- Aesthetic outcomes appear to be only minimally influenced by loading protocols, and the differences may not be perceived by patients in the same way as clinicians.
- Regular maintenance and well-fitted restorations remain key to long-term success.

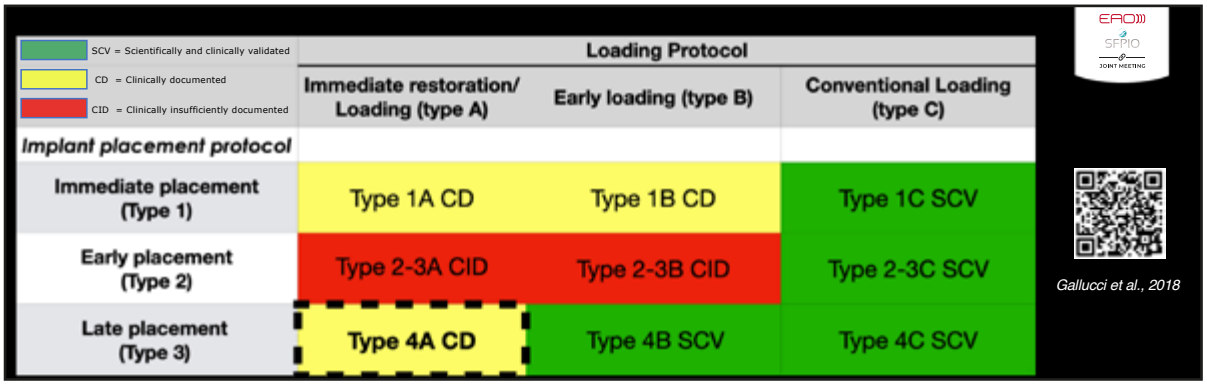


Figure 2

9 Sadilina S, Müller NPA, Strauss FJ, Jung RE, Thoma DS, Bienz SP. *Patient-Reported and Clinician-Reported Esthetic Outcomes at Implant Sites Are Not Associated: A Systematic Review With Individual Participant Data Meta-Analysis.* Clin Oral Implants Res. 2025 Aug 20. doi: 10.1111/clr.70019

Franz Strauss

Relevance of macro- and microgeometry of provisional implant restorations

A pre-clinical study

The speaker opened by outlining the strengths and limitations of randomised controlled trials, noting that achieving true control of variables in clinical settings is difficult due to multiple factors, including individual patient differences. By contrast, pre-clinical models allow standardised conditions and the isolation of single variables. This context formed the backdrop for introducing a study by Strauss et al. (J Clin Periodontol 2024)[1] which investigated the biological impact of a wide restorative emergence angle on marginal bone and peri-implant soft tissue integrity. The study concluded that a wide angle increases peri-implant bone loss and impairs the supracrestal soft tissue complex, whereas a narrow angle attenuates bone loss and promotes stability of the junctional epithelium. (Figure 1)

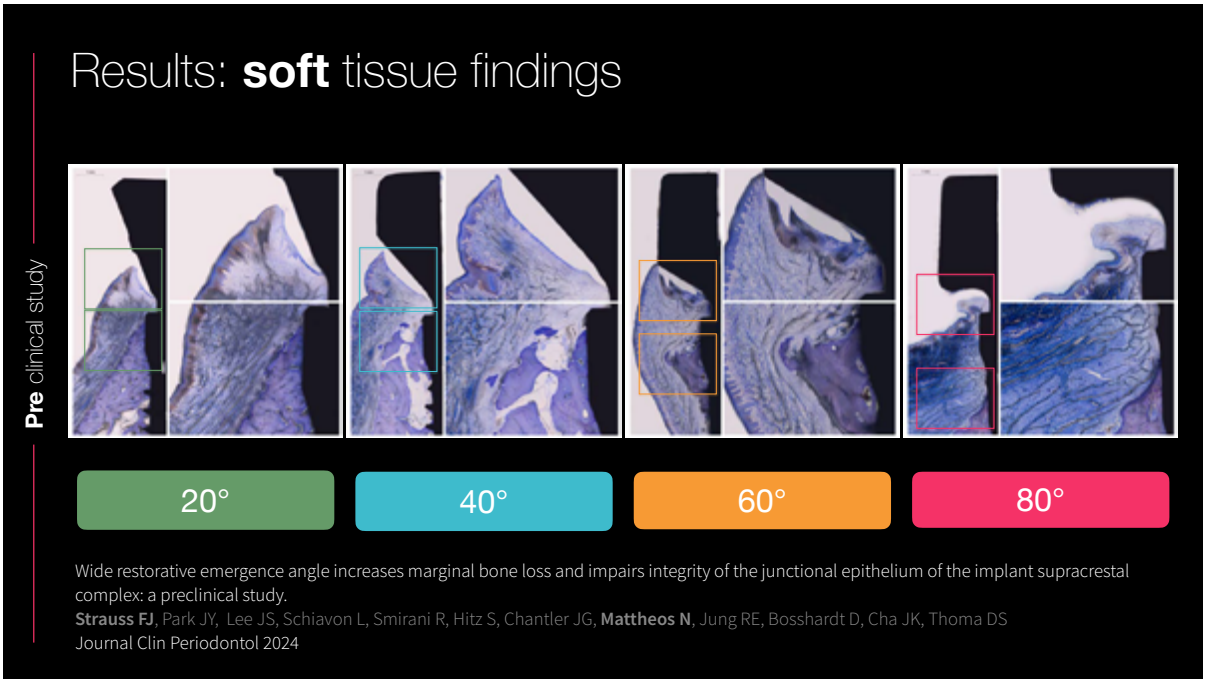


Figure 1

1 Strauss FJ, Park JY, Lee JS, Schiavon L, Smirani R, Hitz S, Chantler JGM, Mattheos N, Jung R, Bosshardt D, Cha JK, Thoma D. *Wide Restorative Emergence Angle Increases Marginal Bone Loss and Impairs Integrity of the Junctional Epithelium of the Implant Supracrestal Complex: A Preclinical Study.* J Clin Periodontol. 2024;51(12):1677-87. DOI:10.1111/jcpe.14070

Clinical implications

Existing guidelines (Su et al., 2010; Óscar-González et al., 2020; Gómez-Meda et al., 2021), mostly based on expert consensus, highlight the need for supporting clinical evidence. Available studies indicate that a concave emergence profile provides greater mucosal margin stability, whereas a convex profile increases the risk of mucosal recession seven-fold (OR = 7) after three years[2] (Figure 2).

Take-home message

The macro- and micro-geometry of the restoration play a decisive role in the long-term stability of peri-implant hard and soft tissues – geometry shapes stability.

Discussion

What should be done when an implant cannot be immediately provisionalised, even though this was previously planned for?

First, the patient must be informed in advance about this possibility. If immediate provisionalisation is not feasible, a removable, Essix, or bonded provisional restoration should be provided as soon as possible to maintain function and aesthetics.

How should we define and approach the aesthetic zone?

Most studies define the aesthetic zone as the area between the two first premolars, where the bone level and soft tissue contours are critical to visual harmony. Achieving predictable results here requires microsurgical precision and a prosthetic design that respects the biological dimensions of the peri-implant tissues.

What is the best material and surface for provisional abutments?

Currently, there are no conclusive studies identifying the optimal material or surface to improve clinical outcomes in provisionalisation. Products offered by industry often advance faster than scientific evidence, and robust multicentre studies involving diverse clinical settings are needed to provide generalisable recommendations. Meanwhile, clinicians should exercise caution when introducing new materials into practice.

Do submarginal concavities favour plaque accumulation?

An individualised maintenance plan should be established from the very beginning. In some cases, crowns may need to be unscrewed periodically for cleaning, polishing and soft-tissue evaluation. Maintenance techniques must be adapted to the specific transmucosal morphologies recommended by prosthodontic guidelines.

To what extent are provisionals necessary for the patient? Are we sometimes performing treatments for ourselves when patients do not perceive aesthetics in the same precise way?

This remains an open question without a single answer. In each case the clinician should evaluate the actual need for a provisional restoration alongside the patient's expectations. This raises a broader issue: how does the patient perceive and interpret additional procedures? Current surveys often capture general satisfaction but lack the sensitivity to assess specific details, which may explain the discrepancy between ClinROs and PROs.

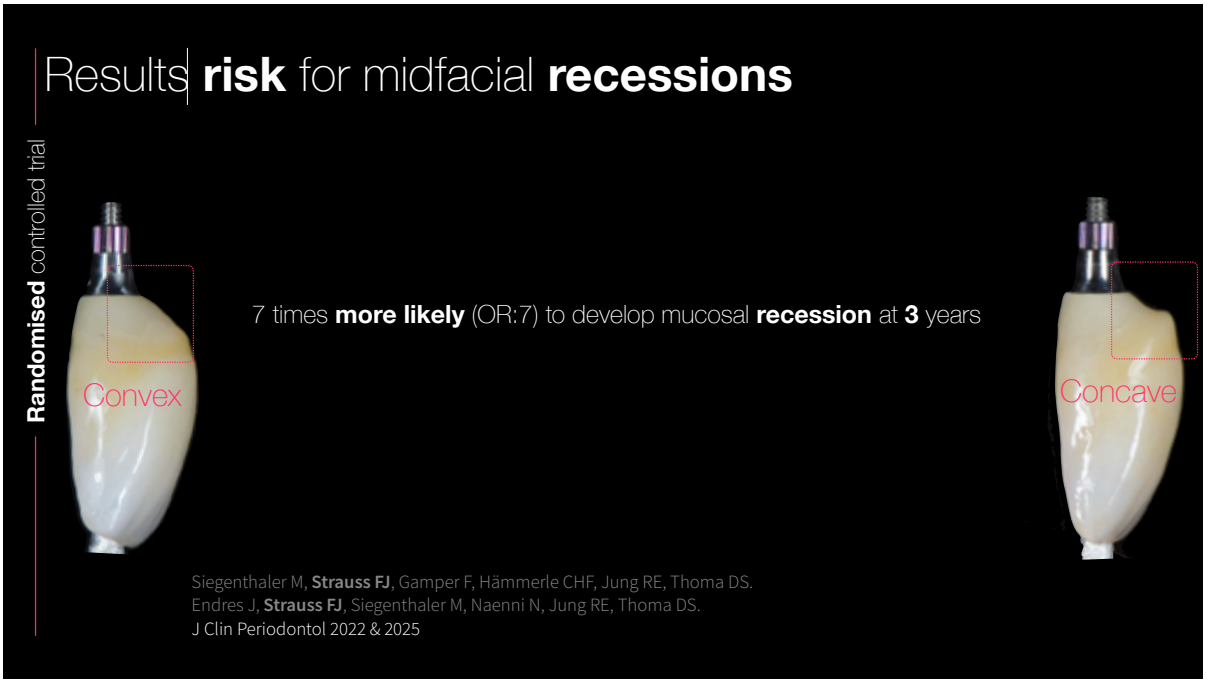


Figure 2

2 Siegenthaler M, Strauss FJ, Gamper F, Hämmerle CHF, Jung RE, Thoma DS. *Anterior implant restorations with a convex emergence profile increase the frequency of recession: 12-month results of a randomized controlled clinical trial.* J Clin Periodontol. 2022;49(11):1145-57. DOI:10.1111/jcpe.13696
Endres J, Strauss FJ, Siegenthaler M, Naenni N, Jung RE, Thoma DS. *Convex Versus Concave Emergence Profile of Implant-Supported Crowns in the Aesthetic Zone: 3-Year Results of a Randomized Controlled Trial.* J Clin Periodontol. 2025 Aug 20. DOI:10.1111/jcpe.70018

EAO Congress Scientific Report; Monaco 2025, Session 8

Augmentation techniques for hard and soft tissues

Leonardo Mancini

Soft tissue grafting

The speaker began by addressing the significance of soft tissue grafting and posed three key questions that would structure his presentation: why, when and how do we do it?

Drawing upon literature ranging from Lang & Loe's 1972 papers, to more recent publications by Sanz et al. (2022) and Stefanini et al. (2024), he emphasised the critical role of keratinised mucosa around dental implants. The mucosa acts as a protective shield, preventing plaque accumulation, reducing discomfort during brushing, and increasing implant survival and success rates. He then presented a graph showing the prevalence of mucositis relative to the width of the keratinised mucosa.[1]

Implants that have undergone soft tissue augmentation demonstrate higher survival rates and lower rates of peri-implantitis in the medium and long term.2 Sites that have received gingival grafts appear to better maintain the gingival margin and marginal bone levels over time.[2]

Regarding whether augmented sites are associated with better peri-implant conditions, the speaker noted that in cases with a soft tissue height of less than 2 mm, greater changes in bone level were observed over a 10-year period.3 Conversely, thick soft tissue with greater height helps to maintain the bone level around implants in the long term.[3] Furthermore, mucosa that is thinner than 2 mm has a higher probability of colour mismatch problems when compared to adjacent teeth or the contralateral tooth.[4] The tissue improvements achieved in the short term were maintained beyond 10 years.[5]

Concerning the second question of when to perform soft tissue augmentation, the speaker explained that there is a minimal risk of complications if the augmentation is performed prior to implant surgery. This increases to a moderate to high risk when the procedure is performed concurrently with implant placement. The risk is minimal during second-stage surgery, and becomes high again after the definitive restoration is delivered.[6]

Factors that affect the complexity of cases include an absence of keratinised tissue; the size of the defect; its location; tissue thickness; and the timing of the intervention.

If augmentation is performed before the implant is placed, there is the possibility of using either a soft tissue graft or a substitute. In cases where guided bone regeneration (GBR) is planned, prior soft tissue improvement facilitates a better outcome, as the membrane is more likely to become exposed in patients with thin mucosa, a lack of keratinised tissue, or scar tissue. Partial thickness soft tissue thinner than 0.45 mm may reduce blood supply and increase the risk of compression.

When the soft tissue augmentation procedure is performed simultaneously with implant surgery, two or three procedures are carried out concurrently, with concomitant healing and modelling of the soft tissues. Performing a connective tissue graft alongside immediate implant placement, without bone grafting, reduces the horizontal changes of the alveolar ridge.[7] This helps maintain the gingival contour due to the increased soft tissue thickness.[8] The connective tissue graft contributes to the stability of the soft tissues in the middle third.[9] A connective tissue graft should be considered when a high risk of recession is anticipated in the aesthetic zone.[9]

Placing a graft at the same time as the healing abutment is connected allows for concomitant healing and modelling of the soft tissue, and for the soft tissue component to be handled exclusively. It also allows for an undisturbed healing phase.

1 *Impact of keratinized mucosa on implant-health related parameters: A 10-year prospective re-analysis study. RCT*
Leonardo Mancini et al. Clin Implant Dent Relat Res. 2024 Jun.
2 *Do soft tissue augmentation techniques provide stable and favorable peri-implant conditions in the medium and long term? A systematic review*
Martina Stefanini et al. Clin Oral Implants Res. 2023 Sep.
3 *Influence of mucosal tissue height on implant crestal bone: A 10-year follow-up of a controlled clinical trial*
Algirdas Puisys et al. J Dent. 2024 Sep.
4 *The peri-implant mucosa color: A systematic appraisal of methods for its assessment and clinical significance. Leonardo Mancini et al. Clin Implant Dent Relat Res. 2023 Apr.*
5 *Long-term treatment outcomes of single maxillary buccal peri-implant soft tissue dehiscences: A 10-year prospective study*
Andrea Roccuzzo et al. Clin Implant Dent Relat Res. 2024 Feb.
6 *Timing of soft tissue augmentation around implants: A clinical review and decision tree*
Leonardo Mancini et al. Int J Oral Implantol (Berl). 2023.
7 *The importance of soft tissue condition in bone regenerative procedures to ensure long-term peri-implant health*
Mario Roccuzzo et al. Periodontol 2000. 2023 Oct.
Davide Guglielmi et al. J Clin Periodontol. 2022 Oct
8 Soft and hard tissue changes after immediate implant placement with or without a sub-epithelial connective tissue graft: Results from a 6-month pilot randomized controlled clinical trial
Davide Guglielmi et al. J Clin Periodontol. 2022 Oct.
9 *Immediate implant placement with or without connective tissue graft: A systematic review and meta-analysis*
Lorenz Seyssens et al. J Clin Periodontol. 2021 Feb.

Performing a connective tissue graft after prosthetic rehabilitation is associated with a high probability of complications, influenced by factors such as whether the crown is screw- or cement-retained, the type of dehiscence, and its horizontal and vertical components.[10]

The speaker then moved on to how the soft tissue is augmented: via a flap, an autogenous soft tissue graft, or the use of biomaterials. He presented a timeline showing the evolution of different autogenous harvesting techniques, beginning with those involving vertical releasing incisions (from 1974, 1982, 1985), moving on to techniques without releasing incisions (1985–2008), and finally showing the de-epithelialised free graft techniques of Zucchelli (2003, 2010) and Aguirre-Zornoza (2017).

Depending on the donor site, the percentage of fatty tissue varies, with 75% in the anterior region, 45% in the posterior region, and 10% in the retromolar area. The connective tissue increases in thickness in a corono-apical direction.[11] The speaker described how the site can be analysed using ultrasound guided by a stent, enabling assessment of the presence of blood vessels, connective tissue thickness and density, and the presence of adipose tissue.[11]

Turning to the likely evolution of the technique over time, and with help from ChatGPT, he projected that in 2035 connective tissue grafts would remain the gold standard for complex or aesthetically demanding cases, while the absence of a graft or the use of biomaterials would be the options of choice for routine cases.

Finally, he highlighted the following key takeaways:

- Soft tissue augmentation is a preventive treatment for the long-term success of implants.
- Timing is a crucial factor in the reliability of the procedure.
- Connective tissue grafts remain the gold standard for complex or aesthetic cases.
- The use of personalised, guided ultrasound can reduce the invasiveness of grafting procedures.

10 *Classification of facial peri-implant soft tissue dehiscence/deficiencies at single implant sites in the esthetic zone Giovanni Zucchelli et al. J Periodontol. 2019 Oct*

11 *Echo-guided soft tissue harvesting: A novel approach identifying tissue thickness, density, vascularisation and a safe harvesting zone in the palatal region Leonardo Mancini et al. Int J Oral Implantol (Berl). 2025.*

Matteo Chiapasco

Autogenous bone augmentation with or without soft tissue augmentation

The second presenter addressed the topic of autogenous bone augmentation with or without soft tissue augmentation, posing the same fundamental questions as the previous one: why, when and how we perform these procedures.

Bone augmentation is necessary when the residual bone volume is insufficient even for the placement of short, narrow or angled implants, or when the anticipated prosthetic or aesthetic outcome would be poor. In such cases, the reconstruction of both hard and soft tissue is required.

However, what is the rationale for using autogenous bone? The production of custom scaffolds from porous hydroxyapatite or xenografts using CAD/CAM is well-documented, particularly for horizontal ridge augmentation and self-contained defects.[1] Nevertheless, as these materials primarily possess osteoconductive potential, it seems biologically implausible that, without the addition of autogenous bone, adequate revascularisation and new bone formation could occur, especially in severe three-dimensional defects. This is why autogenous bone remains the gold standard.[1]

Autogenous bone can be harvested from two intraoral sites – the ramus and the symphysis – or extraorally from the iliac crest and calvarium. While the symphysis has historically been widely used, it is falling out of favour due to the potential for associated neurological complications. The mandibular ramus is now the site of choice, as it significantly reduces the incidence of problems associated with the harvesting of autogenous bone blocks.[2] Regarding extraoral donor sites, the iliac crest is a safe area with a very high volume of bone suitable for intraoral regeneration. However, the presenter noted that his preferred site was the calvarium, due to its easy accessibility, very low associated complication rate, and the ability to harvest a substantial amount of autogenous bone.[3] As well as blocks, scraped bone can be obtained from almost any intraoral donor site using bone scrapers or micro-scrapers. The combination of autogenous bone with a xenograft has proved to be a successful combination for promoting neo-angiogenesis and new bone formation.[4,5]

Regarding the complexity of bone augmentation, the presenter identified several influencing factors:

- The size of the bone defect
- The location of the defect
- The thickness of the soft tissue
- The amount of keratinised mucosa

With respect to defect size, both the depth and width are determining factors. The location of the defect is influenced by factors such as the presence of adjacent teeth; the proximity of anatomical structures like the mental foramen; and whether it is in the maxilla or mandible. In the latter, the palatal flap cannot be displaced, and in the anterior mandibular region, significant traction from the floor of the mouth musculature or lip pressure complicates the ability to achieve passive flap closure.

