TWIN-FLEX CLASP AS AN ESTHETIC APPROACH FOR REMAINING CENTRAL INCISOR ABUTMENT IN UNILATERAL MAXILLECTOMY CASES

Salah AF Hegazy¹ and Emiel AM Hanna²

1. Lecturer, Faculty of Dentistry, Mansoura University
2. Lecturer, Faculty of Dentistry, 6 October University

ABSTRACT

The aim of this study was to evaluate the use of esthetic twin-flex clasp on remaining central incisor abutment in unilateral maxillectomy case regarding the alveolar bone height changes and probing depth compared with the conventional simple circlet clasp. Ten patients with unilateral maxillectomy of ages ranged from 30-40 years, and of either sex were represented in this study. The patients were with completely dentulous mandibular arch, and intact maxillary side. Two types of clasps with the same obturator design. Were used, conventional obturators with simple circlet wrought wire clasps group I, while the other type with twin-flex clasp on the remaining central incisors group II. The effect of both clasps on the remaining central incisor abutments was evaluated by measuring the alveolar bone height changes and probing depth. The results showed statistical insignificant difference in the degree of mesial marginal bone loss around maxillary central incisor between the two groups after first and second six months from insertion (T=0.16, P<0.87 and t=1.15, p<0.28 respectively). While, there was statistical significant difference in the degree of distal marginal bone loss around maxillary central incisor between the two groups after first six months and statistical insignificant difference after second six months from insertion (t=3.16 and p<0.01, and t=0.81 and p<0.43). There was statistically significant difference of the probing depth appeared between the mesial and distal aspect of the maxillary central incisor in the first and second six months of the study for the group I. It was concluded that the Twin - flex clasp considered a promising esthetic clasp in cases with unilateral maxillary defects.

INTRODUCTION

Special prostheses are necessary to seal acquired tissues openings of the palate and contiguous structures. Obturators close or seal these defects allowing for restoration of esthetics and function such as mastication, deglutition, and speech. Successful obturation depends on the volume of the defect, and the positioning of remaining hard and soft tissues to be used to retain, stabilize, and support the prosthesis. Obturator designs for partial maxillectomy defects have included open and closed hollow obturators, inflatable obturators, and 2-piece hollow obturator prostheses.
The tooth closely adjacent to the anterior margin of unilateral maxillectomy defect should have a rest and retainer if adequate retention is to be achieved. This anterior rest and retainer ensure proper orientation of the prosthesis. If this concept is not employed, the prosthesis will tend to rotate out of retentive areas posteriorly. However, the poor bony support of the tooth adjacent to the defect does not permit its use as a partial denture abutment.

It was suggested to use a wrought wire clasp to decrease the forces on the upper central incisor instead of amputating the tooth to serve as overdenture abutment. Unfortunately, the wrought wire retentive clasp arm shown is not esthetically accepted.

Many authors have described methods for the elimination of facial clasp arms in anterior applications proposed alternatives to circumferential clasping. Twin – flex clasps could be used in both anterior and posterior application. The clasps were said to provide improved esthetics, while permitting increased clasping options. This clasp can provide a flexible clasp that is less noticeable to the patient. It serves as a flexible, hidden clasp that engages the proximal undercut.

This work aimed to use the twin flex clasp as an esthetic clasp in obturators used for reconstruction of unilateral maxillectomy cases. The effect of twin-flex clasp on the upper central incisor abutment when compared with the conventional wrought wire clasp used was clinically evaluated.

**MATERIALS AND METHODS**

Ten patients presented with unilateral maxillectomy of age ranged from 30 to 40 years of both sex were selected from the Faculty of Dentistry, Mansoura University, and Faculty of Oral and Dental Medicine 6 October University.

The patients have completely dentulous maxillary intact side against completely dentulous mandibular arch Fig. (1). Patients were presented before surgical intervention to make acrylic surgical obturator and two weeks postsurgical to make intermediate obturator. During the first six month, the patients had restricted surgical and dental follow up for proper hygiene measures. After complete healing, radiotherapy treatment and, the patients presented for definitive metallic obturators construction.

