

A Study on Endoscopic Assisted Reduction And Fixation of Fracture Angle of Mandible

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Abstract :

Objective:The key objective of this article is to evaluate the intraoperative and postoperative results(both aesthetic and functional) of endoscopic assisted reduction and rigid fixation of fractures of angle of the mandible.

Materials and methods:We analysed all cases in which endoscopic techniques were used to assist with the reduction and repair of fractures of angle mandible during the period 1-6-13 to 1-6-15, in our hospital JLN medical college Ajmer(31 cases, Age Group: 19-65). Endoscopic exploration via transoral approach. A secondary port was made transbuccal few cm above the angle of mandible . Plates(2mm minidynamic compression plates) were introduced transorally, while screws(2*10mm) were placed through a transbuccal trochar Success was judged by the successful reduction of the fracture and application of a rigid fixation plate by means of the limited, endoscopically assisted approach, a measure of the ability to accomplish the procedure and by the evaluation of functional results(bite and occlusion, mouth opening ,post operative x-rays) after 12 weeks postoperatively.

Results and conclusion:Rigid plate fixation was completed endoscopically for 31 angle mandible fractures without any neurovascular complications and with only minimal scarring. 30 of the 31 fractures plated endoscopically resulted in normal occlusion, mouth opening and function. In one of the cases, a persistent malocclusion necessitated reexploration and refixation, resulting in a successful functional outcome with normal occlusion

The endoscopically assisted approach for the repair of fractures of the angle of mandible is a feasible but challenging technique which offer good intraoperative and postoperative results(both aesthetic and functional)

Keywords: Closed reduction, ORIF, Endoscopic assisted, Mandible angle fractures Maxillomandibular fixation

I. Introduction

Mandibular angle fractures represent the largest percentage of mandibular fractures of all mandibular fractures. The frequent involvement of the angle in mandibular fractures can in part be attributed to its thin cross-sectional bone area and second is the presence of third molars, particularly those that are impacted, which weakens the region.¹⁻³ Other variables, such as bone density and mass, severity, direction, and point of impact, also influence the site of fracture.⁴ The bone in the mandibular angle area is thin inferiorly, and the fracture is generally posterior to the dentition, preventing adequate stabilization by maxillomandibular fixation (MMF). Unstable rotation or distraction of the proximal and distal fracture segments often occurs as a result of the opposing muscular forces of the elevator group of muscles (ie, masseter, medial and lateral pterygoids, and temporalis muscles) and the depressor group of muscles (ie, geniohyoid, genioglossus, mylohyoid, and digastric muscles). Furthermore, the presence of a third molar may inhibit or impair reduction, decrease bony contact, alter the vascularity of the fracture site, or be a source of pathogenic organisms.⁵ Mandibular angle fractures poses a unique challenge for surgeons because they have the highest reported postoperative complication rate of any mandibular area.

The way in which mandibular fractures are treated and repaired has undergone a gradual evolution. Over the years, many techniques for the repair of mandibular fractures have been introduced. Multiple surgical options are available for the reduction and fixation of these fractures. Today, rigid internal fixation using compression and noncompression plating systems has gained widespread popularity. Advantages of rigid internal fixation include avoidance of Maxillomandibular fixation, early functioning of the mandible, increased patient satisfaction, shorter periods of hospitalization, and earlier return to the workplace, among others.⁵This study evaluates the intraoperative and postoperative results (both aesthetic and functional) of endoscopic assisted reduction and rigid fixation of fractures of angle of the mandible.

II. Materials And Methods

We analysed only mandibular angle fractures treated with two 2-0 noncompression monocortical miniplate fixation were included in the study. Comminuted or infected fractures were not treated with miniplates cases in which endoscopic techniques were used to assist with the reduction and repair of fractures of angle mandible during the period 1-6-13 to 1-6-15, in our hospital JLN medical college Ajmer (31 cases, Age Group: 08-65). Patient Evaluation: A thorough history and physical examination were the first and most important steps in developing an appropriate diagnosis and treatment plan. Determining the mechanism of injury was essential. This often revealed the actual causative force and lead us to evaluate for the possibility of associated life-threatening injuries, such as cervical spine and neurosurgical injuries and airway impairment. These were ruled out or addressed prior to proceeding with any treatment of mandibular fracture. Initial management was always begun with Advanced Training Life Support protocol⁶. Then complete head and neck examination was done. Attention was towards inspection of occlusal relationships; evaluating for the presence of anterior or posterior open bites and assessing for mobility and/or tenderness anywhere along the length of the mandible. We assessed and documented the presence of teeth, as well as mental nerve paresthesias, and the presence of trismus. Examination also included palpation of the mandible for obvious step-off deformities and alignment deviations from the midline. Facial asymmetry and cranial motor and sensory nerve function were also be evaluated, in addition to temporomandibular joint function.