Turning to factors that affect the quality and quantity of keratinised mucosa, a thin mucosal biotype can lead to suture dehiscence, flap perforation or necrosis, along with increased risk of post-operative complications. There is significant evidence to indicate that the use of autogenous connective tissue grafts in soft tissue augmentation procedures is a critical factor for peri-implant health.[6,7,8,9,10,11] Both the thickness of the mucosa and the amount of keratinised tissue are crucial, and it is often necessary to improve them prior to performing bone augmentation.[6,7,8,9,10,11]

Finally, the presenter shared a classification of bone defects, focusing on Type 4. This type of defect can be managed with autogenous bone and xenografts using PTFE membranes, autogenous bone blocks, or custom-made CAD/CAM titanium meshes. In these cases, soft tissue augmentation is performed both before and after the bone augmentation, with the entire diagnostic and case preparation phase being prosthetically guided.[12]

1 *Minimal invasiveness in vertical ridge augmentation. Urban et al. Periodontal 2000. 2023 Feb*
2 *A retrospective 10-year mean follow-up of implants placed in ridges grafted using autogenous mandibular blocks covered with bovine bone mineral and collagen membrane Matteo Chiapasco et al. Clin Oral Implants Res. 2020 Apr.*
3 *Dental implants placed in severely atrophic jaws reconstructed with autogenous calvario, bovine bone mineral, and collagen membranes: A 3- to 19- retrospective follow up study. Chiapasco et al . COIR 2018 Jul.*
4 *Augmentation procedures for the rehabilitation of deficient edentulous ridges with oral implants. Matteo Chiapasco et al. Clin Oral Implants Res. 2006 Oct.*
5 *Bone augmentation procedures in implant dentistry Matteo Chiapasco et al. Int J Oral Maxillofac Implants. 2009.*
6 *Horizontal stability of connective tissue grafts at the buccal aspect of single implants: a 1-year prospective case series. Thomas De Bruyckere et al. J Clin Periodontol. 2015 Sep.*
7 *Keratinized mucosa around implants in partially edentulous posterior mandible: 10-year results of a prospective comparative study. M. Roccuzzo et al. COIR 2016 Apr.*
8 *Effects of soft tissue augmentation procedures on peri-implant health or disease: A systematic review and meta-analysis. Daniel S Thoma et al. Clin Oral Implants Res. 2018 Mar.*
9 *Autogenous soft tissue grafting for periodontal and peri-implant plastic surgical reconstruction Giovanni Zucchelli et al. J Periodontol. 2020 Jan.*
10 *Impact of keratinized mucosa on implant-health related parameters: A 10-year prospective re-analysis study. Leonardo Mancini et al. Clin Implant Dent Relat Res. 2024 Jun.*
11 *Do soft tissue augmentation techniques provide stable and favorable peri-implant conditions in the medium and long term? A systematic review. Martina Stefanini et al. Clin Oral Implants Res. 2023 Sep.*
12 *Horizontal bone-augmentation procedures in implant dentistry: prosthetically guided regeneration. Matteo Chiapasco et al. Periodontol 2000. 2018 Jun.*

EAO Congress Scientific Report; Monaco 2025, Session 9

Emerging prosthesis-related complications with respect to timing

Duygu Karasan

Incidence of prosthetic complications and their prevention

In a prosthesis, multiple elements have to work together, because when one component fails it leads to complications or failure of the whole structure. Complications in fixed implant prostheses can be categorised as technical (mechanical or material-related), biological (soft tissue or bone-related) and aesthetic. The speaker focused on technical complications relating to implant-retained single crowns and partial fixed restorations, describing different scenarios and how to prevent them.

Several factors can affect technical complication rates, including the 3D implant position; the design of the restoration and choice of material; and the choice of abutment.

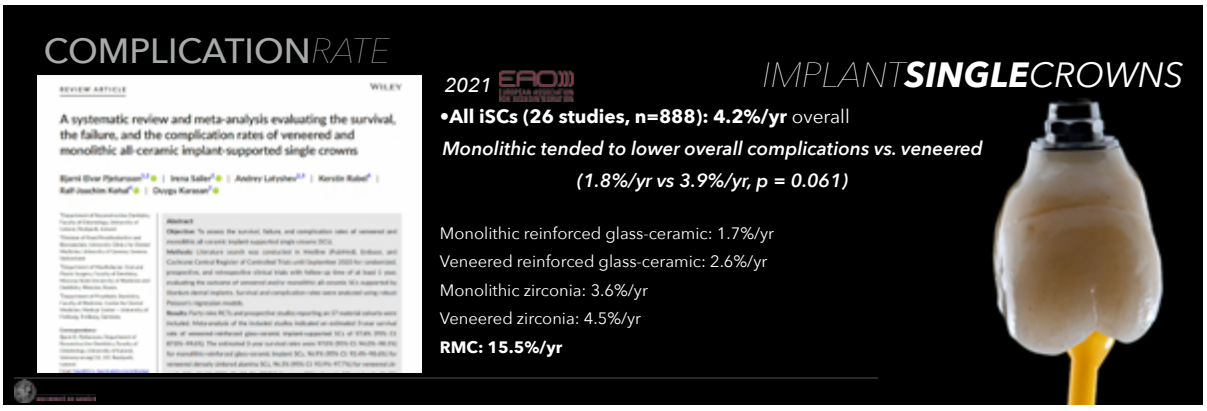
The survival rate of monolithic and veneered zirconia single-implant crowns is high, with failure rates of 3.9% and 3.7% respectively.[1] The main complications are chipping (especially on veneered crowns) and screw loosening (more common on monolithic crowns). Overall, monolithic crowns are associated with fewer complications than veneered ones. The position of the crown (anterior or posterior) has no influence on the complication rate. With regard to material selection, lithium disilicate reinforced glass ceramics or zirconia are recommended.

Titanium bases are now used to support single implant crowns, and debonding of the suprastructure from the Ti-base is the main complication.[2] This can be avoided by using the correct cement type and bonding protocol, along with an appropriate abutment with the right surface treatment. The height of the Ti-base and the size of the bonding surface will influence the retention of the crown.

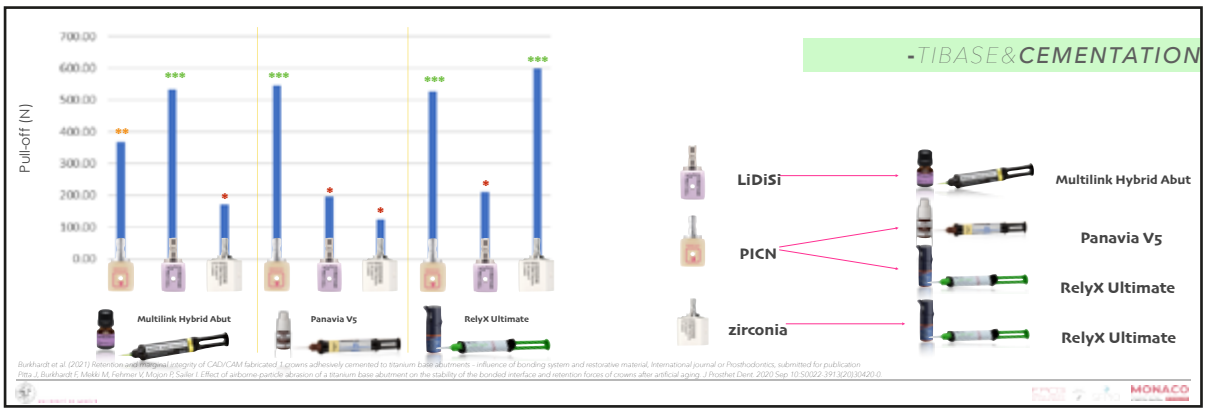
Complication rates for implant-supported multi-unit fixed dental protheses vary depending on whether they are veneered or non-veneered. The chipping rate is 28 times higher on veneered reconstructions compared to monolithic ones. However, screw loosening still occurs more frequently on monolithic restorations.[3] Zirconia is the preferred material for all-ceramic reconstructions, but it is important to choose the appropriate type (3Y-TZP or 5Y-TZP) based on the position and function of the prosthesis.

Splinting is only an evidence-based recommendation for short or extra short (<6mm) and narrow implants. Turning to cantilevers, clinical evidence has only been obtained for metal-ceramic options, and their use is not recommended on short implants in the posterior region.

Digital diagnostic tools are very helpful for achieving an optimal prosthesis-driven 3D implant position, as well as to craft better and more accurate occlusal designs.



1 Pjetursson BE, et al. A systematic review and meta-analysis evaluating the survival, the failure, and the complications rate of veneered and monolithic all-ceramic implant-supported single crowns. Clin Oral Implants Res. 2021 Oct;32 Suppl 21:254-288
2 Chantler JGM, et al. Clinical performance of single implant prostheses restored using titanium base abutments: A systematic review and meta-analysis. Clin Oral Implants Res. 2023 Sep;34 Suppl 26:64-85
3 Pjetursson BE, et al. Systematic review evaluating the influence of the prosthetic material and prosthetic design on the clinical outcomes of implant-supported multi-unit fixed dental prosthesis in the posterior area. Clin Oral Implants Res. 2023 Sep;34 Suppl 26:86-103.



Complications Failures	Number of abut-ments	Estimated annual failure/ compilation rates	Number of abut-ments	Estimated annual failure/ compilation rates	Number of abut-ments	Estimated annual failure/ compilation rates	Number of abut-ments	Estimated annual failure/ compilation rates
	PFM B-FDPs Estimated annual failure rate* (95% CI)		Veneered Zr B-FDPs Estimated annual failure rate* (95% CI)		Monolithic Zr B-FDPs Estimated annual failure rate* (95% CI)		Monolithic LiDi B-FDPs Estimated annual failure rate* (95% CI)	
Overall complication rate	149	1.93* (0.80-4.67)	0	n.r.	96	11.76* (3.06-45.19)	0	n.r.
Overall failures due to ceramic fractures	385	0.36* (0.02-0.63)	288	0.46* (0.18-1.16)	210	0.36* (0.12-1.08)	50	1.0* (0.03-5.50)
Failure due to framework fractures	385	0.16* (0.03-0.67)	288	0* (0-0.34)	210	0.36* (0.12-1.08)	50	1.0* (0.03-5.50)
Failure due to catastrophic veneer fractures	385	0.28* (0.09-0.70)	288	0.46* (0.18-1.16)	134	0* (0-1.81)	0	n.r.
Total number of ceramic chippings or fractures	393	2.20* (1.56-3.11)	353	4.95* (3.72-6.60)	210	0.18* (0.02-1.83)	0	n.r.
Minor ceramic chippings	254	0.88* (0.49-1.65)		2.86* (2.16-3.76)		0.18* (0.02-1.83)	0	n.r.
Major ceramic chippings - repair	254	0.90* (0.36-2.23)		1.65* (0.54-5.06)		0* (0-0.66)	0	n.r.
Loss of retention	363	1.56* (0.40-6.13)	179	2.75* (1.38-5.46)	185	1.46* (0.21-10.27)	0	n.r.
Screw loosening or fractures	267	2.36* (0.09-63.5)	188	8.33* (3.12-17.26)	172	0* (0-0.73)	0	n.a.

Beatriz de Tapia

Impact of prosthesis design/characteristics on biological complications

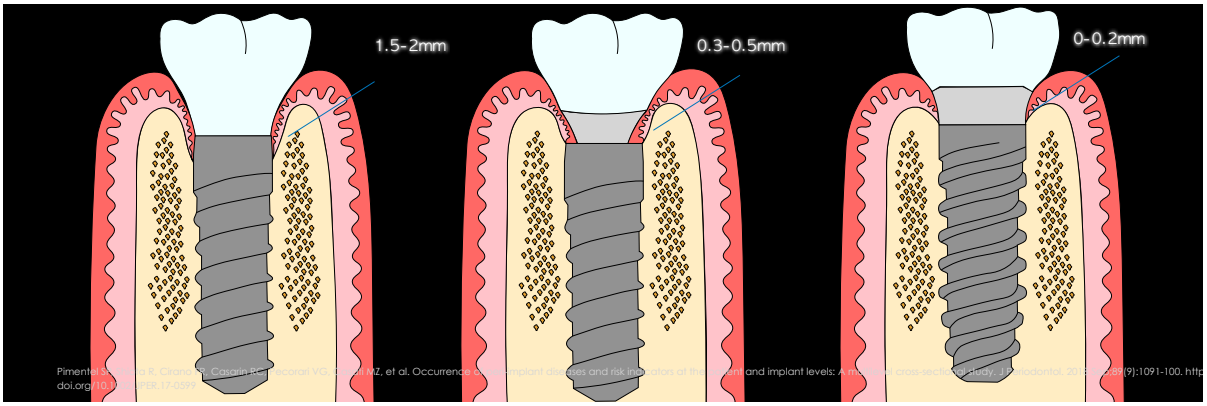
The prevalence of peri-implant disease is extremely high, and there is an absence of proven protocols to reliably treat it. Prevention is essential, and this means controlling all patient-related risk factors, as well as planning surgery and subsequent prosthesis design optimally.

It is important to keep initial bone remodelling in mind, because implant thread exposure following re-establishment of the biological width can increase the risk of peri-implant disease by up to eight times.[1] The main factor that determines the final peri-implant bone position following remodelling is the position of the microgap. Microleakage of peri-implant pathogens may occur via the microgap of all implant connections. Internal and conical (morse taper) connections are recommended to keep the implant-prosthesis connection as tight and sealed as possible.

An increase in the microgap due to an ill-fitting prosthesis that has been positioned too close to the marginal bone will lead to a greater risk of peri-implantitis. The goal is to move this microgap away from the bone. This can be achieved by using platform switching connections (to move the gap horizontally) or tissue-level implants (to move it vertically). Moving the microgap away from the bone can lead to a reduction in bone loss from 1.5–2 mm to close to 0 mm.

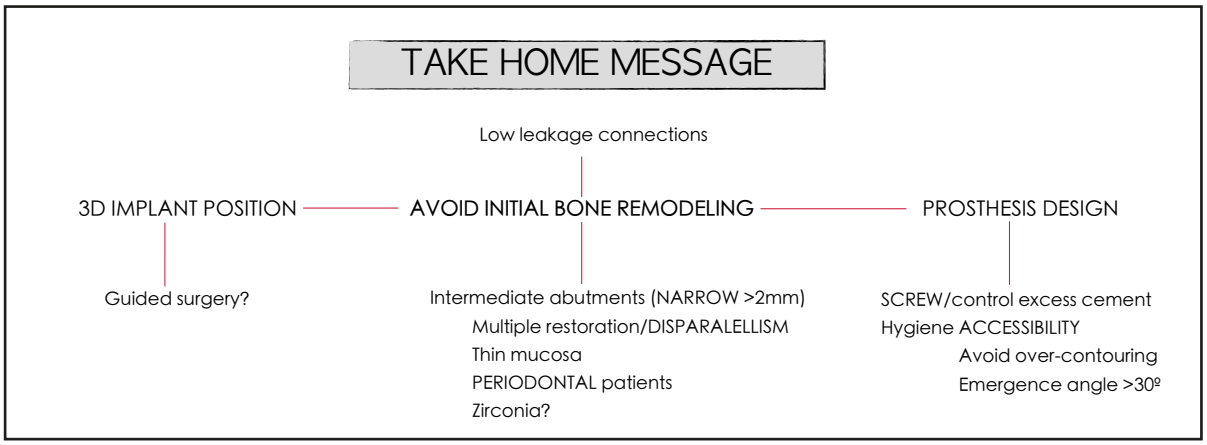
Abutments play a major role in addressing this issue. Narrow concave abutments that are higher than 2 mm are recommended. Abutments that are made of zirconia are associated with slightly less inflammation. Both patients with thin mucosa and periodontal patients can benefit from the use of these abutments, combined with subcrestal implant positioning. The one abutment-one time protocol is recommended, because multiple disconnections have been linked to increased bone loss.

Cemented prostheses have better strength transmission and less bacterial leakage than screw-retained options, although in 80% of cases residual cement leads to biological complications including marginal bone loss.[2]



1 Ravidà A, et al. Interproximal implant thread exposure after bone remodelling as a risk indicator for peri-implantitis. J Periodontol. 2023 Jun; 94(6):751.764.
2 Sailer I, et al. Cemented and screw-retained implant reconstructions: a systematic review of the survival and complication rates. Clin Oral Implants Res. 2012 Oct;23 Suppl 6:163-201

The main aetiological factor associated with peri-implant disease is bacterial biofilm accumulation. As a result, the cleanability of the prosthesis is an extremely important part of its design. Prostheses with an emergence angle that is greater than 30º and a convex profile are linked to an increased risk of peri-implantitis. Over-contoured prostheses can also limit the ability of the clinician to properly diagnose disease, especially during its early stages. This is due to the difficulty of positioning the probe correctly. These cases are also associated with worse results following treatment.[3] As a result, perfect prosthetically-guided 3D positioning of the implant is essential to avoid over-contouring.



3 De Tapia B, et al. Adjunctive effect of modifying the implant-supported prosthesis in the treatment of peri-implant mucositis. J of Clin Periodontol. 2019 Oct; 46(10):1050-1060.

Kevimy Agossa

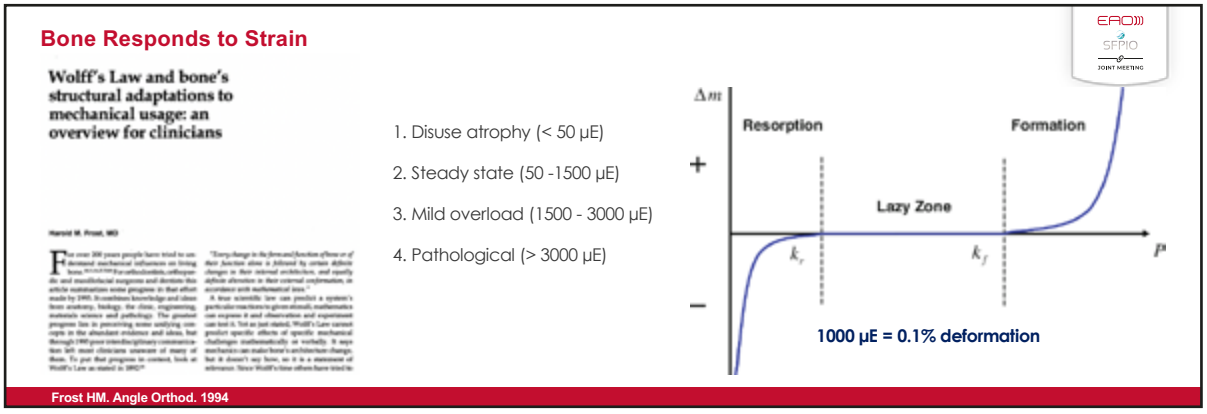
The role of occlusion in peri-implant marginal bone loss

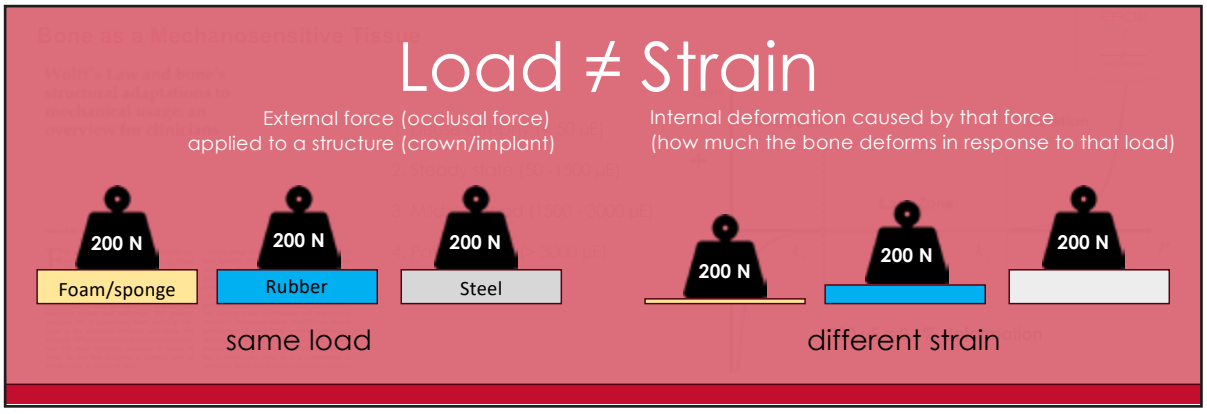
The speaker began by observing that we are living in a golden age of dental implants: the 'titanium era'. This is characterised by long-term data showing high survival rates for implants. As a result, survival is no longer the final goal, and instead long-term clinical success is the key measure of success. This is important because despite all the progress that has been made, more than a third of implants are affected by progressive bone loss.

The aetiology of marginal bone loss is multifactorial. It includes patient factors; local site and anatomical constraints; the surgical approach; technical choices; and the characteristics of the implant and prosthesis. Occlusion is also an important factor. Because implants don't have a periodontal ligament, they adapt to mechanical forces differently to teeth. Occlusal forces applied to the implant prosthesis translate into stress and strain at the implant neck that can contribute to marginal bone loss.

Bone responds to strain. If there is too little, it reabsorbs; if there is the right amount, it is maintained; under high levels of strain it becomes denser; and if the strain is excessive it breaks or severely reabsorbs. But strain is different to load. Load is an external (occlusal) force that is applied to a structure (crown/implant), while strain is the internal deformation to the material caused by that force (how much the bone deforms in response to that load). From a biological point of view, what it is important is not how heavily the bone is loaded, but how much it deforms.

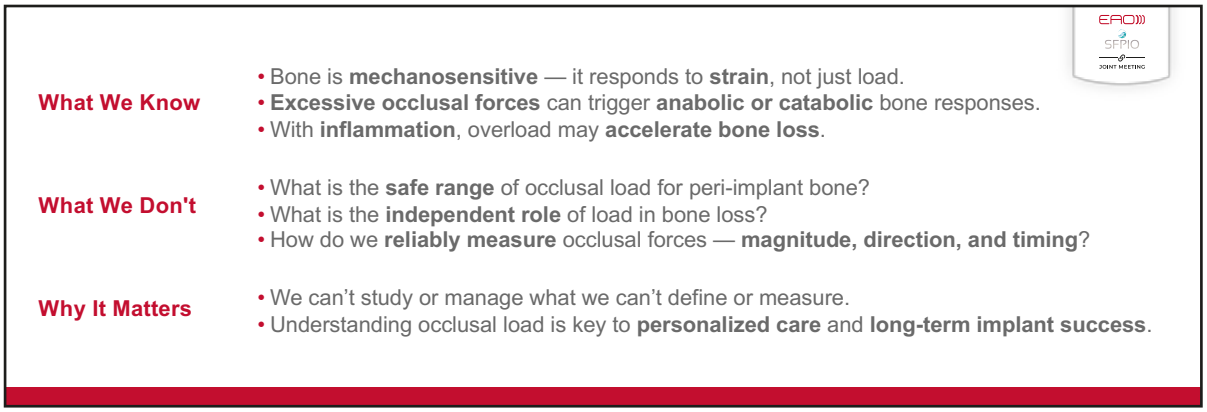
One of the problems with occlusion is that it's not possible to precisely measure the strain at the bone level. Occlusal forces are transmitted to the bone indirectly, through layers including the crown, abutment and implant body. This is why it is so difficult to obtain a universal definition of what constitutes overload on dental implants. Furthermore, some animal studies[1,2] have determined that overload does not induce marginal bone loss in itself, but only in the presence of gingival inflammation. As a result, there isn't currently a reliable way to measure occlusal overload. Until we reach that point, the data from studies will be inconclusive. In the meantime, computerised transducers provide a way to measure occlusal load over teeth and implants with more accuracy.





