The Functional Reconstruction of Unilateral Free End Gaps after Giving Due Consideration to Posterior Maxilla

Liviu Steier, Germany

“The implant-based or implant tooth-supported rehabilitation of a shortened tooth row is definitely the best provision variant both functionally as well as aesthetically.” Quotation from: The prosthetic provision of gap bite—information from www.dgzmk.de

The restoration of the free end gap is becoming more and more important with time. Scientifically established augmentation processes that are used routinely allow the insertion of implants and the permanently fitting rehabilitation of chewing units. The incorporation of neighboring anatomical circumstances is dropped, the loading of existing teeth for anchoring prosthetic structures is dropped, and the filling of the mouth cavity with additional supporting structures is also dropped. Thus, implant based rehabilitation of the shortened tooth row actually represents a particularly prophylactic-oriented treatment measure in the long term, and is also the functionally and aesthetically best provision variant, as characterized by DGZMK (Deutsche Gesellschaft für Zahn-, Mund- und Kieferheilkunde, German Society for Teeth, Mouth and Jaw Medicine).

Case Description

A 33-year-old male patient introduces himself with a free end gap in the right upper jaw from tooth 13 and he wants to have a permanently fitting restoration. The OPG shows a strong pneumatized jaw cavity with a remaining bone height of less than 5 mm (Figure 2). As the bone height above the jaw cavity is less than 5 mm, a two-sided process is the means of the selection (SA4). In connection with an augmentation, the existing bone quality cannot be improved through D3. The Maestro system (of Bio Horizons) offers the special D4 Implant for this situation in 9, 12, 15 mm lengths, and 4 as well as 5 mm diameters.

Main properties of the implant used:

– The thread design is rectangular in shape. The mechanic defines the rectangular thread as “power thread,” which has its special indication during power transmission. This thread exercises 10x more compression power on the bone as compared to a comparable “V” thread design. It was developed for connection or “fixation” of two surfaces of different objects (Figure 1).

D4 implants have the following specialties:

– The number of threads per length unit is increased and thus adjusted to the sunk bone quality.
– The HA coating of the implant surface in case of bad bone quality was confirmed in many studies to date. Similar products have a maximum surface of 200 mm².

The treatment was carried out according to the common protocols:

1. Sinus elevation using PRP and Tri-calcium-phosphate. The healing time was 6 months.
2. After successful healing, insertion of three “root form” implants was undertaken.
3. Second stage starts after five months.
4. Prosthetic rehabilitation.

Protocol of sinus augmentation (based on Tatum):

The Tatum protocol for the release of the lateral sinus wall was followed. An expanded, angled incision on the palatinal part of the toothless alveolar ridge was carried out up to the region of the corner tooth. The cremitized gingiva was given special attention, which existed here to a very small extent. A releasing vestibular incision in the retro maxillary region improved access and vision. A full thickness flap was lowered and the most important anatomical limita-
tions were displayed. The length of the flap could be increased with the help of a periost slitting. Under conditions of constant cooling, the scope of the lateral access window was primarily centered and secondarily removed with a rose borer for better viewing of the membrane. The window was closed carefully by applying pressure from the caudal to the cranial. The cutting membrane could be mobilized without any injury and moved to a new cranial position. The filling of the created cavity was done with the initially-created bone replacement mixture in accordance with the customary method. The augmented unit was protected by a bio-absorbing membrane (Osseo Quest from Gore Company). The wound was closed with ePTF sewing material (Gore-Tex from Gore Company). The healing took place without any complications (Figure 3).

The implantation was conducted after six months. The quality of the newly gained bone was graded as D3 (Starter from Bio Horizons company) in the framework of the explorative boring. The pilot bores were placed in the future insertion positions with the boring stencil. The implant alveola was enhanced with the help of osteotomes. This way the bone density around the implant could be increased through compression.

Implant selection (Maestro, Bio Horizons Company):
• Tooth 14 = D4, length 10 mm, diameter 4 mm
• Tooth 15 = D4, length 10 mm, diameter 4 mm
• Tooth 16 = D4, length 9 mm, diameter 5 mm

The implants were inserted mechanically with the following torque values:
• 14 = 45 N/cm²
• 15 = 20 N/cm²
• 16 = 20 N/cm²

The wound was sealed tightly with ePTF sewing material (Gore-Tex from Gore Company). The wound healing process did not have any complications (Figure 4). The implants were released after exactly five months and they were provided with healing caps. The gingival healing progressed according to expectations and lasted 14 days. There was a deformation with open tray. The seat of the impression post (= introduced post) was checked through radiography. The articulation took place in a medium value articulator. The usual bite registration process allowed the articulation of the counter jaw.

The created prosthetic restoration (Figures 8, 9) can be described as follows:
- Blocked single crowns, shaped especially for effective hygiene,
- Blended with ceramics,
- Surface shaped proximal ratios (optimized for oral hygiene measures),
- Meagre palato-vestibular platform,
- Inter-occlusal encryption with the help of “B” and “C” contacts.

The constructions were placed in situ with the help of the identity key (Figure 10). The radiography test confirmed the exact fit (Figure 5). The titanium screws of the construction were drawn with 25 N/mm². The prosthetic restoration was cemented with IM (Nobel Biocare Company). The occlusal contact ratios (Figure 11) and the cleaning capability were checked. The patient was released after a control period in a routine recall.

Summary
The reconstruction of maxillary free end gaps represents a special challenge to diagnostics, therapy and material selection as well as to patient and dentist. The precise indication enables the determination of treatment protocols, the strict observation of the existing protocol, the selection of suitable instruments, augmentation material and technology. The targeted selection of the implant, paying special consideration to the architecture, guarantees optimum results.

Need Help?

What is ProRoot™ MTA?
A superior root repair material with:
- Water-based chemistry,
- No evaporation, setting in the presence of moisture,
- Resistance to marginal leakage and reduction of bacterial migration,
- Normal healing responses without inflammation,
- Easy clinical manipulation,
- Tooth-colored new formula,
- Biocompatibility.

Clinical applications for ProRoot™ MTA
Because of its unique features and benefits, ProRoot™ MTA offers distinct advantages over other materials for these root canal repair procedures:
- Repair of root perforations during root canal therapy,
- Repair of root fractures,
- Root-end filling,
- Pulp capping,
- Repair of root perforations during root canal therapy,
- Apicectomies.