

Fixed complete prosthesis with no screws and no cement

New restoration concept using LOCATOR F-Tx[®]

Dr Karl-Ludwig Ackermann, Gerhard Neuendorff & Janez Fiderschek, Germany

The fifth German oral health study (Deutsche Mundgesundheitsstudie) showed that the population in many countries are ageing and the desire for better quality of life related to the preservation of teeth and their functionality, among other things is constantly increasing. Periodontal disease is a major cause of tooth loss, as tooth loss results in a decreased ability to maintain physiological masticatory function, as well as a decreased general quality of life. Edentulous people exhibit a lower self-esteem by being excluded from normal masticatory function. The following article describes the fabrication of a fixed superstructure for the edentulous mandible that uses an innovative attachment system.

Dental implants as support for a removable dental prosthesis were introduced many years ago as a treatment option and as an alternative to a conventional complete denture. In the past ten years, considerable efforts have been made to develop new fixed treatment concepts. Attempts have even been made to implement treatment without bone augmentation procedures (e.g. Dr Paulo Maló's All-on-4 concept). Most restorations are cement- or screw-retained solutions. For the past year, an innovative attachment system has been available that combines the clinical comfort and structured laboratory techniques of a fixed complete prosthesis without the need for it to be cemented or screw-retained.

The LOCATOR F-Tx system (Zest Dental Solutions, USA) makes it possible to produce an aesthetic dental restoration. The prosthesis is attached to the implants by means of a snap-in attachment system. This new attachment gives the patient greater assurance of function and quality of life. It also allows the practitioner to remove the prosthesis and make corrections at any time. Furthermore, complex laboratory procedures, that require channels and screw retention, are not required.

Case presentation

The treatment plan consisted of a removable overdenture on four implants in the maxilla and a fixed prosthesis on four implants for the edentulous mandible with the aid of the LOCATOR F-Tx attachment system (Figs. 1–3). This treatment procedure, managed by means of prefabricated system components, will be presented in the following section step by step.

Surgical measures

The surgical procedure was performed after clinical and osseous diagnostics and by using surgical templates (Figs. 4 & 5). Both arches were planned with a minimum of four implants in a cross arch placement and symmetrical distribution which is advantageous in order to guarantee optimised support and load distribution.

