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Management Of A Completely Edentulous Hemimandibulectomy Patient With Maxillary Twin Occlusion And Mandibular Hollow Denture Prosthesis- A Case Report

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Abstract
The occurrence of Squamous Cell Carcinoma is high in patients with a history of long term tobacco use. Extensive lesions of the oral cavity may lead to resection of mandible, which can compromise the patient's functions and esthetics to varying degrees, due to its complex attachments and prominent position in the facial architecture. Prosthodontic rehabilitation of a completely edentulous hemimandibulectomy patient is even more challenging due to a number of compromising factors. Revamping certain basic principles of Prosthodontics maybe necessary for successful rehabilitation of these patients. The ultimate aim of the Prosthodontist is to improve the quality of life of these patients, which will not only have a positive physical impact but also enhance the overall mental well being of these patients. This case report presents such a complex scenario of prosthodontic rehabilitation of a completely edentulous hemimandibulectomy patient. Due to the mandibular deviation towards the resected side, incorporation of a maxillary twin occlusion on the unresected side was required to attain a favourable post operative maxillomandibular relation. Due to the extension of the mandibular denture into the defect area in the mandibular region, considerable increase in weight of the mandibular denture was expected, which would have compounded the already existing compromised retention and stability owing to the decreased mandibular denture bearing area. Hence a hollow mandibular denture was planned to reduce the weight of mandibular dentures. Considerable improvement in esthetics and function were noticed and the patient is comfortable and well tolerated with the present prosthesis.

Keywords: *Completely Edentulous Hemimandibulectomy; Maxillary Twin Occlusion; Mandibular Hollow Denture*

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I. Introduction

Globally, oral cancer ranks sixth among all types of cancer. Tobacco consumption is a prime cause of oral cancer, prominently in developing nations. The occurrence of the tongue and buccal mucosa cancer are prevalent in India with a higher number of buccal mucosa cancer cases.[1] Extensive lesions of the oral cavity may lead to resection of mandible, which can compromise the patient's functions and esthetics to varying degrees, due to its complex attachments and prominent position in the facial architecture. The problems arising in a completely edentulous hemimandibulectomy patient is even more compounded due to the challenging impression procedures, difficult maxillomandibular relationship, compromised retention and stability and possible increase in weight of mandibular dentures. Prosthodontic rehabilitation of such a patient is a challenge and a thorough knowledge of the facial anatomy, physiology, mandibular movements and patient's psychology is essential for a successful treatment outcome. This case report presents prosthodontic rehabilitation of a completely edentulous hemimandibulectomy patient with twin maxillary occlusion and a mandibular hollow denture prosthesis secondary to squamous cell carcinoma of buccal mucosa.

II. Case Report

An ex-serviceman, aged seventy-seven years reported to the Division of Prosthodontics and Crown and Bridge with the chief complaint of difficulty in eating since four years. The patient gave a history of difficulty in chewing due to complete loss of teeth, which were extracted before the surgical removal of a cancerous lesion on the left-side of the mouth four years back. The patient also gave a history of weight loss following hemimandibulectomy. The patient did not undergo guide flange therapy and was not in possession of any other

