

Report on the 18th Expert Symposium of BDIZ EDI

Compact know-how

Short, angulated and reduced-diameter implants. The 18th Expert Symposium in Cologne offered an exciting and high-quality one-day congress programme.



The symposium was chaired by Prof. Nickenig (left) and Christian Berger (3rd from left). Participant and guest Prof. Christoph Benz (3rd from right), President of the German Dental Association, next to speakers Dr Markus Tröltzsch, Dr Alexandros Manolakis and Prof. Friedhelm Heinemann.

Dr Markus Tröltzsch (Ansbach, Germany), member of the BDIZ EDI board, began by asking whether there are alternatives to those implants that were the focus of the symposium. Tröltzsch is the author of the DGI and AWMF guideline on bone augmentation. "One thing we always have to point out is that stand-alone augmentation procedures are associated with their very own set of complications and possibilities for failure." In the first part of his presentation, Tröltzsch asked why we place which implant. Avoiding augmentation altogether—even if the patient in particular would like to avoid it—is not

always the most effective way. It was important that patients are fully informed about the treatment options and risks.

Using a diagram from the aforementioned guideline, Tröltzsch emphasized the importance of the soft tissue surrounding the defect ("skeletal envelope"). Recognising and defining this was one of the key factors in the success of augmentation. Clinical practise had shown that any displacement of the soft tissue beyond its original position (before the defect occurred) constituted a different type of augmentation than augmentation within the skeletal envelope. Tröltzsch said that

it was important how far the soft tissue had to be displaced beyond its original position, as this was "high-risk territory".

Tröltzsch referred to the minimum distance between implants according to Tarnow et al., which also applied to short, angulated or reduced-diameter implants. Not only the lateral dimension but also the width of the bone is important, he said: "If we don't leave two millimetres of space around the implant, failure is inevitable." When it comes to planning, implant dentistry is currently in the post-backward planning phase, said Tröltzsch. Planning is based on the likelihood of complications after prosthetic planning. Implant dimensions could be a factor in why implants around 6 mm in length are harder to salvage if complications arise "because we simply do not have any reserves to fall back on. Of course, if we go wide, vertical loss is much more likely than if we just have a funnel around the implant."



Dr Markus Tröltzsch

Implant dimensions could indeed play a role in a potential rescue mission. At the end of his presentation, Tröltzsch pointed out that the choice is not between augmentation and alternative techniques. “We have to ask ourselves: How can we achieve the best possible outcome for the patient with the least amount of risk? How do our techniques complement each other to achieve this goal for the patient?”

The “short ones” in focus

The dean of short implants, Dr Eduardo Anitua (Vitoria, Spain), examined the extent to which short implants can be a reliable alternative to conventional implants. In his opinion, extra-short implants—now available in lengths of less than 5 mm—offer added value by reducing the bone volume required. However, they require the use of the right instruments and a high level of surgical skill, as it is not uncommon for the surgeon to work very close to critical anatomical structures.

Anitua recalled the early days 35 years ago, when implants were 13 or 15 mm long, whereas today his implants have an average length of only 6.5 mm. He said that he had carried out various biomechanical analyses to test the load-bearing capacity of the implants and the bone and had written books on the subject. His conclusion was that the larger the diameter of the implant, the less stress on the bone. Anitua then looked at studies



Eduardo Anitua, MD, DDS, PhD

of implant lengths in the maxilla, concluding that short (6.5 or 5.5 mm) implants gave the same results as “long” ones. He said that one day he had asked himself why he, like so many others, had performed so many lateral sinus lifts in his career just to place 13 mm implants when he could have achieved the same results with 5.5 or 6.5 mm implants with less pain and better predictability. Other studies had shown him that even 4.5 and 5.0 mm implants had the same results in terms of force exerted on the area of maximum total load compared with 10, 11 or 13 mm implants. His conclusion: “When inserting implants vertically, length does not matter.” His view on angulated implants was a much less favourable one. Angulated implants, he said, increased stress levels “exponentially”. Biomechanical issues and serious complications during explantation were further arguments against angulated implants. Anitua called them “one of the biggest mistakes of the last 20 years in implant dentistry” from a scientific point of view. For All-on-4 and All-on-6 restorations, he advocated avoiding cantilever situations to prevent stress to the bone and increase treatment predictability.