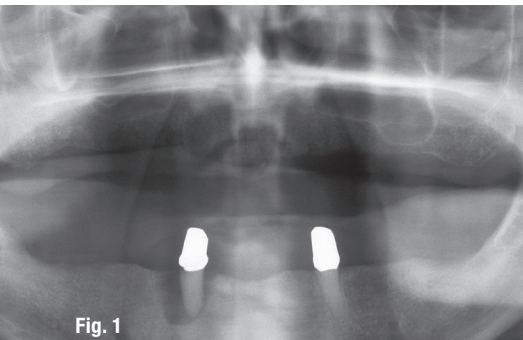


Fig. 1

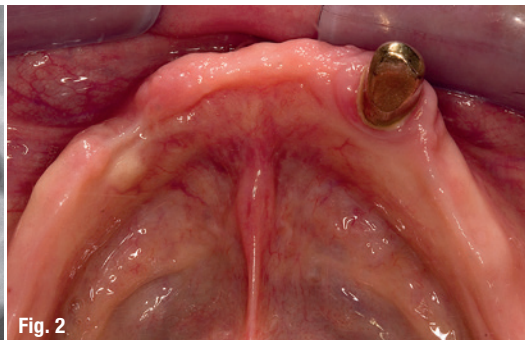


Fig. 2

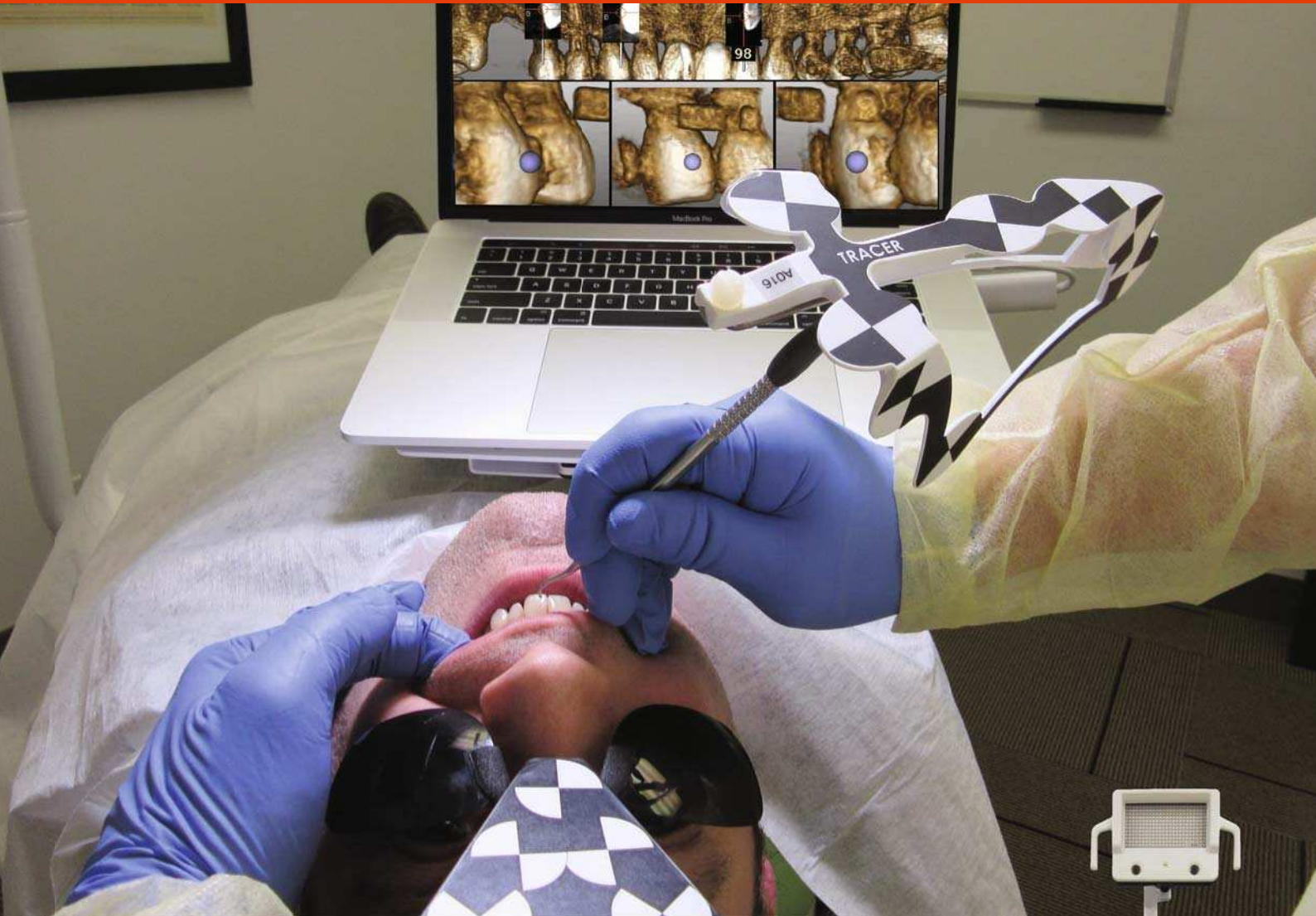


Fig. 3

Figs. 1–3: Initial situation: an 83-year-old patient for whom the retention of the maxillary and mandibular prostheses was severely impaired resulting in successive tooth loss and the associated bone loss, making a conventional removable complete prosthesis virtually impossible.

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Prosthetic measures

Initially, complete prosthetic planning and laboratory procedures to re-establish the proper vertical and occlusal dimensions was completed. This required the positioning of teeth in the patient's mouth in order to meet the functional, phonetic and aesthetic demands of the patient (Figs. 6–8). Of course, the focus was also on the spatial orientation of the attachments (LOCATOR F-Tx abutments and denture attachment housings), the prosthetic teeth and the prosthetic restorative material.

The LOCATOR F-Tx attachment system is delivered from the manufacturer in an all-in-one package. The spherical geometry interface between the abutment and denture attachment housings allows the correct positioning of the housing in the proper angulation for the best prosthetic outcome of the prosthesis. This spherical feature also makes it possible to use the attachment system with implants with up to 20 degrees of divergence from a common vertical.

