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Outcomes of extra oral versus intraoral approach for Mandibular angle fracture reduction

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Abstract

Objective: To compare the outcomes of intraoral versus extraoral approach in the treatment of mandibular angle fracture.

Method: The randomised controlled trail was conducted at the Department of Maxillofacial Surgery, Mayo Hospital, Lahore Pakistan, from September 2016 to March 2017, and comprised patients of mandibular angle fracture who were divided into two equal extraoral group A and intraoral group B. . Baseline and post-operative data on 1st and 7th days as well as 3 months following the surgery was collected. Data was analysed using SPSS 20.

Results: Of the 100 patients, there were 50(50%) in each of the two groups. Mean age of group A was 32.28±7.79 years compared to 33.72±8.13 years in group B. There were 39 (78%) males in group A and 36(72%) in group B. The mean pain score at baseline in the groups was not significantly different (p=0.795). On the 7th day and 3 months post-operation, mean pain score was significantly lower in group A (p=0.002). Nerve complication in group A was significantly high compared to group A (p=0.005).

Conclusion: Extra oral approach for the management of mandibular angle fracture is better with regards to pain while intra-oral approach is less associated with nerve complications.

Key Words: Angle of mandible, Fracture, Intraoral approach, Extraoral approach, Incision.

Introduction

Facial trauma is very common in our part of the world. Among the mandibular fractures, those of the angle of mandible are the most common ones occurring in the developed countries, accounting for 30% of all mandibular fractures.[1,2] It is a frequent occurrence in Pakistan and is associated with high incidence of facial fractures in different combinations.[3,4]

Due to its position and difficulty in surgical approaches, the management of mandibular angle fractures are very challenging compared to the management of other fractures of mandible.[5]

Extraoral approach to mandibular angle is carried out by giving incision in submandibular skin crease which is hidden in this crease and does not produce unsightly appearance. This approach also avoids contamination of the fixation hardware from the oral cavity. The disadvantage of this approach is the risk of damage of the marginal mandibular branch of the facial nerve.[6, 7] On the other hand, the intraoral approach to the angle of mandible[6] is carried out by giving an oral mucosal incision. This approach has the advantages of no external scarring and injury to the marginal mandibular nerve. It also allows direct vision of the desired occlusion during the placement of the hardware.[1,8] The intraoral approach for fixation of fracture of angle of mandible is more commonly used because of the ease and popularity of the approach for applying superior border single-plate fixation technique. This approach provides better access to the angle of mandible.[6]

Maxillofacial surgeons face an ongoing challenge when it comes to the management of mandibular angle fractures. The ideal treatment for these fractures remains controversial, and the reported complication rates, though many involve noncompliant populations, remain unacceptably high. Studies have reported variable results regarding intraoral and extraoral approaches. The current study was planned to compare the two techniques to see which one is superior.

Materials and Methods

This study was carried out in the department of Oral & Maxillofacial surgery, Mayo Hospital Lahore. This was a randomized controlled trail carried out from Sep 2016 to Mar 2017. Sample selection was done with non-probability purposive sampling technique. Sample size calculation was done with the help of software "Sample size determination in health studies" using two proportions formula.[9] Sample size of 100 cases (50 in each group) was calculated with 5% level of significance 95% power of test and taking expected percentage of nerve complications in both groups i.e. 0%[8] in intraoral approach group versus 20%[8] in extra oral approach group in the treatment of mandibular angle fracture. Medically fit patients with age range between 16 to 60 years were included in this study. All these patients were diagnosed cases of fracture of angle of mandible on radiograph, Orthopantomogram (OPG). The dental condition of all these patients was suitable for maxillomandibular fixation (MMF). While those with pathological fractures, edentulous patients, fire arm injury (FAI) and comminuted fracture cases were excluded from this study.

Thorough history was taken and meticulous clinical examination was performed on all patients. Informed consent was taken. Anxiety reduction protocols were followed.[10] For female patients privacy was ensured. Surgery was performed by consultant. Patients were assigned to one procedure or other based on lottery method and divided in Group-A (extra oral) and Group-B (intraoral) approach. Before doing any procedure the baseline pain score was recorded.

In Group B intraoral approach was carried out by giving mucosal incision from first molar to external oblique ridge area. In Group-A, extra oral approach to the mandibular angle was carried out by giving incision in submandibular crease, which was hidden in this crease and not producing unsightly appearance. The incision was given about 2cm below to the body of mandible.

All patients were treated by consultant. Preoperative and post-operative data was collected by the researchers and recorded on a special proforma. Assessment of pain was done with the help of visual analogue scale and pain was treated as quantitative variable. As on visual analogue scale the pain intensity was recorded on a scale of 0-10. House and Brackmann classification was followed for demarcating the nerve injury in patients with extraoral surgical approach. [11]

Patients were seen up on 1st post-operative day, 7th day and 3rd month following surgery. SPSS version 20.0 was used to analyze the data.

Quantitative data like age and decrease in pain score was presented in form of mean $\pm$ SD. Qualitative data like gender and outcomes variables i.e. nerve complication was presented in form of frequency and percentages. Comparison of qualitative data like nerve complication was done with the help of chi square test and to compare decrease in pain in both treatment groups t-test was applied. Repeated measure ANOVS was applied to see the pain score trend in bot treatment groups during follow up time period. p-value of ≤ 0.05 was considered significant.

Results

Of the 100 patients, there were 50(50%) in each of the two groups. Mean age of group A was 32.28±7.79 years compared to 33.72±8.13 years in group B. There were 39 (78%) males in group A and 36(72%) in group B (Table 1).

