

CASE REPORT

The importance of implant-supported overdentures in a bimaxillary complete edentulous patient – case report.

Valentin Melchner¹, Edwin Sever Bechir², Florentin Daniel Berneanu²

¹Dental Medicine Clinic Dr. Melchner Valentin, Munchen, Germany

²George Emil Palade University of Medicine, Pharmacy, Science, and Technology of Targu Mures, Romania

Abstract

Introduction. Complete edentulism is escorted by various comorbidities, which affect an individual. The management of edentulous patients was approached since the early days of dentistry.

The aim of this case report was to present the implanto-prosthetic rehabilitation of a bimaxillary complete edentulous patient with implant-supported overdentures, by using Straumann dental implants.

Case presentation. This case report presents the applied treatment to a bimaxillary complete edentulous patient, where the predictable osseointegration and implant stability after the placement of implants was possible, with the purpose to support the overdentures.

Conclusions. The oral rehabilitation of complete bimaxillary edentulism through implant-supported overdentures is a procedure with a predictive treatment that presents beneficial aspects in the quality of life of the patients.

Keywords: bimaxillary complete edentulism, treatment planning, implant insertion, implant supported overdentures

Introduction

The aging process determines the apparition of physiological changes associated with the functional modifications of the oro-facial system [1]. Complete edentulism, a phenomenon with worldwide prevalence, represents the biologic aging disease processes, induced by dental decays, periodontal diseases, trauma, oral cancer, a.s. Edentulism is escorted by various comorbidities, which affect an individual. From the public health perspective, edentulism influenced the general and systemic health degree, and the life quality of patients, including psychological aspects, the function of the oro-facial system, nutrition, morbidity, and mortality [2].

The management of edentulous patients was approached since the early days of dentistry [3]. Complete denture wearers present a reduced masticatory efficiency compared to the individuals that have natural teeth. The chewing cycles are significantly lower, the bite force and the activity of masticatory muscles are significantly lower than in dentate patients [4, 5].

Dental therapy of extended and complete edentation necessitates new approaches in obtaining these purposes that cannot be achieved by traditional dentistry. Dental

implantology, which represents the anchoring of different type of biomaterials into the jawbones, offers the way to remake the support and retention for the prosthetic rehabilitation in the case of the lost teeth [6, 7]. The advanced results in the researchers about implant designs, biomaterials, and techniques induced predictable success [7]. Many implant types are used today in the rehabilitation of different edentulism cases, for the support through the dental implants of fixed or movable prosthetic restorations [6, 8].

The surgical interventions in implantology require performance in conditions of detailed knowledge of the present and the future clinical situation, which can appear on the prosthetic field after the insertion of the implant/implants and of the implant-supported overdentures. For this reason, the knowledge regarding the oro-facial anatomy, and the surgical techniques applied to implants insertion, does not compensate the lack of knowledge of the functionality in the oro-facial system [6, 9].

Straumann Bone Level Tapered (BLT) implants characteristics are clinically recognized by their Straumann Bone Control Design and the CrossFit connection together with their correspondent prosthetic CrossFit

component elements of Bone Level Implant (BLI) products. These implants present a tapered apex with 3 cutting notches, especially appropriate in cases with soft bone or fresh extraction sockets, where the primary stability is very important [10]. Straumann implants present a sandblasted surface followed by acid etching, so they exhibit moderate roughness, necessary to increase interface contact between the osseous tissue and the implant surface, for better osseointegration of the implants. The Straumann BLT implants are supplied with the Loxim Transfer Piece that is connected by a snap-in mounting to the implant. The 15° conical-cylindrical CrossFit® connection presents 4 internal grooves, which offer a mechanical locking friction fit, with long-term stability under loading conditions and minimization of screw loosening [11-16].

According to the manufacturing company, the postoperative healing period is reduced from 3-6 months to 1 month and a half, and after this time, the implant-supported prosthetic restoration can be inserted on the implant-abutment [14].

The aim of this case report was to present the implanto-prosthetic rehabilitation of a bimaxillary complete edentulous patient with implant-supported overdentures, by using Straumann dental implants.

Case presentation

Patient B. H., age 53, went to the office for the prosthetic rehabilitation of the masticatory function. During the anamnesis, it was found that the patient is an "old wearer" of partial and then complete acrylic, maxillary and mandibular, dentures. His main complaint was the reduced masticatory efficiency with fatigue in the masticatory muscles. The patient's medical history revealed no systemic conditions that may contraindicate the implant-prosthetic treatment.