An indirect technique was used to transfer the position of the implants to a working model using laboratory analogs. The use of digital impression techniques to transfer implant positions is also possible. A metal framework was milled to fit over the denture attachment



Fig. 4: Implant placement with backward planning.

housings (Figs. 9 & 10). The selected abutment cuff heights matched the sulcus depth. This decision is preferably determined by the clinician intraorally (Figs. 11–14). It is recommended that the denture attachment housing be placed supra-gingival for maximum adhesion to the prosthesis. Also, the denture attachment housings with the processing balls must be seated on the abutments

before the pick-up procedure of the metal framework. The framework should always be designed and milled in such a way that a small (max. 0.2mm) cement gap exists between the framework and denture attachment housings.

In order to ensure a passive fitting framework, final pick-up of all the denture attachment housings in the framework must be done chairside, all at the same time, and before any further laboratory adjustment steps are performed. The denture attachment housings were aligned as parallel as possible within the aesthetic contour of the prosthesis and block-out spacers were placed on the abutments below the denture attachment housings to block out all undercuts. The framework was cemented on using a metal-to-metal cement (Figs. 15–17). The setting time of the cement is ten minutes.

Final adjustments of the framework were performed (Fig. 18). In order to maximise aesthetics, the metal

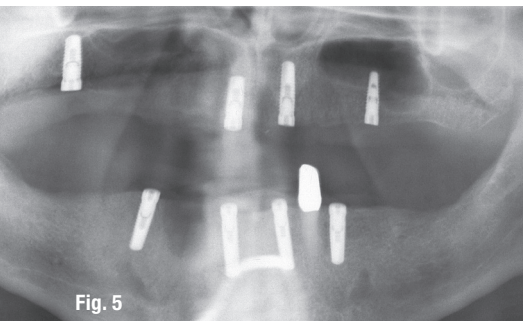


Fig. 5



Fig. 6



Fig. 7

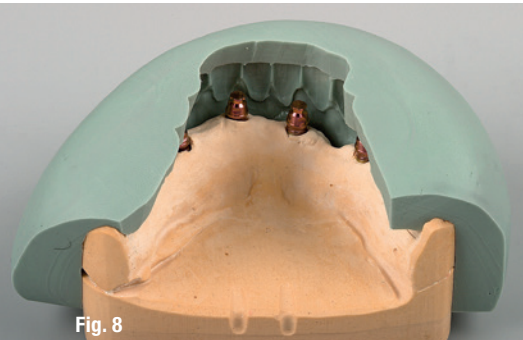


Fig. 8

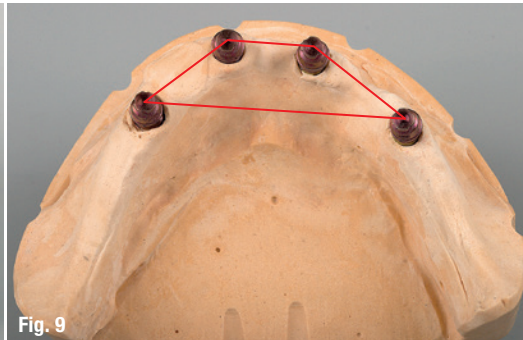


Fig. 9



Fig. 10

Fig. 5: Post-op control radiograph. **Fig. 6:** Completed set-up and wax-up of the maxilla and mandible. **Fig. 7:** Sufficient inter-arch distance between the opposing dentition and the retentive elements must be assured. **Fig. 8:** The framework dimension is defined by the available space between the anterior and posterior walls of the alveolar bone. **Fig. 9:** Trapezoidal and symmetrical distribution of implant placement across the midline for a balanced load distribution. **Fig. 10:** Preparation of the metal framework.

