

## A Comparative Study between Extra Oral and Transoral Approaches for Mandibular Fracture

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### Abstract

**Introduction:** Mandibular fractures are known to represent 70 percent of all maxillofacial fractures and out of these, 26- 35 percent are mandibular angle fractures. Most of the confusion and debate exists about the right approach for fractures of the mandibular angle. There are certain prerequisites for choosing approach: Type of fracture, amount of displacement of fractured segments, number of fractured segments, ease of accessibility and visibility, perfect anatomic reduction of the segments, perpendicular application of drilling device for fixation and approach related complications.

**Aim:** To evaluate ease of accessibility, time taken for the procedure, ease of anatomic reduction and complications among mandibular fracture patients with extra oral and transoral approached used.

**Method:** In this retrospective cohort study, a total of 63 patients were included. Out of which 36 patients underwent transoral approach and 27 patients underwent extraoral approach for management of mandibular angle fractures.

**Results:** Out of the total patients studied 61.9% had isolated mandibular angle fractures and rest of the patients had other associated facial bone fractures. Intermaxillary fixation was required in only 9.5% of the patients, as manual occlusion was difficult. Out of all the patients, a scar was seen only in patients operated by extraoral approach.

**Conclusion:** Transoral approach was found to be much better for there is no risk of damage to the facial nerve and no visible external scar.

**Keywords:** Mandibular fracture, extra oral, transoral approach, facial bone fracture

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### Introduction

Mandibular fractures are known to represent 70 percent of all maxillofacial fractures and out of these, 26- 35 percent are mandibular angle fractures. [1,2] Haug et al. gave the ratio of incidence of mandibular, zygomatic, maxillary fractures was 6:2:1 respectively. [3] There are

several reasons proposed for the increased occurrence of mandibular angle fracture: The abrupt change in the anatomy at mandibular angle region which is 20° in the vertical plane and 90° in the horizontal plane at the upper border, the presence of impacted mandibular third molars, less

cross-sectional area due to the large amount of space occupied by the crypt of mandibular third molars and biomechanical consideration of angle as a lever area of mandible. [4,5] The suprahyoid group of muscles (mylohyoid, geniohyoid, anterior belly of digastric) which are attached to mandible anterior to the angle region exerts a pull inferiorly with the angle acting as a lever area and at the same time muscles of mastication (pterygomassetric sling, temporalis) exert a pull superiorly thereby causing more often but not always displacement of the fractured segments at the angle region. [4] Hence, there is a need for open reduction and internal fixation (ORIF) of mandibular angle fractures.

Most of the confusion and debate exists about the right approach for fractures of the mandibular angle. There are certain prerequisites for choosing approach: Type of fracture, amount of displacement of fractured segments, number of fractured segments, ease of accessibility and visibility, perfect anatomic reduction of the segments, perpendicular application of drilling device for fixation and approach related complications. [3,5,6] Hence a cohort study was performed in patients with mandibular angle fractures between transoral and extraoral (submandibular) approach for management of mandibular angle fractures to evaluate ease of accessibility, time taken for the procedure, ease of anatomic reduction and complications.

### **Methodology:**

In this retrospective cohort study, a total of 63 patients who reported to our hospital from January 2018 to August 2022 were assessed. Out of which 36 patients underwent transoral approach and 27 patients underwent extraoral approach for management of mandibular angle fractures.

Inclusion criteria: Patients over the age of 18 years of either sex with either unilateral or bilateral mandibular angle fractures even

if associated with other facial fractures were included in the study.

Exclusion criteria: Edentulous patients, immune-compromised patients, and patients in whom surgery was delayed for more than 10 days were excluded from the study.

Pre-operatively, a detailed case report was prepared of all patients having undergone a CT face with 3-D reconstruction and other necessary haematological investigations. After appropriate fitness, they were taken up for surgery.