At the clinical examination complete bimaxillary edentulism was observed, with atrophy in the maxillary arch.

The OPG radiological examination disclosed severe bone atrophy at level of the maxillary jaw.

At the mandible, the OPG examination revealed the presence of a residual granuloma next to the apex of the extracted tooth 4.5. In addition, the alveolus of the extracted tooth 4.5 was partially mineralized and its buccal cortical plate was missing. In the position of tooth 4.6, the edentulous ridge was almost sufficient for implant insertion (Figure 1).

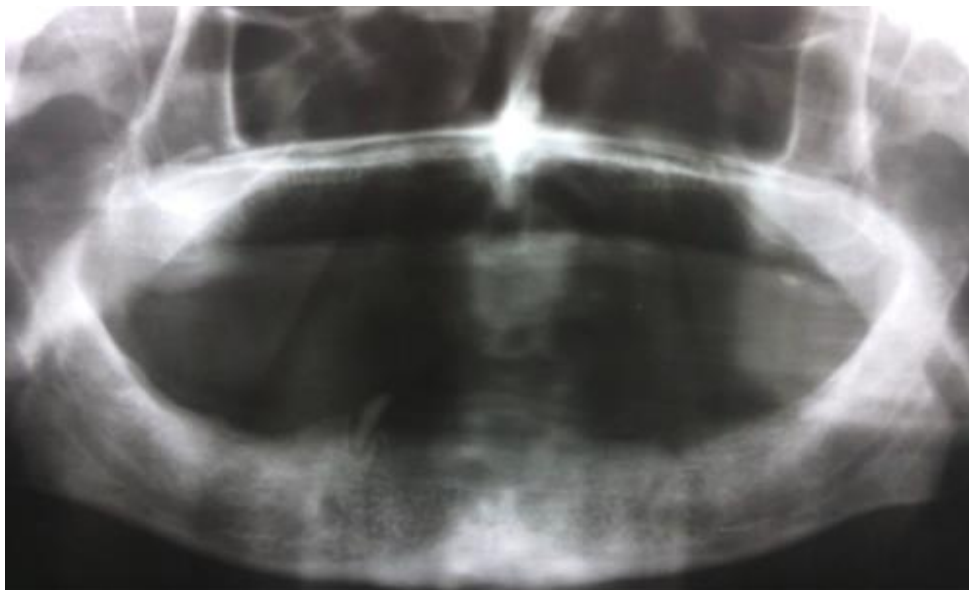


Figure 1. OPG at the presentation of patient

Because of the insufficient bone length and width in the maxillary osseous tissue at the level of the surgical site, the treatment plan included a bone augmentation technique. The surgery phase included simultaneous implant placement. The patient signed the informed consent.

The applied working protocol included establishing the treatment plan, the acquirement by the patient of the knowledge necessary for correct dental hygiene at home, the mental training of patient, rehabilitation of the oral cavity functions with preprosthetic and proprosthetic treatments, the surgery phase of the implants insertion, realization of the overdentures with implant support, insertion of overdentures in the oral cavity, and monitoring.

The implant treatment plan was to insert 8 implants, on which telescopic removable prostheses with implant aggregation would be made.

The 8 selected implants, which were inserted under local anesthesia, had the following dimensions, according to the chosen implant area:

- 1.4 Straumann ITI BoneLevel NC 12 mm long and 3.3 mm in diameter;
- 1.6 Straumann ITI BoneLevel NC 10 mm long and 3.3 mm in diameter;
- 2.4 Straumann ITI BoneLevel NC 12 mm long and 3.3 mm in diameter;
- 2.6 Straumann ITI BoneLevel NC 10 mm long and 3.3 mm in diameter;
- 3.3 Straumann ITI BoneLevel RC 12 mm long and 4.1 mm in diameter;
- 3.6 Straumann ITI BoneLevel RC 10 mm long and 4.1 mm in diameter;
- 4.3 Straumann ITI BoneLevel RC 12 mm long and 4.1 mm in diameter;
- 4.6 Straumann ITI BoneLevel NC 10 mm long and 4,1 mm in diameter.

The medication in the preoperative phase consisted of amoxicillin and clavulanic acid 2 g and dexamethasone 8 mg i.v., in order to reduce the postoperative edema.

