Hemimandiblectomy with and without intermaxillary fixation: A Quincy experiment

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Abstract— *Oral malignancy involving mandible, floor of mouth, tongue, and also palate when treating surgically often requires resection of mandible. Resection of mandible leads to loss of mandibular continuity, deviation of mandible towards resected site, altered mandibular movements, difficulty in swallowing, and impaired speech. Management of this type of mandibular defects without bony reconstruction is complex. Hemimandibulectomy with intermaxillary fixation prevent mandibular deviation and malocclusion.*

Keywords: Intermaxillary Fixation, Hemimandibulectomy, Mandibular Deviation.

I. INTRODUCTION

Surgical treatment for cancerous lesions of the oral cavity frequently requires resection involving the mandible, floor of the mouth, tongue and also the palate.[1,2] In patients who have undergone mandibular resection, the remaining mandibular segment will retrude and deviate towards the surgical side. While opening the mouth, this deviation increases, leading to the opening and closing of the angular pathway. Apart from deviation other dysfunction noted are (1) Difficulty in mastication and swallowing which are due to sensory and motor deficits, loss of bone and muscular attachments of floor of mouth; function of tongue is compromised, (2) Difficulty in speech due to compromised tongue control, (3) mandibular movements - the absence of the muscle of mastication on the surgical side results in a significant rotation of the mandible upon forceful closure and (4) respiration is also impaired.[3]

On contrary mandibular resections resulting in little soft tissue loss have lesser mandibular deviation and mandibular discontinuity. As a result of surgical treatment leads to mandibular deviation and altered muscle function this result in facial asymmetry and malocclusion. Normal occlusion in which the posterior natural teeth interdigitate is lost; and the teeth on the remaining mandibular segment will occlude lingual to the maxillary teeth.[4] There is deviation of the residual mandible medially and superiorly. The severity of mandibular deviation is determined by the location and extension of the resection, the amount of soft and hard tissue resection, type of closure and the presence of remaining natural teeth, the degree to which innervations has been involved, the use of adjunctive procedures like radiation therapy. Patients who are closed with a myocutaneous or free flap soon attain an acceptable interocclusal relationship with adjunctive therapy, while some patients who are closed primarily, are never able to achieve an appropriate and a stable interocclusal relationship.[1, 2]

This present study done at Udaipur, Rajasthan, India, was aimed to compare hemimandiblectomy with and without intermaxilary fixation procedures for mandibular deviation and to reestablish a normal occlusal relationship.

II. METHODOLOGY

This Quincy experimental study was carried out in the department of Oncology, Geetanjali Cancer

Center, Geetanjali Medical College and hospital, Udaipur (Rajasthan) India, during March 2016 to Feb 2017.

In this study, patients of carcinoma of oral cavity attended at department of Oncology, Geetanjali Cancer Center, Geetanjali Medical College and hospital, Udaipur (Rajasthan) India, during March 2016 to Feb 2017 were included. M medically compromised patient and those who has not given consent for the study were excluded. Finally total 38 patients of carcinoma of oral cavity were included in which hemimandibulectomy was performed. After explanation and justification of the objectives of study, consent was obtained and consent form signed.

Out of total 38 patients, in 21 patients intermaxillary fixation was done for 4 weeks and guiding elastics was given for 2 weeks (Group 'A'). In 17 patients intermaxillary fixation was not done (Group 'B'). Comparison was done between group 'A' and group 'B' after 6 weeks.

In this study wax plates were used to obtain bite registration. The patients were asked to bite into a wax plate that was folded and slightly softened by the heat of the lamp. After taking bite registration measurements were taken with a calliper, noting the distance in mm between the tip of maxillary canine and mandibular canine imprinted in the wax plate.

Statistical Analysis: The data thus collected were compiled in Microsoft excel 2010 spread sheet and data were analysed with the help of trial version of SPSS version 20 (IBM SPSS Statistics Inc., Chicago, Illinois, USA) Windows software program. Unpaired t test was used to compare the clinical data. Level of significant was set at < 0.05.

III. RESULTS

In the study, patients were from age groups between 35-55 years in whom 40 subjects were male and 40 subjects were female. Patients were selected from general OPD of oncology department. Patients from both the groups i.e. hemimandiblectomy with intermaxilary fixation procedure (Group 'A') and hemimandiblectomy without intermaxilary fixation procedure (Group 'B') were comparable in age and sex wise distribution.

When results were compared of group 'A' and group 'B' after 6 weeks, it was observed that subjects of group 'A' i.e. hemimandiblectomy with intermaxilary fixation procedure (IMF) showed significantly ($p<0.001$) less mouth opening than in subjects of group 'B' i.e. hemimandiblectomy without IMF. (Table 1)

Table 1
Comparison of Mouth Opening after Hemimandiblectomy with and without IMF

Type of Proceedure	Mean	Std. Deviation	Mean differences	p value
Hemimandiblectomy with IMF (Group 'A')	0.53	0.11	0.87	0.001 (S)
Hemimandiblectomy without IMF (Group 'B')	1.41	0.14		

IV. DISCUSSION

Literature shows various surgical techniques described for reconstruction of mandible but the micro vascular flap reconstruction is the most preferred in current scenario. Vascularised bone flaps can be used to rebuild any defect extension, while bone grafts should have their use restricted to smaller

defects, less than 5 cm in length.[5]

This article describes rehabilitation of hemimandibulectomy patient who has undergone resection and reconstruction using myocutaneous flap. Intermaxillary fixation helps in such cases to prevent deviation of the mandible, improve masticatory function and esthetics. This therapy is most successful in patients for whom the resection involves only bony structures, with minimal sacrifice of tongue, floor of the mouth, and adjacent soft tissues. Any delays in the intermaxillary fixation, due to problems such as extensive tissue loss, radiation therapy, radical neck dissection, flap necrosis and other postsurgical morbidities may result in an inability to achieve normal maxillamandibular relationship.