The case for angulated implants

Contradicting Dr Eduardo Anitua, Dr Alexandros Manolakis (Thessaloniki, Greece) argued for the use of angulated implants and demonstrated how they allowed faster rehabilitation of patients with atrophic jaws—often with immediate restoration. The exact positioning of the implants, the amount of bone around the implants and, above all, the design of the restoration are important, he said. Why (and when) should angulated implants be used? Because there is often too little bone available, especially in the posterior region of the jaw, even for short implants. In addition, the aim is to provide the patient with a fixed restoration, preferably without bone augmentation, while achieving high primary stability. “Moreover, these implants allow us to provide an immediate restoration.” For

Manolakis, the concept makes good biomechanical sense because the distal extensions of fixed bridges should be as short as possible. With the All-on-4 or Fast & Fixed concepts, the distal implant or the head of the distal implant can be placed in the region of the second premolar, so that the cantilever is only one tooth—one molar—wide.

“Clinically, the angulated implants do not differ in survival rates from straight implants.” Maxillary loss rate: 0–3.3%. Mandibular loss rate: up to 7.2% (De Bruyn et al.).

Opinions differed on marginal bone and bone loss over time, Manolakis said. Some meta-analyses had found identical bone behaviour, while others had found significantly more bone loss with angulated implants. Manolakis did not consider the difference (between 0.2 and 0.3 mm, respectively) to be clinically significant.

So what would happen in the worst-case scenario of peri-implantitis? Manolakis considered the longer (angulated) implants to offer a clear advantage in these cases. The short 5 mm implants would probably have to be removed, he said, while 10 or 12 mm implants would still offer room for retreatment.

Lack of studies on reduced-diameter implants

Reduced-size implants were the subject of Dr Keyvan Sagheb (Mainz, Germany),



Alexandros Manolakis, DDS

who discussed important criteria for success based on clinical cases and current literature. From the practitioner's point of view, he said, the question is whether costly treatment concepts are necessary or whether other, less surgically demanding treatment alternatives are available. One question was paramount: "Should I do socket management or immediate implant placement?" He considered reduced-diameter implants and short implants (defined at the University Hospital in Mainz as shorter than 8 mm) an interesting option. Of course, the question of angulated implants with All-on-4 or All-on-6 also played a role.

In the case of reduced-diameter implants, he was interested in whether they were as good as, better than or worse than an implant in the atrophied jaw that required augmentation. According to the literature, reduced-diameter implants (intraosseous diameter less than 3.5 mm) had about the same survival rate as standard implants (98%). Unfortunately, the findings by Nicola Alberto Valente et al. had not been challenged until now. According to Sagheb, there are no relevant prospective randomised trials because such a study is difficult to design and implement.

For the three groups of reduced-diameter implants, Sagheb found that mini-implants ($\varnothing \leq 2.5$ mm) worked to support definitive maxillary and mandibular complete dentures. For temporary dentures,

the Mainz team placed six implants in the maxilla and at least four implants in the mandible, preferring delayed placement in the maxilla and also preferring to wait four to six weeks in the mandible, which works well with the new hydrophilic surfaces. In the category of narrow implants ($\varnothing 2.5$ to < 3.3 mm), Sagheb cited advantages in the anterior region where interdental width is reduced (lateral maxillary incisors and mandibular anteriors). The most exciting group for him were implants with diameters between 3.3 and 3.5 mm supporting definitive maxillary and mandibular complete dentures. This seemed to be an alternative in the posterior region, but also for single-tooth restorations. In summary, Sagheb considered "the narrow ones" as an alternative in situations with reduced mesiodistal width to avoid augmentation and especially the complexity of lateral augmentation, thus reducing morbidity, and to be able to perform one-stage instead of two-stage procedures.