1 Heitz-Mayfield LJ, et al. Does excessive occlusal load affect osseointegration? An experimental study in the dog. Clin Oral Implants Res. 2004 Jun;15(3):259-68.
2 Kozlovsky A, et al. Impact of implant overloading on the peri-implant bone in inflamed and non-inflamed peri-implant mucosa. Clin Oral Implants Res. 2007 Oct;18(5):601-10.

The author finished his presentation by saying that a study currently under preparation suggests that quantifying occlusion at the implant level might be relevant in helping to understand the relationship between marginal bone loss and occlusal variables.



EAO Congress Scientific Report; Monaco 2025, Session 10

Timing of complication management – bone grafting procedures

Puria Parvini

Key factors to improve the success rates of immediately placed and restored implants

The lecture opened with a case of a poorly positioned implant in the upper left central incisor position, resulting in significant aesthetic and psychological impact for the patient. Although the speaker was confident that the lost bone could be reconstructed – particularly since mastering the Khoury technique – he emphasised the emotional burden of subjecting a patient to multiple surgeries. This reflection introduced the central question: can we reduce invasiveness and the number of surgical interventions while maintaining long-term success?

Preservation is easier than augmentation – but how can we achieve it, and how should each case be assessed to determine whether immediate procedures are feasible? Evidence on immediate implant placement and immediate loading remains limited (Trimpou 2010; Parvini 2020; Obreja 2022; Trimpou 2022; Parvini 2022; Parvini 2023a; Parvini 2023b; Schwarz 2025).

Dr Parvini summarised 12 key factors to minimise complications in immediate implant therapy:

1. **Operator experience**.
2. **Team experience and accurate clinical diagnosis,** focusing on three aspects: smile line position, soft-tissue phenotype, and marginal gingival level.
3. **Implant system selection** that ensures high primary stability.
4. **Narrow-diameter implants** to preserve biological space and reduce the risk of bone loss and recession (Caneva 2010; Vignoletti 2014).
5. **Mandatory CBCT** in the aesthetic zone. Classifications such as Gluckman (2018) help anticipate anatomical challenges during planning.
6. **Preoperative antibiotics:** 2–3 g of amoxicillin one hour before surgery (Salgado-Peralvo 2021).
7. **Avoiding implant placement in severe defects.** Consider ridge preservation instead.
8. **Atraumatic extraction** of the tooth.
9. **Optimal 3D implant positioning.** Guided surgery supports this goal (Schiavon 2025).
10. **Flapless approach** whenever possible, as flap elevation may cause up to 0.5 mm thinning of the buccal cortical plate (Pitman 2023).
11. **Gap filling** to reduce post-extraction resorption and midfacial recession (Sanz 2017; Seyssens 2022).
12. **One-Abutment–One-Time concept** to minimise crestal bone loss and midfacial soft-tissue recession (Molina 2017).

The lecture concluded with a recommendation to use the SAC classification and risk profile assessment as decision-making tools for case selection. Two clinical cases were presented illustrating the application of these principles.

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Romain Doliveux

Management of complications associated with bone grafting procedures

No regenerative technique is entirely free of complications, although prevalence rates vary widely – from 0% to 77.8% (Urban 2023). A major limitation in the literature is the lack of consistency in how complications are reported, making it impossible to draw clear conclusions. Dr Doliveux focused on complications related to ridge augmentation procedures, specifically those involving blocks, membranes and titanium meshes (but excluding sinus floor elevations).

Dehiscences

Prevention of dehiscences depends mainly on flap management and ensuring tension-free closure (Naenni 2019; De Stavola 2014). The presence of keratinised mucosa is beneficial, though its absence does not necessarily increase the risk of dehiscence. In full-arch cases, the speaker advised detaching removable prostheses and opting for immediate loading using transitional implants.

Treatment involves surface debridement with a high-speed bur to remove the exposed portion of the membrane, block, or mesh, followed by local disinfection with chlorhexidine.

The classification by Sanz-Sánchez et al. (2022) distinguishes between dehiscence with and without infection and proposes tailored management strategies for each situation.

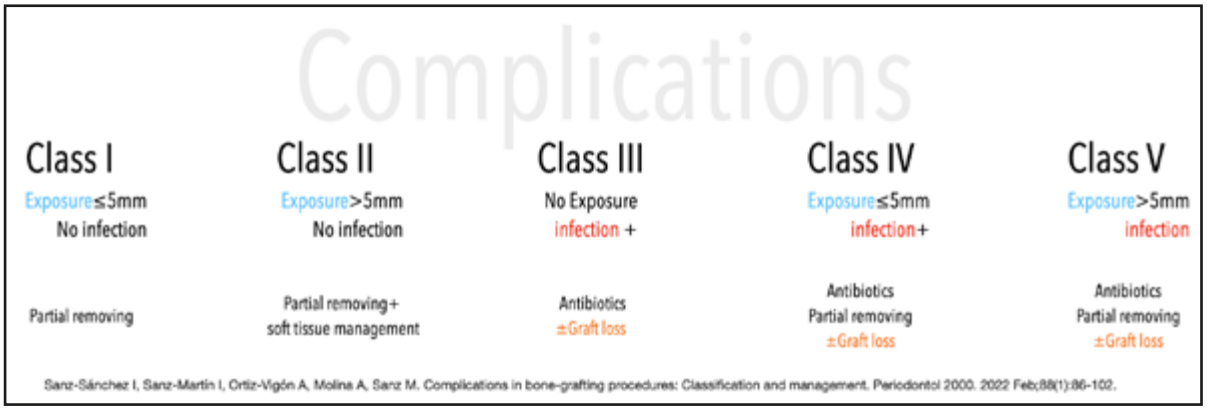
Infection

Infection represents the most severe complication impacting regenerative procedures. The presence of pus or fistula formation is an early warning sign that often precedes partial or total graft loss. Early intervention is essential, and management requires surgical access to drain the pus and assess possible graft mobility. The Urban et al. (2023) classification was presented as a practical procedural guide. To prevent infection, the speaker emphasised the importance of preoperative control of the bacterial load and the periodontal condition of the patient.

Resorption

Determinants of graft resorption include patient age, recipient site, soft-tissue pressure, and the bony envelope (Naenni 2019). However, the key takeaway was that 'the resorptive pattern may tend to follow the natural anatomy of the original ridge'. Using a clinical case involving full-arch maxillary reconstruction, Dr Doliveux illustrated two key planning concepts:

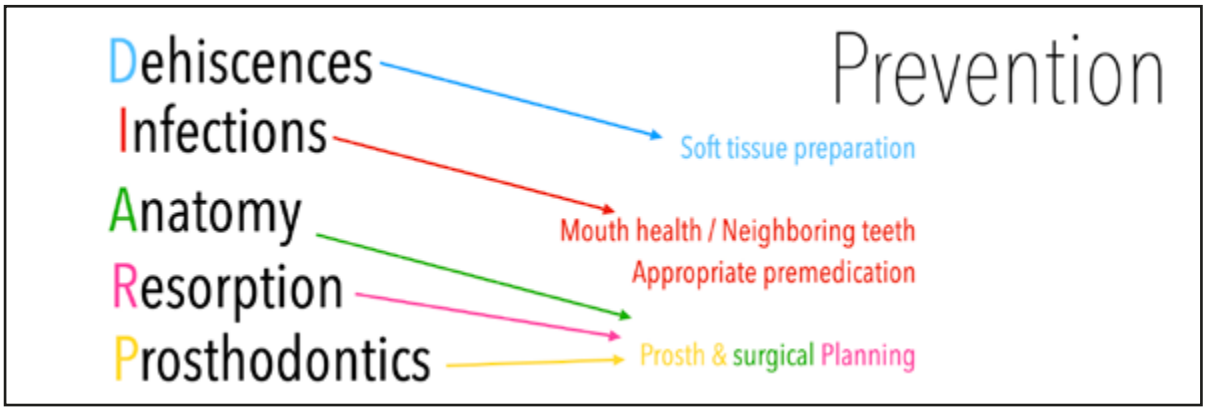
- The muscular corridor, where graft resorption is minimised.
- The prosthetic guide, defining the future tooth position during bone regeneration, enabling less invasive and more predictable outcomes.

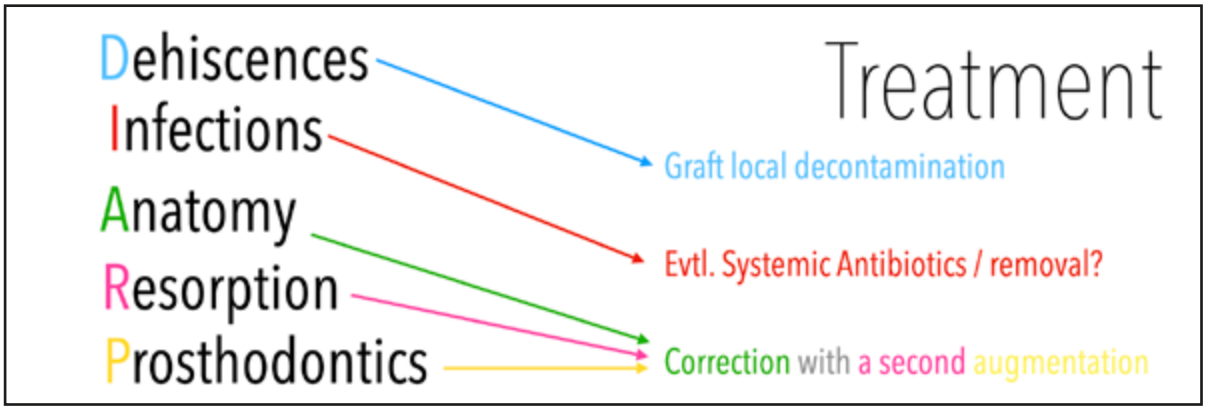


Anatomy

The speaker highlighted the presence of superficial branches of the mental nerve, which may be injured during periosteal incision for flap release, as well as potential inferior alveolar nerve involvement when harvesting from the mandibular ramus. Surgical guides have been proposed as a means of minimising such complications during autogenous block harvesting (De Stavola 2017). He also presented dynamic navigation surgery as a less invasive alternative to conventional surgical guides, illustrating the approach with a published clinical case (Doliveux 2024).

Dr Doliveux concluded by recommending the use of the SAC classification tool for risk assessment and case planning. He closed with two summary slides outlining the key messages and clinical recommendations presented.





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Mario Roccuzzo

Management of complications associated with reconstructive peri-implantitis treatment

When reconstructing defects caused by peri-implantitis, the first question is whether it truly works. There is still no unified and predictable treatment approach for peri-implant defects that is supported by the literature. As Dr Roccuzzo emphasised, 'not all implants are the same', and therefore peri-implantitis treatment should be specific to the implant design and surface involved. He referred to his well-known three-step protocol published in 2011: soft-tissue debridement, implant surface decontamination, and placement of biomaterials (Roccuzzo 2011).

In cases lacking keratinised mucosa, he strongly recommended the addition of a connective tissue graft to protect and seal the regenerative material. The importance of keratinised tissue as a success factor in peri-implant defect regeneration was also emphasised in the 15th European Workshop on Periodontology (Jepsen 2019).

Flap design and surgical approach

Unlike the abundant literature on periodontal regeneration around teeth, few studies exist on flap design when treating peri-implant defects. Most use a full-thickness flap, and Dr Roccuzzo identified this as a possible reason for the limited success rates reported in the literature. He advocated a split-thickness incision at the papillae, avoiding vertical releasing incisions, and ensuring careful decontamination as critical factors for success. Depending on the defect morphology, either a buccal-only or a buccal-and-lingual flap may be indicated.

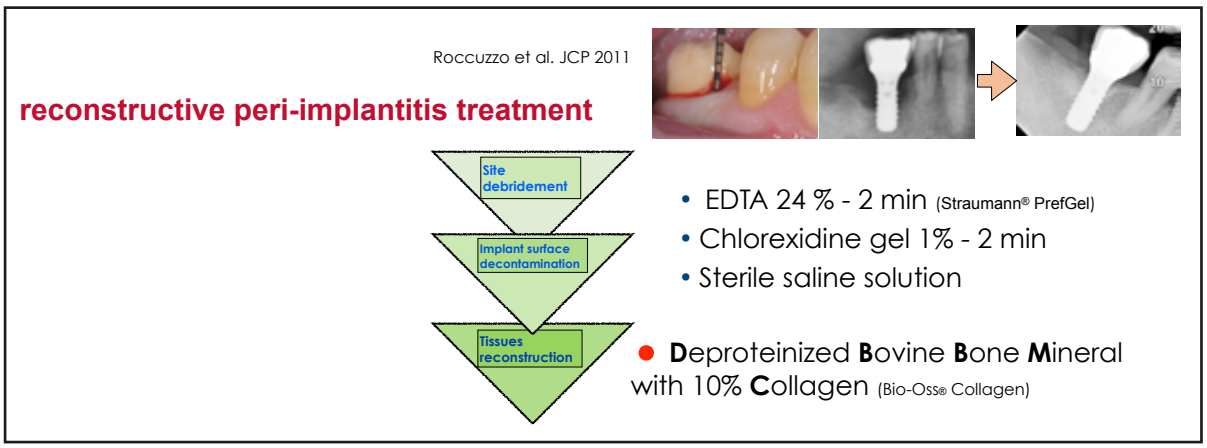
In the absence of keratinised tissue, he proposed a perforated connective tissue graft, prepared with a punch, extending either over the buccal aspect or circumferentially (360°) around the implant neck to achieve a soft-tissue seal. He clearly stated that this was his personal clinical opinion rather than evidence-based guidance. Poorly positioned or restored implants were defined as a red line, contraindicating this regenerative approach. He also warned about potential biases in published data when such cases are included in outcome analyses.

Use of membranes

The use of membranes is contraindicated, with the evidence consistently discouraging their application (Monje 2023; Regidor 2023; Cho 2025; Ramanauskaite 2025), as they may increase the risk of early complications such as dehiscence or material exposure (Donos 2023).

Timing and patient factors

The optimal timing for reconstructive therapy varies. Beyond the defect itself, a comprehensive patient assessment is essential. Dr Roccuzzo stressed that plaque and bleeding indices must both be below 20% before attempting regenerative surgery. Furthermore, patient compliance with supportive maintenance has been shown to be more important for long-term success than the defect configuration itself (Roccuzzo 2021).

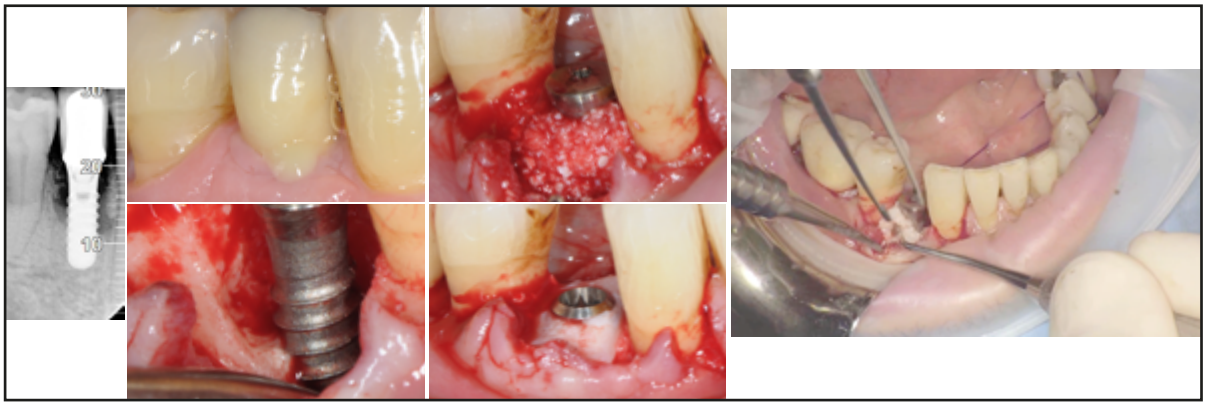


Regeneration should not be initiated in periodontally unstable patients, as successful outcomes cannot be expected in such cases. Multiple surgeries may be required as complete resolution is not always achieved at the first attempt. Patients should also be informed of the possible occurrence of mucosal recession, which can be treated secondarily with a connective tissue graft (Roccuzzo 2024).

Key messages

Successful regeneration of peri-implant defects is achievable only when the implant is correctly positioned, appropriately restored, and surgically managed with precision. To minimise complications, Dr Roccuzzo highlighted the following principles:

- Maintain plaque and bleeding indices below 20%.
- Apply minimally invasive surgical techniques.
- Select regenerative materials carefully.
- Establish an effective soft-tissue seal.
- Ensure close and regular maintenance.



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EAO Congress Scientific Report; Monaco 2025, Session 11

Timing of complication management – sinus floor elevation (early and late)

Claudio Stacchi

Intra-operative sinus lift complications and management

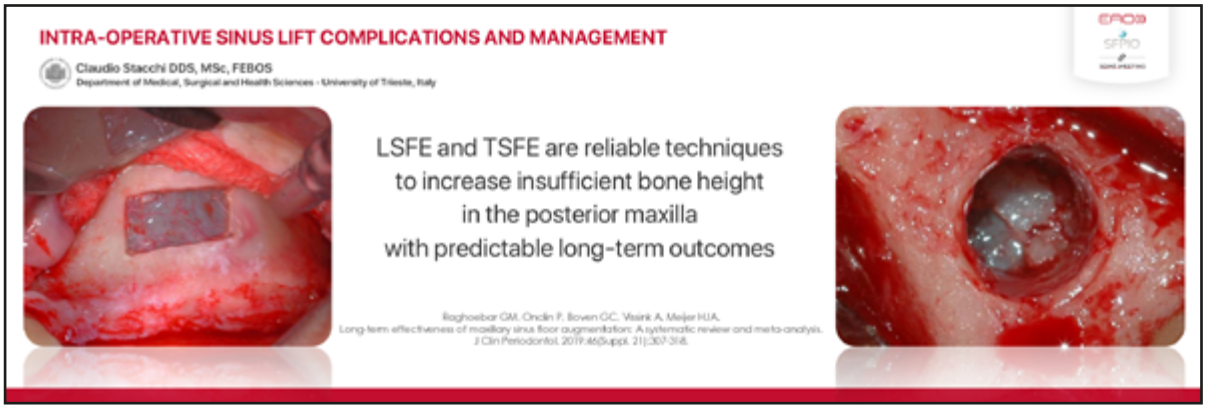
Sinus floor elevations, along with the surgical removal of impacted teeth, are the procedures with the highest incidence and severity of complications.[1] The most common intra-operative complications are membrane perforation and haemorrhagic events. Others include:

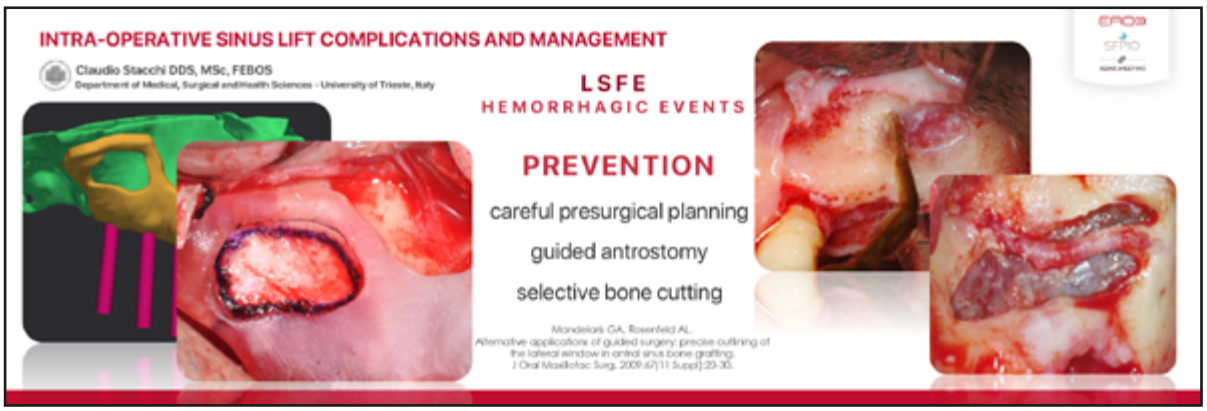
- paraesthesia by compression of the infraorbital nerve
- sensitivity or loss of vitality of adjacent teeth
- benign paroxysmal positional vertigo related to the use of osteotomes during crestal approach sinus lifts

Haemorrhagic events can occur when performing the lateral approach and relate to the presence of the alveolar artery running through the lateral wall of the sinus. Pre-surgical planning (CBCT) is very important to avoid the interception of this artery when it has an intraosseous course (approximately 50% of cases). If bleeding occurs, the best way to control it is by using thermocoagulation with a bipolar electrosurgery unit.