![Fig.(1) Dentulous patients presented with unilateral hemimaxillectomy.](image-url)

Maxillary and mandibular irreversible hydrocolloid impression were made and poured in dental stone. Maxillary and mandibular custom trays were constructed in autopolymerizing acrylic resin.

Preparation of rest seats on both remaining maxillary premolars and molars, and necessary guiding planes preparation was made. The maxillary custom tray was border molded with green stick compound and used to record maxillary final rubber base impression after blocking of undesirable soft tissue undercuts with cotton pellets.

The definitive obturator had double aker clasps on maxillary first and second molars and on first and second
premolars in intact side. According to the type of the wrought wire clasp used on the maxillary central incisor near the surgical site, the patients were classified into two equal groups randomly:

**GROUP I.**

Patients were received their obturators with conventional simple circllet wrought wire clasp on the remaining central incisor abutments.

**GROUP II.**

Patients were received their obturators with twin-flex clasp on the remaining abutment central incisors as an esthetic alternative.

The twin-flex clasp was constructed as follows:

The master cast surveyed for proper determining proper path of insertion. The central incisor abutments were prepared for adequate rests to help prevent them from rotating.

A 19-gauge Ticonium round wire (Co.N.) was placed into a 0.01inch under cut on the tooth surface adjacent to edentulous space in a manner similar to a rotational path design. The length of the wire was 15 mm and 3mm away from the free gingival margin of each abutment.

After the wires were carefully adapted to the surface of the tooth, they were hold in the proper position and a slight amount of wax was flow to maintain the wires in place on the teeth block. The rest of the cast was blocked out as for a conventional RPD, and an additional wax was flow to the wire along its length beneath its height of contour. The master cast was duplicated with the wire in place and the refractory cast was prepared for waxing and 24-gauge sheet wax over the shape of the wire in the investment to allow 2 mm of the tip of the wire to remain uncovered.

After an accurate framework has been confirmed, the wax was flushed from the master cast with boiling water or stream and was cleaned the wire. The metallic frameworks of both groups were tried intraorally and maxillomandibular relationship was recorded using modeling wax. Setting of artificial teeth was made and after finishing and polishing of the definitive obturators it was inserted and adjusted intraorally using pressure indicating paste. Fig. (2-5).

**Methods of evaluation**

1. **Radiographic assessment of marginal bone loss:**

   This was assessed using the Corel Draw No.11 software*. A standardized digital panoramic radiograph** was taken for each patient to measure the marginal bone loss for the natural upper central abutment mesially and distally. The mean marginal bone loss was calculated by measuring the difference between crestal bone height in relation to the fixed cervical line of the natural central incisor.

---

*Corel Draw, Version 11, Corel Corporation
** MRO5, Villa, Italy
2. Peri-abutment probing depth:

The probing depth was measured to the nearest 0.5 mm using a pressure sensitive plastic periodontal probe* at four sites for each implant; labial, lingual, mesial and distal, then results were divided by four.

**RESULTS:**

Table (1) shows the mean marginal bone loss around mesial and distal aspects of maxillary central incisor after different periods of study for both groups. The mean value at the mesial aspect after 1st 6 months was 1.97±0.16 for group I and 1.95±0.019 for group II. Statistically, there was insignificant difference in the degree of marginal bone loss between the two groups at first 6 months. t=0.16 and P value <0.87.

After the 2nd 6 months, the mean marginal bone loss value at the mesial aspect was 2.23±0.15 for group I and 2.13±0.12 for group II. Statistically, there was insignificant difference in the degree of marginal bone loss between the two groups at 2nd 6 months. t=1.15 and P value <0.28.

There was a statistically significant difference in the degree of marginal bone loss at the mesial aspect between the two periods of times for group I (T = 2.82; P<0.018), and insignificant difference for group II (T = 2.02; P<0.071).

The mean value at the distal aspect after 1st 6 months was 1.42±0.08 for group I and 1.56±0.07 for group II. Statistically, there was significant difference in the degree of marginal bone loss between the two groups at first 6 months. t=3.16 and P value <0.01. After the 2nd 6 months, the mean value at the distal aspect was 1.65±0.04 for group I and 1.62±0.08 for group II. Statistically, there was insignificant difference in the degree of marginal bone loss between the two groups at second 6 months. (t=0.81 and P value <0.43). There was a statistically significant difference in the degree of marginal bone loss at the distal aspect between the two periods of times for group I (T = 6.08; P<0.001), and insignificant difference for group II (T = 1.26; P<0.22).