"Minis" as an additional option, not a replacement

Prof Friedhelm Heinemann (Greifswald, Germany) spoke about the practical aspects of prosthetic fixation with mini-implants. He highlighted serious alternatives for patients for whom extensive and time-consuming augmentation procedures were not an option because of their medical history or their preference. Shorter or narrower implants could help avoid augmentation in certain indications. However, the use of implants with reduced length and/or diameter would need to be based on scientific principles.

There was a consensus definition of mini-implants at the 18th European Consensus Conference, which Heinemann recapitulated: Implants with a diameter of less than 2.7 mm are called mini-implants (almost exclusively single-phase). They are always transgingival, which means that primary loading cannot be completely excluded. Heinemann presented 10- to 15-year-old cases with mini-implants as extra abutments for partial dentures, as

replacements for lost teeth or as additional support, including for an existing tooth (Greifswald concept).

He recalled a retrospective study by Prof Torsten Mundt (Greifswald, Germany), who had followed the clinical performance of 738 mini-implants placed about 15 years ago to stabilise complete dentures, looking at risk factors for failure, peri-implant health, marginal bone resorption, and the maintenance effort in terms of oral health-related quality of life.

Results: Over the five-year period, the success rates were 95.7% in the maxilla and 94.3% in the mandible—corresponding to 15 and 11 failures, respectively, but also 5 and 9 reimplantations. An important point, he said, was that the restoration could continue to be used. "This is basically a very simple and not very high-end restorative procedure." There was a lot to learn with this procedure, Heinemann warned, and it was different from the approach with standard implants. He therefore considered it an addition to his implant treatment armamentarium, but not a replacement for anything.

Overall, Heinemann concluded, reduced-diameter implants represent an expansion of the range of implant indications—especially in view of an increasingly ageing population and the associated multimorbidity. Reduced-diameter implants would become increasingly important for supporting partial and complete dentures. On the other hand, these



Priv.-Doz. Dr Dr Keyvan Sagheb



Prof. Dr Friedhelm Heinemann



Lively discussions with the audience after each presentation.

implants are not suitable for use by beginners. They should be reserved for experienced implantologists, particularly in transgingival placement and in cases of extremely reduced bone volume.

Fixed teeth in one day— a clinical report

Dr Ingo Frank (Landsberg, Germany) spoke on “Fixed teeth in one day—a reliable treatment option?” He presented treatment approaches for patients with periodontally compromised dentition. For



Dr Ingo Frank

many patients, he said, immediate restoration of chewing function is often the key to starting treatment. His presentation used clinical cases to illustrate the decision-making process for or against immediate loading to provide optimal prosthetic anchorage for aesthetic, functional and economical restorations. Frank introduced the system used at his practice in Landsberg. Most patients were interested in getting fixed teeth in one day, he said. At the Landsberg clinic, he reported, patients were treated under general anaesthesia three to four times a week.

Typical patients were over 50 years old, had worked a lot in their lives and now realized they needed to do something—often with a lot of anxiety as they had often not taken very good care of their teeth. The clinic used digital impressions. A total of 16 implant systems are available, four of which have immediate-restoration concepts. Frank showed a case that had worked completely on his own, fully guided, without an in-office lab, although he admitted that this was not at all his preferred setting because of the potential of problems.

The Landsberg clinic usually works with templates. Frank showed curious clinical cases to illustrate his clinic’s method:

careful patient selection, a prosthetically driven approach especially for the “fixed teeth in one day” treatment, never without a 3D scan, always with a digital workflow, and with frequent recalls.

Conclusion

At the end of the Expert Symposium, Prof Jörg Neugebauer presented the 2023 Guideline on “Short, angulated and reduced-diameter implants”, updated for the second time since the beginning of the European Consensus Conferences. We had already presented this Guideline in detail in the 1/2023 issue of the *EDI Journal*. This is the consensus recommendation: “The use of short, angulated or reduced-diameter implants in sites with reduced bone volume can be a reliable, faster and less risky therapeutic option in terms of specific treatment parameters, compared with the risks associated with the use of standard-dimension implants in combination with augmentation procedures. The implant surgeon and the restorative dentist must have appropriate training to select the best possible therapy choice for each patient.”

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