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REVIEW

ENHANCING RECOVERY FROM ORAL FACIAL NEOPLASIA: A NARRATIVE REVIEW OF THE ROLE, DESIGN AND REHABILITATION IMPACT OF SURGICAL OBTURATORS

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Abstract. *Surgical obturators play a crucial role in the comprehensive rehabilitation of oncologic patients who experience maxillary defects following surgical intervention. This narrative review explores the significance of surgical obturators in facilitating recovery, detailing their design considerations and functional necessities. Surgical obturators serve as immediate post-operative aids, providing essential support for speech articulation, swallowing and mastication while promoting tissue healing. The design process meticulously considers anatomical fit, speech intelligibility, masticatory efficiency, and patient comfort to enhance overall rehabilitation outcomes. Moreover, this review addresses contemporary challenges in obturator design, including microbial buildup and the weight of the prosthesis, proposing novel solutions to enhance usability. The development and application of various types of surgical obturators – conventional, hybrid, and implant-supported – are analyzed, clarifying their diverse roles in the long-term management of patients. By synthesizing current knowledge and advancements in this field, this review aims to provide a comprehensive understanding of the critical importance of surgical obturators in the recovery journey of oncologic patients.*

Key words: *functional restoration, maxillary defect, prosthetic rehabilitation, surgical obturators, quality of life*

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INTRODUCTION

Intraoral defects are a serious concern, especially when they occur in the maxilla. These defects can lead to openings into the antrum and nasopharynx, causing discomfort and difficulty for patients. It is alarming to learn that these defects can arise from both congenital malformations and surgical intervention for oral neoplasms [1]. Acquired defects resulting from surgery are commonly encountered, and this problem has only been exacerbated by the COVID-19 pandemic. It is distressing to hear that patients with advanced oral mucormycosis or severe malignancy may experience palate necrosis and ulceration and that severe surgical operations such as radical resection may be required to treat these specific problems [2]. Unfortunately, these operations can lead to several functional issues, including reduced masticatory function, fluid leaking into the nasal cavity, and dif-

ficulties in chewing, biting, and speaking after hypernasal speech [3]. Obturator's type and shape remain important factors for determining the quality of speaking and feeding processes [4].

This review explores the role, design, and rehabilitation impact of surgical obturators in enhancing recovery for patients with maxillary defects, particularly those resulting from oncological surgeries. By analyzing the latest advancements in obturator design and application, insights will be provided into how these prosthetic devices can significantly improve functional outcomes and quality of life for affected individuals.

ROLE

For patients with intraoral defects resulting from surgical intervention for oral neoplasms, multidisciplinary teams are essential to optimizing results. For the rehabilitation of surgically managed patients, especially those suffering from maxillary cancer, the maxillofacial prosthodontist's assistance to these teams is invaluable. Obturator prosthesis is a scientifically validated method for reducing hospital visits, controlling pain, and improving dental function and mental health. The incorporation of obturator prostheses has the potential to significantly enhance the quality of life for patients having intraoral cancer resection [5]. Prosthodontic management involves three phases: pre-operative construction and insertion of a prosthesis, post-operative modification, and construction of a definitive prosthesis once healing is complete [6].

DESIGN

Depending on the size and severity of the defect, the surgeon and the reconstructive team make customized selections. Consequently, there have been multiple attempts to develop a unified classification system of midface post-ablative abnormalities due to the complexity and three-dimensional construction of the maxilla [15]. Over the previous fifty years, seventeen distinct classifications have been suggested (The Glossary of Prosthodontic Terms, 2017). If a patient is partially dentate, there are distinct classification methods for maxillectomy defects. No classification scheme for edentulous maxillary deformities has been developed, as far as the authors are aware. Dental arch abnormalities resulting from edentulous maxillectomy have been given a straightforward classification system with distinct features. It is simpler to learn and use because this categorization was based on the Aramany classification [7]. The suggested classification system divides the horizontal components into seven groups according to the connection between the defect region and the remaining edentulous area (Fig 1). Maxillary defect patients were classified according to the order given by Aramany (1978) [8].

Class I: This deformity affects the incisive papilla and is situated along the maxillary arch's midline (Fig. 1A).

Class II: Unilateral defect with one side of the remaining alveolar ridge on the contralateral side and an intact anterior (Fig. 1B).