prosthesis following surgery. The patient used to smoke 20-25 beedis per day from past 40 years which has been discontinued since four years. The past medical history revealed the patient to be treated for squamous cell carcinoma, buccal mucosa with wide local excision, left modified radical neck dissection, left hemimandibulectomy, pectoralis major myocutaneous flap and primary closure. The patient was moderately built and nourished and well oriented to time, place and person. Facial asymmetry was noticed on the left side with drooping of the left angle of mouth. A scar was present extending from the vermilion border of lower lip to the lower border of chin and a tissue sag was seen on left side lower third of face which was sessile, soft and non tender on palpation (Fig. 1). The condyle, angle, ramus, body and anterior portion of mandible was absent on left side. Intraoral examination of mandible revealed midline resection with PMMC flap on left side with an intact tongue and class 1 ridge on right side (Fig. 2). On clinical examination and investigations (Fig. 3), a diagnosis of completely edentulous maxillary and mandibular arches with PDI of Class IV and Cantor and Curtis class III partially resected mandibular arch in an operated case of Squamous Cell Carcinoma left buccal mucosa was arrived. The objectives of treatment included restoration of esthetics, function, protection of tissues and psychologic therapy. The primary impression of maxillary and mandibular arches were made with irreversible hydrocolloid material. The mandibular impression was made with a modified stock tray for optimal recording of the mandibular defect. The primary cast was poured in Type II gypsum product. Border moulding was done using low fusing impression compound and secondary impressions were made using zinc oxide eugenol for maxillary arch and polyvinyl siloxane light body impression material for the mandibular arch. The master cast was poured in Type III gypsum product. Orientation jaw relation was recorded and transferred to a semi adjustable articulator. Next, the tentative maxillomandibular relationship was recorded (Fig. 4). Ideal teeth arrangement was done on articulator using standard principles. Non anatomic teeth were used for the arrangement of posterior teeth to allow for freedom in lateral excursions. Anterior and posterior try in was done and clear deviation to the resected side was noticed with midline shift in the anterior region (Fig. 5). Disarticulation of teeth on the right and left sides was noticed due to the angular path of mandibular closure. To ensure the patient has a wider occlusal table on the unresected side and to ensure uniform contact of teeth as per the patient's mandibular movement, a functionally generated path was recorded. For this purpose, a wax occlusal ramp was incorporated in maxillary trial denture in the palatal aspect of unresected right side. Functionally generated path was recorded on the wax occlusal ramp by asking the patient to perform functional movements such as swallowing and lateral excursions. Twin occlusal table teeth arrangement was now done on the right side according to the functionally generated path (Fig. 6). Posterior teeth contact was hence established. After occlusal interference correction extraorally, the final try in was done (Fig. 7). Maxillary denture flasking, dewaxing and packing was done in the conventional manner. Packing was done with heat cure PMMA, bench curing was done for 20 minutes and curing was done by the long curing cycle. A specialized acrylization procedure was carried out for reducing the weight of mandibular denture. For this purpose, after mandibular denture flasking and dewaxing, a wax hollow bulb was created (Fig. 8). In order to create the wax hollow bulb, the defect area in the mandibular cast and the corresponding region in the cope portion of the flask, is marked with an indelible pencil. Base plate wax was adapted in the marked areas of drag and cope portion of the flask. The wax was carefully removed from the defect area and the two portions of the wax were joined together and sealed with sticky wax. A hollow wax bulb was hence obtained. Water was injected into the wax hollow bulb with the help of a 2 ml disposable syringe. The wax hollow bulb with the injected water was now kept in freezer for 24 hours. After 24 hours, the wax covering was peeled off and a customized ice cube was obtained (Fig. 9). Heat cure acrylic resin was mixed and placed in the defect area in the drag portion of the flask. The customized ice cube was now placed in the defect area and the cope portion of the flask was inverted over the drag. Bench curing was not done and the flask along with the clamp was placed directly in the acrylizer. On completion of curing and finishing of the mandibular denture, the water was removed from the hollow bulb by creating a small hole in the processed denture. This hole was later closed with self cure acrylic resin. On weighing the dentures, considerable reduction in weight of the dentures was noticed before and after removal of water. The hollow mandibular denture was checked for floating in water (Fig. 10). Final denture insertion was done (Fig. 11). Routine post denture insertion instructions were given. The patient was advised to not have food with the new dentures for the first week. From second week, the patient was advised to have soft diet from the right side only. Bite force measurement was done during the one week follow up and was found to be considerably less when compared to a complete denture patient. The patient was well adapted to the new dentures and considerable improvement in function and esthetics was noticed (Fig. 12).

