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Journal of Oral Medicine, Oral Surgery, Oral Pathology and Oral Radiology

Journal homepage: www.joooo.org



Original Research Article

Quality of life in patients with mandible fracture treated with closed reduction using Erich arch bar vs intermaxillary fixation screws

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ARTICLE INFO

Article history:

Received 23-06-2022

Accepted 15-07-2022

Available online xx xx xxxx

Keywords:

Intermaxillary fixation

Erich arch bar

IMF screws

ABSTRACT

The aim of this study is to compare the quality of life (QoL) in patients with mandibular fractures undergoing closed reduction with conventional arch bar versus intermaxillary fixation screws at 4th week follow up. Objective is to assess the quality of life by GOHAI index in the 2 groups.

Materials and Methods: A prospective analytical study was conducted on 50 patients between the age group of 18-50 years with dentate mandibular fractures as the study sample. Patients were divided into two groups. The control group underwent four weeks of maxillomandibular fixation with arch bar and test group underwent closed reduction with intermaxillary fixation screws. Both techniques were compared in terms of GOHAI index for assessment of QoL. QoL scores were recorded at 4th week follow up. Oral hygiene, operator injuries and time taken for the procedure was also observed on day of procedure and 4th week after procedure.

Results: The GOHAI's total value score of ≤ 50 indicates a good QoL, 51-56 indicates a fair living quality, and 57-70 demonstrates the poor QoL. In this study the mean rank for the control group was found to be 43.5 and 35.36 for the test group suggesting a good QoL for the test group. Conclusion: There was significant difference between QoL of control group and test group, with test group (IMF Screws) having better QoL. Arch bar placement (control) is time consuming and had more oral hygiene problems when compared to IMF screws. Operator injury is less in IMF groups, but chances of dental complications are higher.

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1. Introduction

Erich arch bar and intermaxillary fixation screws are among the several ways of intermaxillary fixation (IMF). Arch bars have become the standard treatment for IMF. In 1989 the self-drilling IMF screws were introduced as an alternative, which are inserted in the alveolar bone of maxilla and mandible. This study was conducted at the Department of Oral and Maxillofacial Surgery, Government Dental College, Thiruvananthapuram in patients undergoing IMF

for treatment of mandibular fractures, to assess the QoL between the 2 modalities.

2. Materials and Methods

This is a prospective analytical study to compare the QoL, oral hygiene, operator injuries and surgical operating time taken for intermaxillary fixation with IMF screws and Erich arch bar. Patients with mandibular fractures needing IMF, reporting to the Department of Oral and Maxillofacial Surgery, Government Dental College, Thiruvananthapuram were randomly grouped into 2 groups. Group A received

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arch bars and Group B IMF screws. After 4 weeks of follow up, a self-evaluation was done using the Global oral health assessment index {GOHAI}. The mean of total score among two groups was tested with Mann Whitney U test. Data from average surgical time taken, difference in OHI-S score and operator injuries was presented as mean and standard deviation among 2 groups and was tested with student t test. For statistical analysis, SPSS software was used. p value less than 0.05 was considered as significant.

3. Data Interpretation and Results

Mean age in Group A was 33.3 ± 9.4 years and in Group B, 32.6 ± 5.4 years. Mean time for arch bar fixation was 51 ± 27 minutes and IMF screw fixation time was 28.6 ± 5.5 minutes. The Mann-Whitney U test displays a statistically significant ($p < 0.05$) higher time taken for Group A (Mean rank = 61.91) when compared to B (Mean rank = 39.09). Similarly, OHI difference was observed more in Group A (Mean rank = 74.22) than B (Mean rank = 26.78).

The GOHAI's total value score of ≤ 50 indicates a good QoL, 51-56 indicates a fair living quality, and 57-70 demonstrates the poor QoL.¹ Mann-Whitney U test displays a statistically significant ($p < 0.05$) higher mean rank for QoL for Group A (Table 1).