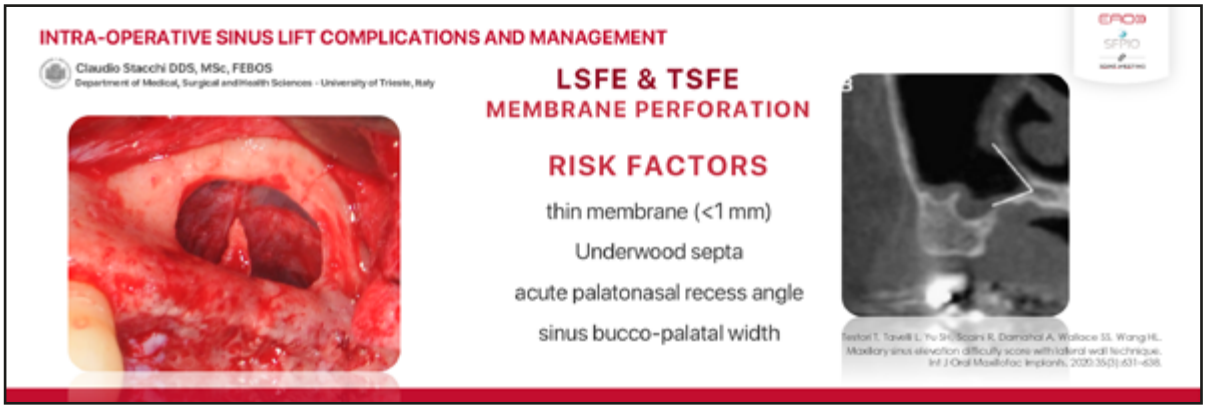
The most common complication in both sinus lift techniques is membrane perforation. Even when fixed intraoperatively, perforation is linked to a higher risk of implant failure in the long term.[2] Risk factors for sinus perforation include thin (<1mm) membranes; the presence of Underwood septa; an acute palato-nasal recess angle; and the sinus bucco-palatal width (narrow in lateral approach, wide in transcrestal approach). In the lateral approach, the incidence of perforation is about 20% using rotary instruments and 11% using piezoelectric surgery. The safest technique involves erosion of the window, rather than reflecting or removing it.[3]

When perforation occurs during a lateral sinus lift approach, suturing (only on thick membranes) or covering the defect with a collagen or autologous fibrine membrane are the appropriate approaches. Using grafting materials with rounded particles is also linked to a lower risk of perforation.





For the transcrestal technique, the approach to management depends on when the perforation occurs. If it happens before insertion of the material and is small (≤2 mm), detachment and elevation of the membrane, followed by placement of a collagen sponge or membrane, is suggested before placing the implant. For larger perforations (>2mm) the recommendation is to place a short implant if there is sufficient crestal bone height. If not, a lateral approach is recommended to repair the perforation before continuing the procedure. If perforation occurs after inserting the graft and before placing the implant, it is necessary to place a short implant. If that's not possible, it is necessary to switch to a lateral approach and repair the perforation. Finally, if the perforation occurs after implant placement, frequent monitoring of the patient is required. If sinusal symptoms occur, medical therapy or surgical removal will be necessary.



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Pablo Galindo

Post-operative sinus lift complications and management

The purpose of a sinus augmentation procedure is to insert biomaterial inside the sinus to create new bone, thereby enabling an implant to be placed in a prosthetically driven position. This in turn will maximise the likelihood of long-term success for the patient. Implant survival rates following sinus augmentation have increased over time,[1] and complications can be classified as immediate or long-term.

Early post-surgical complications include haemorrhage, haematoma, Schneiderian membrane perforation and acute sinusitis. Schneiderian membrane perforation is the most common intra-operative complication during sinus augmentation, and it has been associated in the long term with reduced implant survival, poorer quality of newly formed bone, and a higher risk of secondary sinus infections. Acute sinusitis is mainly caused by migration of the biomaterial, which can result in local inflammation or even obliteration of the ostium. Another potential cause is mucus retention, which may occur if the palatal wall is not adequately reached during surgery, leaving a gap between the grafting material and the palatal bony surface. The prognosis for acute sinusitis is worse if the patient has a previous history of sinusitis; in cases where several approaches have been made in the same sinus; or if there is a thin sinus mucosa. Where acute sinusitis is present, the likelihood of implant survival decreases over time.[2] This can be due to a secondary graft infection that leads to graft loss (categorised as partial in 25% of cases and total in 2.6% of cases[3]).

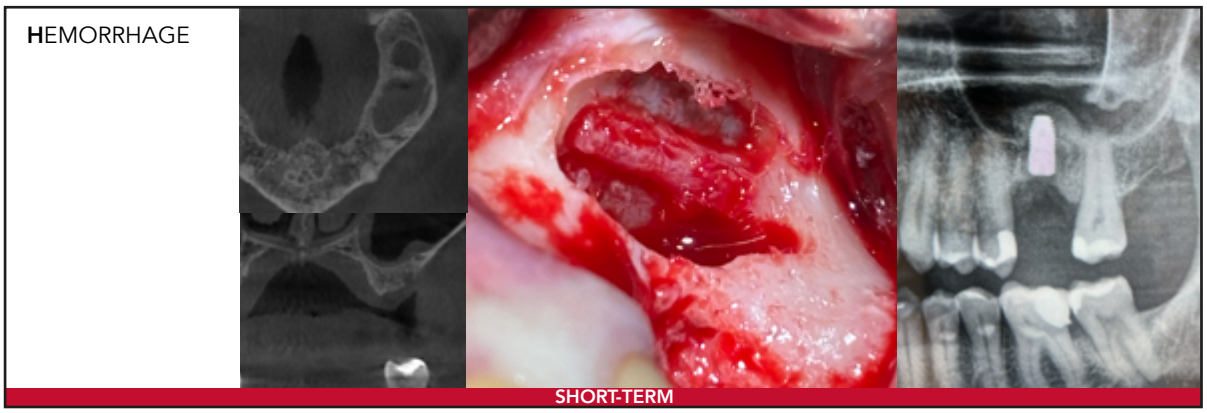
Late post-surgical complications may arise as a consequence of Schneiderian membrane perforation, chronic sinusitis, graft resorption, and even changes in voice quality. Factors such as the surgical approach (lateral vs. crestal), the height of the residual alveolar ridge, and the thickness of the sinus membrane play a major role in determining implant survival, the quality of newly formed bone, and the likelihood of postoperative sinusitis.

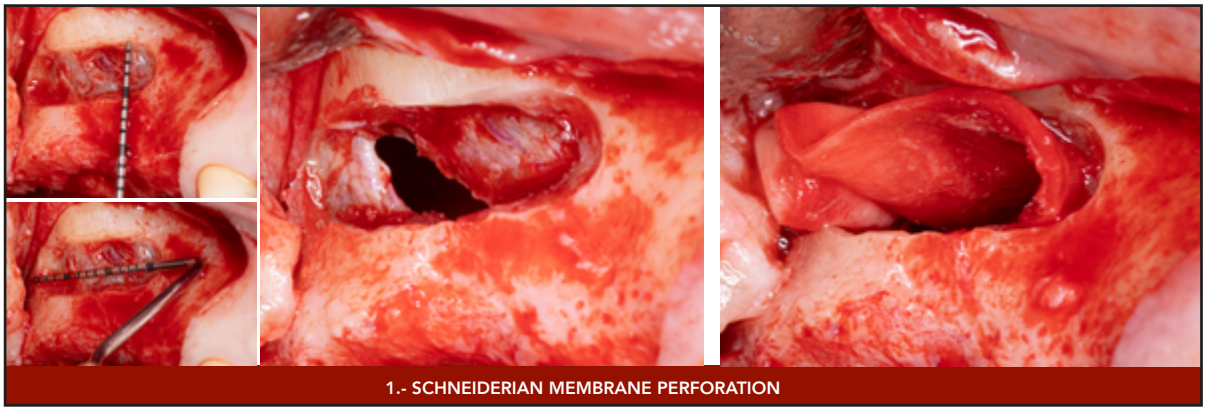
In cases involving a perforation of more than 1 cm, implant survival rates decrease dramatically. Additionally, following membrane perforation, new bone that is formed in the area is of lower quality. Migration of biomaterial to the sinus results in acute sinusitis in 10–30% of cases, and a secondary graft infection in 7–11% of cases. Furthermore, acute sinusitis will progress to chronic sinusitis in 10–20% of cases.

Chronic sinusitis is linked to three important surgical factors:

- overfilling of the sinus cavity (packing large-granule biomaterials inside the sinus can compress the membrane and lead to necrosis and migration of the material to the sinus)
- presence of foreign bodies in the maxillary sinus (graft biomaterial, dental material, migration of the implant)
- membrane perforation by the implant

Finally, two papers describe an unusual complication: the modification of the patient's voice following a sinus lift augmentation procedure. This can happen because the volume of the sinus is being reduced and it is a resonant cavity that modulates the voice.





TAKE-HOME clinical pearls

Effective but not risk-free: Sinus floor elevation is predictable, yet complications, though often manageable, may have lasting consequences

Critical complications: Schneiderian membrane perforation and chronic sinusitis are the main drivers of long-term graft and implant failure

Special consideration: In selected patients, persistent changes in voice quality can occur and should be discussed preoperatively

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Peer Kämmerer

Zygomatic implants – complications and management

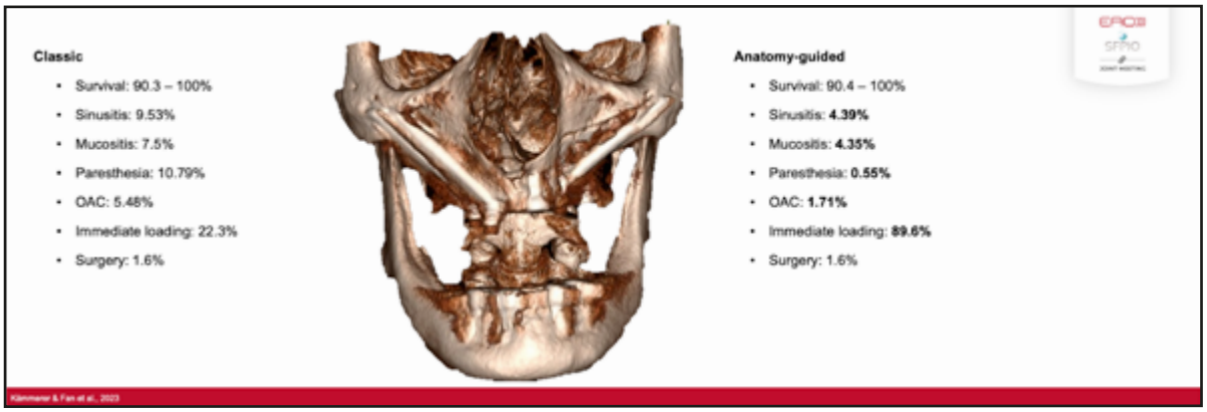
Zygomatic implants (ZI) were initially performed by the speaker to restore extreme oncologic cases. However, he posited that the procedure can also be considered as an alternative to sinus lifting, with the prospect of shortening the healing period and making immediate restoration a possibility. An anatomical approach to ZI will in many cases avoid penetration of the maxillary sinus or excessive palatal emergence of the implants. Survival rates using the classical approach are the same, but with a higher prevalence of sinusitis, mucositis, paraesthesia and oroantral communications, and with fewer opportunities for immediate loading. Surgical complication rates are similar in both approaches, and are a reminder that ZI must be considered an advanced procedure, requiring considerable skill and experience.[1,2]

One potential complication is not achieving sufficient primary implant stability. This is an essential prerequisite for the procedure, and can result from suboptimal positioning of the ZI. Another complication described in the literature is orbital inflammation and fistulae, due to the position of the implants not respecting adequate inter-implant distance.

Appropriate planning of the surgery (digital planning with CBCT, followed by the preparation of a digital model to visualise the surgery) is fundamental to avoid complications. Navigation is another tool that can help the surgeon achieve appropriate positioning, although it is not a substitute for surgical visualisation, which can require extensive flap reflection, plus sinus elevation.

Mucositis is frequently associated with a lack of keratinised mucosa, but can be controlled by the patient following an appropriate cleaning protocol.

In conclusion, ZI is a clinical option that is suitable for experienced surgeons. It is carried out under sedation or general anaesthesia, and associated with an excellent survival rate. The anatomical approach minimises complications, and offers shorter healing times and immediate restoration.



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EAO Congress Scientific Report; Monaco 2025, Session 12

Hidden factors affecting the outcome of implant therapy

Franck Renouard

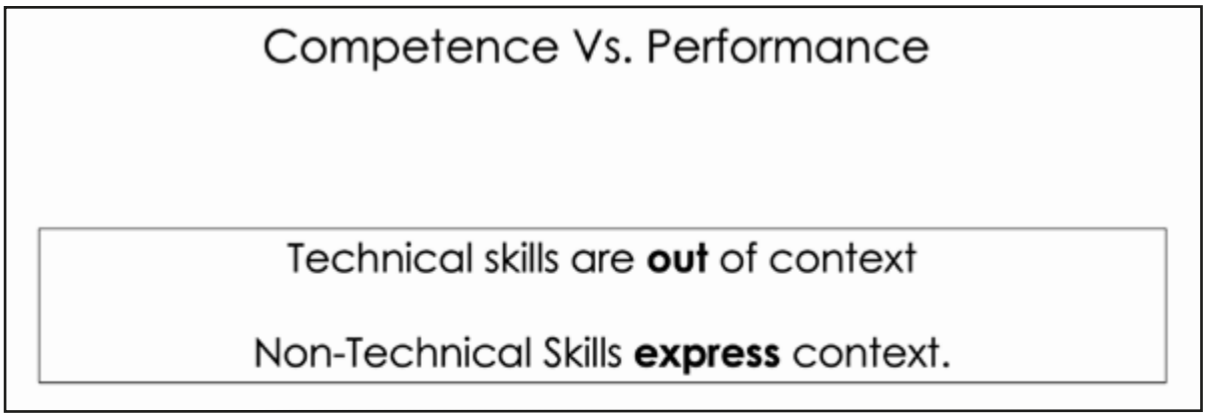
Why is a good level of knowledge not enough to treat patients well?

A good level of knowledge is not enough to treat patients well. Our brains receive an average of 11 million bits of information per second, but our prefrontal brain ('smart brain') can only process a maximum of 50 bits per second. While we believe that we are always in control of our thoughts and actions, very few of them are in fact managed by the smart brain. In practice, our brain is the same as the Homo sapiens brain, and can only consider very few parts of the available information. Every daily action we perform, no matter how difficult it is, is being performed with a primitive brain.

It is also important to distinguish between competence and performance. Competence is an absolute value and is based on what someone is able to do in theory, based on their experience, knowledge and education. Performance, on the other hand, is how competence is applied in real life, and is impacted by conditioning factors such as stress and personal problems. Technical skills that are learned in congresses and on courses are gained out of context and are performed in ideal conditions, based on repeated gestures. But non-technical skills express the context. They reflect factors that are specific to the patient and circumstances, such as having a big tongue, producing lots of saliva and having a phobia. Furthermore, the brain is unable to do two things at the same time, so multitasking is physiologically impossible.

The concept of non-technical skills for surgeons was developed in 2000 and derived from aviation.[1] This doesn't focus on the surgeon's technical knowledge, but their ability to apply non-technical skills, such as situational awareness, decision-making, communication, teamwork and leadership. More than 80% of problems and complications in daily practice relate to a failure of non-technical skills.

There are a lot of factors that can affect the quality of care. Interruptions are one example. In one study looking at the administration of medications,[2] interruption was associated with a 12% increase in procedural and clinical failures, and interruptions occurred in 50% of the situations. Fatigue is a critical factor too. One study demonstrated that the effects of not sleeping for 24 hours are the same as having one gram of alcohol in the blood in terms of the number of errors and unnecessary movements observed during procedures.[3] Another factor is dehydration. A 1% loss of water in the body leads to a decrease in attention, while a 2% loss significantly decreases the ability to concentrate. A 3% loss leads to a decrease in intellectual and physical performance. Sound is also a stress factor.



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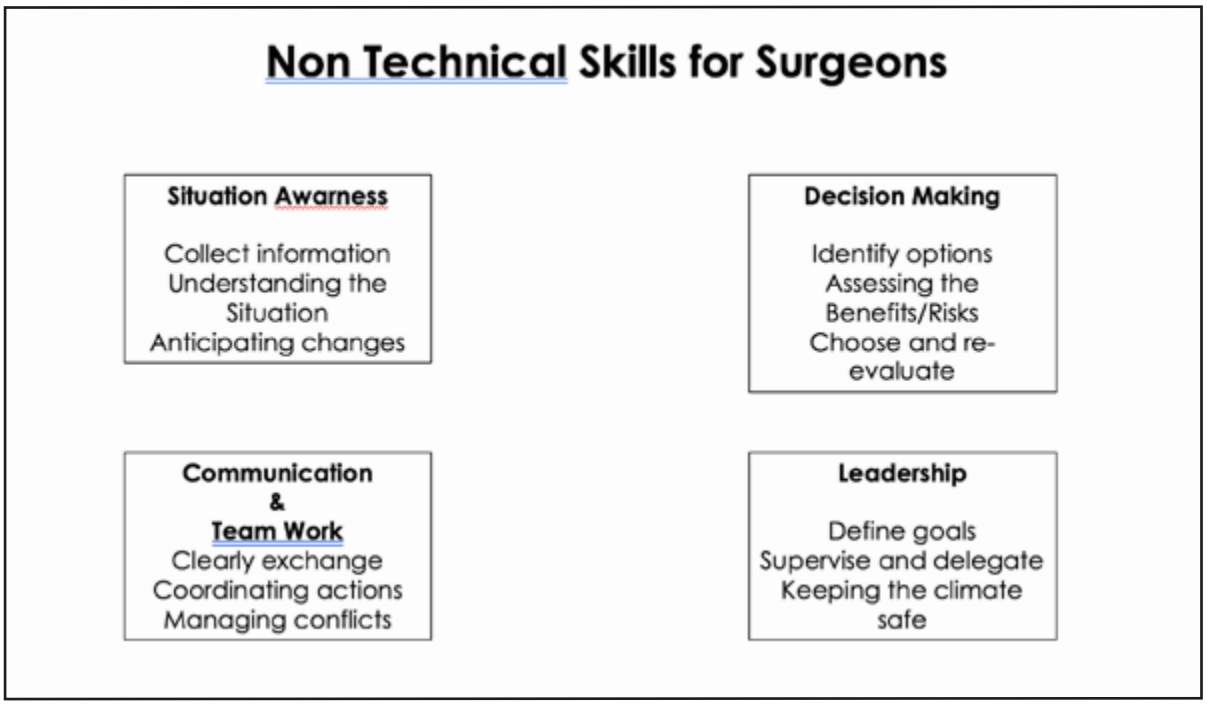
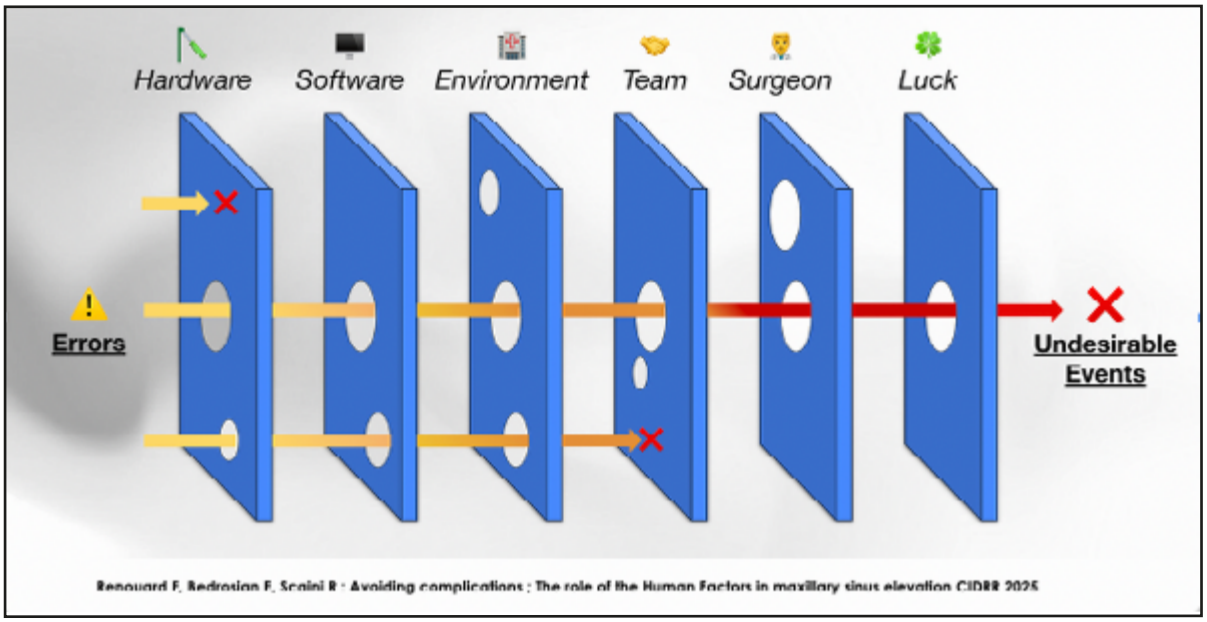
James Reason's Swiss Cheese Model of safety and the prevention of errors assumes that it is impossible to work without errors. Our brain makes an average of four to six errors per hour. The goal, then, is not to avoid errors, because that is impossible, but to learn to anticipate them and to develop the confidence to say no, or to avoid a risky situation.[4] And of course it is essential to learn from our mistakes in order to be better able to anticipate them.





