

# Management of Atrophic Mandibular Fractures in Pakistan – Changing Trends with Preference to Extra-Oral Approach

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## ABSTRACT

**Background:** With the ever-increasing incidence of facial trauma in geriatric population, it is very important to improve the care given to these patients. This study has been focused on determining a better approach for management of atrophic mandibular fractures. **Objective:** To compare the frequency of complications of extra-oral versus intra-oral approach for the management of atrophic mandible fractures. **Study Design:** Randomized control trial. **Settings:** Outdoor patient of department of Oral and Maxillofacial Surgery, Mayo Hospital, Lahore Pakistan. **Duration:** One year, 20th January, 2018 till 20th January, 2019. **Methodology:** Seventy consecutive patients were included in this study from the OPD of Oral and Maxillofacial Surgery. All the patients were randomly assorted in the both groups, group A being the intra-oral approach and group B being the extra-oral approach. The outcome was determined on the basis of presence or absence of mal-union or non-union after the fractures were treated. **Results:** The mean age of cases in extra and intra oral group was 76.54±8.13 years and 73.66± 8.04 years. In extra-oral group, there were 21(60%) male and 14(40%) females and in intra-oral group, there were 25(71/4%) male and 10(28.6%) female cases. In extra –oral group 3(8.6%) cases had complication and in intra-oral group 2(5.7%) cases had complications, the frequency of complication in both groups, p-value >0.05. Among complications in extra-oral group 2(5.7%) cases had non-union and 1(2.9%) had malunion and in intra-oral group 1(2.9%) cases had non-union and malunion each. The frequency of type of complication was statistically same in both group, p-value >0.05. **Conclusion:** The incidence of complications is statistically same in both groups. Hence, we encourage the use of extra-oral approach for management of atrophic fractures of mandible.

**Keywords:** Atrophic mandibular fracture, Mal-union, Non-union.

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## INTRODUCTION

Maxillofacial injuries in older population comprise of 16.8% of all injuries with increasing prevalence over the last few years.<sup>1</sup>

The mandible is fractured more commonly than other bones of facial skeleton, accounts for about 36% to 54% of all maxillofacial trauma.<sup>2</sup> The reason behind this susceptibility is that it lies at a very prominent aspect of the face and with age and atrophy, the prominence of the mandible or pseudo-prognathism increases.<sup>4,5</sup> With atrophy and decrease in bone mass of the mandible, the susceptibility of mandible to fracture increases further.

The selection of correct type of immobilization is essential in management of any fracture as with continued movement, the process of laying down of matrix along which bone is formed is not achieved. With atrophic mandible, the conservative approach towards fracture management like maxillo-mandibular fixation (MMF) is not a viable option due to lack of teeth, and small cross-sectional area of the jaw which cannot allow additional

screws placed for maxilla-mandibular fixation of the jaws. Open reduction with internal fixation leads to better outcome, but chances of non-union/mal-union are present due to decreased tendency of atrophic mandible to heal.<sup>3,6,7,8</sup> There is less chances of hardware exposure with this open reduction and internal fixation as well.<sup>9</sup>

Various approaches are available for exposure of atrophic mandible fractures.<sup>12,13</sup> The major advantage of approaching an atrophic mandible with extraoral approach is the fact that with resorption of alveolus, the position of inferior alveolar neurovascular bundle changes and becomes more superficial.<sup>15</sup> Now the intraoral approach requires an incision to be placed on the crest of the ridge which can increase the incidence of damage to the bundle. In addition to this, excessive periosteal stripping would be required to expose the lower border of mandible to place hardware, which will put the bundle at risk and will increase chances of malunion or non-union due to compromise of blood supply in case of damage. This can be easily avoided

using extra-oral approach and exposing the lower border of mandible.<sup>14,15</sup>

The placement of hardware along the lower border of mandible is essential as these patients are denture wearers. Now the placement of hardware anywhere along the upper border will irritate the mucosa due to constant pressure from dentures and might even require a second surgical procedure for removal of hardware.<sup>16</sup> Another important factor to be considered is that atrophic mandible fractures sometimes require bone grafting and should be fixed with reconstruction plates. This can be easily be managed by extra-oral approach with minimum risk of infection which if not controlled can lead to mal union or non-union of fractured segments.<sup>17</sup>

In Pakistan, there is no published data available on management of atrophic mandibular fractures in local population, but the popular approach among many surgeons is intra oral with the use of mini-plates. One of the main reasons is that intra-oral approach is considered rather straight forward, less time consuming, cheaper than placing reconstruction plates, no scar formation and usually preferred by the patients as well. But the disadvantages include possible inferior alveolar nerve paresthesia, excessive periosteal stripping to achieve hardware placement on lower border and increased chances of infection in case of graft placement.<sup>15,16,17</sup> In this article, we are discussing the results of a study conducted with atrophic mandible, comparing extra-oral and intra-oral approaches and evaluating the incidence of mal union and non-union in our patients.

