

Prosthetic Treatment of a Patient with Maxillary Defect

Ivan Gerdzhiakov¹, Mariana Dimova-Gabrovska²

^{1,2}Department of Prosthetic dentistry, Faculty of Dental Medicine, Medical University of Sofia

Abstract: Introduction: Prosthetic methods of treatment are of prime importance in complex treatment and rehabilitation in patients with maxillary resection. Aim: the aim of this clinical case description is to present the prosthetic rehabilitation with post-resection partial prosthesis in a patient with maxillary resection and the possibility for restoration of occlusal relationships. Material and methods: The described clinical case follows the prosthetic rehabilitation of a 62-year old patient, operated on the occasion of osteoblastoclastoma of the upper jaw. The treatment plan included closing of the passage defect in the traditional way, by fabricating a post-resection prosthesis from Meliodent HC- a heat-polymerizing acrylic plastic with low residual monomer content. For objectifying and assessing the achieved occlusion-articulation relationships, a computerized occlusal analysis was performed with the T-SCAN 8 system. Results: The results of the conducted prosthetic rehabilitation showed good retention and stability of the prosthesis. Optimal defect hermetization was achieved, with a stable barrier between the oral and the nasal cavity, which helped to restore speech and masticatory function and facilitate swallowing. Conclusions: Prosthetic rehabilitation methods for patients with maxillary defects ensure successful recovery of occlusal relationships.

Keywords: maxillary defect, maxillary resection, obturator, post-resection prosthesis, T SCAN

1. Introduction

Prosthetic treatment methods are the main means for restoration and rehabilitation of patients with maxillary resection [1, 2]. The most commonly used is the three-stage treatment scheme, applying surgical, temporary and definitive obturators, fabricated over different time intervals after the resection [3, 4]. It is believed that this rehabilitation approach allows optimal recovery of patients' nutrition, speech, breathing and aesthetics and provides an acceptable quality of life [5, 6]. Mihaylov et al. [7] considered that optimal treatment results are achieved when implementing a four-stage method for treatment and rehabilitation. The "maintaining prosthetic treatment", designated as the fourth stage, includes systematic care after completion of the prosthetic treatment, as well as replacement and rationalization of prosthetic structures, adequate to the changes in the dental status and prosthetic field over the time. Maxillofacial defects after maxillary resection cause serious nutrition disorders and therefore, restoration of masticatory function is the main goal of prosthetic treatment [8, 9].

The literature describes numerous studies of masticatory function in patients with obturators [10, 11, 12, 13, 14, 15]. Most of them examine the changes in masticatory efficiency and occlusal force after treatment [11, 13, 16, 17]. According to Matsuyama et al. [11], masticatory efficiency after obturator prosthesis is comparable to that in young people, although less occlusal force is measured. Ono et al. [13], however, believe that it is close to that in healthy subjects. Kreeft et al. [16] determine masticatory efficiency as similar to that in patients with complete dentures, which, however, is not confirmed by the results of Reitemeier et al. [18], who found less masticatory efficiency. The opinions of the factors influencing masticatory function are also controversial. According to some of them [10, 13, 18], these factors include the size, location of the defect and the presence of teeth [16], while other authors believe that the size of the defect does not affect masticatory function, but the presence of natural teeth facilitates nutrition.

2. Aim

The aim of this clinical case description is to present the prosthetic rehabilitation with post-resection partial prosthesis in a patient with maxillary resection and the possibility for restoration of occlusal relationships.

3. Material and Methods

The described clinical case follows the prosthetic rehabilitation of a 62-year old patient, operated on the occasion of osteoblastoclastoma of the upper jaw. During the examination we found: a unilateral passage defect in the region of the upper right alveolar ridge and partial edentulism of the upper jaw with preserved 21, 22 and 23 teeth (Figure 1) and intact dentition of the lower jaw.