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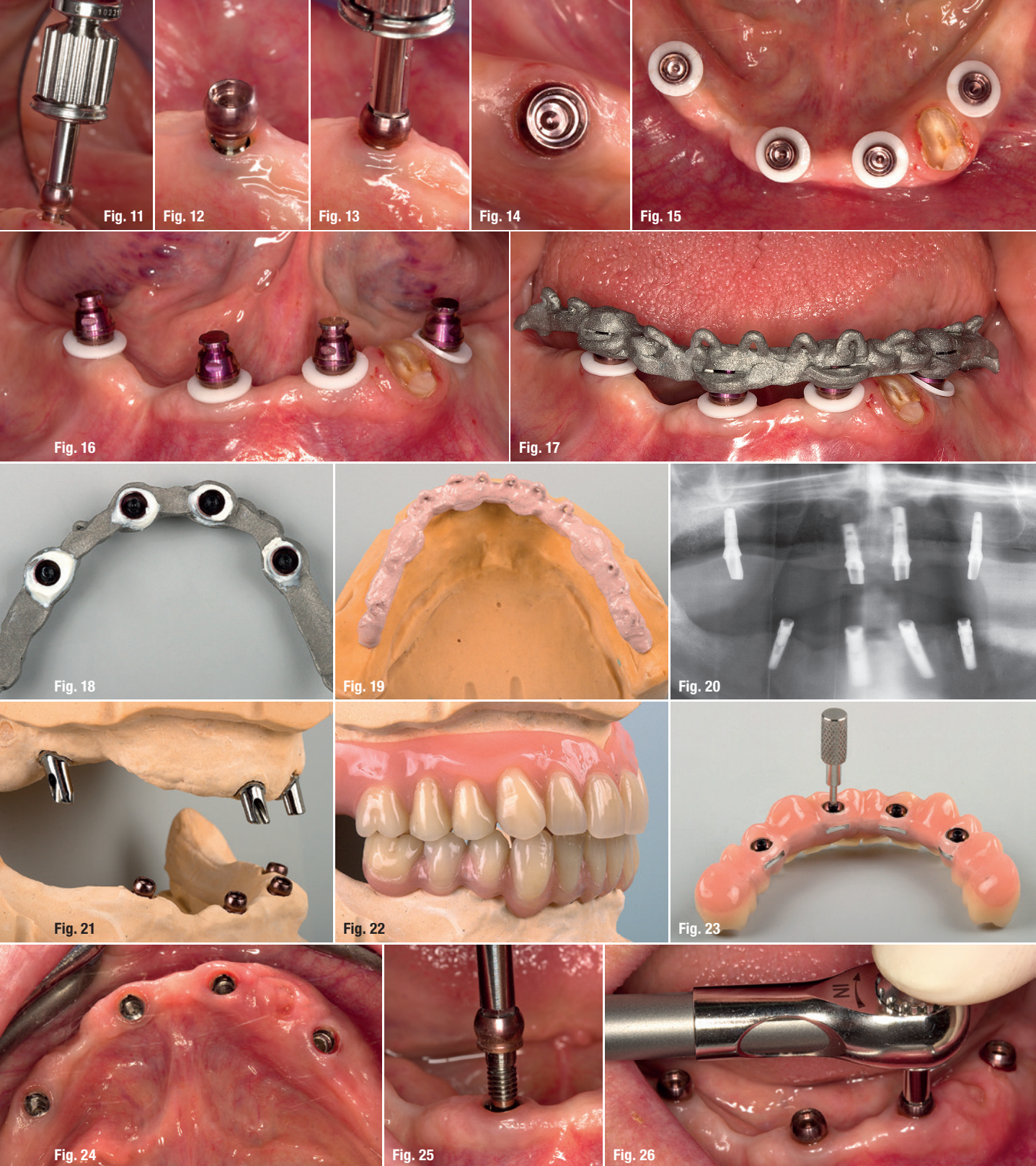
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Figs. 11–14: Insertion of the abutments. **Figs. 15 & 16:** Placement of block-out spacers at the point of transition between the denture attachment housings and the abutments. **Fig. 17:** Passive try-in of metal framework without pressure. **Fig. 18:** Further adjustments of the framework were performed in the laboratory. **Fig. 19:** For maximum aesthetics, coating the metal framework with an opaque material is recommended. **Fig. 20:** The panoramic radiograph demonstrated the abutments seated gap-free on the four implants in the mandible. **Figs. 21 & 22:** Inter-maxillary adjusted occlusion and shaping. **Figs. 23–26:** Tightening of the processing balls and inspection of abutments for a secure fit.

framework was coated with an opaque material (Fig. 19). In the meantime, a panoramic radiograph was taken to confirm that the abutments were seated gap-free on the four implants in the mandible (Fig. 20). In the maxilla, four telescopic abutments were screwed into the maxillary implants (Fig. 21).

