

# Comparison of Techniques of Closed Reduction - Arch Bar Versus Ivy Eyelet

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## ABSTRACT

**Introduction:** Many of the postoperative sequels that are seen during the clinical practice of maxillofacial trauma are due to the bypassing of one of the fundamental principles. Currently open reduction and rigid internal fixation is becoming the gold standard for managing simple as well as complex mandibular fractures. The aim of present study was to determine the better maxillomandibular fixation technique between Erich arch bars and Ivy eyelet wiring for closed reduction.

**Material and methods:** The present prospective observational study was conducted amongst 30 subjects who had mandibular fracture and were randomly allocated into two groups. Detailed information about demographics, medical and dental history amongst all the subjects was obtained before the start of the procedure. Double gloves were used during the procedure and the incidence of glove perforation was noted. All the data was recorded in a tabulated form and analysed using SPSS software. Chi square test and student t test were used for the analysis of data.

**Results:** The study enrolled 30 subjects with the mean age of 34.27 +/- 11.12 years. There were 19 males and 11 females in this study. Patient acceptance was good in 10 cases of arch bar and 6 cases of ivy eyelet. It was poor in 5 cases of arch bar and 9 cases of ivy eyelet. There was no significant difference between the two groups.

**Conclusion:** According to our study, both ivy eyelet and Erich arch bars are equally efficacious for performing maxillomandibular fixation with no significant difference between the two.

**Keywords:** Masticatory, Needlestick, Occlusion

## INTRODUCTION

For successful surgical trauma practice adequate importance should be given to the principles of fracture reunion, that are, good anatomical alignment and semi rigid or rigid fixation. Many of the postoperative sequel that are seen during the clinical practice of maxillofacial trauma are due to the bypassing of one of the fundamental principles. The philosophies for managing mandibular fractures have changed vividly over time but the prime objective of re-establishing of occlusion and masticatory functions remains the same. Numerous techniques have been given in the literature for Maxillomandibular fixation.<sup>1-11</sup> Currently open reduction and rigid internal fixation is becoming the gold standard for managing simple as well as complex mandibular fractures,<sup>2,12</sup> but IMF or postoperative fixation with wire or elastic placement is still being performed using Erich arch bars, splints, embrasure wires, interdental eyelet wiring,

pin fixation and bonded brackets. Every technique carries its own pros and cons. In the year 1870, Hammond<sup>9</sup> first introduced arch bars in the field of oral and maxillofacial trauma surgery. Arch bars can provide an efficient and versatile technique for maxillomandibular fixation and have their own set of disadvantages. There is a risk of needle stick injury to the operator, the surgical time for removal and placement is more, traumatic injury to periodontium, and difficulty in maintaining oral hygiene are few disadvantages of traditional arch bars.<sup>13,14</sup> Even Ivy eyelets carries its own set of risks, with chances of percutaneous injury and there hence there are increased chances of serological disease transmission.<sup>1</sup> The aim of present study was to determine the better maxillomandibular fixation technique between Erich arch bars and Ivy eyelet wiring for closed reduction.

## MATERIAL AND METHODS

The present prospective observational study was conducted amongst 30 subjects who had mandibular fracture and were randomly allocated into two groups. There were 15 subjects in each group. Amongst Group I subjects Erich arch bar were placed and amongst Group II, ivy eyelet wiring was performed. The study was performed for duration of 1 year. The study was approved by the Institutional ethical committee prior to initiation of the study and all the subjects were informed about the study and a written consent was obtained from all the subjects in their vernacular language. Most of the subjects came directly to the hospital but some were referred from local dentists. Detailed information about demographics, medical and dental history amongst all the subjects was obtained before the start of the procedure. A single operator performed all the closed reduction under complete aseptic conditions. The time from the initiation of anaesthesia till complete Maxillomandibular fixation was completed was taken as the total surgical time. MMF was rated by all the subjects based on their convenience and comfort level. MMF was done for duration of 4 weeks.

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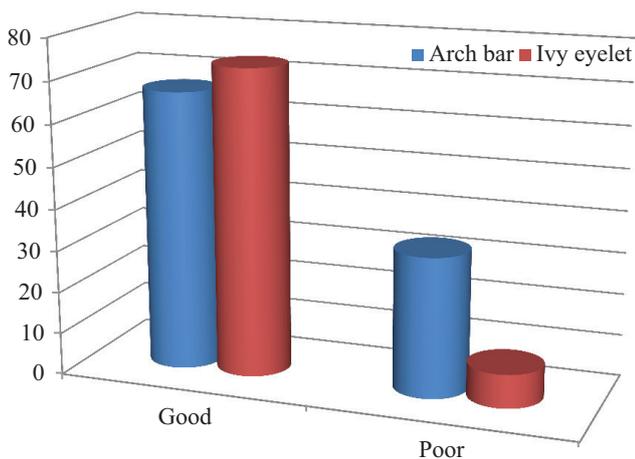
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Parameter		Arch bar	Ivy eyelet	P value
Patient acceptance	Good	10(66.7%)	6(40)	>0.05
	Poor	5(33.3%)	9(60%)	
Post-operative occlusion	Satisfactory	14(93.3%)	13(86.7%)	>0.05
	Unsatisfactory	1(6.7%)	2(13.3%)	
Surgical time (mins)	Range	92-110	80-103	>0.05
Glove perforation	Present	13(86.7%)	14(93.3%)	>0.05
	Absent	2(13.3%)	1(6.7%)	
Oral hygiene	Good	10(66.7%)	11(73.3%)	>0.05
	Poor	5(33.3%)	4(26.7%)	
Stability	Adequate	14(93.3%)	13(86.7%)	>0.05
	Inadequate	1(6.7%)	2(13.3%)	

**Table-1:** Comparison of Arch bars and Ivy eyelet wiring



**Graph-1:** Comparison of oral hygiene between two groups

After 4 weeks the postoperative occlusion was evaluated as satisfactory or if there was any malocclusion like tipping or rotation then it was graded as unsatisfactory. Subject's oral hygiene recorded throughout the study period. Double gloves were used during the procedure and the incidence of glove perforation was noted.