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Riccardo Scaini

Cognitive aids in implantology

When we are stressed or rushed our brain takes shortcuts: in those situations it is easier to skip the safety steps or protocols that prevent errors. In the aviation industry, it's understood that safety doesn't come down to luck. Instead, it is based on a triangle made up of equipment, human factors and the environment. Each of the three sides must be strong. The same principle applies in dentistry. We need reliable tools and software, clear checklists and communication, supported by protocols to promote ergonomics and safety. Cognitive aids apply to each of these sides.

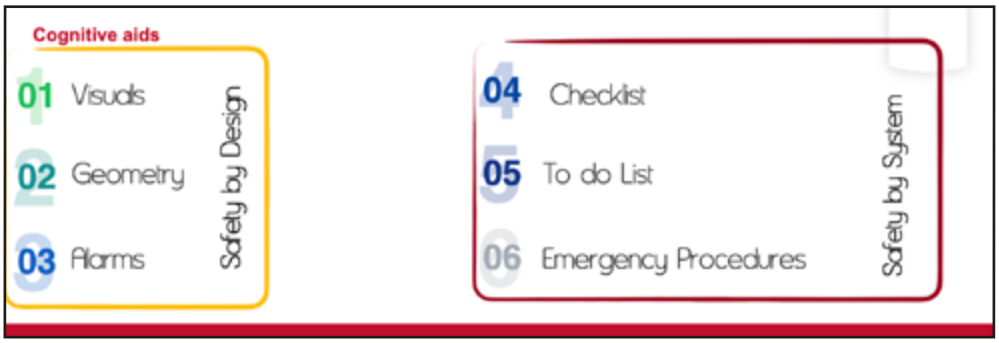
There are two different types of cognitive aid: those that make instruments safe by design (through elements such as visual appearance, geometry and alarms) and those that are based on the processes, rules and feedback which collectively form the safety systems. These include checklists, to-do lists and posters displaying emergency protocols.

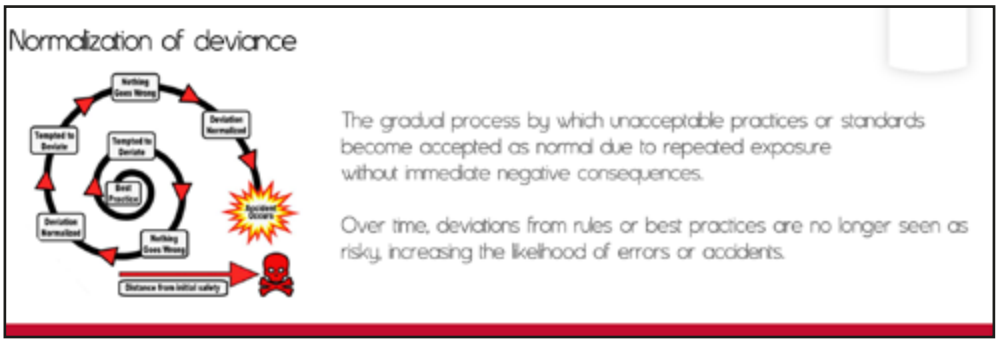
Visual aids that fall into the safe by design category include shapes, colours and dimensions that our brain notices instantly before we consciously read anything. For example, geometry can assure that a component will only mate with the correct part. Audible aids include alarms made by instruments to highlight critical risks.

Checklists are the primary element of safety systems. They are made up of structured lists of critical steps and are short and standardised and designed to be used at a specific moment.[1] An example is a pre-op checklist. To-do lists provide a visual way of documenting who carries out an assignment, when they do it and the progression of the task. They help prevent coordination errors. Finally, emergency posters, such as those displayed on the walls of operating theatres, tell the team, at a glance, exactly what to do next. They include information such as doses and sequences for rare time-critical events like basic life-support or anaphylaxis. They are important because stress, infrequency and time pressure dramatically increase the risk of bad decision-making.

Even after all safety protocols have been followed, errors still take place, and there are factors that it is important to be aware of, such as the normalisation of deviance. This refers to small shortcuts (unacceptable practices or standards) that aren't intrinsically harmful but which gradually become accepted, and hence routine, due to repetition. As they start to feel safe, the likelihood of errors or accidents increases. A debriefing strategy can be used to help identify and address normalisation of deviance. It consists of a three-minute blame-free team review that takes place immediately after a procedure during which something unexpected occurred. The goal is to identify what went well and what should be changed, and to assign concrete follow-up actions in response to that. Such an approach can turn experience into rapid system improvement.

An emerging trend in cognitive support is the involvement of the patient as an active partner.[2] This is important because patients who understand their treatments act as an additional safety layer. Human errors can't be avoided, but protocols that make small mistakes unlikely and big mistakes almost impossible can be designed.





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Rino Burkhardt

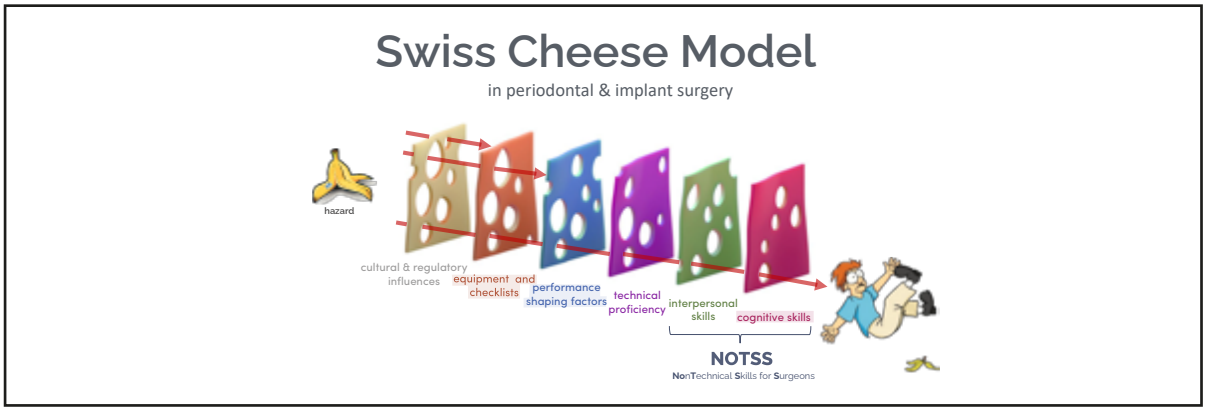
Factors to limit complications

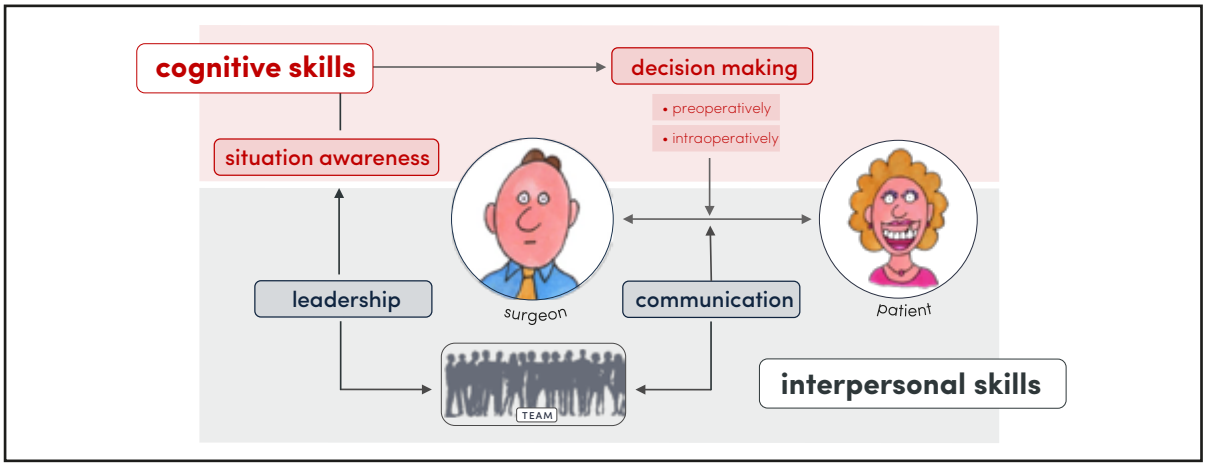
When assessing risk, it is important to consider two components: the likelihood of the event occurring, and its consequences. The average risk of an adverse aesthetic outcome per inserted implant is approximately 1 in 3,[1,2] while the risk of death on boarding a flight is approximately 1 in 2.7 million (2018–2022). It's possible that clinicians haven't been adequately informed about the risk of adverse aesthetic outcomes and how to prevent them, although it's a fact that a lot of information has been gathered about these risks over the past ten years. This raises the question of why the prevalence of adverse aesthetic outcomes for implants is still so high when there is so much data.

As a first step, it's necessary to analyse the current situation. Several papers focus on technical factors to explain failures, such as a recent study[3] in which implant positioning was cited as the major influencing factor for mucosal dehiscence in implants in aesthetic positions. As a preventive measure, it concluded that proper planning was a key factor. However, in the introduction, it also noted that human factors resulting in errors of judgement represent the primary cause of complications in implant dentistry. The speaker emphasised that we need to focus on these human factors, rather than technical aspects alone.

It is important to differentiate between factual or theoretical knowledge, and personal knowledge, which encompasses critical thinking, decision-making and psychomotor execution. By definition, human factors encompass environmental, organisational and job-related factors, including those that influence behaviour at work in a way which can affect safety and job performance. When the Swiss Cheese Model is applied to periodontal and implant surgery, non-technical skills are the final layers protecting the patient. These non-technical skills fall into two categories. The first is interpersonal skills, which encompass communication (teamwork) and leadership. The second is cognitive skills, including situational awareness and decision-making skills (which are relevant both preoperatively and intraoperatively). Finally, non-technical skills are influenced by performance-shaping factors, such as cognitive biases, stress and sleep deprivation.

Cognitive biases during the preoperative phase – including premature closure bias, specialty bias, overconfidence bias and anchorage bias – are related to increased risks. But the main risk factor during this phase is poor communication, which is influenced by many factors, including the perspective of the sender and the receiver. A dissatisfaction with the outcome of a process is usually





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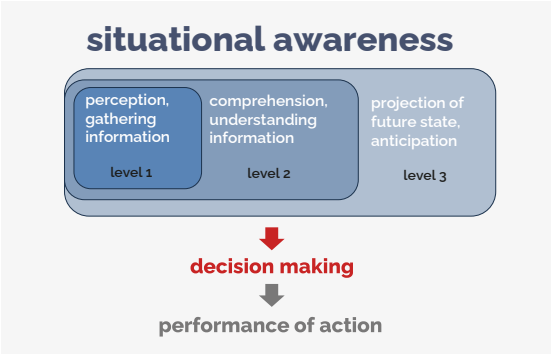
based on a discrepancy between what the person expects and what they get. This typically results from overconfidence bias, a conflict of interest, or because of a lack of risk communication or communication of uncertainty. Non-verbal communication also has a significant impact on the satisfaction of the patient, and is much more important than just the words that are spoken.

While the intraoperative phase is influenced by the two categories of non-technical skills, the most important skill at this stage is situational awareness: if it is absent or inadequate, the other skills will be incorrectly applied too. Situational awareness involves knowing what is going on around something. It consists of gathering information, understanding it, then anticipating what will happen next. Depending on the situation, the actions that flow from it can be conscious or unconscious.

Intraoperative decision-making has four modalities:[4] rule-based (which is typically more important for beginners), intuition (which is prone to cognitive bias), analytical (balancing pros and cons) and creative (developing new options in real time).

Returning to why adverse aesthetic outcomes following implant treatment are still such a big issue, the speaker summarised the key factors. He asserted that intelligent clinical action doesn't just require the stable repetition of learned behaviours, but must be combined with coherence and the flexibility to respond to a changing world. It is essential to focus on human factors, because they are the key to learning flexibility, to protecting patients from avoidable harm, and to preventing clinicians from experiencing frustration and stress.



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EAO Congress Scientific Report; Monaco 2025, Plenary 1

Impact of time in implant dentistry

Ben Moore

What if time did not exist

Physical time is notoriously difficult to define, yet it remains a fundamental dimension of both science and everyday life. While literature and cinema have often imagined 'time machines', physics tells us that travelling backwards in time is not possible. The only way to access the past is through astronomy: by detecting light and other radiation that has crossed the universe over billions of years. The James Webb Space Telescope now allows us to observe galaxies that formed only a few hundred million years after the Big Bang.

To explore even earlier epochs – around 380,000 years after the origin of the universe – we rely on the cosmic microwave background or 'relic radiation', which has been mapped by missions such as COBE, WMAP, and Planck. It is often described as the universe's first photograph, a snapshot of its primordial dawn.

The speaker, an astrophysicist, introduced a powerful metaphor for time: he condensed the entire history of the universe into a single 24-hour day. In this metaphor, the 13.8 billion years since the Big Bang are compressed into two rotations of the clock, each of 12 hours. Each hour corresponds to about 575 million years, each minute to nearly 10 million years, and each second to roughly 160,000 years.

This cosmic day begins with the universe's dawn image, taken just minutes after midnight, when atoms formed for the first time. It reveals tiny quantum fluctuations in temperature and density – the minute irregularities from which all galaxies eventually grew.

Humans appear only in the very last second of this cosmic day. What might the following second bring? On one hand, we could face an apocalyptic desert scattered with bottles and dental implants, reminding us of how little may remain of us in the long run. On the other hand, the alternative points to a more plausible path: the progressive hybridisation of humans and machines, symbolising the growing intertwining of artificial and biological structures. Two faces of the same coin – extinction or transformation – illustrating the uncertainties that lie beyond the last second of our cosmic day.

Ten minutes after midnight takes us almost one hundred million years into the future. Continents will have shifted and humanity will be irrelevant or absent, although Earth will still continue its geological dance. By 12:30, three hundred million years ahead, a new supercontinent will rise, with climates and landscapes alien to us.

Ninety minutes after midnight, nearly a billion years into the future, the Sun's growing brightness will warm the Earth beyond habitability. By noon, seven billion years from the universe's birth, our star will have become a red giant, erasing what remains of the inner planets. The Earth's geological evolution will end in the fire of its own Sun.

At about 10^{21} years, stars and galaxies will have disappeared and the universe will be dominated by black holes. By around 10^{67} years, even black holes will have evaporated, leaving a cold and dark universe – the definitive end.

Howard Gluckman

The impact of time on implant dentistry

In implant dentistry, time has two faces: the speed of the procedure and the longevity of its outcomes. Over the years, surgical techniques have evolved in pursuit of both, seeking to combine efficiency with long-term success. This evolution has been shaped by five factors:

1. Technological innovation
2. Biological understanding
3. Treatment planning evolution
4. Holistic patient wellbeing
5. Access to knowledge and research

Technological innovation has brought CBCT, intraoral scanning, guided and dynamic navigation, stackable guides, and even robotics and artificial intelligence, opening new frontiers alongside biotechnology. The decisive change will come when the three domains of robotics, artificial intelligence and biotechnology converge, reshaping not only how implants are placed but how surgical decision-making itself is conceived.

Biological understanding has refined the concepts of abutment connection, post- extraction socket management, midfacial growth, and partial extraction therapy to better preserve tissues. These advances highlight that long-term stability is not determined by the implant alone, but by the delicate balance between hard and soft tissues, where surgical choices must respect biology as much as mechanics.

Treatment planning has evolved with digital avatars, tools like DSD and Smilecloud, and guided bone harvesting, all contributing to individualised precision. Beyond technical accuracy, these resources allow clinicians to integrate facial analysis, aesthetics and bone availability into a comprehensive digital workflow, turning planning into a truly interdisciplinary and patient-specific process.

Holistic patient wellbeing not only includes communication and trust, but also attention to airway function and systemic health. This broader vision emphasises that implant therapy must be integrated into the patient's overall quality of life, where psychological comfort, breathing, and systemic conditions are included in treatment outcome measures.

Finally, **access to knowledge and research** has been transformed by the coexistence of traditional scientific sources and the immediacy of digital platforms. With smartphones as constant companions, clinicians can now follow live surgeries, share cases, and access research updates instantly, accelerating the diffusion of techniques but also raising new challenges in evaluating the quality and reliability of information.

As the speaker underlined, only time determines our success. Innovations and refined techniques may promise efficiency and aesthetics, but it is long-term follow-up that ultimately validates their predictability and stability. The concluding remarks emphasised the enduring value of natural dentition. While implant dentistry has advanced remarkably, long-term follow-up demonstrates that implant reconstructions are not free of complications, while conventional approaches aimed at preserving teeth can often provide more stable and durable outcomes.


Only time determines
our success.


Teeth are
timeless.

Stephen Chu

Evolution of prosthetic techniques in implant dentistry over time

Although the title of this session referred broadly to the evolution of prosthetic techniques in implant dentistry, the speaker narrowed the scope to single implants and emphasised two dimensions directly linked to time:

- immediate provisional restorations
- the long-term influence of the prosthetic contour on peri-implant tissues

Immediate provisional restorations

Although techniques have varied, post-extraction socket implants have been used for more than 30 years and are well documented. The rationale behind this approach is essentially time-related: it is better to preserve the existing anatomy at the moment of extraction than to attempt reconstruction after atrophy has occurred. It has the added advantage of maintaining hard and soft tissues in a more favourable condition. For the patient, it also means a 'one surgery-one time' approach, reducing interventions while accelerating function and comfort.

Supporting this concept, Wittneben and colleagues[1] performed a meta-analysis of the literature published since 2010 on immediately placed and immediately loaded single implants in the aesthetic zone, and concluded that the procedure represents a predictable and safe treatment option.

Building on this, the speaker presented the concept of 'dual zone therapy' and the prosthetic socket seal.[2] This is designed to preserve both the tissue inside the socket and the surrounding soft-tissue profile, thereby maintaining aesthetics and volume after extraction.[3] The evidence illustrates the difference: Tarnow (2014) reported an average collapse of –0.4 mm in peri-implant soft tissues, whereas Chu (2015) documented a gain of +0.9 mm when using this protocol, highlighting its potential to improve long-term aesthetic outcomes.

Finally, in the fresh-socket approach, precise implant positioning remains critical: studies indicate that a buccal gap greater than 2 mm[4] and a buccal bone thickness of more than 1.5 mm[5] are key thresholds for maintaining stability and aesthetics.

Complementing these findings, Crespi et al. (2018)[6] have highlighted the critical impact of the prosthetic aspect in socket sealing. In a four-year study comparing implants with grafting and membrane versus those with a custom healing abutment, the latter demonstrated superior ridge preservation, with less recession and collapse over time.

These results emphasise that the physical support provided by a prosthetic seal can be more effective than extensive surgical augmentation in maintaining ridge volume and shape.

Options for custom healing abutments include systems such as Cervico, where each prosthesis is fabricated individually, or the use of prefabricated components that achieve the same goal directly. These include gingival cuffs used with temporary cylinders (a three-piece system) and integrated anatomic components (a two-piece system), of which the latter offers greater efficiency. Regardless of the design, the key goal is to create a custom healing abutment that provides consistent anatomic support, and protects the graft.

Effect of prosthetic contour

From abutment systems, the discussion moved to the prosthetic contour – another dimension where time exerts its influence. The way provisional restorations shape the peri-implant soft tissues during healing has long-term consequences for stability and aesthetics, meaning that decisions made in the first weeks after placement can determine outcomes many years later.

With the advent of digital dentistry, the choice between prefabricated stock and custom abutments has become increasingly relevant. In comparing both approaches, the speaker highlighted two main drawbacks of stock designs:

- subcritical contour: insufficient vertical dimension compromises tissue stability and favours peri-implant disease

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2 Chu SJ, Salama MA, Salama H, Garber DA, Saito H, Sarnachiaro GO, Tarnow DP. *The dual-zone therapeutic concept of managing immediate implant placement and provisional restoration in anterior extraction sockets*. Compend Contin Educ Dent. 2012;33(7):524-32, 534. PMID: 22908601

3 Trimpou G, Weigl P, Krebs M, Parvini P, Nentwig GH. *Rationale for esthetic tissue preservation of a fresh extraction socket by an implant treatment concept simulating a tooth replantation*. Dent Traumatol. 2010;26(1):105-11. DOI:10.1111/j.1600-9657.2009.00831.x

4 Levine RA, Dias DR, Wang P, Araújo MG. *Effect of the buccal gap width following immediate implant placement on the buccal bone wall: A retrospective cone-beam computed tomography analysis*. Clin Implant Dent Relat Res. 2022;24(4):403-13. DOI:10.1111/cid.13095

5 Monje A, Chappuis V, Monje F, Muñoz F, Wang HL, Urban IA, Buser D. *The Critical Peri-implant Buccal Bone Wall Thickness Revisited: An Experimental Study in the Beagle Dog*. Int J Oral Maxillofac Implants. 2019;34(6):1328–36. DOI:10.11607/jomi.7657

6 Crespi R, Capparé P, Crespi G, Gastaldi G, Romanos GE, Gherlone E. *Tissue Remodeling in Immediate Versus Delayed Prosthetic Restoration in Fresh Socket Implants in the Esthetic Zone: Four-Year Follow-up*. Int J Periodontics Restorative Dent. 2018;38(Suppl):s97–s103. DOI:10.11607/prd.3123

- decementation: limited bonding area increases the risk of restoration failure

Subcritical contour

The design of the prosthetic emergence profile plays a decisive role in shaping peri- implant soft tissues. The subcritical contour – how the restoration emerges from the implant platform – must be biologically acceptable, avoiding impingement on the crestal bone so that the biologic width can re-establish during healing. In practical terms, this means maintaining a straight contour for approximately 0.5–1.0 mm circumferentially from the implant–restoration interface. By contrast, the critical contour (CEJ to free gingival margin) governs soft tissue support and aesthetics. Stock abutments often fail to provide this vertical segment, leading to over-contoured profiles too close to the bone. This hinders tissue adaptation and favours plaque accumulation, crestal bone loss and peri-implantitis.[7] Digitally designed custom abutments enable the creation of a controlled subcritical contour that aligns with ideal emergence-profile guidelines and enhances cleanability for both screw- and cement-retained restorations (Chu et al., 2019).[8]

Decementation

A second limitation of stock abutments is their reduced bonding surface. With less area available for adhesion, the retention of Ti-bases and superstructures becomes less predictable, with decementation rates of 3–7% reported.[9] Anatomical custom abutments, by contrast, offer a broader bonding interface, which lowers the risk of decementation and improves the durability of prosthetic outcomes.