Radiological Evaluation: Along with a thorough history and physical examination, proper radiological assessment is paramount in establishing a diagnosis and developing an appropriate treatment plan for any mandibular fracture. X-ray mandible AP and lateral views and a 3 dimensional CT reconstruction of faciomaxillary bones were obtained and documented in every case. All of our patients were treated with antibiotics and 0.1% chlorhexidine rinses from the time of presentation to approximately 7 to 10 days after surgery. In all patients, Angle fracture and degree of displacement were assessed by orthopantomography and mandibular postero-anterior radiography before surgery. We identified the highest point of the glenoid fossa on the side of fracture in panoramic radiography which was named Gln. Then we drew tangents of the lower border and the distal border (ascending ramus) of the mandible. The angle formed by these two lines was named external gonial angle. Then we drew the line of intersection of external gonial angle, and the point produced by reaching this line to the mandibular angle region is Go. The distance between Gln and Go (posterior ramal height) was measured to compare by follow up panoramic. Surgical method: All the cases were done under general anaesthesia by the same team of surgeons. An Endoscopic exploration via transoral approach was done. A secondary port was made, transbuccal few cm above the the angle of mandible. Titanium plates (2mm minidynamic compression plates) were introduced transorally, while screws (2*10mm) were placed through a transbuccal trochar and fixation of plates were done by means of the limited, endoscopically assisted approach.

After operation, patients were placed on physiotherapy exercises after 1 week. All patients were followed up 1, 2, 4, 6 and 12 weeks postoperation. At the follow up sessions we assessed occlusal relationships; evaluating for the presence of anterior or posterior open bites, mandibular deviation on opening and complications of surgery (facial nerve weakness, and presence of infection). In order to assess the mandibular deviation we measured deviation of the mandible from midline during opening. At the last follow up session (end of 12 weeks) we assessed patients' satisfaction and posterior ramal height (Gln-Go distance). To address the patients' satisfaction, the patients were asked to give a subjective opinion of treatment. In order to measure the postoperation Gln-Go indicator, we used the final panoramic X-ray performed at the 12th week of follow up. The statistical evaluation of the findings was performed with the help of the SPSS (Statistical Package for Social Sciences) software.

III. Results

A total of 31 patients with angle fracture were included and treated by endoscopic-assisted open reduction transbuccal approach. The mean age was 27.32 ± 12.19 (min = 8, max = 65) years with 27 males (87.10 %) and 4 females (12.90 %). At the first follow up session (end of 1 week), there was 2 instance of disturbed occlusion (6.45 %) which was minor and addressed by continuing elastic therapy after first week and at the end of 12 weeks we found acceptable occlusion in that patient and were tolerated by those patients easily.

Table 1- Age group

AGE GROUP (IN YEARS)	NUMBER OF PATIENTS	PERCENTAGE
0-10 YEARS	1	3%
10-20 YEARS	8	26%
20-30 YEARS	14	45%
30-50 YEARS	7	23%
>50 YEARS	1	3%

Table 2-Summary of the study samples in the endoscopic group and acquired results at the end of 12 weeks

Patient number,	Sex/age	Disturbed occlusion	MAO (mm)	Mandibular deviation (mm)	Gln-Go (preop) (mm)	Gln-Go (at the 12th week) (mm)	Gln-Go changes from preop to postop (mm)
11	M/8	-	40	0	45	55	10
2	M/13	-	42	0	59	61	2
3	F/14	+	43	0	53	59	6
4	M/18	-	46	2	49	61	12
5	M/20	-	45	0	61	69	8
6	M/19	-	40	0	75	77	2
7	M/15	-	38	0	69	79	10
8	M/18	-	45	0	58	61	3
9	M/14	-	46	0	67	69	2
10	M/21	-	44	0	64	72	8
11	M/23	-	36	0	79	80	1
12	M/25	-	45	0	62	66	4
13	M/27	-	39	1	54	59	5
14	F/29	-	42	0	64	72	8
15	M/30	-	53	0	58	65	7
16	M/27	-	38	0	51	58	7
17	M/24	-	38	0	60	65	5
18	M/22	-	41	0	53	59	6
19	M/23	-	39	0	42	52	10
20	M/25	-	40	6	61	62	1
21	M/26	+	37	4	69	70	1
22	M/27	-	40	0	64	72	8
23	M/29	-	41	0	54	54	0
24	M/45	-	41	0	50	53	3
25	F/50	-	33	2	58	58	0
26	M/47	-	39	0	51	55	4
27	M/35	-	42	0	45	46	1
28	M/33	+	27	0	51	55	4
29	M/36	-	41	3	59	60	1
30	M/39	-	39	0	68	68	0
31	F/65	-	40	0	58	59	1