4. Discussion

QoL score between two groups who underwent closed reduction by Arch bar fixation and IMF screws respectively for various dentate region fractures of mandible for 4 weeks was compared. The tool was the modified GOHAI index, measuring functional rehabilitation, psychological aspect of trauma, pain, socialization, and treatment satisfaction.

GOHAI questionnaire assesses the oral health function of the patient in three domains namely physical, psychosocial, and pain domains. Physical domain assesses eating, speech and swallowing; psychosocial domain assesses worry about oral health, dissatisfaction with appearance, and avoidance of social contacts while pain domain evaluates discomfort and use of medications to relieve pain.²

Group B had better physical and psychosocial outcomes as compared to A. They could swallow better, talk better, were less dissatisfied with their appearance, and tried to avoid social contacts less often. All patients were satisfied with the given treatment, but Group B subjects would recommend their treatment to someone else more often; which is consistent with the study by van den Bergh et al.³

Mean age in Group A was 33.3 ± 9.4 years in comparison to the Group B which was 32.6 ± 5.4 years. Maximum participants in both the groups were in between the age group of 20-40 years. Population distribution suggested that male participants were 57.4% and female patients were 38.5% in group A. Group B contained 42.6% male and 61.5% female participants. Morris et al.⁴ found that the

average age was approximately 38 years, with most patients (33%) in the third decade. Majority of patients were men (83.27%).

Rai et al.⁵ published the treatment of minimally displaced favourable fractures of both jaws with IMFS or arch bars. This study demonstrated easy fixation with self-drilling 2mm titanium and stainless-steel screws in 20 minutes operating time. Although self-tapping screws were also used for some patients, the process was cumbersome, time consuming and unpleasant for the patient as well as the operator.

Surgical time in Group B was shorter (in average 22 min shorter, $p < 0.001$). Their application took an average 39.09 mins while arch bar took 61.91 mins ($p < 0.001$). This is in accordance with other studies.⁵⁻⁷

van den Bergh et al.⁸ observed that among 22 patients, 11 patients with arch bars had gingival hyperplasia. In the IMF screws group partial mucosal overgrowth of 11 (5.9%) screws in 11 patients was seen. Rai et al.⁵ reported a total of 92 (38.3%) screws partially or totally covered with mucosa out of 240 screws. In this study 106 screws, out of 300, were submerged due to placement of the IMFS in alveolar mucosa instead of attached mucosa.⁸ Poggio et al.⁹ suggested a thickness of 1-mm of alveolar bone around the screw for good periodontal health. Hernández et al. opined screw insertion in the incisal and molar regions. Thota and Mitchell¹⁰ suggested placement between the canine and first premolar in proximity to the mucogingival junction.

Oral Hygiene Index (OHI) was assessed for each patient before and 4 weeks after the procedure and the difference was calculated, in this study. Mean OHI difference for the Group B (0.54 ± 0.12) was significantly lower to A (1.11 ± 0.29). Rothe et al.¹¹ calculated OHI scores, at immediate postoperative period, after 15 days, 30 days, and 45 days and found that maximum hygiene was maintained in IMF screw group.

Although double gloves were used by the operators in this study, 18 perforations occurred in Group A, with 4 needle stick injuries. Group B had 6 perforations, with no needle stick injury. Van den Bergh et al.⁸ had 8 needle stick injuries with arch bars and none with screws. Hence the use of IMF screws is safer.

van den Bergh et al.⁸ observed spontaneous loosening of six (3.2%) IMF screws in four patients that were located in the molar region of the mandible, of which three were replaced. 72 screws loosened in this study though healing was unaffected. This was consistent with literature, i.e., 10.4% and 24%.^{5,6,12}

The main risk of using screws is the possibility of damaging roots, especially in crowding. Sahoo et al.,¹³ noticed iatrogenic damage to caused by screws in 4% subjects. Rocca et al.(2007)¹⁴ observed damage in 1.5% cases while Vatsa et al.(2018)⁷ reported 15%. Care should be taken during insertion of the screw, with regards

