

Systematically to the goal

Mini implants for Stabilization of partial dentures

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Prostheses are still considered by many to be aesthetically pleasing, cost-effective, but often associated with limitations in terms of comfort and functionality. This may be because the additional support desired by unfavorable residual tooth distribution is not indicated by conventional implants in a large number of patients for financial, medical or anatomical reasons. Thanks to the now clinically proven mini dental implants, however, it is possible to supply a much larger number of patients quickly and cost-effectively with a functioning solution for a secure prosthesis.

With mini dental implants, which include the MDI mini dental implants, both total and partial dentures can be anchored. For this purpose, the one-piece implants with a ball head and a diameter of less than 3 mm (MDI are available in diameters 1.8 - 2.1 - 2.4 and 2.9) are inserted into the jawbone in a less stressful surgical procedure. Full dentures require at least four implants in the lower jaw and at least six implants in the maxilla. Since lower bone density is present in the upper jaw, MDI mini-dental implants with a diameter of 2.4 or 2.9 mm and aggressive thread design are used, while in the lower jaw according to the better bone quality MDI with diameter 1.8 or 2, 1 mm and finer thread. The position of the implants is based on the bone supply and the location of important anatomical structures. A number of clinical studies are available on the use of MDI in this indication. Recently, there are more and more publications on this topic.

MDI for pillar augmentation in partial dentures

For partial denture wearers, mini-implants have a similar function to those with full dentures. By introducing mini dental implants in strategic positions, not only the denture content is improved. The mobility

of the prosthesis is minimized by the improved storage and reduces the burden of natural abutment teeth. This can reduce the risk of premature tooth loss. Regarding the determination of the number and position of mini dental implants for the anchoring of partial dentures, more factors have to be considered than with the stabilization of complete dentures: The residual dentition must be included in the planning. In general, the likelihood of achieving long-term success increases with the number of abutments - both natural teeth and implants. So far, however, there were no guidelines as to how many implants should be placed in which positions. This is not least due to the large number of possible starting situations of the residual dentition - there are over 65,000 variants per jaw! In order to address this complexity in a structured way and to provide users with decision support, a planning scheme for MDI was developed in cooperation with a working group experienced MDI user and the University of Greifswald. Depending on the number, position and weight of the remaining teeth, a recommendation is made for planning so-called strategic and optional implants per quadrant (Figures 1 and 2). Strategic implants pursue the primary goal of quadrangular support in planning and thus represent the required minimum number of implants. Optional implants

can be added depending on the individual case to compensate for potential weak points and increase stability. Based on the planning scheme, there is a subdivision into six classes (class 0 to 5) per jaw, whereupon the required number and position of the implants are deduced. It is assumed that incisors in both jaws have the least value - a prosthesis is stabilized exclusively on them, so usually the most severe problems. Accordingly, the same number of implants must be placed as in the toothless case (classes 0 and 1). Teeth from position 4 (premolars and molars) have a higher value, so fewer strategic implants are required (grades 2 and 3). However, the most favorable situation occurs when the canine is present. In this case, no strategic implants are required (grades 4 and 5). Optionally necessary optional implants are to be planned individually in all classroom cases, i.a. depending on the periodontal, endodontic and prosthetic significance of the remaining teeth. On the basis of this scheme mini dental implants are also inserted in my practice to stabilize partial dentures - with great success.

The following case studies show the surgical or prosthetic procedure when using MDI.

Case Study 1

The patient presented in February 2011 in the practice. The teeth 33 and 34 were classified as not worth preserving and removed alio loco. It was desired to stabilize the partial denture by means of mini-implants in order to relieve the abutment teeth in the 4th quadrant and to achieve additional support and a good prosthesis retention in the edentulous 3rd quadrant. Figures 3 and 4 show the initial situation with the preservable teeth 43 and 44 supplied with telescopic crowns. On the X-ray, the extraction sockets in the 3rd quadrant are still clearly visible.