The mean pain score at baseline and day 1 post-intervention in the groups was not significantly different ($p>0.05$). On the 7th day and 3 months post-operation,

mean pain score was significantly lower in group A (p=0.002) (Figure). Nerve complication in group A was significantly high compared to group A (Table 2).

Discussion

Fracture of mandible is a common entity in facial trauma, accounting for 2/3rd of all facial fractures. Fracture of the angle of mandible accounts for about 25-35% of all mandibular fractures. [12-14] The basic principles of fracture reduction and fixation also apply to that of the mandibular angle region. In these fractures, fixation devices are applied at a certain location to fix a fracture. These lines are known as Champy's lines of tension. In the mandibular angle region, these lines are located at the upper border. [15,16]

Open reduction and internal fixation (ORIF) is considered the ideal treatment for displaced mandibular angle fracture.[17] Different methods of the management of mandibular angle fracture include maxillomandibular fixation, ORIF with one or two non-compression plates by intraoral approach, intraoral lag screw application, extraoral ORIF by reconstruction plate and extraoral or intraoral transosseous wiring. [6,18,19]

Intraoral approach to the angle of mandible has certain advantages like reduced chances of damage to marginal mandibular branch of facial nerve, less scarring and direct vision of the desired occlusion during the placement of the hardware. [20] Disadvantages of intraoral approach are reduced visualisation, access and increased chances of infection.

There are various extraoral approaches for ORIF of the mandibular angle fracture.[21] The advantages of these extraoral approaches are increased visualisation, superior and better access along with reduced chances of contamination by oral pathogens and, hence, less chances of infection. Disadvantages of extraoral approach include increased chances of damage to the marginal mandibular branch of facial nerve and external facial scarring and aesthetic problem. [22]

The current study reported results comparable with earlier findings. [23-25]

One study noted that intraoral approach to the mandibular angle took less operating time compared to the extraoral approach, and that intraoral approach was associated with lesser complications.[20]

Two local studies[26,27] reported higher nerve damage with extraoral approach which is consistent with the findings of the current study. A study done abroad reported similar findings.[28] One recent study reported that marginal nerve damage was higher with extraoral approach compared to intraoral approach but the difference was not statistically significant.[29]

One study compared transbuccal, intraoral and extraoral modalities for the management of mandibular angle fracture, and reported that post-operative pain was mild to moderate in all the groups which was managed with analgesics.[30]

The current study's limitation is that due to the non-existence of a registration authority for RCTs in Pakistan, an RCT trial number could not be arranged.

Conclusion

Extraoral approach for the management of mandibular angle fracture was found to be significantly better in terms of pain reduction, while intraoral approach was better as far as facial nerve damage was concerned.

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Table No. 1: Age, Gender & Nerve complications in Treatment Groups

		Extra-oral Approach n=50	Intra-Oral Approach n=50	p-value*
Age (Years)		32.28±7.79	33.72±8.13	-
Gender	**Male**	39(78%)	36(72%)	-
	Female	11(22%)	14(28%)	

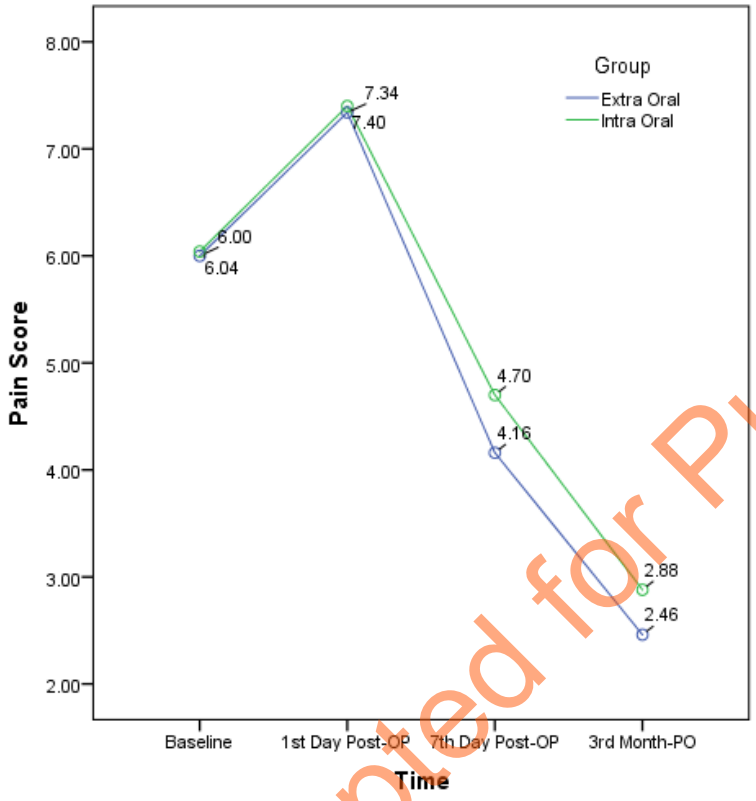
Note: (*): p-value was calculated with Chi- Square Test

Table-2: Pain Assessment in Treatment groups

		Extra-oral Approach n=50	Intra-Oral Approach n=50	p-value**
Pain Assessment with VAS	**Baseline**	6.00±0.75	6.04±0.78	**0.795**
	1st Day	7.34±0.96	7.40±1.08	**0.771**
	7th Day	4.16±0.76	4.70±0.78	**0.001***
	3rd Month	2.46±0.50	2.88±0.77	**0.002***
Nerve complications	**Yes**	8(16%)	0(0%)	**0.005**
	No	42(84%)	50(100%)	

Note: (*): significant: p-value≤0.05
(**): p-value was calculated with independent sample t-test

Figure-1: Pain score in Treatment Groups from Baseline till last follow up



p-value (Pain Score)= <0.001

p-value(Group*Pain Score)=0.022