III. Discussion

Mandibular defects maybe congenital, developmental or acquired.[2] Acquired defects maybe due to trauma or surgical intervention of benign and malignant tumours. Due to the high incidence of tobacco use among Indian population, the occurrence of Squamous Cell Carcinoma is highly prevalent, with buccal mucosa as the most common site of occurrence.[1] A classification of hemimandibulectomy, determined by prosthetic considerations, was given by Cantor and Curtis in the year 1971.[3] Patients with a midline resection have a poor

prognosis.[4] The maximum denture bearing area in mandible is 12.25 cm^2, which is reduced to half in these patients. Moreover, due to the deviation of the mandible to the resected side, the anterior border of the ramus and coronoid process maybe in close approximation with the maxillary tuberosity of the unresected side, which may lead to compromised stability, peripheral extension and seal of the maxillary denture. Vestibular depth is not present in mandibular dentures, which is critical for denture stability and peripheral seal. The lips maybe retracted to the resected side, which will predispose to cheek biting and poor control of salivary secretions. Due to this, there is tendency for the lip on the resected side to fall posteriorly dislodging the lower denture. So, the teeth may have to be placed more lingually in this region to counter this problem. Swallowing, speech, mandibular movements, mastication, control of saliva, respiration and psychic functioning are altered in hemimandibulectomy patients.[3] The components of occlusion include temporomandibular joint, associated musculature and the denture bearing area.[5] Mandibular deviation occurs due to two main reasons- scar contracture and muscular imbalance. A concave defect is usually formed following resection of the mandible and tongue because of the bony and soft tissue defect which can be masked if myocutaneous flaps are used. Following surgical resection, the remaining mandible usually retrudes and deviates towards the resected side at vertical dimension of rest. Upon opening the mouth, this deviation increases, leading to an angular pathway of opening and closing. Hence, during mastication in hemimandibulectomy patients, the entire envelope of motion is shifted towards the surgical defect side.[4] In dentulous patients, as the force of mandibular closure is increased, mandible rotates around occlusal contacts on unresected side, and remaining teeth on resected side drop further out of occlusion. This is due to the contact of the buccal slopes of the mandibular buccal cusp with the central fossa of the maxillary posterior teeth instead of the ideal cusp fossa relationship. This movement is called frontal plane rotation. This is applicable to the complete denture patient as well when occlusal contacts are established at the unresected side. Occlusal ramp established functionally, measuring 5-10 mm wide and with a horizontal overlap of 3-4 mm with mandibular teeth, helps to establish a functionally generated path with the mandibular teeth on the resected teeth side due to correction of the frontal plane rotation.[6] The functionally generated path is on an incline which serves as a guide to position the mandible. Anatomic posterior teeth have a single precise position of intercuspation. Precise muscular coordination is not available in hemimandibulectomy patient to guide the mandible into a consistent position of occlusion. A range of positions are rendered by non anatomic teeth and it minimizes lateral stress which would tend to displace the mandibular appliance.[7] The maxillary anterior teeth are placed lingual and mandibular anterior teeth labial to their accustomed positions. Most of these patients cannot make protrusive movements, hence incisal guidance is not a factor in teeth arrangement. Increased vertical overlap in the anterior region will not result in deflective occlusal contact. Similarly, the mandibular posterior teeth are set buccal on unresected side and lingual on the resected side to accommodate the mandibular deviation. Providing two rows of teeth on the unresected side of maxillary denture creates a broader occlusal table. The inner row of teeth restores the function and the outer row supports the cheeks and enhances esthetics.[8] A detachable palatal twin occlusion maybe provided if the mandibular deviation to the resected side is found to be significant.[9] It is provided to prevent encroachment into tongue space during phonation. An increase in weight of denture hampers the retention of the prosthesis that makes the prosthesis unacceptable by the patient. Various methods of hollowing the prosthesis have been described in literature to reduce the weight of the dentures. A customized ice cube was used to hollow the mandibular denture in this case which had several advantages such as ease of retrievability, even thickness of hollow portion, non adherence to acrylic resin, withstand pressure of compression moulding, etc.[10] Osseointegrated implants enable the fabrication of well-retained and stable overlay prostheses. The increased stability will enhance the mastication. Implant retained mandibular dentures maybe planned after assessment of patient adaptation to the established maxillomandibular relation.