Since the 4th quadrant contained the canine as well as a tooth from position 4, the case was assigned to class 5 according to the MDI planning scheme. A mini implant is therefore not mandatory in this quadrant, but can optionally be positioned in the anterior region, for example, to increase stability. In the neighboring quadrant, after removal of teeth 33 and 34, there was a class 0, which required two MDIs. Since the implantation took place six weeks after tooth extraction, it was not possible to implant in the region of the remaining alveolus in the strategically optimal position of 33. In Regio 34, the residual al-

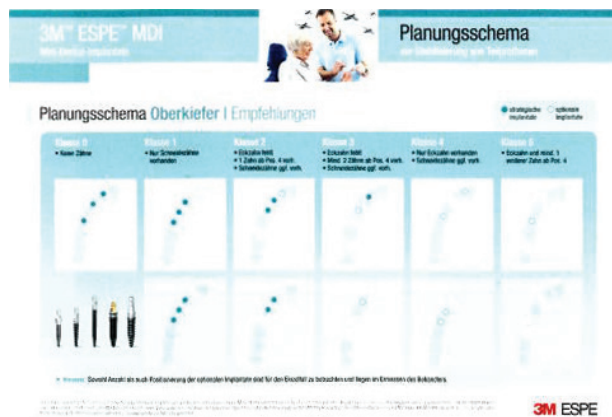


Fig. 1: Planning scheme for the strategic pillar augmentation of partial dentures in the lower jaw ...

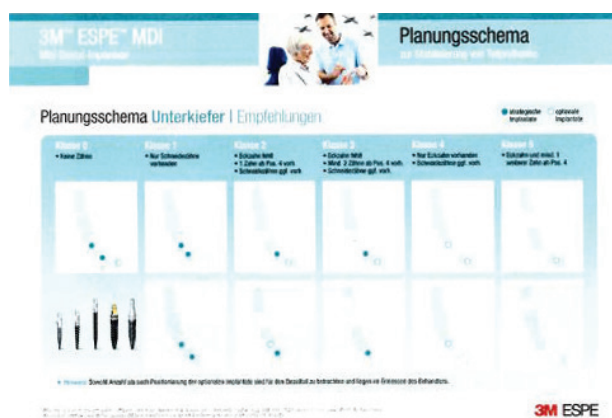


Fig. 2: ... as well as in the upper jaw.



Fig. 3: Starting situation.

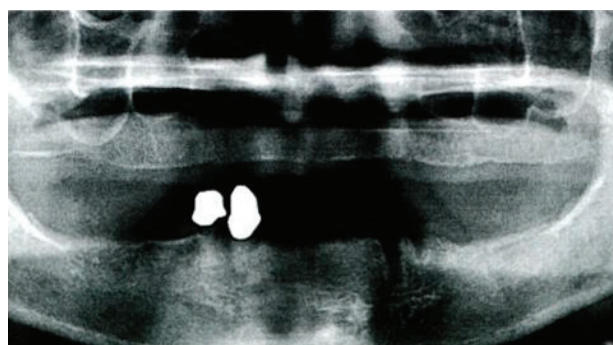


Fig. 4: X-ray of the initial situation: The extraction sockets are visible.

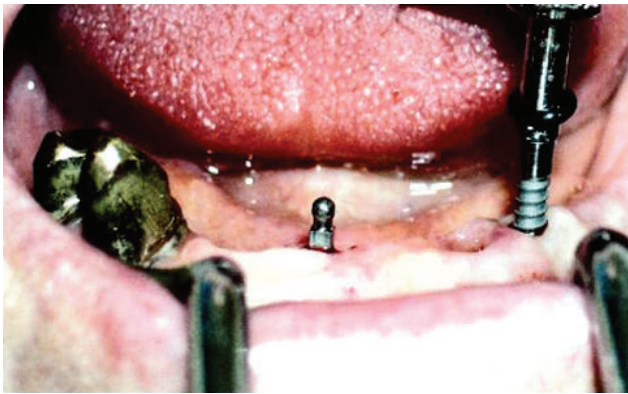


Fig. 5: Insertion of the second implant into the alveolus in region 34 with a wing wrench.

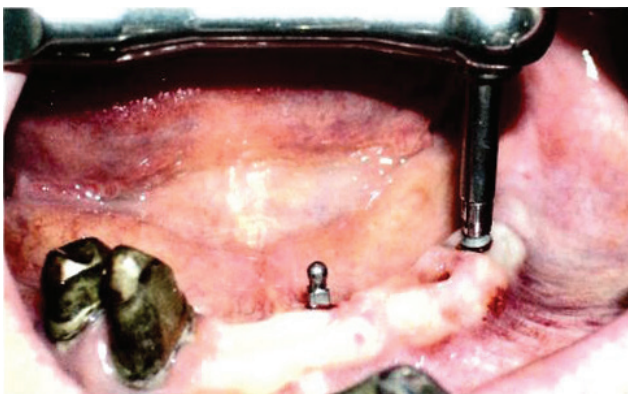


Fig. 6: Use of the torque ratchet.