Surgical phase

Because a minimum of 5 mm of vertical bone was present between the antral floor and the crest, the approach to the maxillary

posterior edentulous area was indicated. The osteotomy in maxillary jaw was realized with high precautions for preserving the integrity of the Schneiderian sinus membrane. The lateral approach for the sinus augmentation was associated with grafting, because of the narrow width of the ridge.

In the treatment stages were included: posterior superior alveolar and greater palatine nerve block anesthesia; the incision of the soft-tissue to afford adequate space for the achievement of the lateral window; the lateral window antrostomy should be realized without sharp edges because these can determine membrane perforation; the sinus membrane elevation was effectuated after the detaching of the sinus membrane with a blunt instrument, careful elevation of the membrane starting on the sinus floor and then extending to anterior and posterior walls with sinus curettes; preparation of implant site by the protection of the sinus membrane with periosteal elevator to avoid damaging with drills; graft placement after the protection of the sinus membrane with a collagen membrane; bone grafts placed in the least accessible area first; implants placement in the prepared implant sites; collagen membrane placement over the created window; suture of the flap with nonresorbable monofilament sutures and horizontal mattress sutures.

At the mandible, after opening the gingival mucosa, the preparation of the implant bed commences with the preparation of the alveolar ridge and with the marking of the implantation site with round burs, followed by the preparation of the implant bed with the BLT pilot drill and the BLT drills, according to the diameter of the endosteal implant. The implant bed is broadened in the cortical layer with the BLT profile drill. The insertion of the implants requires the following steps: attaching the adapter in their correct position; removing the implant from the carrier; placing the implant; correcting the implant orientation oro-facially; removing instruments with Loxim (counter-clockwise turns); after insertion, detach the Loxim with the Adapter.



Figure 2. OPG 4 months after implant insertion

Post-surgical phase

The impression abutments were screwed in the implants and with polyether, an open tray impression was used. After the setting of the impression material, the excess was removed by the aid of a scalpel in order to allow rigid fixation of the impression abutments to the composite tray.

The dental materials used for the realization of the superstructure with implant support were represented by W-Gold-W-Gold BSG

(tungsten alloy) for the primary/patrix component, Straumann alloy (having gold alloy content) for the secondary component (matrix), respectively Begosil L as packaging and Futura jet for polishing, RST polymer (3 M-Espe).

The artificial teeth mounted on the acrylic basis of mobilizable prostheses with implant aggregation were acrylic.

The time interval of the treatment took place between 07.2017 - 04.2018.



Figure 5. Prosthetic abutments fixed on implants at the upper jaw



Figure 4. Prosthetic abutments fixed on mandibular implants



Figure 5. Intraoral aspect of the implant-supported removable overdentures in occlusion

The results of this case presentation confirmed the benefit of the applied implant-prosthetic therapy in time.

Discussions

The purpose of actual dentistry is the rehabilitation of the normal masticatory function of the oro-facial system, with the restoration of the physiognomy, phonation, and health regardless of the atrophy degree, disease form or lesion [17, 18].

The oral implant should not be turned into a "panacea" solution, but the use of this method should not be avoided in cases where, if the treatment plan is properly designed and applied, the success rate is very high.

Currently, the innovations in the field of biomaterials, respectively in the field of dental implantology are in accordance with the biocompatibility requirements [19], which required the emergence of new implantological architectural models, with updated design and modern insertion techniques [7, 20].

Therapeutic success is conditioned by anatomical conditions in the prosthetic field of dental implant sites and frequently demands additional interventions to ameliorate it [21, 22].

Achieving prosthetic rehabilitations with dental implants therapy is a combination of talent and knowledge both of the dentist and dental technician.

Conclusions

- The functional rehabilitation with complex prosthetic restorations represented by implant support overdentures in complete

edentations always represents a clinical challenge.

- The establishment of dental implant therapy, followed by prosthetic rehabilitation should be preceded by profound clinical and paraclinical evaluations, performed with great rigor, in full agreement with the specificity and individuality of each clinical case.
- The functional predictability of future prosthetic restorations with implant support is correlated with a good knowledge of the indications and contraindications of this treatment method, as well as of the factors that contribute to the success or failure of dental implant therapy.

Conflict of interest: None to declare.