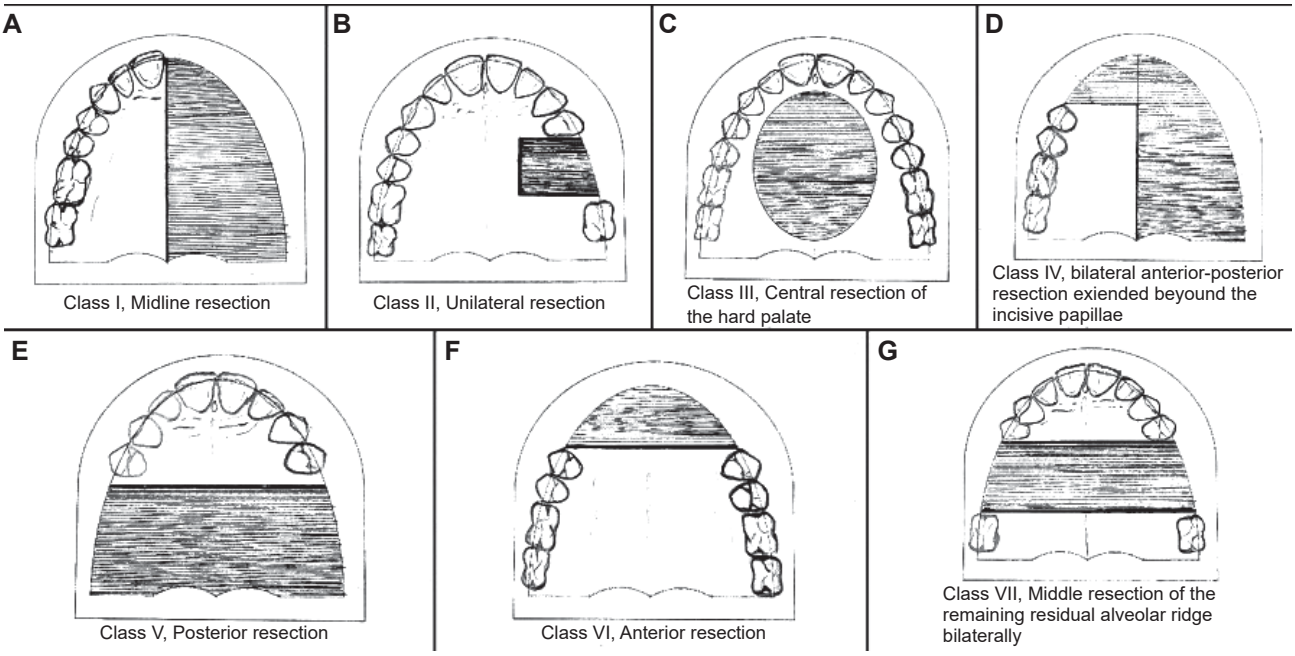

Fig. 1. Maxillectomy defect classification

Class III: The center section of the hard palate has the defect, while the remnant alveolar ridge is still intact (Fig. 1C).

Class IV: Both sides of the maxilla are affected, and the deformity reaches the midline (Fig. 1D).

Class V: Bilateral defect located posterior to the remnant alveolar ridge that still exists (Fig. 1E).

Class VI: The maxillary alveolar ridge has defects in its front section, whereas its posterior half is preserved on both sides. This is a typical presentation of trauma-related and congenital abnormalities (Fig. 1F).

Class VII: Both sides of the maxilla are affected, and the defect crosses the middle section of the alveolar ridge. There is still some residual alveolar ridge present, both anteriorly and posteriorly to the defect (Fig. 1G).

The proposed classification's vertical component was separated into four groups, denoted by the alphabetical letters A, B, C, and D.

Category A: Restrictions to the maxilla, including removal of one or three of its walls, either with or without the palate being compromised. It can be combined with Class 1, 2, 3, 4, 5, 6, and 7 horizontal components.

Category B: Infrastructural, comprising resection of the palate, anterior, posterior, medial, and lateral walls of the maxilla, as well as the maxillary arch, without the orbital floor. It can be combined with horizontal elements from Classes 1, 2, 4, 5, 6, and 7.

Category C: A total maxillectomy involves removing all six maxillary walls, either with or without the orbital material, including 1 and 4 horizontal components.

Category D: Surgical resection of the orbitomaxillectomy, also known as suprastructural resection, involves excising the upper five walls of the maxilla along with its orbital contents, but not the palate or maxillary arch. None of the horizontal components can be mixed with it. There are specific free flaps that can be used to treat it, like myocutaneous rectus abdominis or myocutaneous latissimus dorsi.

PROSTHODONTIC DESIGN CONSIDERATIONS

The immediate function of a surgical obturator includes providing post-operative support for speech, swallowing, and mastication. It assists in tissue healing and reduces the risk of complications such as wound dehiscence or infection. Ensuring the obturator remains stable and properly positioned within the oral cavity is crucial, as is minimizing discomfort or pain associated with the surgical site and prosthetic device. Additionally, the obturator helps the patient adapt to its presence, facilitating acceptance and serving as a temporary solution until a definitive prosthesis can be fabricated [19]. It supports improved oral function, including speech articulation, swallowing, and mastication during the recovery period. Regular assessment of the fit, function, and comfort of the surgical obturator is essential, with necessary adjustments or modifications made as needed. Patient education on proper care and maintenance of the obturator, along with guidance on oral hygiene practices, is also a key component of post-operative care.

REHABILITATION

Post-surgery rehabilitation for maxillary defects incorporates the use of diverse obturator prostheses, encompassing immediate, interim, and definitive surgical obturators [9].

Immediate surgical obturator

Before surgery, impressions are taken utilizing random extended trays and modified casts. The prosthesis is then positioned throughout the process and, if needed, packed using circum-zygomatic wires.