Table (2) shows the mesial and distal marginal bone height changes in each period of the study. There was statistically significant difference between marginal bone loss between mesial and distal aspects for group I at first 6 months (t=7.38 and P<0.001) and for group II (t=4.77 and P<0.0008). Also there was statistically significant difference between marginal bone loss between mesial and distal aspects for group I at second 6 months (t=8.89 and P<0.001) and for group II (t=8.76 and P<0.001).

* Prisa, acer, acerscan. 620st. Acer peripherals America Inc
Twin-Flex clasp as an esthetic approach

Table (3) shows the mean probing depth around mesial and distal aspects of maxillary central incisor after different periods of study for groups. The mean value at the mesial aspect after 1st 6 months was 2.15±0.24 for group I and 2.11±0.016 for group II. Statistically, there was insignificant difference in the degree of probing depth between the two groups at first 6 months. t=0.35 and P value <0.73.

After the 2nd 6 months, the mean probing depth value at the mesial aspect was 2.42±0.15 for group I and 2.33±0.08 for group II. Statistically, there was insignificant difference in the degree of probing depth between the two groups at second 6 months. t=1.21 and P value <0.25.

There was a statistically significant difference in the degree of probing depth at the mesial aspect between the two periods of times for group I (T = 2.3; P<0.044), and significant difference for group II (T = 3.03; P<0.018).

The mean probing depth value at the distal aspect after 1st 6 months was 1.61±0.08 for group I and 1.98±0.23 for group II. Statistically, there was significant difference in the degree of probing depth between the two groups at first 6 months. t=3.75 and P value <0.04.

After the 2nd 6 months, the mean probing depth value at the distal aspect was 1.74±0.08 for group I and 2.28±0.21 for group II. Statistically, there was insignificant difference in the degree of probing depth between the two groups at second 6 months. t=5.81 and P value <0.002.

There was a statistically significant difference in the degree of probing depth at the distal aspect between the two periods of times for group I (T = 2.88; P<0.016), and significant difference for group II (T = 2.33; P<0.042).

Table (4) shows the mesial and distal marginal bone height changes in each period of the study.

<table>
<thead>
<tr>
<th>Groups</th>
<th>1st 6 Month</th>
<th>2nd 6 Month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T value</td>
<td>P value</td>
</tr>
<tr>
<td>I</td>
<td>7.38</td>
<td>0.0001</td>
</tr>
<tr>
<td>II</td>
<td>4.77</td>
<td>0.0008</td>
</tr>
</tbody>
</table>

Table (3) shows the mean marginal bone loss around mesial and distal aspects of maxillary central incisor after different periods of study for both groups.

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mesial</th>
<th>Distal</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1st 6 Month</td>
<td>2nd 6 Month</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Means</td>
<td>SD</td>
</tr>
<tr>
<td>I</td>
<td>6</td>
<td>1.97</td>
<td>0.16</td>
</tr>
<tr>
<td>II</td>
<td>6</td>
<td>1.95</td>
<td>0.19</td>
</tr>
</tbody>
</table>

Table (2) shows the mesial and distal marginal bone height changes in each period of the study.
During construction of the definitive obturator for partially edentulous patients after surgical removal of hemimaxillectomy defects, the main aim is to preserve remaining abutments, improve stability, and support of the partial prostheses. Retention provided by the remaining central incisor abutments should be within physiologic limits of the abutment teeth. Within the scope of these objectives, the designs provided for clasping were either by using flexible wrought wire clasp soldered to the framework, or using conventional infrabulgeand circumferential clasps, and the use of a combination clasp assembly with one flexible retentive arm and rigid bracing. In all these designs, little concern was provided to the esthetic demands of these patients especially young and middle aged patients. The aim of this study was to provide clasp for the remaining maxillary central incisor providing both esthetic and preservation demands.