## METHODOLOGY

**Study Design:** Randomized control trial.

**Settings:** Outdoor patient of department of Oral and Maxillofacial Surgery, Mayo Hospital, Lahore Pakistan.

**Duration:** One year, 20th January, 2018 till 20th January, 2019.

**Sample Technique:** Non probability consecutive sampling.

**Sample Size:** A total of seventy patients were included in this study and were randomly assorted in the both groups, group A being the intra-oral approach and group B being the extra-oral approach.

**Inclusion Criteria:** Patients of age 60 to 90 years, all patients (male and female) with fractured, atrophic mandible (mandibular height less than 20mm) as defined in operational definitions and patients who are medically fit to be operated under General Anesthesia i.e., ASA I and II.

**Exclusion Criteria:** Any bone pathology that led to the fracture of the mandible (pathological fracture).

**Data Collection Procedure:** Mayo hospital is the largest hospital in Pakistan where patients with maxillofacial injuries are referred from all over the country to get specialized care.

The diagnosis of atrophic mandible was made on orthopantomogram and was classified according to Luhr classification.

A submandibular approach was used to get exposure to the para-symphysis region, body of the mandible, and angle region. A retromandibular approach was used for condylar, sub-condylar and ramus fractures, and for bilateral fractures of the mandible, an apron incision was carried out for exposure whole of the lower border. The fractures in both groups were managed with 2.3mm titanium plating systems (load bearing). The outcome was determined on the basis of presence or absence of mal-union or non-union after the fractures were treated.

## RESULTS

The mean age of cases in intra and extra oral group was 76.54±8.13 years and 73.66± 8.04 years. Table 1

**Table 1: Descriptive statistics of age (years) in both groups**

		Mean	S.D	Minimum	Maximum
Age (years)	Intra-oral (n=35)	76.54	8.13	60.00	90.00
	Extra-oral (n=35)	73.66	8.04	60.00	88.00
	Total (n=70)	75.10	8.15	60.00	90.00

In intra -oral group 3(8.6%) cases had complication and in extra-oral group 2(5.7%) cases had complications, the frequency of complication in both groups, p-value >0.05. Among complications in intra-oral group 2(5.7%) cases had non-union and 1(2.9%) had mal-union and in extra-oral group 1(2.9%) cases had non-union and mal-union each. The frequency of type of complication was statistically same in both group, p-value >0.05. Table 2,3

**Table 2: Frequency distribution of gender in both groups**

		Study groups		Total
		Intra-oral	Extra-oral	
Gender	Male	21(60.0%)	25(71.4%)	46(65.7%)
	Female	14(40.0%)	10(28.6%)	24(34.3%)
Total		35(100.0%)	35(100.0%)	70(100.0%)

**Table 3: Frequency distribution of complication in both groups**

		Study groups		Total
		Intra-oral	Extra-oral	
Complications	Yes	3(8.6%)	2(5.7%)	5(7.1%)
	No	32(91.4%)	33(94.3%)	65(92.9%)
Total		35 (100.0%)	35 (100.0%)	70 (100.0%)

Chi-square = 0.215, p-value = 0.643

When data was stratified for age and gender, the frequency of complication and types of complication was statistically same in both study groups,  $p$ -value  $>0.05$ . i.e., In 60-75 years, old cases, 1(5.6%) case in intra-oral group and 1(5.3%) case in extra-oral group had complications while in 76-90 years old cases there were 2(11.8%) cases in intra oral and 1(6.2%) in extra oral group had complications. Among male cases, 2(9.5%) cases in intra-oral group and 1(4%) case in extra-oral group had complications while in female cases there were 1(7.1%) case in intra oral and 1(10%) in extra oral group had complications. None of the patients were lost to follow up.