The treatment plan included closing of the passage defect in the traditional way, by fabricating a post-resection prosthesis. The impressions were taken with standard trays and irreversible hydrocolloid impression material after pre-tamponing the defect with gauze. In the next clinical stage, the occlusion height was determined and the central position of the lower jaw was fixed. After successful testing with the arranged teeth, the prosthesis was fabricated from Meliodent HC (Heraeus Kulzer) - a heat-polymerizing acrylic plastic with low residual monomer content. Due to the relatively small size of the defect, the post-resection prosthesis was made with a solid substituting part (Figure 2). The finished prosthesis was adjusted and articulated in the patient's mouth in the final clinical stage (Figure 3).



Figure 1: Intraoral view of the patient



Figure 2: The finished post-resection prosthesis



Figure 3: Intraoral view of the patient after completed prosthetic rehabilitation

For objectifying and assessing the achieved occlusion-articulation relationships, a computerized occlusal analysis was performed with the T-SCAN 8 system.

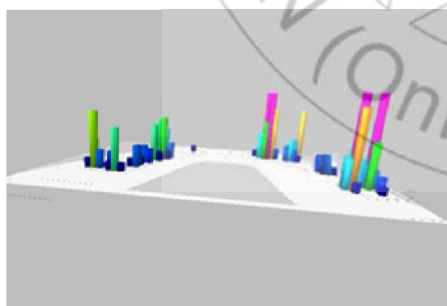


Figure 4: Registration of occlusal relationships in maximum intercuspation

4. Results

The results of the conducted prosthetic rehabilitation showed good retention and stability of the prosthesis. Optimal defect hermetization was achieved, with a stable barrier between the oral and the nasal cavity, which helped to restore speech and masticatory function and facilitate swallowing. An important role for the positive treatment outcome proved the formation of a solid substituting part of the prosthesis, which provided hermetization of the defect. The unilateral location and limited size, and the presence of teeth supported and

facilitated the prosthetic treatment. This confirmed the opinions of most authors [10, 13, 18] for the leading role of these factors in treatment outcomes.

The computerized occlusal analysis presents the force distribution in maximum intercuspation (Figure 4). It is noteworthy the predominant percent of the total force in the frontal left segment (45.5%) versus the right frontal segment (5.8%), which we attribute to the fixed prosthetic treatment of 21, 22 and 23 teeth and the pliability of mucous membranes in the areas of post-resection prosthesis. The analysis of force distribution in the lateral sections shows relatively lower share in percent for the right lateral quadrant (29.2%), compared to the left lateral quadrant (70.8%).

The conducted prosthetic rehabilitation helped to restore the patient's aesthetic appearance, self-esteem and social activity.

5. Discussion

The presented clinical case confirms the results of some studies [1, 2, 5, 6], according to which, prosthetic treatment of maxillary defects allows to successfully restore impaired functions and protects patients from permanent desocialization. The obtained results can be assessed as optimal, since the achievement of a balanced occlusion, with occlusal forces symmetrically distributed by location and size in the central occlusion of patients with post-resection prosthesis, is frequently aspirational. This should be the prosthodontist's target in the entire treatment planning. However, crucial factors, such as abnormal anatomy of the prosthetic field, pliability of mucous membranes in the different areas, lack of adequate bone base in the area of the defect, should be taken into account. Last but not least is the patient's willingness to fully cooperate in carrying out the treatment. Usually, patients' wishes are related only to closing the defect and restoring masticatory and speech functions. All this gives us the reason to interpret the results of the occlusal analysis as satisfactory, taking into account the impossibility to achieve progressive increases of the distally directed occlusal forces in the lateral sections of this clinical case.

6. Conclusions

The applied method of prosthetic treatment allowed successful defect hermetization and helped to restore the normal parameters of the functional (nutrition and speech) and psycho-social status of the patient.

