Loss of multiple teeth due to aggressive periodontitis is associated with severe remodeling/atrophy of supporting alveolar bone, resulting in soft tissue deficiencies that challenge augmentative interventions. Following establishment of a stable periodontal status, a possible therapeutic option is to replace missing teeth and counteract the bone remodeling phenomenon with bone augmentative procedures and the placement of dental implants, although presence of malpositioned teeth might complicate the planning of such surgical procedures. A virtual setup that addresses both orthodontic and prosthodontic goals assists in the planning of irreversible surgical procedures.

CASE HISTORY REPORT

A 38-year-old female patient was referred to the Department for Prosthodontics at the Medical Center, University of Freiburg, Germany, for prosthodontic treatment. The systemic history was unremarkable, but dental status was characterized by a generalized vertical and horizontal atrophy of the jaws, aggressive periodontitis, multiple tooth loss, and malposition of residual teeth (Fig 1a, Fig 3a). The patient requested esthetic and stable, preferably fixed, treatment. The patient’s current inadequate maxillary clasp-retained removable dental prosthesis (RDP) (Fig 1b) was replaced with a new temporary acrylic resin RDP after the extraction of hopeless teeth. Periodontal and conservative therapies were then performed, and reevaluation 6 weeks later showed stable periodontal status and good compliance, which led to definitive treatment planning. A multidisciplinary team digitally designed a customized orthodontic and prosthodontic setup simulating a final situation that satisfied both functional and esthetic demands of the patient and the dentists (Figs 2a and 2b). Subsequently, virtual setup, present situation, and Digital Imaging and Communications in Medicine (DICOM) data of the patient were superimposed in 3D planning software (SimPlant
Dentsply Implants) to serve as orientation for the further augmentative procedures (bilateral external sinus floor elevation and autologous bone grafting). After a healing period of 6 months, a tooth- and tegument-supported drilling template was produced to allow for implant installation according to the digital setup (Xive, Dentsply). After submerged healing of 6 months, implants were temporized with screw-retained, computer-aided design/computer-assisted manufacturing (CAD/CAM)–fabricated acrylic restorations (PMMA, Temp Basic, Zirkonzahn) (Fig 3b). Thereafter, the patient underwent orthodontic treatment of residual teeth. Implant-supported provisionals served as anchorage for orthodontic appliances (Fig 3c), allowing teeth alignment according to the former setup.

Furthermore, a connective tissue graft was harvested from the palate to complete the soft tissue conditioning in the esthetic area (FDI 12–22). Finally, definitive restorations were designed (CAD) (Zirkonzahn.Modellier), milled (CAM) out of zirconia blanks (Prettau Zirconia, Zirkonzahn), and assembled to the implants (Fig 3d, Figs 4a and 4b). To improve the esthetic outcome of anterior restorations, a facial porcelain veneer (ICE Zirkon Ceramics, Zirkonzahn) was applied.

Fig 1  (a) Panoramic radiograph and (b) intraoral frontal view prior to treatment.

Fig 2  Superimposition of the (a) prosthetic-orthodontic setup (red) with the (a, b) malpositioned teeth (blue).

Fig 3  Occlusal view (a) prior to treatment and (b) at the time of implant-supported provisional prosthesis. The latter served to provide additional anchorage for (c) orthodontic appliances to achieve (d) the final outcome.
DISCUSSION

Implants prescribed for fixed prosthesis support were placed in optimally determined sites and then used to support screw-retained provisional prostheses. Whenever malpositioned teeth are located in future dental implant sites, a two-stage approach or the eventual use of temporary anchorage devices such as palatal implants and mini-screws, might be necessary. Furthermore, alternative treatment plans also need to be considered—eg, a double-crown–retained RDP combining teeth and short implants and therefore avoiding augumentative and orthodontic procedures. Moreover, implant-supported hybrid (≥ 6 implants) or removable prostheses (≥ 4 implants) may also be regarded as alternative treatment options. In this particular case history, the patient refused a removable prosthesis and extraction of the residual teeth.

CONCLUSIONS

Treatment planning in the case of complex clinical situations requiring a comprehensive interdisciplinary approach is challenging. This case history report demonstrates that comprehensive treatment planning that includes digital options can readily facilitate communication between orthodontist, prosthodontist, and oral surgeon, thus ensuring an optimal esthetic outcome.

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REFERENCES


Titanium Release in Peri-implantitis

The aim of this study was to investigate the titanium (Ti) content of biopsies from patients with severe peri-implantitis or controls without Ti exposure. Peri-implantitis is considered to be an infectious disease, but recent studies have shown that Ti can aggravate inflammation in combination with bacterial products. The Ti content of peri-implantitis and periodontitis (control) tissue is unknown. Thirteen patients referred for peri-implantitis and 11 for periodontitis treatment were included in this study. Disease severity was obtained from dental records. Biopsies were taken from both groups and chemically analyzed with inductively coupled plasma mass spectrometry for Ti content. Additionally, two patients with peri-implantitis and two with periodontitis were recruited, and their biopsies were analyzed microscopically with light microscopy, transmission electron microscopy, and scanning electron microscopy with element analysis to investigate the presence of particulate Ti. All patients lost one or more implants despite undergoing peri-implantitis or periodontitis treatment. Peri-implantitis tissue contained significantly higher concentrations of Ti than control samples, with a mean ± standard deviation of 98.7 ± 85.6 and 1.2 ± 0.9 μg/g, respectively. Particulate metal was identified in peri-implantitis and control biopsies, but element analyses could confirm only the presence of Ti in peri-implantitis tissue. This study showed that high contents of particulate and submicron Ti were present in peri-implantitis tissue. These high Ti contents in peri-implant mucosa can potentially aggravate inflammation, which might affect the prognosis of treatment interventions.