### **Surgical Techniques**

1. Extraoral approach: Risdon submandibular incision was placed, and the underlying tissue was separated while taking care to preserve the marginal mandibular nerve. The bone with the fracture segment was then completely exposed after elevating the periosteum. The fractured fragments were then aligned, and the mouth is maintained in full occlusion, after which fixation with two plates 2.5 mm mini plate along the inferior border and a 2 mm miniplate along the mid mandible was done. After the fixation, the intermaxillary fixation was released and occlusion was checked. Finally, the incision was closed in layers with absorbable sutures for the muscle and subcutaneous tissue and nonabsorbable sutures for the skin.

2. Transoral approach: A retromolar incision was placed extending to the first molar or premolar. Then dissection of the underlying tissue and periosteal stripping of muscles was done to expose the fracture segment adequately. Then fracture reduction was done and the mouth was maintained in occlusion either manually or with the help of intermaxillary fixation. After attaining proper occlusion fracture segment was fixed with 5 holes with a gap 2mm plate system and 8/10mm screws while taking care to mold the plate as per the body or ramus of the mandible. The plate was placed along Champy's line of

osteosynthesis. After fixation, intermaxillary fixation was released and occlusion was checked. Finally, the incision was closed in layers with absorbable sutures. Postoperatively, if there is no intermaxillary fixation, the patient can be asked to do mouth opening exercises and occlusive exercises which helps in early adaptation and reduces the chances of trismus. Oral intake of clear liquids was started from day 1 and the patients were discharged after 4 days and advised for a weekly follow-up.

Statistical Analysis was done using SPSS software version 23.0.

### Results:

Sixty three patients were studied out of which 80.89% were males and rest were females. The age group ranged from 18-60 years with a mean age of  $33.8 \pm 4.29$ . Out of the total patients studied 61.9% had isolated mandibular angle fractures and rest of the patients had other associated facial bone fractures. The clinical profile of the patients is shown in Table 1

Intermaxillary fixation was required in only 9.5% of the patients, as manual occlusion was difficult. In the rest of the patients, occlusion was attained by manual reduction during the surgery. All patients had preserved pre-operative facial nerve function and none had any pre-operative infection. The mean duration of surgery was  $85 \pm 10.1$  mins.

Postoperative complications such as scarring, malocclusion, and infection were evaluated at each regular follow-up. Three patients in the extraoral group developed postoperative surgical site infection which was managed conservatively with antibiotics and dressing. Evaluation of scarring was done with periodic photographs in the postoperative follow-up using the Vancouver scar scale.

Out of all the patients, a scar was seen only in patients operated by extraoral approach. Comparative analysis of clinico demographic parameters is shown in Table 1.

**Table 1: Clinico-demographic profiles of patients among extraoral and transoral group.**

Parameter	EXTRAORAL (n=, 42.9%)	TRANSORAL (n=, 57.1%)	P value
Age average	35.7	32	0.01
Sex: Males	21	30	0.04
Females	6	6	0.07
Type of fracture: Isolated	12	27	0.02
Type of fracture: Associated	15	9	0.05
AVERAGE SURGICAL TIME (Minutes)	90	80	0.03
VAS post op	5.5/10	4.9/10	0.07
Infection	3	0	0.02
scarring	8	No visible scar	
Mouth opening	33.3 mm	35 mm	0.03
Facial nerve palsy	0	0	-

Postoperative pain was measured using the visual analogue scale.

The marginal mandibular branch of the facial nerve was assessed for paresthesia and nerve injury during the immediate and

late postoperative period. In the pre-operative period, the patients experienced a higher degree of pain and the extent of mouth opening was also less, due to the displaced bone fragments following the trauma.

**Table 2: Clinical profile of patients**

Parameter	Frequency , N =63	Percentage
Diabetes	7	11.1
Hypertension	10	15.8
Preserved pre-operative facial nerve function	63	100
Pre op infection	0	0
Intra operative intermaxillary fixation	6	9.5
Post op infection	3	4.7
Preserved postoperative facial nerve function	63	100

There was a greater degree of reduction in the pain and increase in the mouth opening after the displaced fragments were aligned postoperatively.