References

1. Yoshida FS, Mituuti CT, Totta T, Berretin-Felix G, Influence of the masticatory function on the swallowing in the healthy elderly. *Audiol., Commun. Res.* [online]. 2015, vol.20, n.2, pp.161-166
2. Vaishnavi R, ariga P, Dhanraj M, Jain AR, Effect of edentulism on general health and quality of life. *Drug Invention Today*, Vol 10, Issue 4, 2018, p. 549-553
3. Lee DJ, Saponaro PC, Management of Edentulous Patients, *Dent Clin N Am*, 2019, Volume 63, Issue 2, Pages 249–261
4. Abd El Aziz O, Saba EKA, Mesallati SA, Masticatory Efficiency of Complete Dentures Constructed by different Denture Base Materials, *IJSR*, Vol. 5, Issue 6, 2016, p. 1292- 1299
5. Fayad MI, Alruwaili HHT, Khan MS, Baig MN. Bite Force Evaluation in Complete Denture Wearer

- with Different Denture Base Materials: A Randomized Controlled Clinical Trial. *J Int Soc Prev Community Dent.* 2018;8(5):416-419
6. Gowd MS, Shankar T, Ranjan R, Singh A. Prosthetic Consideration in Implant-supported Prosthesis: A Review of Literature. *J Int Soc Prev Community Dent.* 2017;7 (Suppl 1):S1-S7
 7. Mittal Y, Jindal G, Garg S. Bone manipulation procedures in dental implants. *Indian J Dent.* 2016;7(2):86-94
 8. Mahesh V, Aditi N, Abhinav S, Principles of occlusion in implant dentistry, *Journal of ICDRO,* 2015, Vol. 7, Issue 3, p. 27-33
 9. Prosthetic considerations during implant treatment planning. In: Hupp JR, ed. *Introduction to Implant Dentistry: A Student Guide.* *J Oral Maxillofac Surg.* 2017;75 (suppl 2) :21. <https://www.joms.org/pb/assets/raw/Health%20Advance/journals/yjoms/YJOMS752S.pdf>
 10. https://www.straumann.com/content/dam/medial-center/straumann/en/documents/brochure/technical-information/490.038-en_low.pdf
 11. <https://www.straumann.com/content/dam/medial-center/straumann/en/documents/smart/490.192-SmartM-Bone-Level-Tapered-Implant-en.pdf>
 12. Kofron MD, Carstens M, Fu C, Wen HB, In vitro assessment of connection strength and stability of internal implantabutment connections, *Clinical Biomechanics,* 65(2019): 92–99
 13. <https://www.straumann.com/content/dam/medial-center/straumann/en-us/documents/brochure/product-information/NAMLIT.1043.V2%20-%20BLT%20basic%20information.pdf>
 14. <https://www.straumann.com/us/en/dental-professionals/products-and-solutions/implant-borne-prosthetics/abutment-connections.html>
 15. https://straumann.implantdivision.ro/download/490.038-en_low_procedura_chir_BLT.pdf
 16. http://www.schmidt-dental.pl/wp-content/uploads/2016/11/Straumann_Bone_Level_Tapered_Implant_2_9mm_SC.pdf
 17. Dewan SK, Arora A, Sehgal M, Khullar A. Implant failures: A broader perspective. *J Dent Implant.* 2015;5:53–9
 18. Mangano C, Mangano F, Piatelli A, Iezzi G, Mangano A, La Colla L. Prospective clinical evaluation of 307 single-tooth Morse taper connection implants: a multicenter study. *Int J Oral Maxillofac Implants* 2010;25(2):394-400
 19. Duraccio D, Mussano F, Faga MG, Biomaterials for dental implants: current and future trends, *J Mater Sci* (2015) 50:4779–4812
 20. Gaviria L, Salcido JP, Guda T, Ong JL. Current trends in dental implants. *J Korean Assoc Oral Maxillofac Surg.* 2014;40(2):50-60. doi:10.5125/jkaoms.2014.40.2.50
 21. Colombo M, Mangano C, Mijiritsky E, Krebs M, Hauschild U, Fortin T. Clinical applications and effectiveness of guided implant surgery: a critical review based on randomized controlled trials. *BMC Oral Health.* 2017;17(1):150
 22. Mish C., Resnik R., *Misch's Avoiding Complications in Oral Implantology,* 1st Edition, Mosby, 2017

Corresponding author:

Edwin Sever Bechir

George Emil Palade University of Medicine, Pharmacy, Science and Technology of Tirgu Mures, 38 Gheorghe Marinescu street, Tirgu Mures, 540139, Romania

Email: bechir.edwin@gmail.com

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