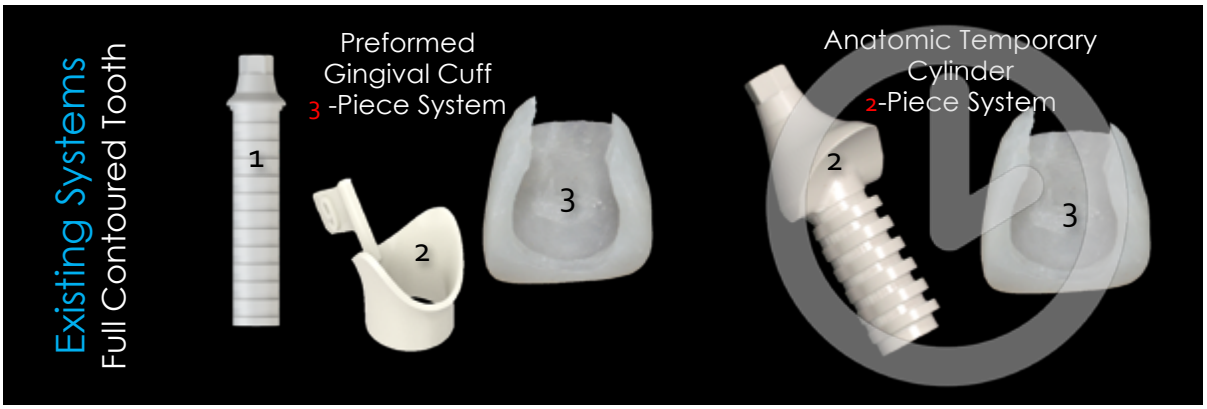
Different restorative components have different mechanical properties, with variations between original and third-party abutments reported in terms of accuracy, microleakage and long-term stability.[10][10] However, the data presented made clear that neither original equipment manufacturers (OEMs) nor third-party manufacturers consistently provide the full range of restorative solutions, meaning comprehensive availability is rare. As a result, choosing the most appropriate restorative components remains a complicated task.

Conclusions

In closing, the speaker emphasised that time-sensitive decisions at the healing stage have lasting consequences. The use of a custom healing abutment or a full provisional restoration crown is essential to support soft tissue volume during the early healing period. Furthermore, custom-designed abutments provide two key advantages:

- they enable the proper development of the subcritical contour, guiding tissue adaptation
- they offer a greater adhesion surface area, thereby reducing the risk of decementation

Together, these strategies underscore how thoughtful prosthetic design can influence both immediate healing and long-term stability.



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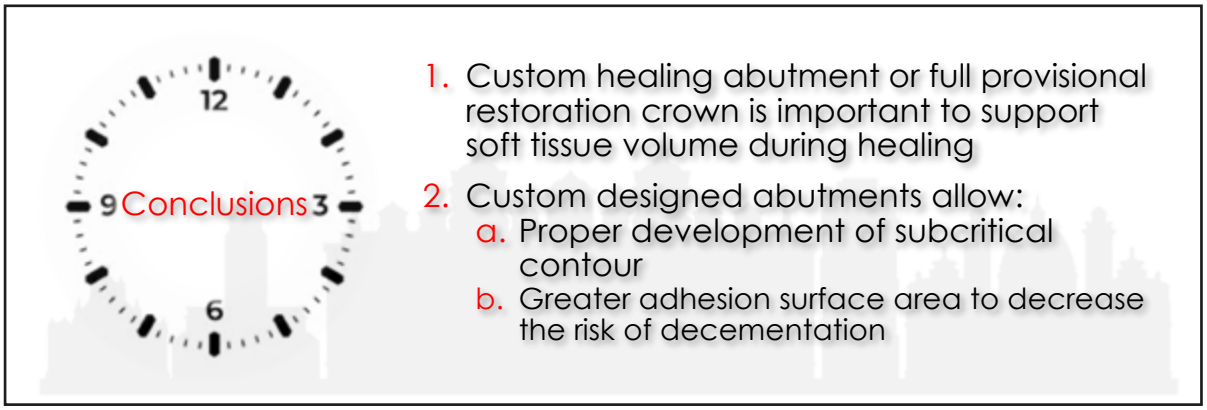
Ideal Design of Implant REP
The contour of the abutment – restoration should be biologically acceptable without impinging on the osseous crest circumferentially since the re-establishment of the biologic width is part of the wound healing process
Chu SJ, Kan JYK, Lee EA, Lin GH, Jahangiri L, Nevins M, Wang H-L. IJPRD 2020


12
9
Conclusions
3
6
1. Custom healing abutment or full provisional restoration crown is important to support soft tissue volume during healing
2. Custom designed abutments allow:
a. Proper development of subcritical contour
b. Greater adhesion surface area to decrease the risk of decementation

EAO Congress Scientific Report; Monaco 2025, Plenary 2

1st Global Consensus for Clinical Guidelines in implant dentistry

This session, chaired by Dr Professor Hom-Lay Wang and Professor Frank Schwarz, presented the vision, methodology and structure of the 1st Global Consensus for Clinical Guidelines in implant dentistry (GCCG).

The GCCG represents an innovative, evidence-based approach to consensus-building in clinical dentistry. Its primary objective is to develop practical, clinically applicable guidelines that can be directly implement in daily practice – metaphorically described as a 'flow diagram for Monday morning'. The inaugural GCCG focused specifically on the rehabilitation of the edentulous maxilla.

A defining feature of the GCCG is its inclusive and global character. It engaged not only a wide network of international experts, but also incorporated the perspectives of patients and cross-specialty stakeholders. This collaborative effort was supported by major foundations in the field, including the Osteology Foundation, the ITI Foundation, and the Oral Reconstruction Foundation, with publishing partnerships through Wiley and Quintessence.

Organisational structure and methodology

The initiative was spearheaded by Ronald Jung, Frank Schwarz and Hom-Lay Wang, supported by a steering committee, scientific leaders, a scientific task force, and a methodological consultant, Ina Kopp.

It employed a distinctive and rigorous methodology. Central to its approach was the integration of Patient-Reported Outcomes (PROs) and Clinician-Reported Outcomes (ClinROs). Professor Schwarz emphasised the importance of aligning clinician and patient perspectives. A mismatch often occurs as clinicians tend to focus on technical outcomes (such as pink aesthetic scores), while patients are more concerned with personal impacts and potential 'decision regret' (for example, questioning whether undergoing implant treatment was the right choice). To address this gap, the GCCG developed a core outcome set for the edentulous maxilla, mapping 49 consensus-based recommendations directly to 34 specific PROs and ClinROs.

Consensus was built through a comprehensive process including eight systematic reviews and five Delphi surveys, which collected feedback from a broad group of clinicians, patients and public stakeholders, ensuring diverse perspectives were incorporated.

The four working groups

Four working groups were established, each focusing on a key clinical question:

- **Working Group 1.** Determined the number of implants required and the timing of placement and loading (e.g. immediate vs. delayed).
- **Working Group 2.** Compared short implants with standard or zygomatic implants.
- **Working Group 3.** Evaluated the necessity of bone augmentation, specifically sinus grafting and ridge augmentation.
- **Working Group 4.** Assessed the choice between implant-supported fixed prostheses and removable overdentures.

The groups brought together 108 experts from over 27 countries, who convened in Boston to finalise the consensus.

Clinical workflow and presentation outline

A key feature of the GCCG is its organisation around a structured clinical workflow, moving beyond a narrow focus on implant placement alone. The guidelines are designed to guide clinicians through the entire patient journey:

- Patient selection and diagnostics
- Treatment planning
- Treatment procedures
- Management of complications
- Long-term maintenance (highlighted as a critical phase)

During the plenary, presentations from the chairs of the four working groups guided the audience through this workflow.

Todd Schoenbaum: patient selection and diagnostics

Todd Schoenbaum described how his task had been to synthesise and present the consensus findings related to patient selection and diagnostics and treatment planning.

Part 1: patient selection

A. Comprehensive patient assessment

A strong consensus (95%) was reached on two fundamental principles. First, clinicians must conduct a structured assessment that includes anatomical, systemic, psychological and financial considerations. Second, a shared decision-making process must be proactively initiated to align treatment options with the patient's personal goals.

B. Evaluating the existing denture

A critical and somewhat surprising consensus (97%) was that if a patient's current removable denture is satisfactory in terms of aesthetics, function, phonetics and hygiene, implant treatment may not be required. The focus should therefore shift to patients who are dissatisfied with their current prosthesis. For these patients, there was near-unanimous agreement (98%) that clinicians must present both fixed and removable implant-supported options.

C. Evaluation for implant rehabilitation

The diagnostic process should include an assessment of:

- Facial and smile aesthetics (e.g. symmetry, smile line).
- Vertical restorative space (occlusal vertical dimension).
- The patient's tolerance for palatal coverage.
- Inter-arch relationships (skeletal class).
- Ridge morphology.
- Financial expectations and limitations.

D. Clinical scenarios for residual bone

Consensus recommendations were provided for specific resorption patterns, with varying levels of agreement:

- **Sufficient anterior bone, severely resorbed posterior ridge (76% consensus):** Options include standard anterior implants with posterior sinus augmentation (lateral or transcrestal); standard anterior implants with tilted posterior implants; or standard anterior implants with posterior zygomatic implants.
- **Sufficient anterior bone, compromised posterior height (<5mm) (90% consensus):** Options include standard anterior implants with posterior sinus augmentation, or anterior implants with posterior short implants.
- **Sufficient posterior bone, prohibitively thin anterior bone (90% consensus):** Either rely on posterior implants only (if feasible) or augment the anterior ridge prior to placing standard posterior implants.
- **Severely resorbed maxilla (compromised throughout) (87% consensus):** Zygomatic implants should be considered if augmentation is not feasible, with the caveat that such surgery must be performed only by highly trained surgeons in appropriate clinical settings. Additionally, there was a 77% consensus to exercise caution when using implants 6 mm or shorter for full-arch rehabilitation, due to insufficient supporting evidence.

Part 2: Diagnostics and treatment planning

A. Imaging and evaluation

There was strong consensus (97%) that cone beam computed tomography (CBCT) is required for all full-arch edentulous implant cases. CBCT should be used to evaluate anatomical complexity, bone volume, morphology and deficiencies, particularly near the nasal cavity and maxillary sinuses (81% consensus).

B. Prosthetically driven planning

A central theme was the need for a prosthetically driven approach. Key recommendations included:

- The prosthetic plan must be finalised before surgery begins (91% consensus).
- A facially driven approach should guide assessment of tooth position, lip support and occlusion (96% consensus).
- CBCT (DICOM) data must be merged with the diagnostic setup (using radiopaque markers or digital templates) for accurate planning.
- The diagnostic setup, whether digital or conventional, should be tested intraorally to validate aesthetics, phonetics and function.
- A clinical try-in is essential before surgery to confirm these factors and ensure patient satisfaction (96% consensus).

C. Final workflow integration

Imaging and prosthetic setup must be integrated and template-based guided surgery should be used whenever possible to ensure implants are placed in the correct, pre-determined prosthetic position (91% consensus).

Professor Schoenbaum concluded by noting that most patient-reported and clinician-reported outcomes would be addressed in subsequent presentations and then introduced the next speaker, Dr Franz Strauss (Figures 1 and 2).

Dr Strauss opened his presentation by reinforcing the patient-centred focus of the GCCG initiative. He then described the consensus conclusions on treatment planning, covering number and distribution of implants, prosthetic design, immediate loading protocols, and the management of the severely resorbed maxilla.

Implant number and distribution

A key question was the number of implants required for a full-arch restoration. The consensus offered clear but flexible guidance:

- Fixed prostheses: a minimum of four implants is required. To minimise complications, however, the group recommended considering the placement of a fifth or sixth implant.
- Removable overdentures: likewise, a minimum of four implants is recommended, with additional implants advised to enhance stability and reduce future risk of complications.

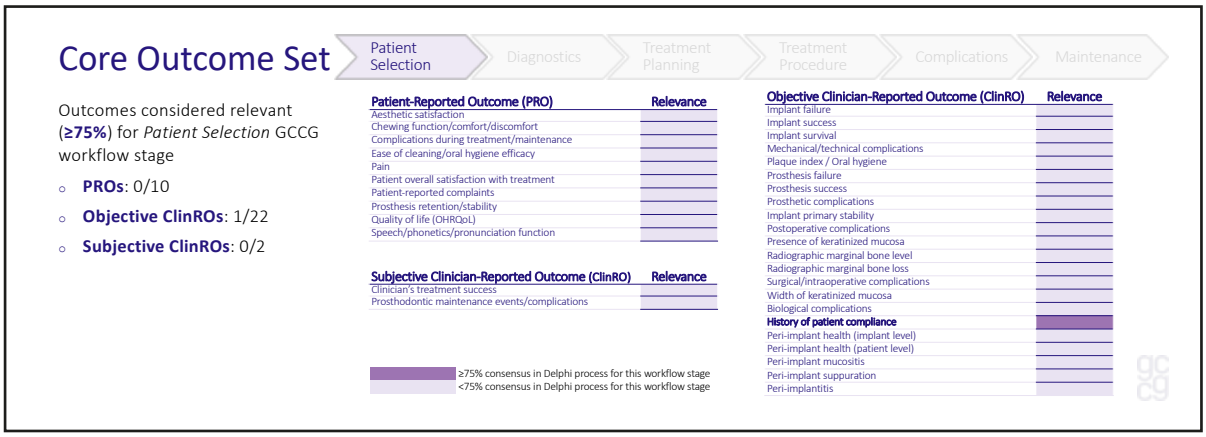


Figure 1: Consensus on core outcomes for patient selection in edentulous maxilla rehabilitation

Prosthetic design and bone preservation

The consensus strongly emphasised minimising patient morbidity. A key recommendation was to prioritise prosthetic designs that preserve bone, particularly an FP-1 prosthesis (replacement of teeth only) or a shallow FP-2 prosthesis (replacement of teeth plus a limited portion of gingiva). Dr Strauss highlighted a critical issue: these recommendations are largely based on clinical expertise, rather than robust scientific evidence, reflecting a gap between daily practice and published research and underscoring the need for future studies.

Immediate implant placement and loading

The consensus supported the use of immediate loading protocols to shorten treatment time and improve patient satisfaction, while recognising the current limitations of the evidence. Key recommendations included:

- Employing a one-piece, screw-retained, cross-arch splinted provisional prosthesis (86%).
- Ensuring a minimum of four implants with adequate primary stability (95%).
- Avoiding removable interim prostheses during the healing phase to enhance the patient experience (90%).

This approach was recommended for both immediate placement in extraction sockets and for healed sites, provided that clinical conditions and implant stability were favourable.

Management of the severely resorbed maxilla

For cases of advanced bone resorption throughout the arch where augmentation is not feasible, the consensus supported the use of zygomatic implants, with strict conditions:

- Zygomatic implant surgery must be performed exclusively by highly trained and experienced surgeons.
- These procedures should ideally be conducted in a hospital setting.
- Immediate loading with a cross-arch splinted prosthesis should be considered where possible.

This recommendation (75% consensus) emphasised that zygomatic implants represent a highly specialised technique requiring advanced surgical expertise.

Conclusion

Dr Strauss concluded by noting that for the treatment planning phase, no definitive consensus was reached on specific PROs or ClinROs. Instead, the relevant outcomes are expected to be evaluated either before initiation of treatment or during the long-term maintenance phase (Figure 3).

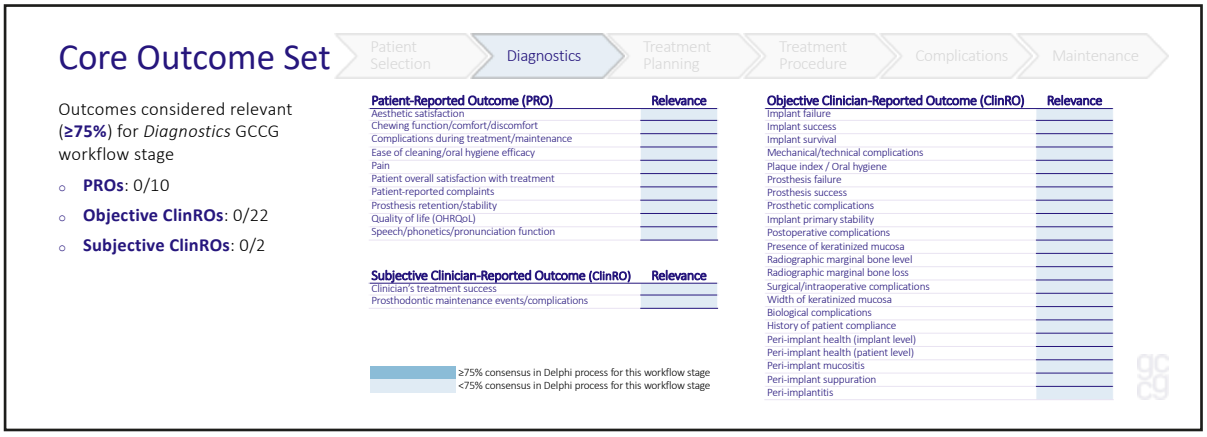


Figure 2: Consensus on core outcomes for diagnostic phase in edentulous maxilla rehabilitation

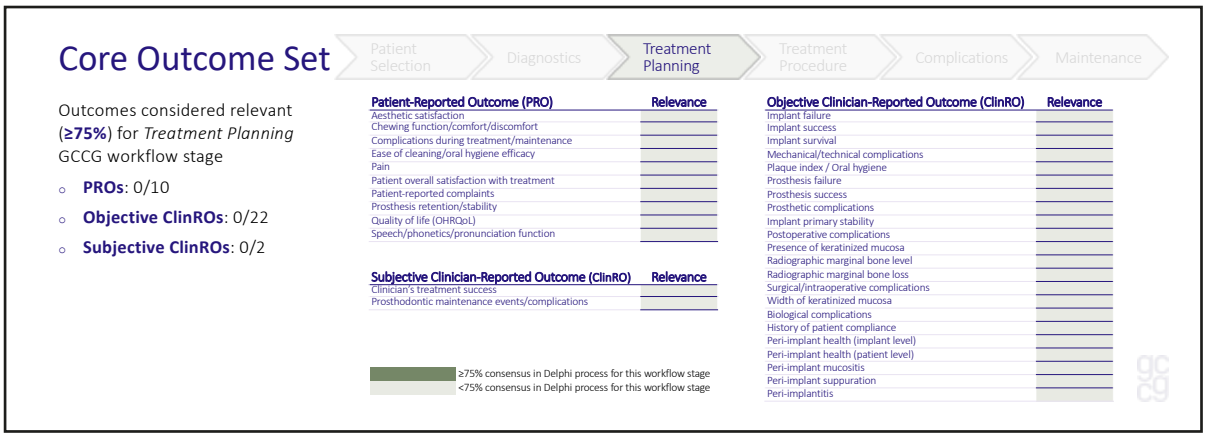


Figure 3: Consensus on core outcomes for treatment planning in edentulous maxilla rehabilitation

Summary of Dr Guo-Hao (Alex) Lin's presentation on treatment procedures and complications

Dr Alex Lin's presentation focused on the practical application of the GCCG guidelines, outlining consensus recommendations for treatment procedures and the management of specific complications in the rehabilitation of the edentulous maxilla.

Part 1: Treatment procedures

Dr Lin organised his recommendations around a comprehensive clinical workflow (Figure 4).

A. Surgical planning and implant placement

The foundational recommendation, supported by a consensus (81%), is to plan implant positioning based on the finalised prosthetic setup. The goal is to perform guided surgery to ensure implants are placed in the correct prosthetically driven position. Dr Lin illustrated this with a clinical case involving a fully digital workflow, using a bone reduction guide and a stackable surgical guide to achieve optimal implant placement.

B. Hard and soft tissue management

- **Bone augmentation.** For vertical ridge augmentation, there was an 80% consensus on using rigid fixation pins to stabilise membranes and particulate grafts, thereby preventing membrane migration and ensuring graft containment. No specific consensus was reached regarding horizontal augmentation.
- **Soft tissue.** The group strongly recommended that when keratinised mucosa is insufficient, soft tissue grafting should be performed – either at the time of implant placement or during a second-stage surgery – to improve tissue phenotype and ensure long-term health and stability. This statement reached a consensus (91% agreement).