References

- [1] Anand R, Nikhil V, Ponnanna AA. Prosthodontic rehabilitation of an edentulous patient with velopharyngeal insufficiency. *Indian J Stomatol* 2010;1(2):121-3.
- [2] Anandakrishna GN, Gali S. Management of Velopharyngeal Disorders. A Case Series. *J Prosthodont.* 2010 Jul;19(5):397-402. doi: 10.1111/j.1532-849X.2010.00602.x. Epub 2010 Apr 28.

- [3] King GE, Martin JW. Complete dentures for the obturator patient. *Dent Clin North Am.* 1996 Jan;40(1):217-37.
- [4] Huryn JM, Piro JD. The maxillary immediate surgical obturator prosthesis. *J Prosthet Dent.* 1989 Mar;61(3):343-7.
- [5] Depprich R, Naujoks C, Lind D, Ommerborn M, Meyer U, Kübler NR, Handschel J. Evaluation of the quality of life of patients with maxillofacial defects after prosthodontic therapy with obturator prostheses. *Int J Oral Maxillofac Surg.* 2011 Jan;40(1):71-9. doi: 10.1016/j.ijom.2010.09.019. Epub 2010 Oct 25.
- [6] Irish J, Sandhu N, Simpson C, Wood R, Gilbert R, Gullane P, Brown D, Goldstein D, Devins G, Barker E. Quality of life in patients with maxillectomy prostheses. *Head Neck.* 2009 Jun;31(6):813-21. doi: 10.1002/hed.21042.
- [7] Mihaylov Tr, Gerdzhikov I, Dimova-Gabrovska M, Mihaylova K. "MAXILLOFACIAL INJURIES AND DEFECTS - Quality of life after orthopedic rehabilitation". MU-Varna, 2016.
- [8] Kornblith AB, Zlotolow IM, Goen J, Huryn JM, Lerner T, Strong EW, Shah JP, Spiro RH, Holland JC. Quality of life of maxillectomy patients using an obturator prosthesis. *Head Neck.* 1996 Jul-Aug;18(4):323-34.
- [9] Rogers S, Lowe D, McNally D, Brown J, Vaughan E. Health-related quality of life after maxillectomy: a comparison between prosthetic obturation and free flap. *J Oral Maxillofac Surg.* 2003 Feb;61(2):174-81.
- [10] Koyama S, Sasaki K, Inai T, Watanabe M. Effects of defect configuration, size, and remaining teeth on masticatory function in post-maxillectomy patients. *J Oral Rehabil.* 2005 Sep;32(9):635-41.
- [11] Matsuyama M, Tsukiyama Y, Tomioka M, Koyano K. Clinical assessment of chewing function of obturator prosthesis wearers by objective measurement of masticatory performance and maximum occlusal force. *Int J Prosthodont.* 2006 May-Jun;19(3):253-7.
- [12] Matsuyama M, Tsukiyama Y, Tomioka M, Koyano K. Subjective assessment of chewing function of obturator prosthesis wearers. *Int J Prosthodont.* 2007 Jan-Feb;20(1):46-50.
- [13] Ono T, Kohda H, Hori K, Nokubi T. Masticatory performance in postmaxillectomy patients with edentulous maxillae fitted with obturator prostheses. *Int J Prosthodont.* 2007 Mar-Apr;20(2):145-50.
- [14] Xing GF, Jiao T, Sun J, Jiang YL. The analysis of masticatory efficiency after maxillofacial prosthetic treatment for unilateral maxillary defect. [Article in Chinese]. *Shanghai Kou Qiang Yi Xue.* 2003 Dec;12(6):422-3.
- [15] Yontchev E, Karlsson S, Lith A, Almqvist SA, Lindblad P, Engström B. Orofacial functions in patients with congenital and acquired maxillary defects: a fluoroscopic study. *J Oral Rehabil.* 1991 Nov;18(6):483-9.
- [16] Kreeft AM, Krap M, Wismeijer D, Speksnijder CM, Smeele LE, Bosch SD, Muijen MS, Balm AJ. Oral function after maxillectomy and reconstruction with an obturator. *Int J Oral Maxillofac Surg.* 2012 Nov;41(11):1387-92. doi: 10.1016/j.ijom.2012.07.014. Epub 2012 Aug 31.

