Case Report

Prosthetic Rehabilitation of Maxillary Defect with Restricted Mouth Opening: A Case Report

Sanskriti Rautela[1], Devanshi Palariya[1], Harpreet Kaur[1], Pallavi Kumar[1], Chandana Nair[2], Shikha Luniyal[3]

[1]Post Graduate Student, Department of Prosthodontics, Crown and Bridge, Institute of Dental Sciences, Bareilly, Uttar Pradesh, India, [2]Head, Department of Prosthodontics, Crown and Bridge, Institute of Dental Sciences, Bareilly, Uttar Pradesh, India, [3]Senior Lecturer, Department of Prosthodontics, Crown and Bridge, Institute of Dental Sciences, Bareilly, Uttar Pradesh, India.

ABSTRACT

Maxillofacial defects resulting from surgical interventions such as hemimaxillectomy and hemimandibulectomy, particularly when complicated by microstomia, present significant challenges in prosthetic rehabilitation. This case report details the successful management of such patient utilizing magnets, alongside an obturator fabricated from heat-cure acrylic resin to overcome impression-making difficulties. The resulting prosthesis effectively restored function, improving mastication, speech, and esthetics, thereby enhancing the patient's quality of life.

Key words: Hemimandibulectomy, Hemimaxillectomy, Magnet-assisted sectional tray, Microstomia, Prosthetic rehabilitation

INTRODUCTION

Maxillofacial and palatal defects may arise from various causes, including congenital malformations, trauma, disease, pathologic changes, radiation burns, or surgical procedures such as hemimaxillectomy and hemimandibulectomy. These defects often lead to oro-antral communication, resulting in difficulties with swallowing, deglutition, impaired speech, and facial disfigurement. An obturator, defined as "a maxillofacial prosthesis used to close a congenital or acquired tissue opening, primarily of the hard palate and/or contiguous alveolar/soft tissue structures," serves as a vital solution.[1] The size and shape of the prosthesis vary depending on the defect's extent, based on Aramany's classification.[2] In patients with microstomia, the limited mouth opening complicates conventional impression techniques, necessitating innovative approaches such as sectional trays.

This report explores the use of a magnet-assisted sectional impression tray for making accurate impressions for rehabilitating a patient with combined maxillary and mandibular defects.

CASE REPORT

A 41-year-old male was referred from Rohilkhand Cancer Institute, Bareilly, to the Department of Prosthodontics and Crown and Bridge, Bareilly, with chief complaint of difficulty in chewing, speech, and nasal regurgitation of fluids following surgical resection. Medical history revealed a 5-year diagnosis of hypothyroidism managed with medication, and a prior diagnosis of squamous cell carcinoma of the right buccal mucosa, treated with chemotherapy and surgical resection of the right maxilla and mandible 1 year ago. Patient had a history of chewing tobacco 8–10 times daily for the past 7 years and discontinued the habit a year ago. Dental history included root canal treatment and fixed prosthesis for teeth 35 and 36, 3 years ago.

Extraoral examination [Figure 1] showed facial asymmetry with right-sided deviation of the lower third of the face, suture scars in the right facial region, drooping of the right corner of the mouth, and a mandibular midline deviation of 22 mm from the facial midline at a maximum mouth opening of 18 mm, which increased with opening. Intraoral examination [Figure 2] revealed a right palatal defect extending from the midline to the posterior region involving the hard and part of the soft palate (Aramany Class II), a right mandibular defect distal to the lateral incisor with a surgical skin graft, and partially edentulous maxillary (Kennedy's Class II) and mandibular (Kennedy's Class I) arches. The ridges were smooth and well-keratinized with sufficient height and width, root stumps were present, with missing teeth (16, 17, 43, 44, 45, 46, 47), and a fixed prosthesis (35, 36). An orthopantomogram confirmed the absence of the mandible distal to the left canine, diagnosing a Cantor and Curtis Class II mandibular defect. The diagnosis

Corresponding Author:
Dr. Sanskriti Rautela, Department of Prosthodontics, Crown and Bridge, Institute of Dental Sciences, Bareilly, Uttar Pradesh, India.
E-mail: sanskritirautela@gmail.com

Figure 1: Mandibular deflection of 10mm present on the right side in maximum intercuspation.

Figure 2: Right sided Aramany's class II maxillary defect.

included an acquired palatal defect from maxillary resection and hemimandibulectomy with tooth loss.

The treatment plan aimed to close the oro-antral communication with a palatal obturator featuring clasps on teeth 15 and 27 and a palatally placed row of teeth on the non-resected side for occlusion. Due to fibrosis and scarring limiting mandibular movements 1 year post-surgery, a mandibular guiding appliance was not advised, and the patient was recommended for mouth opening exercises to improve neuromuscular coordination.