### STATISTICAL ANALYSIS

All the data was recorded in a tabulated form and analysed using SPSS software. Chi square test and student t test were used for the analysis of data. Probability value of less than 0.05 was considered significant.

### RESULTS

The study enrolled 30 subjects with the mean age of 34.27+/-11.12 years. There were 19 males and 11 females in this study.

Table 1 shows the comparison of various parameters that were assessed during the study. Patient acceptance was good in 10 cases of arch bar and 6 cases of ivy eyelet. It was poor in 5 cases of arch bar and 9 cases of ivy eyelet. There was no significant difference between the two groups. Postoperative occlusion was satisfactory in majority of the cases in both the groups. There were 1 arch bar and 2 ivy eyelet cases with unsatisfactory occlusion. There was no significant difference between the two groups. The surgical time range in arch bar cases was 92-110 minutes and in ivy eyelet it was 80-103 minutes. Glove perforation was seen in nearly all the cases.

The MMF stability was up to the mark in 14 arch bar and 13 ivy eyelet cases.

Graph 1 shows the oral hygiene status in both the groups. It was good in 10(66.7%) cases of arch bars and 11(73.3%) cases of ivy eyelet. The oral hygiene was poor in 5(33.3%) cases of arch bar and 4(26.7%) cases of ivy eyelet. On applying chi square test there was no significant difference between the two groups as the p value was more than 0.05.

### DISCUSSION

During the 17<sup>th</sup> century an ancient Greek, Edwin Smith first documented the treatment for managing mandibular fractures. Between 25 BC and 11<sup>th</sup> Century AD various surgeons came forward for conservatively managing the jaw fractures. Sushruta pioneered by giving the technique of bandaging to manage cases mandibular fractures. The importance of occlusion during the management of maxillofacial fractures was given by Avicenna. Occlusal stabilization is a unique and characteristic feature of jaw fractures that aids in reducing it to correct anatomical alignment.<sup>15</sup> With the discovery of bone plating there has been a drastic reduction in the duration of maxillomandibular fixation however MMF is required intraoperatively for stabilization of the occlusion and also postoperatively to rectify minor occlusal discrepancies.<sup>12</sup> The introduction of ivy eyelet wires dates back to the era when Sauer in Germany, and Gilmer of united states used a flat round bar and fixed it using brass ligature wires to teeth. Blair and Ivy modified this bar to a width of 2 mm for better stabilization and shape conformation.<sup>16</sup> As per the present study, Patient acceptance was good in 10 cases of arch bar and 6 cases of ivy eyelet. It was poor in 5 cases of arch bar and 9 cases of ivy eyelet. There was no significant difference between the two groups. Postoperative occlusion was satisfactory in majority of the cases in both the groups. There were 1 arch bar and 2 ivy eyelet cases with unsatisfactory occlusion. There was no significant difference between the two groups. The surgical time range in arch bar cases was 92-110 minutes and in ivy eyelet it was 80-103 minutes. Glove perforation was seen in nearly all the cases. The MMF stability was up to the mark in 14 arch bar and 13 ivy eyelet cases.

Self drilling IMF screws were introduced in 1989 that overcame various disadvantages of both arch bars and ivy

eyelets wiring.<sup>12</sup> They had minimal risk of needle stick injury and were easier to apply with minimal surgical time. They didn't induce trauma to gingival tissues.<sup>2</sup> As per the study conducted by Sanjay Rastogi et al, when embrasure wires and arch bars were compared for Maxillomandibular fixation, they found that time for placing and chances of needle stick injury were lesser with embrasure wires as compared to arch bars. Patients were more comfortable with embrasure compared to arch bars.<sup>17</sup> In our study, oral hygiene was good in 10(66.7%) cases of arch bars and 11(73.3%) cases of ivy eyelet. The oral hygiene was poor in 5(33.3%) cases of arch bar and 4(26.7%) cases of ivy eyelet. On applying chi square test there was no significant difference between the two groups as the p value was more than 0.05. As per study by Ahtesham et al, on comparing IMF screws with arch bars patient's oral hygiene was better with screws compared to arch bars and patient acceptance was also improved with screws but stability was better with Arch bars as compared to IMF screws.<sup>18</sup>

## CONCLUSION

Management maxillofacial trauma is a challenging chore as there is little access and lesser surface area for fixation, so it is a time-consuming task. With the discovery of open reduction there has been a reduction in the duration of Maxillomandibular fixation but it is a crucial step to perform during intraoperative period for the stabilization of occlusion. According to our study, both ivy eyelet and Erich arch bars are equally efficacious for performing maxillomandibular fixation with no significant difference between the two.

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