IV. Summary

Modifying certain basic principles of conventional prosthodontics is required in the treatment of hemimandibulectomy patients because of several compromising factors. The incorporation of twin-occlusion on the unresected side of the maxillary prosthesis helped in achieving a satisfactory esthetic and functional outcome of treatment. Hollow mandibular denture reduced the weight of the prosthesis and increased the patient comfort.

References

[1] Borse V, Konwar An, Buragohain P. Oral Cancer Diagnosis And Perspectives In India. Sens Int. 2020; 1: 100046.
[2] Varoujan A. Chalian, Joe B. Drane And Smiles Standish. Maxillofacial Prosthetics− Multidisciplinary Practice. Williams & Wilkins Company; 1972. P. 13−50.
[3] Robert Cantor And Thomas A. Curtis. Prosthetic Management Of Edentulous Mandibulectomy Patients. Part I. Anatomic, Physiologic, And Psychologic Considerations. J Prosthet Dent 1971;25:446−457.
[4] J. Beumer, T. Curtis And M. Marunick: Acquired Defects Of The Mandible: Etiology, Treatment And Rehabilitation. Maxillofacial Rehabilitation; 1996. P. 113−224.
[5] Boucher C.O. Occlusion In Prosthodontics. J Prosthet Dent 1953;3:633.
[6] Charles C. Swoope. Prosthetic Management Of Resected Edentulous Mandibles. J Prosthet Dent 1969;21:197−202.
[7] Brown Ke. Complete Denture Treatment In Patients With Resected Mandibles. J Prosthet Dent 1969; 21:443−447.

[8] Rosenthal Lc. The Edentulous Patient With Jaw Defects. Dent Clin North Am 1964;8:773−779.
[9] Amit D. Hindocha And Mohit T. Dudani. Detachable Palatal Ramp Of Teeth To Improve Comfort In A Completely Edentulous Patient With A Segmentally Resected Mandible. Journal Of Prosthodontics 2016: 1–7.
[10] Sharayu Vinod Nimonkar Et Al. A Method Of Hollowing The Obturator Prosthesis And An Overview On The Pros And Cons Of The Various Materials Used For Hollowing. J Med Life 2021;14:383–389.

Figures

Fig 1: Pre-Operative (Extraoral)

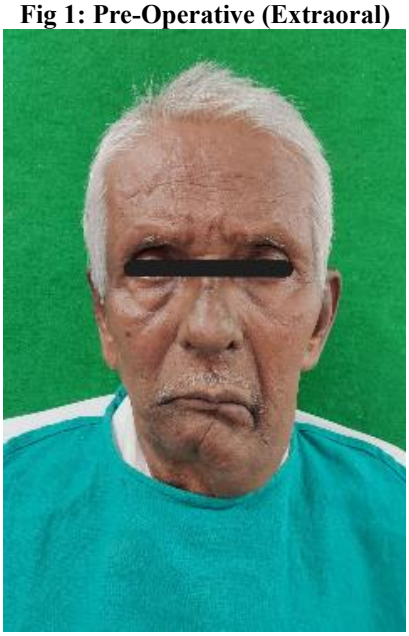

Fig 2: Pre-Operative (Intraoral)