The teeth were attached to the metal framework using denture acrylic. In addition to the aesthetic requirement of the case, it is important to design the shape of the prosthesis' intaglio surface to be functional, aesthetic and offer better oral hygiene, which allows the patient easy access for self-cleaning (Figs. 22 & 23). A symmet-

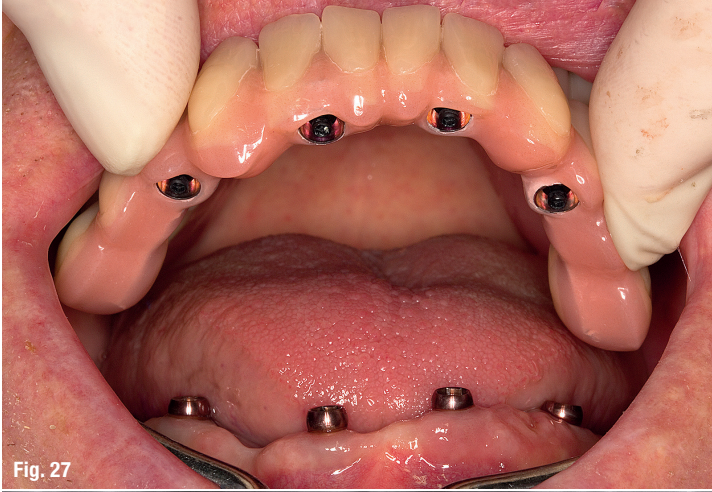


Fig. 27



Fig. 28

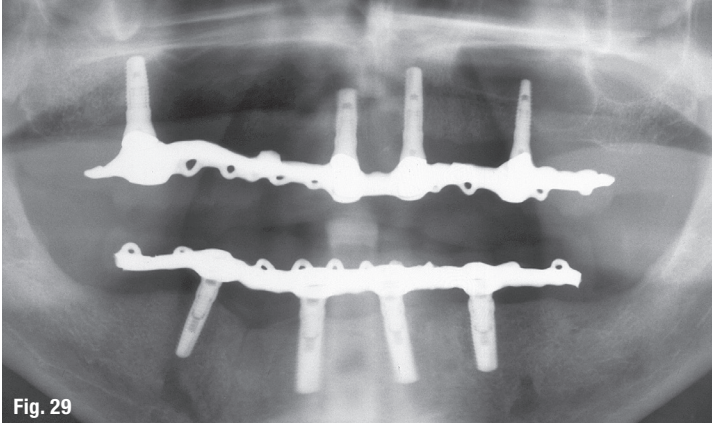


Fig. 29



Fig. 30

Figs. 27 & 28: A posterior/anterior seating of the superstructure is necessary for the LOCATOR F-Tx system to be effective. **Fig. 29:** Final control radiograph. **Fig. 30:** Final situation.

rical implant-placement distribution in the mandible and maxilla guaranteed a stable centric relation and articulation with no aesthetic compromise.

Integration

After removal of the processing balls, the appropriate retention balls were screwed into the denture attachment housings (Fig. 23). It is always advisable to inspect the abutments for a secure fit at the end of all treatment steps (Figs. 24–26). Seating the prosthesis should start in posterior, moving anteriorly, one attachment at a time. This is necessary for the LOCATOR F-Tx attachment system to be effective, as it is the only way to stabilise the fixed prosthesis (Figs. 27–29).

Anatomically correct final prosthetic designs of the prostheses must be done similar to screw-retained restorations in the edentulous maxilla and mandible. This is most evident from the frontal view (Fig. 30). The edge of the mandibular prosthesis is given a scalloped shape to allow self-cleaning through salivary flow, use of a water pick and accurate intraoral cleaning.

In addition, it should be mentioned that the LOCATOR F-Tx prosthesis can easily be removed by the clinician at any time. A user-friendly metal bar and loop tool allows easy removal of the prosthesis by leveraging off the retention balls. However, it also must be emphasised that the retention balls are single use only, so new unused retention balls must be used when reseating the prosthesis.

Conclusion

The attachment system presented here is a valuable addition to the prosthetic therapy options for fixed restorative procedures in the edentulous mandible and maxilla. The cost-benefit ratio is also favourable when compared to other options. The principle of a stable occlusion with symmetrical lateral distribution of implants and a limited posterior extension/cantilever ensures the secure retention of the prosthesis and contributes to the optimisation of speech and the recovery of unrestricted masticatory function. If required, alternative measures such as the fabrication of a removable prosthesis are quite possible.



Dr Ackermann
Author details



Gerhard Neuendorff
Author details



Janez Fiderschek
Author details

contact

Dr Karl-Ludwig Ackermann

Talstraße 23
70794 Filderstadt, Germany
Tel.: +49 711 7088166
kl.ackermann@kirschackermann.de