Table 1: GOHAI questionnaire

	Groups	N	Mean Rank	P Value
Do you limit kinds or amounts of food you eat because of problems with your teeth or jaw?	Arch Bar	50	55.36	0.059
	IMF Screw	50	45.64	
Are you able to swallow comfortably?	Arch Bar	50	72.6	0.001*
	IMF Screw	50	28.4	
Have teeth or wires prevented you from speaking the way you wanted to?	Arch Bar	50	60.92	0.001*
	IMF Screw	50	40.08	
Are you able to eat anything without feeling discomfort?	Arch Bar	50	68.06	0.001*
	IMF Screw	50	32.94	
Do you limit your contacts with people because of the condition of your teeth or mouth?	Arch Bar	50	69.84	0.001*
	IMF Screw	50	31.16	
Are you displeased or unhappy with the looks of your teeth and gums, jaws?	Arch Bar	50	61.69	0.001*
	IMF Screw	50	39.31	
Do you use medication to relieve pain or discomfort around your mouth?	Arch Bar	50	64.75	0.001*
	IMF Screw	50	36.25	
Are you worried or concerned about the problems with your teeth, gums or jaws?	Arch Bar	50	55.77	0.038*
	IMF Screw	50	45.23	
Do you feel nervous or self-conscious because of problems with your teeth, gums, or jaws?	Arch Bar	50	62	0.001*
	IMF Screw	50	39	
Do you feel uncomfortable eating in front of people because of problems with your teeth?	Arch Bar	50	64.28	0.001*
	IMF Screw	50	36.72	
Are your teeth or gums sensitive to hot, cold, or sweets?	Arch Bar	50	58.74	0.002*
	IMF Screw	50	42.26	
Are you satisfied with your treatment?	Arch Bar	50	47.93	0.325
	IMF Screw	50	53.07	
Will you recommend this treatment to others?	Arch Bar	50	59.56	0.001*
	IMF Screw	50	41.44	

positioning and insertion torque.

Breakage (Coburn et al., 2002,¹⁵) or loss of screws (Karlis and Glickman, 1997,¹⁶) or the screws being covered by oral mucosa (Gordon et al., 1995¹⁷), infections (Coburn et al., 2002,¹⁵) loss of teeth (Coburn et al., 2002,¹⁵) and anesthesia due to injury to the mental or inferior alveolar nerves (Schneider et al., 2000¹⁸) are other complications.

Jones(1999)¹⁹ stated that IMFS don't permit postoperative directional traction and tension band effect that can be achieved by arch bar, hence they have less use in comminuted or displaced fractures.

IMFS had better QoL, gingival health, less operating time, fewer operator injuries, and complications that can be easily avoided by proper technique and skill.

5. Conclusion

This longitudinal prospective study, evaluated the QoL in patients with fractures of dentate mandible. Patients were treated by closed reduction with IMF fixation via arch bar and wires or by IMF screws and wires for 4 weeks.

1. There was significant difference in QoL between the Group A and B, IMF screws having better QoL.
2. The arch bar placement is time consuming and has oral hygiene problems when compared to that of IMFS.

3. Operator injury is less in IMFS, but chances of dental complications are higher.

IMFS as a method for conservative treatment of mandibular fractures led to higher QoL scores during the initial 4-week period of fracture healing. Patients treated with IMFS screws experienced less social isolation, ease of eating and lower negative impact on social and financial aspects.

6. Source of Funding

None.

7. Conflict of Interest

None.

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Cite this article: Banwarilal RG, Simon D, Kadukkara A. Quality of life in patients with mandible fracture treated with closed reduction using Erich arch bar vs intermaxillary fixation screws. *J Oral Med, Oral Surg, Oral Pathol, Oral Radiol* 2022;8(3):135-138.