### Discussion:

Mandibular angle fractures are one of the most common types of fractures encountered in the maxillofacial region. Treatment philosophies range from simple maxillomandibular immobilization to rigid internal fixation of bone fragments. [6] Fracture can occur either anterior or posterior to mandibular third molar but rarely involving it. The basic need of rigid internal fixation is primary bone healing under conditions of absolute stability. Rigid internal fixation must neutralize all forces (tension, compression, torsion, shearing) developed during functional loading of the mandible to allow for immediate function. [7] Hamill *et al.* advocated that successful fixation method depends upon the choice of approach. [8] Extra oral approach was once the most standard traditional and popular approach for management of mandibular angle fractures when compared to transoral approach which was first given by Kazanjian in 1933. Due to the increasing aesthetic demands of the patient and avoidance of extraoral scar, transoral approach has overcome the extraoral approach for the management of mandibular angle fractures.

Toma *et al* [9] performed a study in which it was reported that there was no statistically significant difference in the complication rates between the transoral

and extraoral approaches although the transoral is a difficult approach for the fixation of mandibular angle fractures. The surgical time is defined as the time taken from incision and exposure of the fractured site to closure and it was

noted that the transoral approach had a shorter surgical time (mean= 80 minutes) as compared to the extraoral approach (mean = 90 minutes). Toma *et al* [9] stated that postoperative infection could be attributed to the increased operation time in a contaminated field with greater manipulation of tissues which was also seen in our study where three patients in the extraoral group developed postoperative surgical site infection. [10]

### Conclusion:

The results of our study found the transoral approach to be much better for there is no risk of damage to the facial nerve and no visible external scar. It has shorter surgical duration, lesser number of postoperative complications, and minimal morbidity.

### References:

1. Kuriakose MA, Fardy M, Sirikumara M, Patton DW, Sugar AW. A comparative review of 266 mandibular fractures with internal fixation using rigid (AO/ASIF) plates or mini-plates. *Br J Oral Maxillofac Surg* 1996; 34: 31-5-21.
2. Rix L, Stevenson AR, Punnia-Moorthy A. An analysis of 80 cases of mandibular fractures treated with

- miniplate osteosynthesis. *Int J Oral Maxillofac Surg* 1991;20:337-41.
3. Haug RH, Prather J, Indresano AT. An epidemiologic survey of facial fractures and concomitant injuries. *J Oral Maxillofac Surg* 1990;48:926-32.
  4. Fonseca RJ, Walter RV. *Oral and Maxillofacial Trauma*. 2nd ed., Vol. 1. Pennsylvania: W.B. Saunders Company; 1997. p. 474-8.
  5. Leonard PF. *Fractures: A History and Iconography of their Treatment*. No. 3. Novata CA Norman Publishing; 1990.
  6. Ellis E 3rd. Treatment methods for fractures of the mandibular angle. *Int J Oral Maxillofac Surg* 1999;28:243-52.
  7. Tams J, van Loon JP, Rozema FR, Otten E, Bos RR. A three-dimensional study of loads across the fracture for different fracture sites of the mandible. *Br J Oral Maxillofac Surg* 1996; 34: 400-5.
  8. Hamill JP, Owsley JQ Jr, Kauffman RR, Blackfield HM. The treatment of fractures of the mandible. *Calif Med* 1964;101:184-7.
  9. Toma VS, Mathog RH, Toma RS, Meleca RJ. Transoral versus extra-oral reduction of mandibular fractures: A comparison of complication rates and other factors. *Otolaryngol Head Neck Surg*. 2003;128(2):215-19.
  10. Atbib Y., Essad, A., Zhar H., Tadlaoui Yasmina, AI EL CADI, M., & Bousliman Y. Impact de l'immunothérapie dans la prise en charge du cancer du poumon. Etude rétrospective menée à l'Hôpital Militaire d'Instruction Mohammed V-Rabat. *Journal of Medical Research and Health Sciences*, 2022;5(9):2221–2243.