C. Occlusal planning and interim prosthesis

- **Occlusion.** A unanimous strong consensus (100%) supported selecting an appropriate occlusal scheme, ideally mutually protected occlusion, to reduce occlusal overload and minimise prosthetic complications.
- **Interim prosthesis.** Delivering a screw-retained interim prosthesis was deemed critical. It functions as a 'test drive,' allowing the clinician to evaluate and refine aesthetics, phonetics, function and hygiene access with the patient before fabricating the final prosthesis. This recommendation achieved a 95% strong consensus.

D. Prosthetic construction

- **Overdentures.** For implant-supported overdentures, there was a consensus (92%) for reinforcing with a metal framework, adopting an open-palate (horseshoe) design for comfort, and selecting attachments (e.g. studs, magnets, bars) based on available space and implant distribution.
- **Fixed prosthesis.** For fixed full-arch restorations, there was a strong consensus (95%) in favour of screw-retained designs to ensure retrievability, with tissue-facing surfaces contoured for easier hygiene access. Durable materials such as metal-acrylic, metal-ceramic, or monolithic zirconia (when space allows) were recommended (84% consensus).

E. Fit verification and final delivery

Consensus (93%) supports taking a master impression – conventional or digital – and using an intraoral verification jig to confirm passive fit of the framework. If a misfit is detected, sectioning and reassembling the framework or retaking the impression is necessary.

F. Post-delivery protection

For patients with bruxism or high occlusal forces, providing a hard acrylic occlusal guard was strongly recommended (94% consensus) to prevent mechanical and biological complications.

Part 2: Complications

Dr Lin presented the consensus for managing two specific complications.

A. Sinus membrane perforation

If a perforation occurs during sinus lift procedures (lateral window or transcrestal) and is less than 10 mm, the consensus (82%) is to repair it with a resorbable collagen membrane. If the membrane successfully contains the graft, the bone augmentation procedure can and should proceed, followed by close monitoring for postoperative sinus complications.

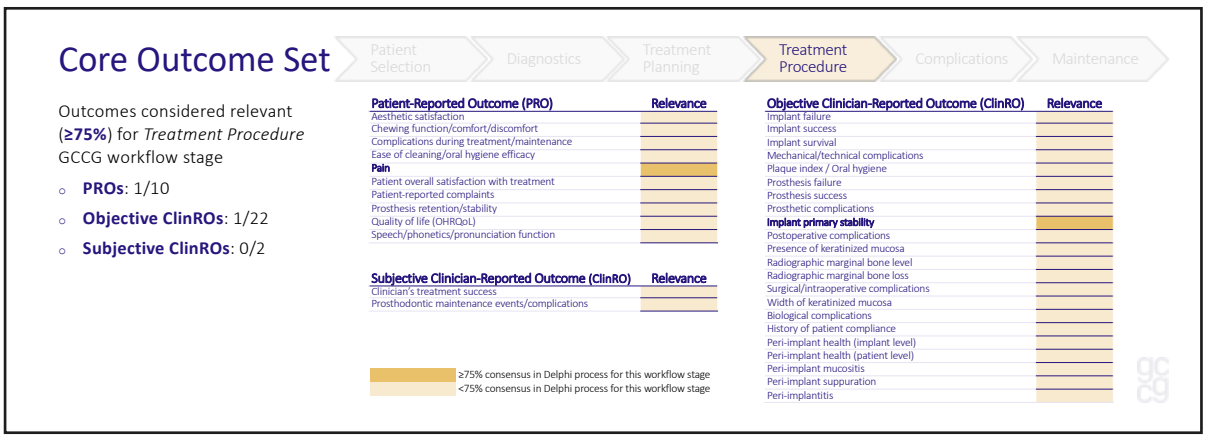


Figure 4: Consensus on core outcomes for treatment procedure phase in edentulous maxilla rehabilitation

B. Zygomatic implant safety

Reiterating previous speakers, Dr Lin emphasised that zygomatic implants should only be placed by highly skilled and trained surgeons (87% consensus). Candidates must be carefully selected – specifically those with a severely resorbed maxilla where bone augmentation is not feasible – and fully informed of the risks, including potential sinus or orbital involvement.

Conclusion

For the treatment phase, only a few core outcomes reached consensus: pain was identified as the key PRO, and implant primary stability as the key ClinRO. Several additional PROs and ClinROs were also defined for complications (Figures 4, 5).

Dr Giulia Brunello

Dr Giulia Brunello concluded the presentation by addressing the critical, yet often overlooked, maintenance phase of implant therapy. She emphasised that maintenance is not merely the final step of treatment but a proactive, long-term commitment that is essential for preventing complications and ensuring patient satisfaction.

The importance of baseline records

A foundational principle established by the consensus is the need to collect comprehensive baseline records immediately after delivery of the final prosthesis. These records serve as a crucial reference for all future assessments and include:

- Clinical parameters: probing pocket depths, bleeding on probing, and plaque scores around each implant.
- Radiographic evaluation: radiographs to establish initial marginal bone levels.

Dr Brunello illustrated this with a patient case, showing how stable bone levels and healthy clinical parameters at the five-year follow-up could be meaningfully evaluated because they were compared with the established baseline.

Supportive peri-implant care and recall visits

The consensus provides clear guidelines for supportive care, highlighting that the frequency of recall visits must be individualised according to each patient's risk profile. While the typical interval is 6 to 12 months, high-risk patients may require visits every 3 to 4 months.

At each maintenance appointment, the following should be performed:

- Reassessment of peri-implant health status: monitoring changes in probing depths, bleeding on probing, and mucosal recession.
- Professional cleaning: thorough removal of plaque and calculus from the implants and prosthesis.
- Prosthetic and occlusal check: evaluating prosthesis integrity, stability, and occlusion.
- Radiographs: taken when clinically indicated to assess bone levels.

Patient oral hygiene instruction

A strong consensus (98%) was reached on the necessity of providing a tailored oral hygiene regimen for each patient. This regimen should reflect both the type of prosthesis and the patient's manual dexterity. Recommended tools include:

- Manual or electric toothbrushes.
- Interdental brushes and implant-specific floss.
- Water irrigators as an adjunct.

Importantly, the consensus recommends that clinicians periodically ask patients to demonstrate their cleaning technique to ensure it is being performed correctly, rather than only checking for plaque accumulation.

Specifics for overdenture maintenance

For patients with implant-supported overdentures, maintenance requires additional considerations. Clinicians should:

- Educate patients that retentive components (e.g. clips, attachments) will require periodic replacement to ensure stability.
- Monitor for loss of retention or signs of instability.
- Evaluate the patient's ability to maintain proper hygiene and function.

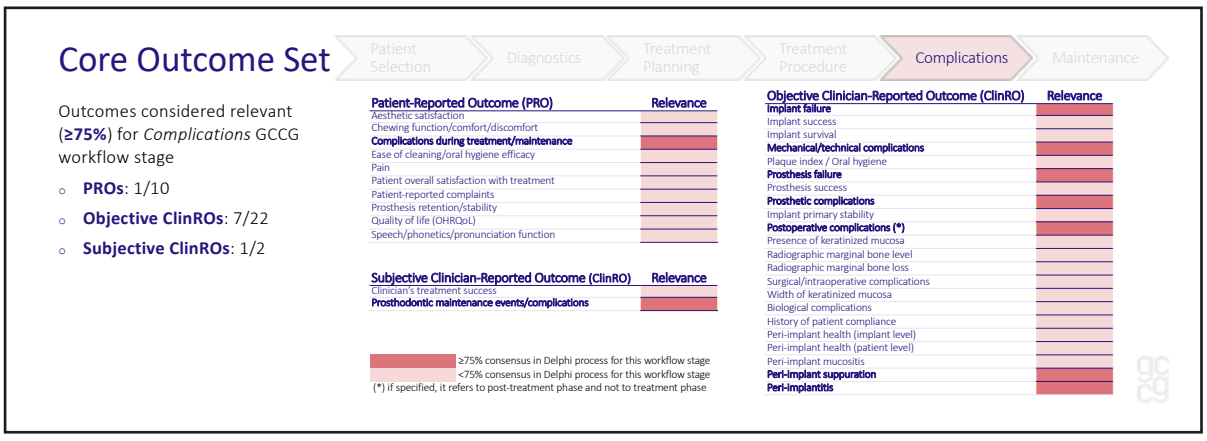


Figure 5: Consensus on core outcomes for management of complications in edentulous maxilla rehabilitation

Core outcome sets for the maintenance phase

The consensus identified key outcomes to monitor during maintenance (Figure 6):

- PROs: the two most critical are the ease of cleaning the prosthesis and overall patient satisfaction.
- ClinROs: a significant number of objective measures (14 out of 22 considered) reached consensus, underscoring the importance of rigorous clinical monitoring in this phase.

Conclusion

Dr Brunello concluded by describing how maintenance fits into the overall GCCG clinical workflow. She positioned it as the essential long-term component that ensures the success and longevity of implant rehabilitation, ultimately protecting the investment made by both the clinician and the patient during the active treatment phases.

Summary

This plenary session introduced the ground-breaking work of the first Global Consensus for Clinical Guidelines (GCCG).

1. Introduction and vision

- The GCCG represents a new and innovative approach to consensus-building by engaging a global community of experts, patients and cross-specialty stakeholders. Its primary goal is to create practical, clinically applicable guidelines – a 'flow diagram for Monday morning' – that integrate Patient-Reported Outcomes (PROs) and Clinician-Reported Outcomes (ClinROs). This ensures treatment decisions balance clinical expertise with patient values and expectations, addressing potential 'decision regret'. The outcome is 49 consensus-based recommendations mapped to a core set of 34 PROs and ClinROs.

2. Key consensus findings by clinical workflow phase

- **Patient selection and diagnostics.** The consensus emphasises the importance of a comprehensive patient assessment, including anatomical, systemic, psychological and financial factors. A key recommendation is that if a patient is satisfied with their existing denture, implant treatment may not be necessary. For those who are unsatisfied, both fixed and removable implant options must be discussed. Diagnosis must be prosthetically driven, using CBCT scans for all cases and merging this data with a diagnostic wax-up to guide planning.
- **Treatment planning.** A minimum of four implants is recommended for both fixed and removable prostheses, with consideration of a fifth or sixth implant to prevent complications. The consensus strongly supports immediate loading protocols (using a screw-retained, cross-arch splinted prosthesis) to enhance patient satisfaction, provided sufficient primary stability is achieved. For severely resorbed maxillas, zygomatic implants are an option, but they must only be placed by highly trained surgeons in appropriate settings.
- **Treatment procedures and complications.** The consensus strongly advocates for a fully guided surgical approach based on a finalised prosthetic plan. Key recommendations include using rigid fixation for vertical bone augmentation, performing soft tissue grafting when keratinised mucosa is insufficient, and employing a mutually protected occlusal scheme. For the prosthesis, screw-retained designs are preferred for retrievability and hygiene. Management of complications includes repairing sinus perforations (<10mm) with a collagen membrane and reiterating the need for specialist care for zygomatic implants.
- **Maintenance.** This phase was highlighted as critical for long-term success. The guidelines stress the importance of establishing baseline records (probing depths, bleeding, plaque, radiographs) after prosthesis delivery. Recall intervals should be individualised, and a tailored oral hygiene regimen must be established for each patient. For overdentures, monitoring and replacing retentive components is essential. The key outcomes in this phase are the patient's ease of cleaning and overall satisfaction.

Conclusion

The first GCCG establishes a new, patient-centric standard for implant dentistry. By providing a structured, evidence-informed workflow from diagnosis through to long-term maintenance, and integrating patient values directly into clinical decision-making, these guidelines empower clinicians to improve patient care and outcomes predictably and systematically.

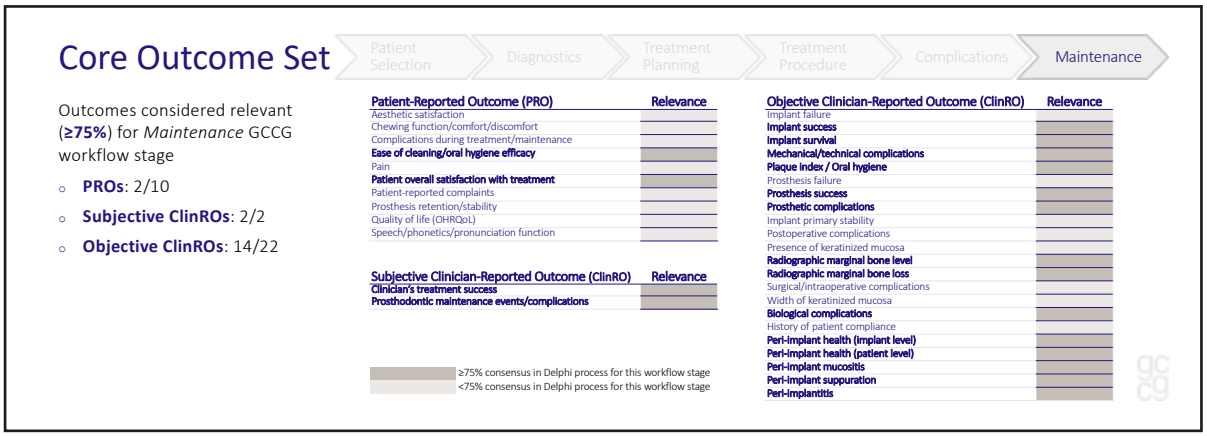


Figure 6: Consensus on core outcomes for maintenance phase in edentulous maxilla rehabilitation

EAO Congress Scientific Report; Monaco 2025, Plenary 3

Timing of peri-implantitis treatment

Giovanni Zucchelli

Management of peri-implant defects via soft tissue manipulation and prosthetic reconstruction

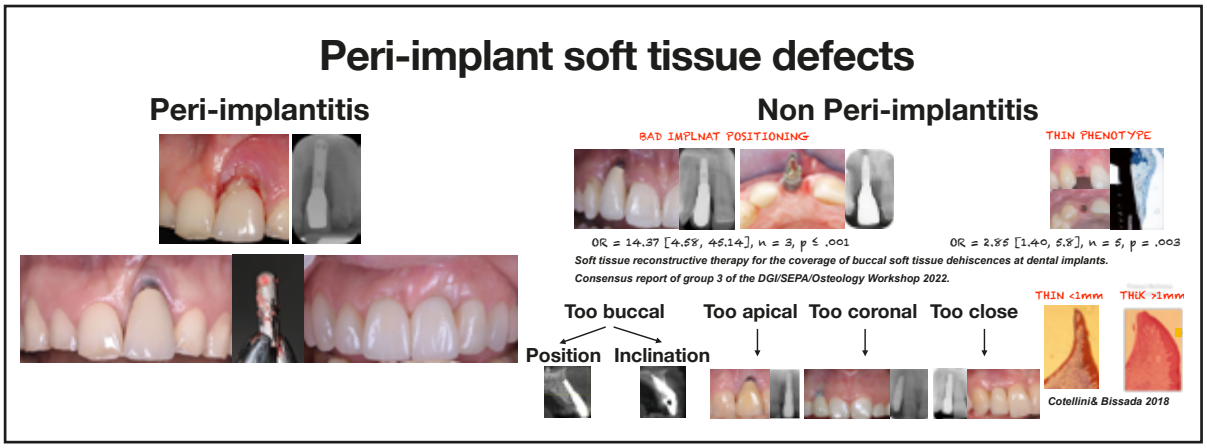
Professor Giovanni Zucchelli's lecture focused on the management of peri-implant defects in the aesthetic zone through soft-tissue manipulation and prosthetic reconstruction. He began by noting that aesthetic complications can generally be divided into two categories: those associated with peri-implantitis, which are characterised by inflammatory bone loss, and those related to soft-tissue deficiencies or implant mispositioning. The latter are far more common and are typically mechanical or anatomical, rather than infectious in nature.

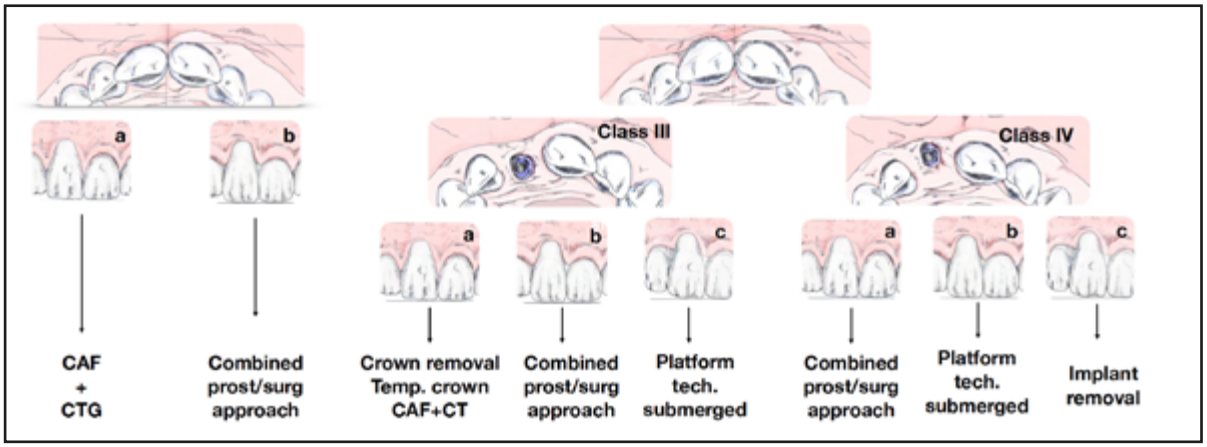
Professor Zucchelli underscored the importance of differentiating between true bone loss and the absence of the buccal bone plate, explaining that a missing vestibular wall does not necessarily indicate contamination or implant failure. In such situations the implant may remain both functional and aesthetically stable thanks to fibrointegration – a biological adaptation where connective tissue forms a protective interface in the absence of direct bone contact. This concept redefines the notion of implant success, placing greater importance on the stability of the soft tissue complex rather than purely on osseointegration.

He went on to outline his step-by-step surgical-prosthetic workflow, which is built upon three essential principles:

1. Three-dimensional evaluation of the implant position
2. Optimisation of soft-tissue thickness and biotype
3. Progressive prosthetic reconstruction to guide mucosal maturation over time

In cases involving buccally positioned implants or fenestrated bone, Professor Zucchelli demonstrated the effectiveness of combining dense connective tissue grafts (CTGs) harvested from the palate, with partial-thickness flaps and tension-free coronal advancement. The goal is not necessarily to cover all exposed titanium, but to increase tissue thickness and re-establish a natural gingival contour. During the prosthetic phase, he recommended the use of





under-contoured provisional crowns, which are then progressively adjusted to sculpt and condition the peri-implant mucosa.

A key innovation he highlighted was the use of a new generation of angulated abutments. These are designed to correct deviations of up to 25–30 degrees, while maintaining the mucosal seal and proper load distribution. Unlike traditional angulated components, this system incorporates a two-part structure with a smooth conical transition and optimised internal geometry. This allows precise reorientation of mispositioned implants without compromising biological width or mechanical integrity. It has expanded the range of treatable aesthetic cases, especially in the anterior maxilla, where minor angulation corrections can determine the success or failure of the final outcome.

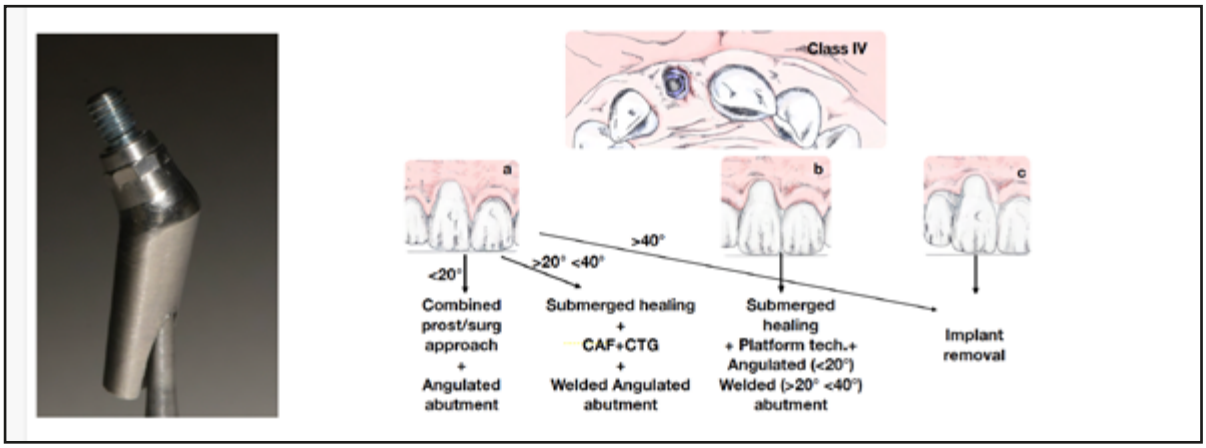
For deeply placed (apical) implants, Professor Zucchelli noted that aesthetic correction is feasible when at least 2 mm of keratinised mucosa are present, as this amount of tissue thickness is sufficient to ensure long-term marginal stability. Conversely, where an implant has been placed in an excessively coronal position, with the platform situated above the cementoenamel junction of adjacent teeth, removal is clearly indicated. This is because the prognosis remains poor even after multiple grafting attempts. He also discussed the challenges of implants that are positioned too close to natural teeth, where the loss of the interproximal papilla is difficult to reverse. In these scenarios, he advocated an interdisciplinary approach combining orthodontic treatment, redesign of the prosthesis, and mucogingival surgery.