- [17] Umino S, Masuda G, Fujita K. Masticatory performance with a prosthesis following maxillectomy: an analysis of 43 cases. *J Oral Rehabil.* 2003 Jun;30(6):642-5.
- [18] Reitemeier B, Unger M, Richter G, Ender B, Range U, Markwardt J. Clinical test of masticatory efficacy in patients with maxillary/mandibular defects due to tumors. *Onkologie.* 2012;35(4):170-4. doi: 10.1159/000337374. Epub 2012 Mar 19.

Author Profile



D-r Ivan Dimitrov Gerdzhikov, PhD, Department of Prosthetic Dental Medicine, Faculty of Dental Medicine, Medical University of Sofia. In 1994 he did Graduation of higher education Master's degree, Faculty of Dental Medicine, Medical University of Sofia, Bulgaria.
 1996. Full-time assistant professor at the Department of Prosthetic dental medicine, Faculty of Dental Medicine of Sofia.
 1999. Specialist in Prosthetic Dentistry.
 1997-2001. Lecturer on maxillofacial prosthetic treatment, Medical College "Y. Filaretova", Sofia.
 2005. Specialist in General Dentistry.
 2009. Appointed on the position of Chief Assistant Professor.
 2015. Defended dissertation "Quality of life in patients with maxillary postoperative defects - analysis and optimization" and acquiring Educational and qualification degree PhD.
 More than 40 participation in national and foreign congresses and scientific forums in the field of prosthetic dental medicine.
 Co-author of the monograph "MAXILLOFACIAL INJURIES AND DEFECTS - Quality of life after orthopedic rehabilitation". 2016.
 Publications - 28.
 Member of the Bulgarian Dental Association, Bulgarian Society of Dental Medicine, Bulgarian Scientific Dental Society.



Assoc. Prof. Mariana Iordanova Dimova-Gabrovska, MD, PhD, DSc Department of Prosthetic Dental Medicine, Faculty of Dental Medicine, Medical University of Sofia.
 1997 Graduation from the Faculty of Dental Medicine, Higher Medical Institute of Plovdiv
 1998-2003. Dissertation work on Prosthetic Dentistry at the Faculty of Dental Medicine, Medical University of Sofia
 1999-2000. DAAD-scholarship for specialization and academic qualification on "Analysis of the condylar position and of the occlusion in cases with normal parameters", Dental Institute of University Johan Wolfgang Goethe, Frankfurt am Main, Germany.
 2004. Defended dissertation "Provisional constructions in fixed prosthetic dentistry" and acquiring Educational and qualification degree PhD.
 2007. Associate professor at the Department of Prosthetic Dental Medicine, Faculty of Dental Medicine of Varna
 2011. Associate professor at the Department of Prosthetic Dental Medicine, Faculty of Dental Medicine of Sofia
 2015. Defended dissertation on "Contemporary tendencies and gnatological preconditions in diagnosis and rehabilitation of craniomandibular disorders", acquiring the scientific degree "Doctor of Sciences"
 2001. Specialist in Prosthetic Dental Medicine
 2005. Specialist in General Dental medicine
 Post-graduate qualification: participation in national and foreign congresses and scientific forums in the field of prosthetic dental medicine, functional diagnostics and treatment of the masticatory system in patients with craniomandibular disorders.
 Member of the Bulgarian Dental Association, Bulgarian Scientific Dental Society, Union of Scientists in Bulgaria, German Society

of dental Medicine (Deutsche Gesellschaft für Zahn- Mund- und Kieferheilkunde - DGZMK), and of the German workgroup on functional diagnostics and treatment (Deutsche Arbeitsgemeinschaft für Funktionsdiagnostik und Therapie – AFDT at DGZMK), member of the European Academy of Craniomandibular Disorders (EACD).