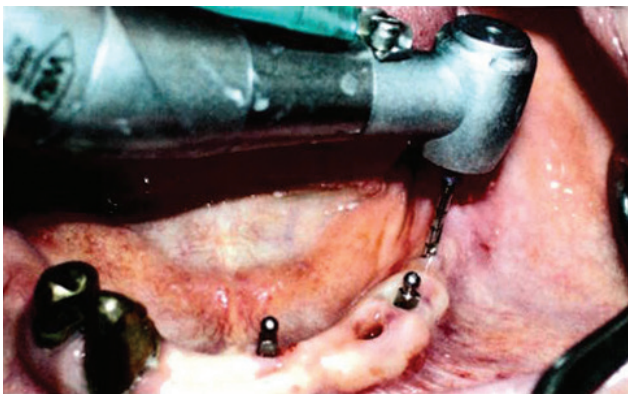


Fig. 7: Pilot hole for the insertion of the third implant.



Fig. 8: Situation immediately after implantation.

veolus was only a few millimeters deep, so that an MDI with a diameter of 2.4 and a length of 13 mm could be inserted here. The second strategic implant in this quadrant was placed in regio 35. Normally, MDI are positioned in the interforaminal area. This was deviated in this case due to the sufficient amount of vertical bone available. An injury of the mental nerve could be excluded thanks to its vestibular position and a sufficient ridge width. Since the bone density in the retroforaminal area is lower than in the anterior region, an optimal primary stability was achieved with an MDI diameter of 2.4 and length 13. To further reduce the tilting moments, an optional implant was also placed in regio 31.

After marking the desired positions on the mucosa, the pilot bore for the first mini-implant was made with a narrow drill (1.1 mm diameter). The drilling depth was only half to one third of the implant length according to the prescribed protocol. This ensures correct implant positioning, while the self-tapping thread design causes compression and condensation of the surrounding bone, contributing to primary stability of the implant. The implant was screwed in and the next hole made. According to the protocol, the implant was inserted using an initial screwdriver, wing wrench and ratchet (Figs. 5 and 6). Figure 7 shows the use of the pilot drill in the preparation of the implant bed for the insertion of the third implant. It is recommended that the mini-implants in the mandibular anterior region with the ball head slightly angled to lingually introduce.

After all MDI had been inserted at the desired location (Figs. 8 and 9), the prosthesis was reworked accordingly. The procedure will be described in detail with reference to the next patient case.

Case study 2

In February 2012, this patient with originally three remaining teeth in the lower jaw (Fig. 10) had their teeth 33 and 44 removed and at the same time four mini dental implants were in-

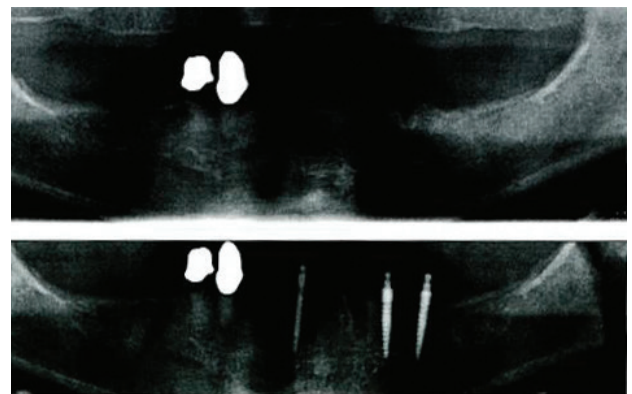


Fig. 9: Control radiograph after implant insertion.

serted. The canine in the 4th quadrant was the only remaining abutment tooth, so the case of class 4 corresponded to the planning scheme. To reduce the tilting moments and relieve the abutment tooth, two optional implants with a diameter of 1.8 mm and a length of 13 mm were set. Since it could not be implanted into the fresh extraction socket in regio 44, it was inserted the first MDI in regio 45. Another implant was placed in position 42. This met the patient's desire for the greatest possible safety for the prosthesis. In the toothless 3rd quadrant (Class 0), the mini dental implants were positioned in regions 31 and 34 because the alveolus 33 was not suitable (Fig.11). Figure 12 shows the control radiograph after implantation. Three months later, six mini-implants were placed in the maxilla (Fig.13). To reshape the existing prosthesis, the distances between the abutments - the tooth and the implants - were measured intra-orally (Fig. 14). The required minimum distances of 5 to 6 mm between two mini-implants and if possible between 6 and 7 mm between tooth and implant must be observed. While the denture base was milled out in the appropriate places, the metal housings MH-1 were placed on the mini-implants (Figures 15 and 16).