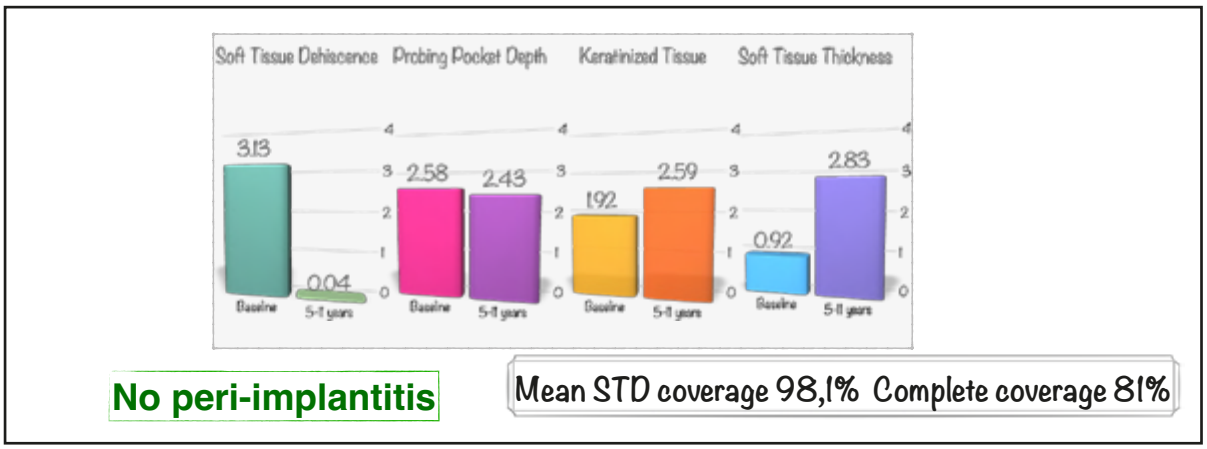
Throughout his presentation, Professor Zucchelli presented clinical cases with follow-ups exceeding ten years, demonstrating that aesthetic and functional stability can be achieved even in the absence of buccal bone, provided that the soft-tissue envelope is thick, well-contoured, and harmoniously integrated with the prosthetic emergence profile.

He concluded by emphasising that the success of modern implantology does not depend solely on bone regeneration, but rather on the synergy between mucogingival surgery and prosthetic design. 'The scalpel,' he said, 'corrects the defect – but it's the prosthesis that educates the tissue.'

Conclusions

- Many aesthetic defects around implants where peri-implantitis is not present can be successfully treated using a sequenced prosthetic-surgical approach.
- Implant depth and the ability to achieve angular correction expand the range of salvageable cases.
- Long-term stability largely depends on connective tissue graft thickness and maturation; waiting periods are critical.
- Certain configurations (for example excessively coronal placement and insufficient interproximal space) limit predictability and point towards explantation or orthodontic space gain.
- Clinical judgment must be based on direct examination (probing, tissue texture, bleeding), not solely on imaging.





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Panos N. Papapanou

EFP guidelines for the prevention and treatment of peri-implant diseases

Professor Panos N. Papapanou's presentation focused on the European Federation of Periodontology (EFP) S3-level clinical practice guidelines for the prevention and treatment of peri-implant diseases. He began by posing a fundamental question: why do clinicians need evidence-based guidelines when experience often seems to suffice? His answer was both candid and convincing – that every clinician, regardless of training or intuition, is subject to bias, and that these biases, conscious or not, can distort clinical judgment. Evidence-based protocols provide a safeguard against personal interpretation and allow collective experience to guide individual decisions.

Professor Papapanou described how the EFP guidelines had been developed through a process involving systematic review, expert consensus and external validation. The EFP S3 methodology integrates the highest available levels of evidence with clinical applicability and transparency. Every clinical question was formulated a priori using the PICO framework (Population, Intervention, Comparison, Outcome) to ensure that each recommendation was based on reproducible scientific grounds. He emphasised that randomised controlled trials carry the greatest evidentiary weight, with smaller or shorter studies explicitly excluded if their methodological quality could not be assured.

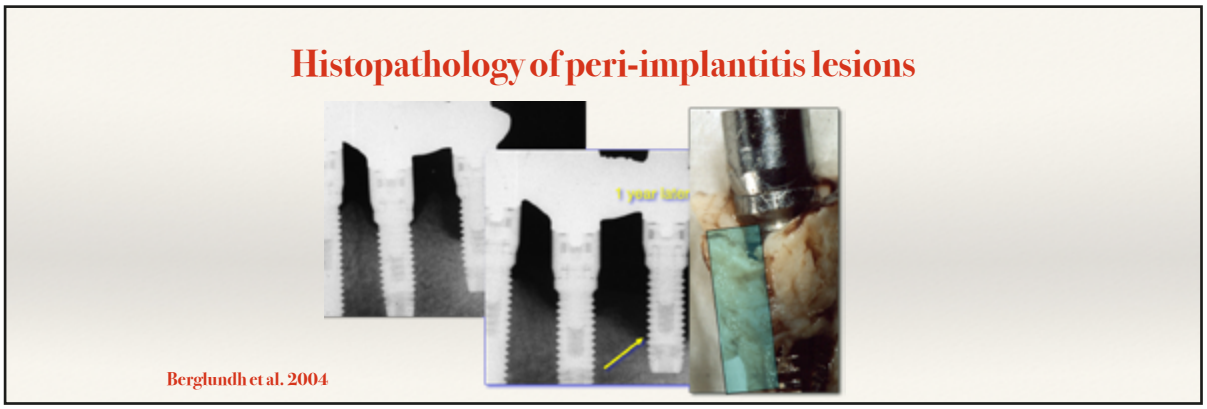
The EFP guidelines on peri-implant diseases are the organisation's third major consensus project and follow on from guidelines on stages I–III and stage IV periodontitis. The meeting took place in La Granja, Spain, in November 2022, and its conclusions were published in the *Journal of Clinical Periodontology* in 2023. Four working groups were established: one addressing the prevention of peri-implant diseases, a second focusing on the management of peri-implant mucositis, with two others devoted to peri-implantitis treatment (one for non-surgical and the other for surgical approaches).

Professor Papapanou summarised the essential messages of the consensus. The first concerns the assessment of peri-implant health. Clinicians are advised to probe six sites per implant using light force, and to record bleeding on probing, probing depth, and changes in the mucosal margin at each recall visit. Baseline radiographs should be obtained three months after prosthetic loading, once physiological remodelling is complete, and repeated whenever increased probing depths with persistent bleeding or suppuration are detected. These measures form the foundation for early diagnosis and longitudinal monitoring.

He then described the preventive framework proposed by the EFP, which is based on the continuum of implant therapy. It begins with **primordial prevention** (addressing risk factors before implant placement) then moves to **primary prevention** (avoiding disease initiation), **secondary prevention** (preventing recurrence), and **tertiary prevention** (limiting complications). Professor Papapanou emphasised that prevention begins well before surgery: correct implant positioning, adequate spacing and prosthetic design are factors in disease prevention, as well as aesthetic optimisation. He noted that every implant candidate must be considered to be at risk, particularly those with a history of periodontitis, diabetes, or poor plaque control.

He drew attention to the biological distinctiveness of peri-implant lesions. Histopathologic studies, including those by Berglundh and Lindhe, have shown that peri-implant inflammatory lesions are topographically and immunologically different from periodontitis. Without the buffering capacity of the periodontal ligament, the connective tissue infiltrate lies in close proximity to the bone and is dominated by plasma cells, leading to more aggressive and circumferential bone destruction. More recent single-cell RNA sequencing studies have confirmed this unique microenvironment, highlighting why peri-implantitis tends to progress faster and less predictably than periodontitis. 'For that reason,' he warned, 'mucositis should never be treated as a minor finding. Every day of delay increases the risk of irreversible loss.'

Turning to therapeutic recommendations, Professor Papapanou outlined that mucositis treatment begins with mechanical debridement using appropriate ultrasonic or plastic-coated instruments, complemented by glycine or erythritol air-polishing systems. Adjunctive antiseptics or probiotics may be considered, though the evidence for these remains weak. Local or systemic antibiotics, photodynamic therapy, and diode lasers are not recommended for mucositis, as studies have not shown superior outcomes compared to mechanical cleaning alone. When prosthetic



design prevents effective hygiene, removal or modification of the superstructure becomes essential, as resolution of the disease is unlikely otherwise.

He emphasised that non-surgical therapy should always precede surgical intervention, both to reduce bacterial load and to improve patient compliance. Success, he said, is not defined by shallow probing depths alone; residual pockets of up to 5 mm can be compatible with health if there is no bleeding or suppuration. Treatment outcomes should be evaluated 6–12 weeks after active therapy, focusing on the absence of inflammation rather than on numerical values.

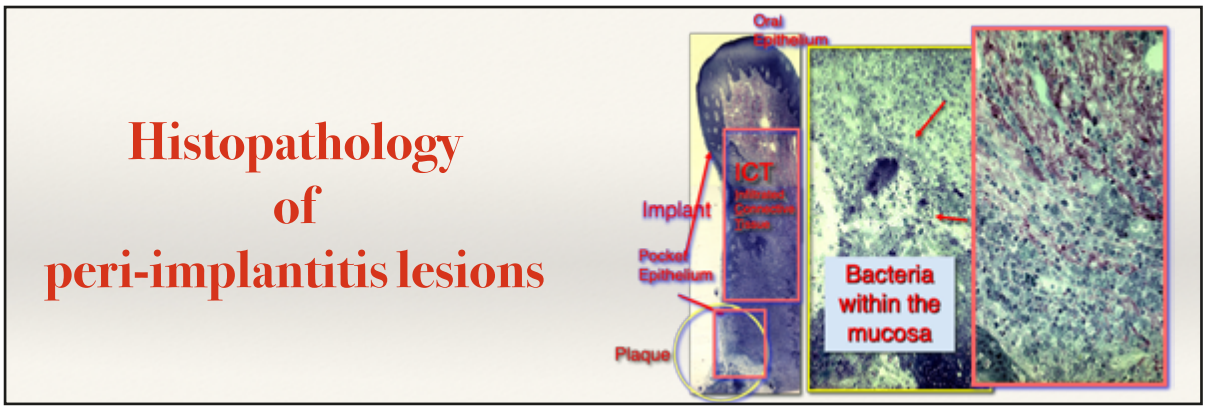
Turning to surgical management, Professor Papapanou reviewed the consensus findings showing that access flap surgery and regenerative procedures can both be effective, with the choice depending on the morphology of the defect and the expertise of the clinician. Regenerative approaches are beneficial in the treatment of contained intraosseous defects, while conventional, pocket-reducing surgical treatment is effective in non-contained or horizontal defects. There is still insufficient evidence to recommend submerged healing over transmucosal healing. The decontamination of the implant surface remains a challenge: titanium brushes may offer practical advantages, while the role of implantoplasty continues to be debated. Chlorhexidine, he cautioned, should be avoided for the decontamination of implant surfaces during surgery due cytotoxicity; saline remains the safest irrigant.

Professor Papapanou concluded by underscoring the importance of patient-reported outcomes in assessing treatment success. In addition to radiographic stability and pocket reduction, patient comfort and aesthetic satisfaction are integral components of a successful treatment outcome. The EFP guidelines, he said, provide a comprehensive, evidence-based framework that integrates prevention, diagnosis, treatment and maintenance. 'They remind us,' he concluded, 'that we do not treat radiographs or probing depths – we treat people.'

Conclusions

The EFP S3 clinical guidelines on peri-implant diseases provide a comprehensive framework for prevention, diagnosis, treatment and maintenance. They offer clear and transparent recommendations based on the best available evidence and international expert consensus.

- Prevention begins with surgical and prosthetic planning.
- Mucositis must be treated immediately to prevent progression.
- Peri-implantitis is more aggressive than periodontitis and requires early intervention.
- No single therapy has proven superior: clinical judgment and individualisation are essential.
- Patient-centred outcomes should be integral to treatment objectives.
- Guidelines must be periodically updated as new evidence emerges.



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Alberto Monje

AAP/AO guidelines for the prevention and treatment of peri-implant diseases

Professor Alberto Monje presented the joint consensus guidelines of the American Academy of Periodontology (AAP) and the Academy of Osseointegration (AO) on the prevention and treatment of peri-implant diseases. The guidelines were drawn up during a meeting in Oak Brook, Illinois, that brought together 41 experts to produce eight thematic reviews. Four of these were on prevention and four on treatment. The reports were jointly published in the *Journal of Periodontology* and the *International Journal of Oral and Maxillofacial Implants*, with additional summaries in the *Journal of Clinical Periodontology Research Digest*. Professor Monje emphasised that while the guidelines were inspired by the European framework, the American approach focused more narrowly on clinical applicability and decision-making matrices derived from both evidence and expert consensus.

He began by highlighting the main systemic and local risk indicators that were identified across the reviews. A history of periodontitis, tobacco use, and poorly controlled diabetes emerged as the strongest predictors of peri-implant disease, while alcohol consumption correlated primarily with prevalence rather than incidence. Multi-implant prostheses and malpositioned implants were associated with up to an eightfold increase in risk. Professor Monje stressed that peri-implantitis is a site-specific disease, meaning that a patient may have several healthy implants and only one affected site. This distinction, he argued, has profound implications for maintenance protocols and epidemiological interpretation.

He went on to review additional findings concerning soft-tissue anatomy and aesthetics. Studies have reported mucosal recession rates of between 20 and 47 percent, often linked to thin biotypes, narrow bands of keratinised mucosa, and buccal implant positioning. Immediate implant placement, once blamed for poor aesthetics, now appears to be less relevant than the underlying morphology and biotype. He reiterated that a thick, keratinised soft-tissue band remains one of the most protective factors against both biological and aesthetic complications.

Regarding prosthetic considerations, Professor Monje presented evidence showing that straight or moderately angled abutments with emergence profiles below 30 degrees are associated with healthier peri-implant tissues. Transmucosal abutments longer than 2 mm appear to facilitate plaque control and reduce marginal bone loss. Inadequate interproximal access for hygiene, he cautioned, is often the true cause of recurrent inflammation. 'Before changing the graft,' he said, 'we should often change the prosthesis.'

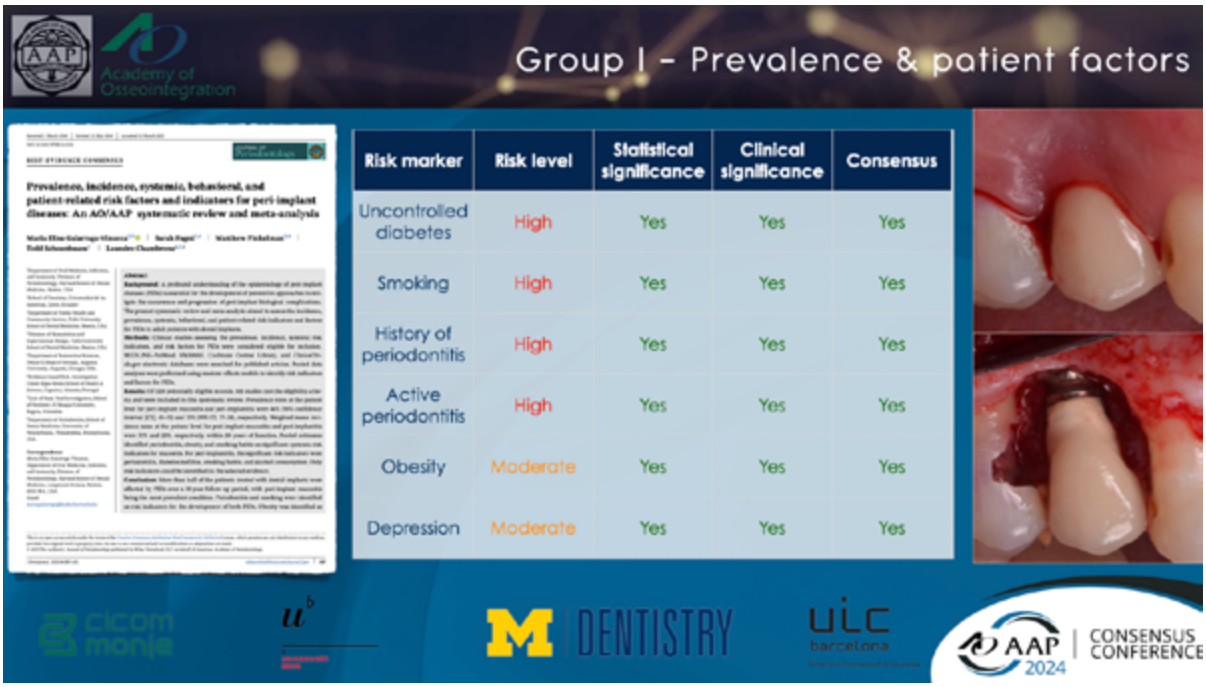
On the surgical side, Professor Monje described findings from comparative studies on implant positioning, bone level, and transmucosal sealing. Implants that were placed too buccally or too close to adjacent teeth were shown to increase the risk of soft-tissue collapse and papillary loss. He advocated for an individualised approach that is based on a three-dimensional assessment, and the avoidance of restorative platforms that restrict interproximal cleaning. In his view, the role of the surgeon is to create an anatomical foundation that allows the prosthesis – rather than the scalpel – to achieve aesthetic harmony.

Turning to treatment strategies, Professor Monje underscored the role of mechanical debridement as the gold standard for surface decontamination. While adjunctive measures such as local antimicrobials, electrolytic cleaning, or laser-assisted techniques

may enhance bacterial removal, none have yet demonstrated superiority to thorough mechanical measures. Regenerative approaches, he added, should be reserved for contained defects and combined with the use of titanium brushes to optimise surface debridement prior to grafting. A network meta-analysis revealed that regenerative surgery yields greater pocket reduction and bone fill than open debridement, though no grafting material proved consistently superior; autogenous bone, in fact, performed slightly worse in some series. According to multiple systematic reviews, the use of barrier membranes may provide limited additional benefit in well-contained defects.

For advanced cases,implantoplasty can be considered when exposed threads remain supracrestal and directly communicate with the oral cavity. Polishing these areas can promote fibroblast adaptation and reduce bacterial colonisation. However, Professor Monje warned that this must be performed judiciously to preserve structural integrity. Resective and regenerative approaches, he concluded, are both effective when selected according to defect morphology and patient factors. 'The true failure,' he said, 'is not the technique we choose, but neglecting to maintain what we have already restored.'

In closing, Professor Monje returned to the concept of lifelong maintenance as the cornerstone of success. He argued that prevention and treatment are inseparable, and that the clinician's duty extends beyond surgery to the long-term stewardship of the patient's health. 'Our best surgery,' he concluded, 'is often the one we never have to perform.'



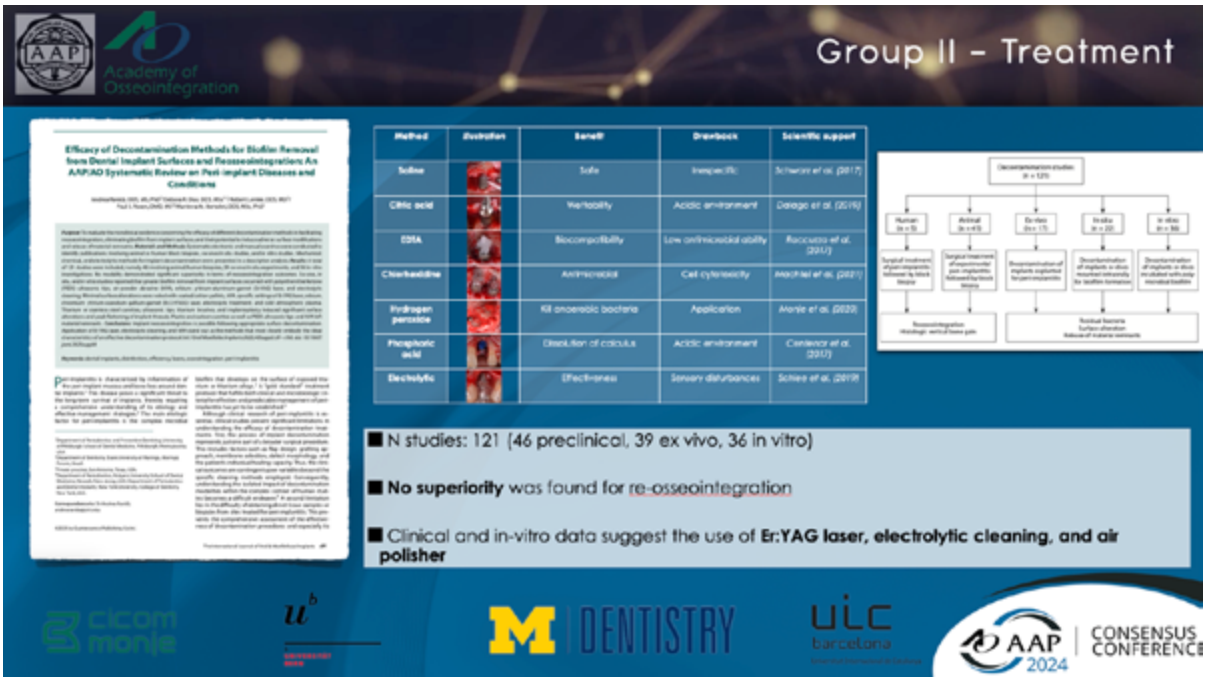
Conclusions

The American consensus complements the European guidelines by:

Emphasising the role of systemic and local risk factors.

- Highlighting the importance of implant three-dimensional positioning and prosthetic design.
- Allowing flexibility in the assessment of adjunctive treatments (probiotics, herbal rinses).
- Reinforcing the evidence that both regenerative and resective therapies are valid and safe.

Taken together, the two sets of guidelines provide a comprehensive and updated framework for preventing and treating peri-implant diseases, with an overriding emphasis on individualised clinical decision-making and evidence-based practice.



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