

A novel approach towards Maxillo-mandibular fixation going past Erich arch bar technique

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Abstract: Background: Maxillo-mandibular fixation (MMF) establishes dental occlusion for the treatment of mandible and maxilla fractures. The present study was conducted to assess cases of MMF cases using Dental ties.

Materials & Methods: The present study was conducted in the department of Oral & maxillofacial surgery in Dr Guru Eye and Dental Surgical centre. It comprised of 20 adult patients of maxillofacial fracture of both genders. MMF was performed using dental Ties. Fracture types, operating room time, dental occlusion, Dental ties application times, number of ties used per patient and device failures were recorded.

Results: Out of 20 patients, males were 12 and females were 8. Most common fracture was Parasymphiseal (7) followed by Left subcondylar (5), right body (4), right angle (3) and Lefort I & II (1). The difference was significant ($P < 0.05$). The mean application time in males was 25.4 minutes in males and 30.5 minutes in females, mean ties used was 10.4 in males and 12.2 in females, failure was needle break 1 in male and female, ties flossed out in 1 female and needle break at swedge in 2 males. The difference was significant ($P < 0.05$).

Conclusion: Authors suggested that dental tie is proved to be the novel and most feasible option next to MMF. There were less failure rates in present study.

Key words: Maxillofacial fracture, dental tie, Oral surgery

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I. Introduction

Maxillo-mandibular fixation (MMF) establishes dental occlusion for the treatment of mandible and maxilla fractures. MMF is most widely used for the treatment of mandible fractures. IMF/maxilla-mandibular fixation (MMF) is considered one of the most important steps in the management of maxillofacial trauma. It is required to register and secure the correct inter-ach relationship of the occlusal surfaces and to maintain this relation for the proper reduction and fixation of fracture fragments.¹

Since the last century, wire-based techniques such as Ivy loops and Erich arch bars have remained the standard of care. In 1943, John B. Erich co-authored acute bone injury. Its use and description of arch bars has become popular all over the world. In the coming decades, Erich Bars has become the leading choice for the establishment of MMF.²

The ability to treat fracture with open reduction (OR) and internal fixation (IF) has dramatically revolutionized the approach to mandible fracture.³ Traditionally, OR/IF has required a period of postoperative mandibular immobilization by rigid maxilla-mandibular fixation (MMF) for up to 6 weeks for satisfactory healing. Various methods to achieve IMF have been described in literature such as Ivy eyelet wiring, Risdon wiring, arch bars, metal splints, acrylic splints, gunning type splints for edentulous patients, bonded brackets, and more recently self-tapping and self-drilling MMF screws.⁴

Unlike arch bars or screw-based systems, customized dental Ties are a non-invasive solution that provides the strong, steady force needed to secure the patient’s bite and successfully achieve MMF. Constructed of a coated suture with a blunt introducer on one end, and a smooth clasp-head on the other, the dental Ties design resembles that of a familiar nylon “zip tie.” Each Tie is applied through the interdental space, creating a balanced series of bilateral sutures.⁵ the present study was conducted to assess cases of MMF using dental ties.

II. Materials and methods

The present study was conducted in the department of Oral & maxillofacial surgery in Dr Gurus Eye and Dental Surgical centre. It comprised of 20 adult patients of maxillofacial fracture of both genders.

Data such as name, age, gender etc. was recorded. A through clinical and oral examination was performed. Patients were subjected to routine blood examination. CT scan was done in all patients. MMF was performed using dental Ties (Fig- 1). Fracture types, operating room time, dental occlusion ties application times, number of ties used per patient and device failures were recorded. CT scans and post-operative exams were done. Following questionnaire was given to fill-

1. Does this study utilizes human cadaver, 3D printing and Erich arch bar?

- 1. Only 3D printing 2. Only human cadaver 3. Only Erich arch bar 4. Only Erich arch bar

2. What is the average time a surgeon takes to achieve MMF?

- 1. 12-15 minutes, 2. 15-16 minutes, 3. 16-20 minutes, 4.

3. The dental ties of 0.5 mm, 0.7 mm and 1.0 mm corresponds to in gauges

- 1. 25, 22 and 18 gauges respectively, 2. 24, 21 and 18 gauges respectively, 3. 28, 27 and 25 gauges respectively, 4. None of the above.

4. What is the force required to achieve sound and stable MMF?

- 1. 44.6-74.4 kg/metre, 2. 9-15 lbs tensile strength, 3. 44.6-74.4 kg/metre or 9-15 lbs, 4. None of the above

5. Is this dental ties suitable for-

- 1. LE-FORT-I Fracture, 2. LE-FORT-II Fracture, 3. LE-FORT-III Fracture, 4. All of the above

6. Are there any exceptions to dental ties application-

- 1. Edentulous student, 2. Minimally or severe mobility, 3. Both a and b, 4. None of the above

7. Inclusion criteria for dental ties are-

- 1. Comminuted fractures, 2. Non-displaced, favorable fractures, 3. Both a and b, 4. None of the above

Results thus obtained were subjected to statistical analysis. P value <0.05 was considered significant.

III. Results

Table I Distribution of patients

Total - 20		
Gender	Males	Females
Number	12	8

Table I shows that out of 20 patients, males were 12 and females were 8.

Table II Type of fracture

Fracture	Number	P value
Right body	4	0.05
Lefort I & II	1	
Left subcondylar	5	
Parasymphyseal	7	
Right angle	3	

Table II shows that most common fracture was Parasymphyseal (7) followed by Left subcondylar (5), right body (4), right angle (3) and Lefort I & II (1). The difference was significant (P<0.05).