Guiding elastic was given for 2 weeks after 4 weeks of intermaxillary fixation. The main purpose is to re-educate the mandibular muscles to re-establish an acceptable occlusal relationship (physiotherapeutic function) for the residual hemimandible, so that the patient can control the opening and closing of the mandibular movements adequately and repeatedly.

The guide flange can be fabricated in cast metal or acrylic resin. If the mandible can be manipulated into an acceptable maxillamandibular relationship but the patient lacks the motor control to bring the mandible into occlusion, a cast mandibular resection restoration as suggested by Robinson and Rubright is appropriate. If some resistance is encountered in positioning of the mandible, then a guidance ramp of acrylic resin is suggested.[6]

There are various modilities in which return of mandible to optimum maxilla-mandibular relationship have been described like intermaxillary fixation,[4] mandibular guidance prosthesis[7] and Vacuum formed PVC splints.[8]

The exercise as suggested by Beumer et al (1979)[9] was suggested to the patient. In this procedure, following maximum opening, the patient manipulates the mandible by grasping the chin and moving the mandible away from the surgical side. These movements tend to loosen scar contracture, reduce trismus and improve maxilla-mandibular relationships. McCasland suggested that patients use straight opening and closing exercise to train the neuromuscular system to avoid deviation of the mandible.[10]

Loss of the mandibular continuty causes rotation of mandibular occlusal plane inferiorly on the defect side. There is an anterior open bite due to pull of the suprahyoid muscle which causes inerior displacement and rotation around the fulcrum of the remaining condyle. Greater loss of tissue leads to greater deviation of mandible, thus compromising the prognosis of treatment.[11] During the initial healing period, early intermaxillary fixation serve the purpose of reducing the mandibular deviation, arch alignment, stable occlusion and improving masticatory efficiency.

Aramany MA et al (1977) reported 14 patients who were treated by the use of immediate intermaxillary fixation after segmental resection of the mandible to eradicate cancerous lesions. They claimed that the use of intermaxillary fixation during the first 6 postoperative weeks reduces the degree of deviation.[4] Fattore et al advocated a two piece gunning splint, both for intermaxillary fixation and as a guidance appliance for an edentulous patient, following hemisection of the mandible.[12] Hasanreisoglu et al suggested that for dentulate patients, palatal guide ramps or mandibular guide flange prostheses are indicated.[13]

V. CONCLUSION

A comfortable mandibular alignment is not always maintainable in the restoration of the patients with

partially resected mandible. The use of intermaxillary fixation during immediate postoperative period will reduce the degree of deviation, mandibular function, mastication, facial symmetry.

CONFLICT OF INTEREST

None declared till now.

REFERENCES

[1] Beumer J III, Curtis TA, Marunick MT. Maxillofacial Rehabilitation. Prosthodontic and surgical consideration. St. Louis : Ishiyaku. Euro America. 1996. p. 113 –224.

[2] Taylor TD. Clinical maxillofacial prosthetics. Quintessence Publishing Co, Illinois, 1997 p. 171-188.

[3] Schneider RL, Taylor TO. Mandibular resection guidance prosthesis: a literature review. J Prosthet Dent, 1986; 55: 84-6.

[4] Aramany MA, Myers EN. Intermaxillary fixation following mandibular resection. J Prosthet Dent 1977; 37:437-44.

[5] Foster RD, Anthony JP, Sharma A, Pogrel MA. Vascularized bone flap versus nonvascularized bone grafts for mandibular reconstruction: an outcome analysis of primary bony union and endosseous implant success. Head Neck 1999;21:66-71. http://dx.doi.org/10.1002/(SICI)1097-0347(199901)21:13.0.CO;2-Z

[6] Robinson JE, Rubright WC. Use of aguide plane for maintaining the residualfragment in partial orhemimandibulectomy. J Prosthet Dent1964; 14:992-999

[7] Beumer III J, Marunick MT, Esposito SJ. Maxillofacial rehabilitation. 3rd ed., 2011, Quintessence. Page 87-89, 118-20.

[8] Monaghan AM, Bear AS. A simple appliance to correct mandibular deviation following hemi mandibulectomy. British J Oral Maxillofac Surg 1990; 28:419-420.

[9] Buemer J, Curtis T, Firtell D. Maxillofacial Rehabilitation. St. Louis: Mosby; 1979. p. 90-169.

[10] Keys SM, McCasland JP. Techniques and results of a comprehensive dental care program in head and neck cancer patients. Int J Radiat Oncol Biol Phys.1976;1:859-65.

[11] Taylor TD. Diagnostic considerations for prosthodontic rehabilitation of the mandibulectomy patient. In: Taylor TD, editor. Clinical Maxillofacial Prosthetics. Chicago: Quintessence Publishing; 2000. p. 155-70.

[12] Fallore L, Marchmont –Robinson H, Crinzi RA, Edmonds DC. Use of a two piece Gunning splint as a Mandibular guide appliance for a patient treated for Ameloblastoma. Oral Surgery Oral Med Oral Patho. 1988; 66: 662-665.

[13] Hasanreisoglu U, Uçtasli S, Gurbuz A. Mandibular guidance prosthesis following resection procedures: Three case reports. Eur J Prosthodont Rest Dent 1992;1:69-72.