Diagnostic impression of maxilla was made with the impression compound (MAARC) and putty consistency Polyvinyl Siloxane (Photosil SOFT), after blocking the unfavorable undercuts with lubricated gauge. For mandible irreversible hydrocolloid impression was made using a sectional tray [Figure 3].[3]

The primary cast was poured in Type III dental stone. A double spacer of modeling wax was adapted over the diagnostic cast, and a sectional impression tray was fabricated using auto-polymerizing acrylic resin. A magnet-assisted sectional tray with four 8 × 3 mm

Figure 3: Diagnostic impressions.

magnets (two anterior, two posterior) was designed to ensure easy detachment and reattachment, preventing separation in the posterior palatal seal region, as snap-fit buttons proved cumbersome [Figure 4].[4]

The left portion of the sectional tray was extended to cover the remaining maxillary teeth, and the right portion was extended to cover the defect area. Before the impression procedure, the wax spacer was removed, and tray adhesive was applied.[5] For the final impression, two sections of putty and light body were used. First section was placed into the tray of non-resected side and impression was made, care was taken with the application of petroleum jelly to prevent binding of the two parts of the impressions, so as to help in easy sectional removal from the mouth. Following this, the 2nd portion of the tray was seated over it and stabilized in its place with the help of magnets. Both portions were removed separately from the mouth and were reassembled extraorally [Figure 5] and a master cast was poured in type intravenous dental stone.[6]

Denture base fabrication was done using autopolymerizing resin. Bite registration was recorded, and articulation was done on a Hanau wide vue articulator. Teeth arrangement was done on the palatal aspect of the non-resected side to make functional occlusion with the remaining mandibular teeth.[7] Clasps arms were given on 15 and 27. Try-in appointment was conducted to check for the proper extensions of the obturator and occlusion [Figure 6]. Flasking and dewaxing were done conventionally, followed by a conventional compression molding technique for acrylization. The defect was successfully covered, and occlusion was established. During the insertion, pressure indicator paste was used to identify any areas of excessive pressure and was adjusted [Figure 7].[8] Instructions were provided on the care and usage of the obturator.

The obturator successfully restored the separation of oral and nasal cavities, eliminating nasal regurgitation and improving mastication and speech. It provided adequate retention, stability, and support by engaging remaining teeth and soft tissues, whereas enhancing midfacial esthetics. The magnet-assisted tray offered

Figure 4: Magnet- assisted sectional custom tray.

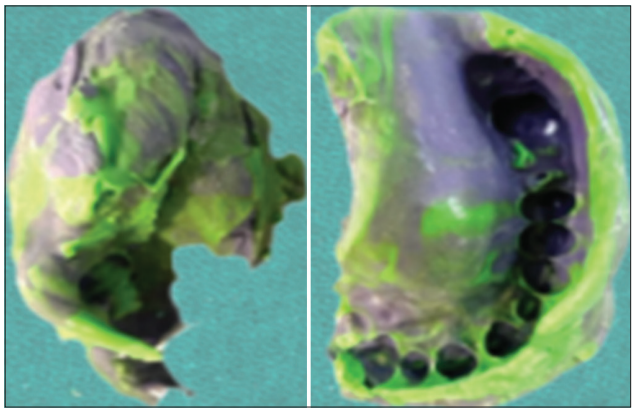

Figure 5: Definitive sectional impressions with polyvinyl siloxane impression material.

Figure 6: Try-in of obturator with palatal row of teeth.

cost-effectiveness, simplified manipulation, reduced trauma, and precise positioning, though it required additional time and labour for fabrication.[9]

Figure 7: Final heat cure obturator insertion.

DISCUSSION

Obturators play a crucial role in separating oral and nasal cavities, restoring deglutition, speech, and esthetics while maximizing support from remaining teeth. Obturators are typically categorized based on the timing of their placement: A surgical obturator is inserted immediately following maxillofacial surgery; an interim obturator is used during the early healing phase, typically 1–2 weeks postoperatively; and a definitive obturator is placed once healing and any adjunctive treatments, such as radiotherapy, are completed.[7] Limited mouth opening complicates treatment, making conventional impression techniques challenging. In the present case, mouth opening was about 18 mm, which posed a significant problem while making impressions. Sectional trays provide an effective alternative in such cases. Baker *et al.* highlighted several advantages of using sectional impression trays, including improved ease of insertion and removal, reduced discomfort during procedures, and the potential to avoid extracting otherwise healthy teeth. The custom design also allows better control over impression material thickness, enhanced stability during use, and accurate repositioning of tray segments both inside and outside the mouth.[4] Requirements of the sectional trays are the ease of reassembling and disassembling the tray intraorally. Readily available materials such as acrylic blocks and snap-fit buttons have been extensively used for this purpose. The magnet-assisted approach addressed the limitations of snap-fit buttons, ensuring stable impressions. It was observed that in the absence of a posterior lock, the tray would separate in the posterior palatal seal region. This realized the need to use magnets both in the anterior and posterior regions. Double occlusal table prostheses have shown promise in cases with mandibular resections, as illustrated in a report by Adil *et al.*, where such a design contributed to significant improvements in chewing ability and overall patient well-being.[6] Heat-cure acrylic resin was chosen over autopolymerizing resin, which leaches over time, or silicone rubber, which is porous and requires periodic replacement.[10] Indications for obturators include temporary use during surgical correction, esthetic restoration, or when surgery

is contraindicated due to age, defect size, avascularity, or lesion recurrence risk. This case demonstrates effective rehabilitation despite combined defects and restricted mouth opening.

CONCLUSION

The greatest challenge in rehabilitating maxillectomy defects is to obtain adequate retention, stability, and support. The use of a magnet-assisted sectional tray provided an effective solution for impression-making in patients with limited mouth opening, ensuring easy reassembly and stability. With proper technique and material selection, functional and esthetic rehabilitation can be successfully achieved, enhancing the patient's overall quality of life.

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