**Table 4: Frequency distribution of types of complication in both groups**

		Study groups		Total
		Intra-oral	Extra-oral	
Complications	No complications	32(91.4%)	33(94.3%)	65(92.9%)
	Non-union	2(5.7%)	1(2.9%)	3(4.3%)
	Malunion	1(2.9%)	1(2.9%)	2(2.9%)
Total		35 (100.0%)	35 (100.0%)	70 (100.0%)

Chi-square = 0.349,  $p$ -value = 0.840

**Table 5: Frequency distribution of complication in both groups with respect to age groups**

Age groups (years)	Complication	Study groups		P-value
		Intra-oral	Extra-oral	
60-75	Yes	1(5.6%)	1(5.3%)	0.969
	No	17(94.4%)	18(94.7%)	
76-90	Yes	2(11.8%)	1(6.2%)	0.582
	No	15(88.2%)	15(93.8%)	

**Table 6: Frequency distribution of types of complication in both groups with respect to age groups**

Age (years)	Complication	Study groups		P-value
		intra-oral	Extra-oral	
60-75	No complication	17(94.4%)	18(94.7%)	0.969
	Malunion	1(5.6%)	1(5.3%)	
	Non-union	0(0%)	0(0%)	
76-90	No complication	15(88.2%)	15(93.8%)	0.582
	Malunion	0(0%)	0(0%)	
	Non-union	2(11.8%)	1(6.2%)	

## DISCUSSION

Over the period of many decades, the management approaches to the treatment of atrophic mandibular

fractures have changed drastically with better understanding of the anatomy and physiology of the aging mandibular bone.<sup>9</sup> One of the main reasons why the trend of treating these fractures conservatively has changed drastically over the last 40 years to more aggressive options is that the geriatric population has increased in population and they now have more participation and active role in the society.<sup>14</sup>

The early approaches were conservative where the clinicians avoided exposing the pencil thin mandible to preserve its blood supply that is coming from the periosteum of the mandible. But with time and development of better techniques, it is now the approach of choice to manage the aged mandible fractures with open technique. A long debate with justifications were carried out on the choice of approach to the mandible. Advocates of intra-oral approach wanted to avoid the possible damage to the facial nerve branches and avoid facial scar. That damage can be easily avoided with meticulous surgical technique. However, this study advocates that management of atrophic mandibular fractures should be done through an extra-oral approach instead of the more traditional intra-oral approach through the mucosa as the former has less chances of complications like mal-union and non-union due to better exposure of lower border of mandible with the need to put the inferior alveolar neurovascular bundle at risk and without the excessive periosteal stripping which can lead to non-union of fractured segments.<sup>14,15</sup>

One of the major problems was that geriatric patients have more medically compromised conditions which make it extremely difficult to treat them under general anesthesia. Even sometimes, it is even difficult to manage these patients under local anesthesia due to low tolerance of procedure and other cardiac and respiratory conditions. But with this increased geriatric population, the improvement in medical management of these patients especially under general anesthesia and with development of better and advanced hardware, it is imperative that the fractures in an atrophic mandible should be dealt with care in order to provide maximum function and stability to the patients' condition.<sup>5</sup> In order to achieve that, we need consensus regarding definitive management of these fractures for better physiological condition of the mandible. The management would lead to better function of the mandible and improved nutrition of the patient with early use of dentures.<sup>6,8</sup>

Ellis in his study showed that open reduction is always better in managing these fractures and that too with extra-oral approach. With minimal periosteal stripping and preservation of blood supply, better healing can be achieved with low risk of infection.<sup>7</sup> In our study, the complication of non-union was determined by digital manipulation of the fracture site after six weeks of healing of the fracture. If the mobility at the fracture site was more than 5mm, then the non-union was considered positive.

Similarly, after the mentioned time, a panoramic radiograph was performed and the continuity of mandible was seen. If there was a step defect seen at the lower border of the mandible, then this was considered mal-union of the fractured site. Both mal-union and non-union requires a second surgical procedure with bone graft in almost all the cases to prevent a continuity defect. Data was collected and analyzed. In intra-oral group 3(8.6%) cases had complication and in extra-oral group 2(5.7%) cases had complications, the frequency of complication in both groups, p-value >0.05. Among complications in intra-oral group 2(5.7%) cases had non-union and 1(2.9%) had mal-union and in extra-oral group 1(2.9%) cases had non-union and mal-union each. The frequency of type of complication was statistically same in both group, p-value >0.05.

### CONCLUSION

The conclusion of this study is that by comparing extra-oral and intra-oral approaches, we have determined that the incidence of complications is statistically same in both groups.

### LIMITATIONS

Small sample size is the only limitation of the study.

### SUGGESTIONS / RECOMMENDATIONS

We encourage the use of extra-oral approach whenever atrophic mandible fractures are encountered because this gives same results as given by intra-oral technique with minimum risk of damage to the neurovascular bundle, with minimal periosteal stripping, and ideal placement of hardware along lower border of mandible, all factors significant to adequate healing.

### CONFLICT OF INTEREST / DISCLOSURE

There was no conflict of interest.

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