Individually tailored spacers served as spacers between MDI and MH-1. Subsequently, the recesses in the prosthesis base were filled with cold polymer (SECURE hard pickup material,

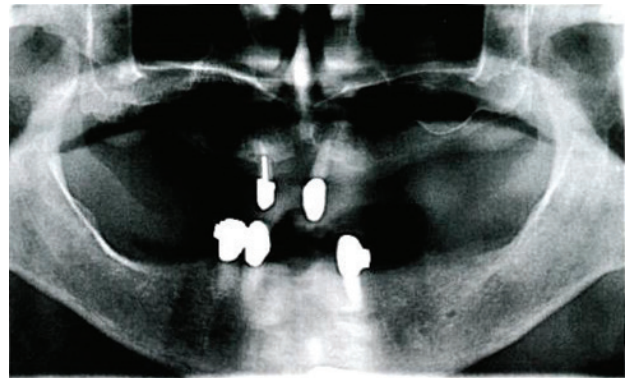


Fig. 10: X-ray of the initial situation.



Fig. 11: Mini implants in their final position.

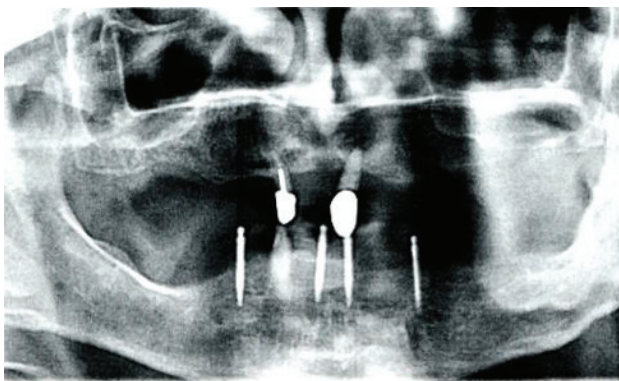


Fig. 12: OPG after implantation.

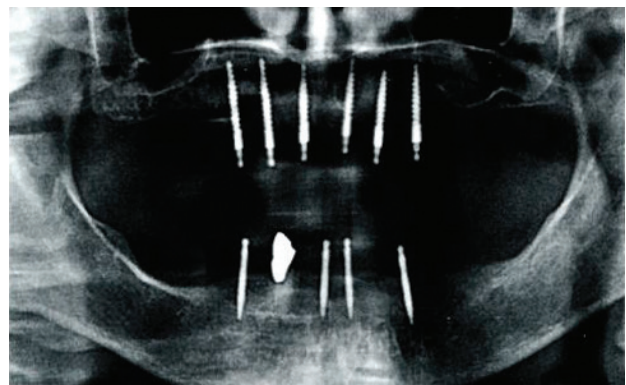


Fig. 13: Control image in May 2012 after implant insertion in the upper jaw.



Fig. 14: Distance measurement.



Fig. 15: Prosthesis with recesses.



Fig. 16: Matrices in the patient's mouth.



Fig. 17: Denture with matrices, also visible is a metallic reinforcement of the base.



Fig. 18: Inserted prostheses.



Fig. 19: Situation at a follow-up examination after 15 months.

3M ESPE) and positioned the prosthesis in the patient's mouth. With light biting, the position was held until the material around the metal casings had completely hardened. Subsequently, the prosthesis including the firmly anchored matrices could be easily removed. Figure 17 shows the remodeled lower jaw prosthesis, Figure 18 both MDI-anchored prostheses in the patient's mouth. The patient was enthusiastic about the improved hold of the new prosthesis. At 15 months follow-up, healthy soft tissue conditions and a stable bone level were seen (Figure 19).

Conclusion

As in the two cases above, most of my patients whose total or partial dentures are stabilized with mini dental implants report a high comfort during treatment and an improved quality of life after the procedure. Because of the success of treatment, many of them also advise other patients to inquire if such an intervention is appropriate for them. Since the insertion of mini dental implants can be done even in patients with a narrow alveolar ridge and the less burdensome procedure is also possible in patients with anamnesis preloaded, this treatment can be carried out in many cases. On the other hand, the use of conventional implants would pose too great a risk for many, especially older patients, since these would often be associated with elaborate augmentation measures. The developed planning recommendations for the indication of pillar augmentation are a useful orientation aid.

Based on my many years of experience with MDI mini-dental implants, it can be summarized that mini-implants complement the conventional implant portfolio in a meaningful way, but of course do not replace it.

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