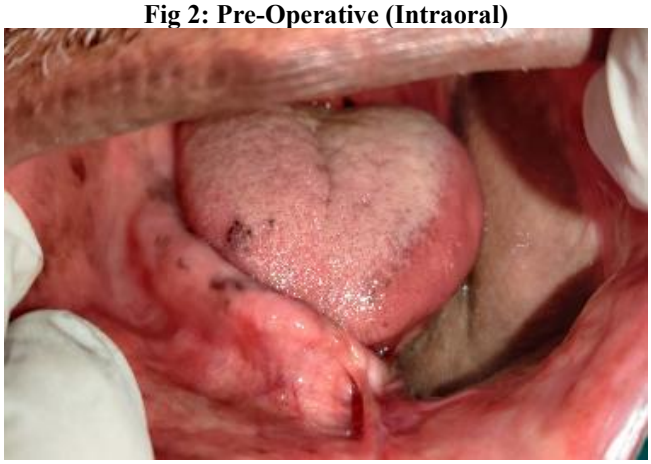

Fig 3: Pre-Operative OPG

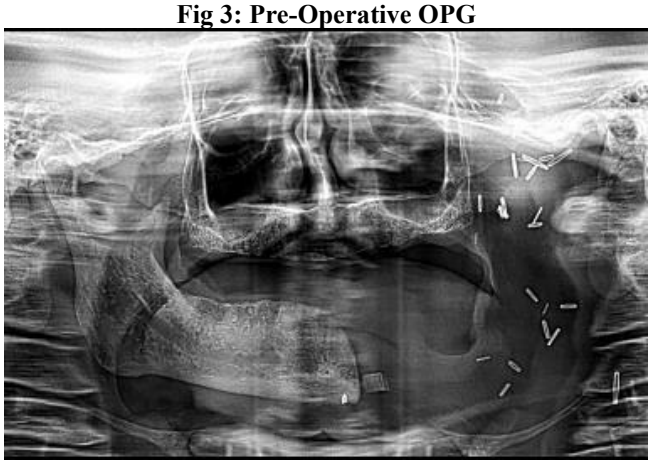

Fig 4: Tentative Maxillomandibular Relation

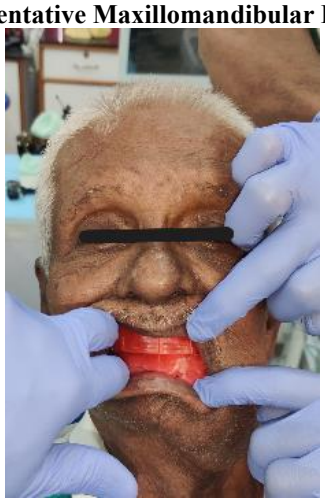

Fig 5: Deviation Of Mandible Towards The Resected Side During Initial Try-In

Fig 6: Twin Occlusal Table

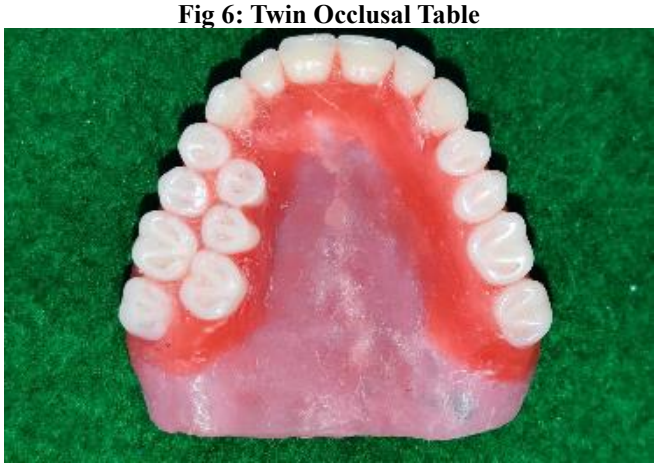

Fig 7: Final Try-In

Fig 8: Wax Hollow Bulb

Fig 9: Customized Ice Cube

Fig 10: Floating Mandibular Hollow Denture

Fig 11: Post-Operative (Intraoral)

Fig 12: Post-Operative (Extraoral)