The results of this study showed statistical insignificant difference in the degree of mesial marginal bone loss around maxillary central incisor between the two groups after first and second six months from insertion ($T=0.16$, $P<0.87$ and $t=1.15$, $p<0.28$ respectively). While, there was statistical significant difference in the degree of distal marginal bone loss around maxillary central incisor between the two groups after first six months and statistical insignificant difference after second six months from insertion ($t=3.16$ and $p<0.01$, and $t=0.81$ and $p<0.43$). This may be attributed to the unique placement of the retentive terminal of the Twin Flex clasp in the mesial undercut of the maxillary central incisor that will minimize forces on the abutment in the mesial aspect and transmit more forces on the distal aspect during rotational movement of the prostheses. On the other hand, the retentive terminal of the simple circlet wrought wire clasp engages the distolabial under cut which will cause greater stresses on the distal aspect of the abutment.

### TABLE (3) The probing depth around mesial and distal aspects of maxillary Significance of the central incisor after different periods of study for groups.

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>1st 6 Month</th>
<th>2nd 6 Month</th>
<th>1st 6 Month</th>
<th>2nd 6 Month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Measal</td>
<td>P value</td>
<td>Distal</td>
<td>P value</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Means</td>
<td>SD</td>
<td>Means</td>
<td>SD</td>
</tr>
<tr>
<td>I</td>
<td>6</td>
<td>2.15</td>
<td>0.24</td>
<td>2.42</td>
<td>0.15</td>
</tr>
<tr>
<td>II</td>
<td>6</td>
<td>2.11</td>
<td>0.16</td>
<td>2.33</td>
<td>0.08</td>
</tr>
<tr>
<td>T value</td>
<td>0.35</td>
<td>1.21</td>
<td>3.75</td>
<td>5.81</td>
<td></td>
</tr>
<tr>
<td>P value</td>
<td>0.73</td>
<td>0.25</td>
<td>0.004</td>
<td>0.0002</td>
<td></td>
</tr>
</tbody>
</table>

### TABLE (4) The Significance between mesial and distal probing depth in each period of the study.

<table>
<thead>
<tr>
<th>Group</th>
<th>Significant test between Mesial and Distal in the same period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1st 6 Month</td>
</tr>
<tr>
<td></td>
<td>T value</td>
</tr>
<tr>
<td>I</td>
<td>5.19</td>
</tr>
<tr>
<td>II</td>
<td>1.08</td>
</tr>
</tbody>
</table>

## DISCUSSION

During construction of the definitive obturator for partially edentulous patients after surgical removal of hemimaxillectomy defects, the main aim is to preserve remaining abutments, improve stability, and support of the partial prostheses. Retention provided by the remaining central incisor abutments should be within physiologic limits of the abutment teeth. Within the scope of these objectives, the designs provided for clasping were either by using flexible wrought wire clasp soldered to the framework, or using conventional infrabulgeand circumferential clasps, and the use of a combination clasp assembly with one flexible retentive arm and rigid bracing. In all these designs, little concern was provided to the esthetic demands of these patients especially young and middle aged patients. The aim of this study was to provide clasp for the remaining maxillary central incisor providing both esthetic and preservation demands.
There was statistically significant difference in the mesial and distal bone height changes for group I at the two different periods of study, while there was statistically insignificant difference mesial and distal bone height changes for group I at the two different periods of study. This may be due to the incorporating of the wrought wire clasp of Twin flex clasp within a channel on the intaglio surface of the RPD framework, and the reciprocation provided by the cast circumferential bracing arm on the lingual plating. This would result in minimizing the stresses on the abutment and decrease alveolar bone height changes.

The main disadvantage of the wrought wire clasps is the allowance of impaction of debris when they are not well adapted to the abutment teeth. A space is often created where the clasp emerges from the framework, adjacent to the guidepalate. This fact explains the statistically significant difference of the probing depth appeared between the mesial and distal aspect of the maxillary central incisor in the first and second six months of the study for the group I.

**CONCLUSION**

1. The Twin - flex clasp considered a promising esthetic clasp in cases with unilateral maxillary defects.
2. Using esthetic clasp for patients with unilateral maxillectomy had a dramatic effect on the psychogenic status of the patients.

**REFERENCES**