

THE INFLUENCE OF SPLINTING ABUTMENTS IN ACQUIRED MAXILLARY DEFECTS ON BITING FORCE

Noha Ali Gamal Eldin* and Enas Taha Ibrahim Darwish*

ABSTRACT

The purpose of this study was to evaluate the influence of splinting abutments in patients with acquired maxillary defects on biting forces using electronic load sensor device.

Materials and methods: Ten patients complaining from hemimaxillectomy were selected .they were divided into two group, the first group received definitive obturator and the second received definitive obturator with splinting the remaining teeth. The biting force were measured using I Load digital sensor

Results : The results revealed that the splinting group record increasing in biting force than the unsplinting group. All The patient of the splinting obturator was satisfied with their obturators.

Conclusion: Splinting the remaining teeth in hemimaxillectomy patient provide more bite force and more patient satisfaction.

INTRODUCTION

Patients after resection of maxillofacial tumors are often left with severe functional problems because of the affected structures that are required for mastication, deglutition and speech. In addition, changes in appearance, psychological functioning and vocational status may also result after surgery.⁽¹⁾

If there are adequate teeth remaining after the resection the support, stability and retention of the obturator will be enhanced.⁽²⁾

Different ways are used to enhance retention of the prosthesis as hollowing the obturator to decrease

weight, modified labial flange, resilient denture liner, implant and splinting.⁽³⁾

Splinting will permit an ideal cingulum rest seat and retainers undercut to be prepared, increasing retention and support of the partial denture framework, it will also change the abutment from single to a 2 rooted tooth, improving mechanical load transfer to the periodontal ligament and surrounding bone in this compromised clinical situation⁽²⁾

Maximum voluntary bite force is an indicator of the functional state of the masticatory system and the level of maximum bite force results from the combined action of the jaw elevator

* Lecturer of Removable Prosthodontics Department, Faculty of Oral and Dental Medicine, Cairo University, Cairo, Egypt.

muscles modified by jaw biomechanics and reflex mechanisms⁽⁴⁾

Determination of individual bite force level has been widely used in dentistry, mainly to evaluate the therapeutic effects of prosthetic devices and to provide references values for studies on the biomechanics of prosthetic devices⁽⁵⁾

The aim of this study was to evaluate the influence of splinting abutments in an acquired maxillary defect on biting force using electronic load sensor device.

MATERIALS AND METHODS

Ten patients had undergone tumor removal surgically and were in need for obturator was selected from the outpatient clinic of the prosthodontic department, faculty of oral and dental medicine, Cairo University.

The patients were generally in an acceptable health condition and free any systemic diseases that may interfere with obturation procedure.

The patients were hemi-maxillectomy with remaining dentulous side with missing upper left first molar (class I modification 1). The patients were subjected to either radio-or chemotherapy and had stopped such treatment at least four years ago without any signs of recurrence.

Patients grouping

The patients were divided into 2 groups; the first group received definite obturator while the second group received splinted acrylic teeth (porcelain fused to casted metal crowns).

Construction of obturator

An appropriate stock tray was selected and slight modification was done using pink wax, blocking of undesirable undercuts was done using a small piece of gauze covered with Vaseline. Primary impression was obtained for the upper and lower jaws to have

the study cast. For the first group, surveying and mouth preparation were done before taking the secondary impression. (Figure 1)

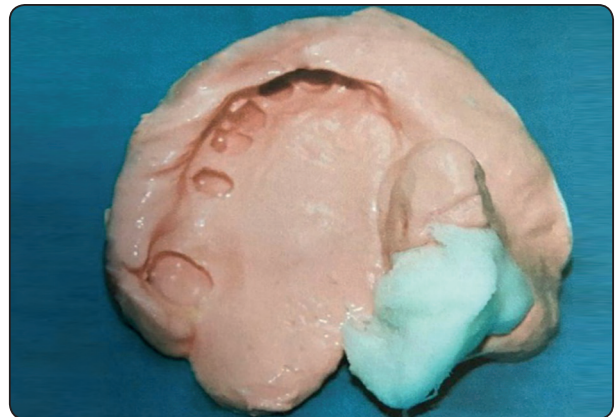


Fig. (1) Secondary impression taken with alginate material

Bite registration using pink wax on the defect side softening of the wax block and allow the patients to close in the correct bite with the intact side completely closed chrome-cobalt alloy with extension base extending into the defect was fabricated. The design included the cingulum rest seat on the upper central incisor, modified T-bar retainer on upper central incisor., occlusal rest seats on posterior teeth, buccal retainers and palatal bracers on the premolars, palatal retainers and buccal bracers on the molars for stabilization and major connector extending into the defect. (Figure 2)



Fig. (2) definitive obturator

For the second group, the teeth were prepared for crown receiving, secondary impression was taking (figure 3) and the wax patterns were prepared to accept the obturator with the design as for the first group. Metal casting was made and crowns were cemented using zinc-phosphate cement.

The obturator was made on the bridge with the same design and dimensions by surveying.

The biting force was evaluated using load star sensor device at insertion, 3 months and 6 months later.

The I-load (digital USB sensor) was connected to PC USB, the force was applied in direction vertical to the top surface of the sensor, a steel ball of 3/8 diameter was placed directly on the center of the dome shape top for comparison only i-load sensor.