Objectives

The surgical obturator aids in initially maintaining skin grafts designed to replace respiratory mucosa, typically being removed after seven to ten days. It also facilitates PO nutrition and hydration, ensuring that patients can consume food and liquids. Additionally, the obturator plays a vital role in enabling intelligible speech, which is crucial for effective communication. By addressing these functions, the obturator helps diminish patient anxiety, contributing to a smoother recovery process [10].

Interim surgical obturator

Impressions of the defect are typically taken about seven days following surgery, and an obturator is used to manufacture the prosthesis utilizing a working cast that has not been changed.

To entirely replace the surgical prosthesis, new impressions may be taken. Alternatively, the surgical prosthesis itself may be modified by adding a durable soft prosthodontic lining to the polymethyl methacrylate (PMMA) of the current prosthesis. Denser PMMA can eventually be used in place of this soft liner.

The addition of a soft prosthodontic liner to existing prostheses offers several advantages. It minimizes time consumption, eliminates the need for lengthy procedures, and reduces costs by eliminating expenses associated with dental laboratory work. However, there are drawbacks to consider [17]. Soft liners can accumulate microbes due to their porous nature,

potentially leading to hygiene concerns. Additionally, they are prone to tearing and cannot achieve the same level of polish as PMMA. Furthermore, the additional bulk of a soft liner can increase the weight of the prosthesis, potentially causing discomfort for the wearer. Therefore, while providing convenience and cost-effectiveness, careful consideration of these limitations is essential when opting for soft prosthodontic liners [11].

Objectives

Addressing the objectives of assisting tissue healing, ensuring prosthesis stability, providing comfort, helping the patient adapt to the device, preparing for a definitive prosthesis, and improving oral function during recovery is crucial for achieving the best outcome for the patient. By focusing on these goals, healthcare providers can enhance the healing process, reduce complications, and ensure the prosthesis remains stable and comfortable. Additionally, supporting the patient's adaptation to the device and preparing them for a definitive prosthesis can significantly improve their overall oral function and quality of life during the recovery period.

Definitive surgical obturator

Once the surgical procedures are completed and the wound has healed for a period of four to six months after stopping all treatment, the temporary obturator can be changed out for a permanent one. Typically, definitive obturator bulbs are hollowed out to reduce the prosthesis' weight [12].

There are various types of definitive obturators available to cater to the individual demands of patients, to provide long-term therapy for maxillary abnormalities. The conventional definitive obturator offers thorough coverage of the problem area to restore oral function and esthetics. It is made with traditional materials and processes. Dental implants are used by implant-supported definitive obturators to improve stability and retention; this is especially advantageous for individuals who have healthy teeth and enough bone support. Whereas magnetic-retained obturators use magnets for safe retention and simple removal, bar-retained obturators use a metal bar attached to implants for enhanced stability [13]. Hybrid obturators balance stability, retention, and convenience of use by combining many retention techniques to provide a customized solution. Based on a planned prosthodontic rehabilitation, prosthetic-driven implant placement techniques maximize implant support for the definitive obturator. Several factors, including the anatomy, oral health, functional needs, and personal preferences of the patient determine the type of definitive obturator used [15].

Objectives

Designing surgical obturators requires careful consideration of several crucial factors to ensure the best outcomes for patients. Anatomic restoration aims to fully restore the missing structures of the maxilla, creating a harmonious and functional oral cavity. Adequate speech function is essential for clear and intelligible speech, optimizing articulation and resonance, while supporting normal swallowing patterns to prevent regurgitation of fluids into the nasal cavity. Enhancing masticatory function improves the ability to chew food effectively and comfortably. Oral continence, which involves providing a seal to prevent air and fluid leakage into the nasal cavity during speaking and swallowing, is also important [16]. Ensuring stability and retention is critical to keep the obturator securely in place during functional activities, without displacement. Comfort is another key consideration to minimize discomfort or irritation to the surrounding tissues and mucosa. Additionally, esthetics is vital, aiming to create a natural appearance that blends seamlessly with the remaining oral structures. Durability is essential, requiring the obturator to be made from materials resilient to wear and tear, maintaining functionality over time. Maintaining oral health is crucial, allowing for easy cleaning and maintenance of oral hygiene to prevent complications such as infection or inflammation. Finally, restoring oral function and appearance significantly improves psychosocial well-being, enhancing the patient's confidence and quality of life [18].

CONCLUSION

Surgical obturators have emerged as a crucial solution in rehabilitating oncological maxillary defects, providing patients with immediate support post-surgery, aiding in tissue healing, and facilitating oral function. By utilizing a multidisciplinary approach and employing various types of obturators, patients' evolving needs can be addressed effectively throughout their rehabilitation journey. These prosthetic solutions not only restore oral function and esthetics but also contribute significantly to patient's overall well-being and quality of life. The combination of surgical expertise with prosthodontic innovation has resulted in the development of surgical obturators, which offer valuable support to individuals navigating the challenges of oncological maxillary defects, fostering hope and restoration. The use of surgical obturators is a scientifically validated method for reducing hospital visits, controlling pain, and improving dental function and mental health. Thus, it is essential to acknowledge the critical role surgical obturators play in rehabilitat-

ing oncological maxillary defects, providing patients with a better quality of life and a reason to hope.

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