Graph I Type of fracture

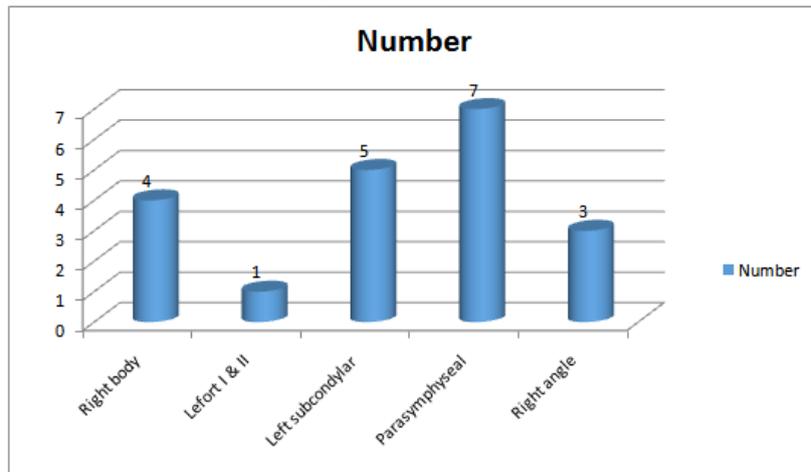
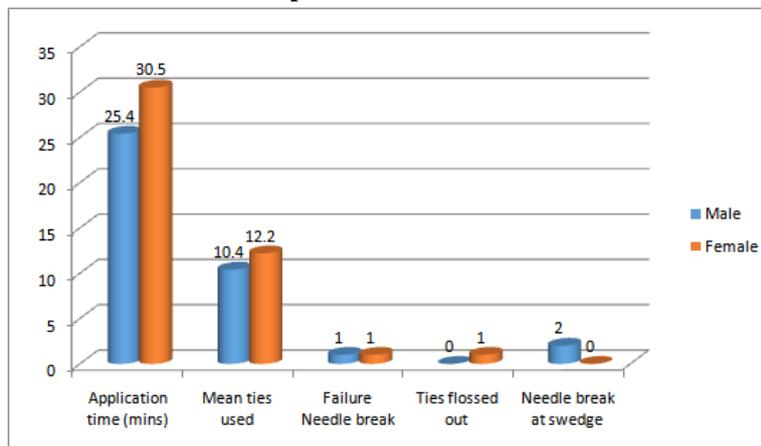


Table III Other Parameters

Parameters	Male	Female	P value
Application time (mins)	25.4	30.5	0.12
Mean ties used	10.4	12.2	0.45
Failure Needle break	1	1	1
Ties flossed out	0	1	0.5
Needle break at swedge	2	0	0.01

Table III, graph II shows that mean application time in males was 25.4 minutes in males and 30.5 minutes in females, mean ties used was 10.4 in males and 12.2 in females, failure was needle break 1 in male and female, ties flossed out in 1 female and needle break at swedge in 2 males. The difference was significant ($P < 0.05$).

Graph II Other Parameters



IV. Discussion

Dental occlusion ties were successful in establishing intra-operative occlusion for open reduction with internal fixation (ORIF). They add to a growing number of approaches to achieve MMF and feature a number of clear advantages: Speed of application and removal with associated cost savings, improved intra-oral access, reduced sharps injury risk for the surgical team, and reduced gingival trauma. The customized dental Ties suture is introduced through the embrasures to create a loop. The stainless steel introducer is threaded through the green side of the clasp head. Apply the recommended four sutures on each side, using the largest size possible to minimize potential floss out. Final tightening is done after all sutures are placed. Sutures are trimmed after tightening.⁶ the present study was conducted to assess cases of MMF using dental ties.

In present study, out of 20 patients, males were 12 and females were 8. One further efficiency identified with the devices stems from their low-profile interface with the teeth. Unlike arch bars with associated tabs and wires, the dental occlusion ties had no surfaces to catch suture when sewing an incision. They also minimally obstructed access to posterior fractures. Angle fractures were readily accessible with no interference from the devices.⁷

We found that most common fracture was Parasymphyseal (7) followed by Left subcondylar (5), right body (4), right angle (3) and Lefort I & II (1). The mean application time in males was 25.4 minutes in males and 30.5 minutes in females, mean ties used was 10.4 in males and 12.2 in females, failure was needle break 1 in male and female, ties flossed out in 1 female and needle break at swedge in 2 males.

Dental Ties are available in two configurations: 1) the dental Ties Kit that includes 12 sutures with an assortment of three different sizes differentiated by colour, and a uniquely designed cheek retractor. And 2) dental Ties Two-Packs including two sutures of the same size.⁸ There is a minimal or less gingival trauma incidence in contrast to conventional arch bar and other wire associated techniques. As the conventional/traditional techniques exerts undue pressure on teeth and gingival tissue, compromising the periodontal health. There is an evidence of mucosal overgrowth in case of screw based techniques which is comparatively less in arch bar unlike the dental ties exhibits negligible gingival trauma and minimal bleeding.⁹

Nylon cable ties have shown tremendous results in almost all study patients. Single ties did not trade-off care of total ties unit applied. Total 8 Nylon ties were applied i.e. 4 on either side. The stable maxilla-mandibular fixation was achieved even on application of ties less than 8. If a 0.7 mm diameter (21 gauge) is selected then 1.0 mm wire (21 gauge) was used to secure the intended embrasure.¹⁰

V. Conclusions

Authors suggested that customized nylon dental tie is proved to be the novel and most feasible option next to MMF. There were less failure rates in present study.

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Fig- 1 MMF with dental Ties



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