Patient was seated in an upright position where the sensor was placed horizontally at the embrasure area of second premolar and first molar, an average of ten readings was taken. (figure4)

Data were collected, tabulated and statistically analyzed by ANOVA test.

RESULTS

The results of the biting force recorded for the first group (definitive obturator) and the second group splinting teeth at time of insertion, after 3 months and 6months are shown in table 1

TABLE (1) Mean and Standard deviations for both groups at insertion, after 3 months and after 6 months.

	At insertion	3 months	6 months
Group I	17.41	23.41	44.44
Group II	22.30	31.40	54.21



Fig. (3) Secondary impression for prepared teeth to receive crowns used for splinting



Fig. (4) The I-load (digital USB sensor) inside the patient mouth

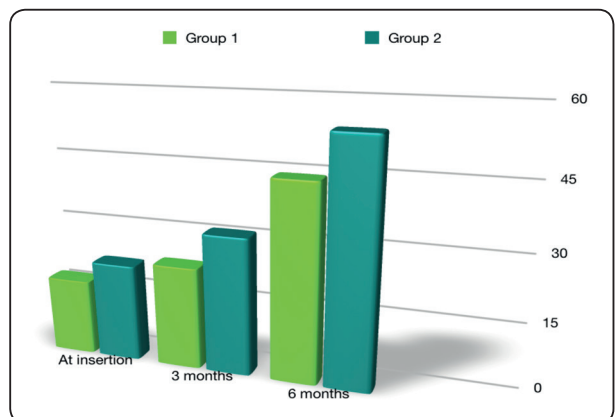


Fig. (5) Bar chart showing biting force for both groups during the follow up period

The highest value of biting force was for the second group while the least value was for the first group at insertion. The results of Anova test revealed that the difference between the mean values of biting force among the two groups is statistically significant.

Splinting the abutments led to an increase in the patient biting force rather than the definitive obturator alone.

Similarly, time led to an increase of the biting force in both group after 3months and 6 months follow up period.

Patient obturator satisfaction questionnaire

Q1 Are you satisfied with the appearance of your obturator

Q2 Are you satisfied with the quality of speech

Q3 Is it a retentive obturator

Q4 Is it a comfortable obturator during chewing.

Q5 Is it a hygienic obturator

Q6 Are you satisfied during swallowing.

TABLE (2) Patient satisfaction questionnaire

	Group1	Group2
Q1	5	5
Q2	4	5
Q3	3	5
Q4	3	5
Q5	3	5
Q6	4	5

IN GROUP 1 three out of five patients were satisfied with the retention, chewing comfort and higiene of their obturators.As regard thespeech quality and the swallowing effect four patients were satisfied while the appearance satisfaction all the patient are satisfied.

In the second group all the patients were satisfied for the six questions of satisfaction.

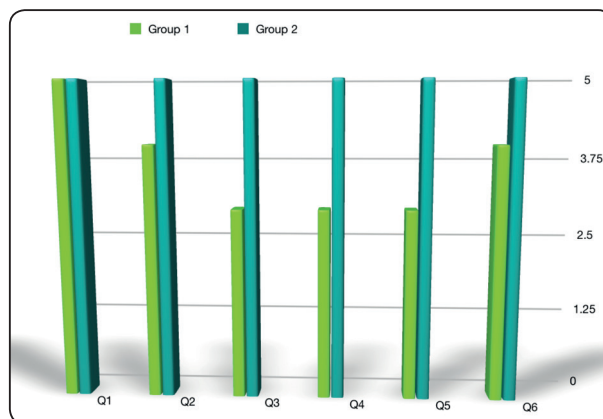


Fig. (6) Bar chart showing patients evaluation of the obturator

DISCUSSION

In this study ten patients complaining from removal of maxillary tumor and were subjected to a hemimaxillectomy are selected. This resection leaded to cutting from the right central incisor to last molar in the same side.

The patients were devided into two groups ,the first group received definitive obturator designed to use the remaining teeth, the hard palate and the lateral area of the defect to get maximum support, retention and stability.The goal is to ensure that the functional load is distributed asequally as possible to each of these structures through a rigid connector as reported by (Parr, Tharp and R Ahm2005)⁽⁶⁾.

The second group received definitive obturator with the same design but the remaining teeth were splinted to permit an ideal cingulum and occlusal rest seat andretainer undercut to be prepared, thus increasing retention and support of the partial denture framework. This will change the anterior abutment from a single to a two rooted tooth, improving mechanical load transfer to the periodotal ligament and surrounding bone. Splinting the remaining teeth with clasping will increase reciprocal components which provide stbility to prosthesis.^(7,8,9,10)

The results of this study revealed that the biting force recorded for the splinting group were greater than those wearing unsplinting obturator throughtout

the follow up period, such result could be attributed to a more comfortable sensation of the splinting group due to more stable obturator during function tended to seat rather than displace the obturator^(11,12). This of course augmented the retention and stability of the prosthesis which in turn reflected in a better chewing efficiency. Both type of obturators showed gradual increase in the biting force over 6 months of the follow up period.

Splinting of teeth reduces tipping of these teeth and providing mutual support to these teeth and prolong their useful life^(2,13,14).

CONCLUSION

The results of the present study revealed that:

- 1- The biting force was statistically higher with definitive obturator with splinting the teeth than the unsplinting one.
- 2- The biting force increased gradually in both groups throughout the follow-up period unsplinting one

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