Table 3- Number of patients Gln-Go changes from preop to postop (mm)

Mouth Opening (In Mm)	Number Of Patients Pre Op	Number Of Patients Post Op At 12 Wk
40-45 Mm	3	0
45-50 Mm	2	1
50-55 Mm	7	6
55-60 Mm	7	7
60-65 Mm	6	6
65-70mm	4	5
>70mm	2	8

The means of Mandibular Anterior Opening (MAO) were 40.64 ± 4.48 mm, at the end of 12th week postoperatively. The means of mandibular deviation were 0.58 ± 1.40 mm, at the end of 12th week

postoperatively. Other functions of TMJ were not impaired in any patient. The mean Gln–Go changes showed 4.52 ± 3.52 (min = 1, max = 12) mm increase. As a subjective evaluation, patients complained of pain and edema on condylar surgical area especially during 1st and 2nd weeks. There were no instances of infection in the surgery site. The average time taken for the procedure was 70 minutes. There weren't any intraoperative neurovascular complications and the average blood loss during the procedure was 145ml. In Postoperative Occlusal relationships: 30 of the 31 fractures plated endoscopically resulted in normal occlusion. In one of the cases, a persistent malocclusion necessitated reexploration and refixation, resulting in a successful functional outcome with normal occlusion

IV. Discussion And Concusions:

Angle fractures pose a unique clinical challenge for reconstructive surgeons.^{7,8} Unfortunately, few prospective randomized studies of operative technique on angle fractures have been performed. As a result, no general consensus on the optimal treatment of mandibular angle fractures has been agreed. Current treatment protocols for angle fractures involve rigid fixation in conjunction with intraoperative maxillomandibular fixation (MMF). This produces absolute stability leading to primary bone union and permits immediate limited postoperative physiological function. Although traditional approaches to the angle fractures are reliable, the presence of visible scars, technical problems and complications such as facial nerve palsy have led to the relatively recent development of endoscopic approaches to these injuries. Although endoscopic approaches have steep learning curves and are time consuming, the surgeon could overcome these problems by improved training and experience. Ducic¹⁰ has presented mean operating time of 32 versus our 70 min.

Mandibular angle fractures continue to present challenges to reconstructive surgeons. A thorough history, with investigation into the mechanism of trauma, along with a complete physical examination and proper radiographic assessment are the keys to the development of a satisfactory treatment plan for comprehensive management of these fractures. There remains an ongoing evolution in the management of mandibular angle fractures. The use of a single miniplate on the superior border of the mandible for noncomminuted angle fractures and an extraoral approach with larger reconstruction plates for comminuted fractures are the current preferred methods of treatment. The ultimate goal when addressing any mandibular fracture is safe and successful establishment of the patient's preinjury occlusion and function. In Endoscopic-assisted reduction and internal fixation scar is very minor, no facial nerve damage is expected and a functional occlusion is ensured with anatomic reduction. An excellent visibility is achieved through the endoscope. This method is also swifter in comparison to other extraoral techniques.¹¹ According to literature, it is said that by using the endoscope, a variety of methods are possible, although an intraoral approach is most commonly used by the surgeons utilizing an endoscope.^{12,13}

Kokmueller et al.¹¹ in 2012 carried out a study to assimilate the endoscope-assisted transoral treatment and closed reduction of subcondylar fractures. Both closed reduction and the endoscopic surgery had acceptable results. Patients undergoing surgery had more complaints in the short run, but they were presented with fewer symptoms in long term follow ups. Overall it is safe to declare that endoscopic surgery is certainly a good replacement for approaches through the skin, for angle fractures. Avoiding the complications related to the traditional open technique, have deemed the endoscopic method a favorite among surgeons. With enhanced experience of the surgeons toward the endoscopic technique the controversies over theright treatment choice would slowly subside.

Bibilography

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