

Original Article

Trapezoidal Condylar Plate: Report Of 15 Cases In The Management Of Mandibular Subcondylar Fracture

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Background: The study aims to show the efficacy of trapezoidal condylar plate (TCP) in the management of subcondylar fracture of mandible.

Methods: The study involves a retrospective study comprising of 15 patients treated at Faculty of Dental Sciences, KGMU, Lucknow from May 2012 to April 2013. Data was collected from pertinent in patient records and radiographs. The operated patients met the criteria of open reduction and internal fixation. None of the patients were lost during 6 months follow up period. All patients were checked for occlusion, pain on opening and lateral excursive movements during their follow up visits.

Results: The patients sample ranged in age from 21years to 54 years with a mean of 35.06 years. In total 15 patients with 17 subcondylar fractures were treated by open reduction and internal fixation with trapezoidal condylar plate. 13 patients reported normal occlusion and 2 patients showed slight disturbance in occlusion. 2 patients showed slight pain on opening and lateral excursive movements which subsided by 3rd postoperative weeks. None showed any complications like facial nerve paresis.

Conclusion: The study shows that trapezoidal condylar plate is better biomechanically and anatomically in subcondylar fractures of the mandible. It is better adapted with lower complication rates.

Keywords: Trapezoidal condylar plate , Subcondyle, Trauma.

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Introduction

The incidence of condylar fractures among the various mandibular fractures ranges from 17.5% to 52%.^{1,2} But condylar fractures very rarely occur singly and is usually associated with fractures of mandibular, parasymphysis, body, angle and even the contralateral condyle. It has been the test of time that management of

condylar fractures has always been controversial. Some of the proponents of closed reduction (Bornemann, 1956; Steinhardt, 1966; MacLennan and Glas, 1969) and those of open reduction and internal fixation were (Haug and Assael, 2001; Brandt and Haug, 2003; Ellis and Throckmorton, 2005; Meyer, 2006; Eckelt

et al., 2006; Ishihama et al., 2007). But a comprehensive description about the absolute and relative indication for open reduction was suggested for the first time by Zide and Kent. But in recent years, Eckelt and Schneider proposed indications based on degree of displacement of fractured segments and amount of overlap.³ Open reduction and internal fixation for management of condylar fracture introduced a wide array of plating systems like DCP, Anchor lag screw, miniplates, 3 D rectangular plates.

The aim of our present study is to study the efficacy of trapezoidal condylar plate, which is biomechanically and functionally better for the management of condylar fractures.

Materials and Methods

A retrospective clinical analysis was carried out in the Department of Oral and Maxillofacial Surgery, Faculty of Dental Sciences, King George's Medical University, Lucknow from May 2012 to April 2013. The study comprises of 15 patients with condylar fractures. None of the patients were lost in the follow up. The condylar fractures met the criteria for open reduction and internal fixation as suggested by Eckelt and Schneider³ i.e. the angulation between segments ranged from 15⁰-45⁰ or overlap of segments

greater than 2mm after evaluation of the CT scans of all the patients. Pre operative PA view of the mandible was done to evaluate the the fractured segments (Figure 1). All the patients were informed about the procedure and written consent were taken for the same. All patients were operated under general anesthesia and submandibular incision was used for low subcondylar fracture and occasionally combined with post ramal incision (Hind's incision). After reduction of the fracture, trapezoidal condylar plate (Synthes, Paoli,PA) is adapted over the lateral surface of condylar segment (Figure 2). The posterior arm of the plate is positioned parallel to the condylar axis and anterior arm is parallel to the lower border of sigmoid notch. Pediatric suction drain was placed for 24 hours to prevent hematoma formation. Subcuticular sutures were placed and all patients were kept under antibiotics and analgesics coverage for 7 days. Post operative MMF was not done in unilateral fractures but applied for 3 weeks in bilateral fractures. Post operative PA view of mandible was done to evaluate the reduction of the fracture (Figure 3).Mouth opening was recorded and movements checked on opening and lateral excursive movements. Patients were followed for 6 months post operatively.



Figure 1: Pre operative PA view of the skull revealing subcondylar fracture of left condyle of the mandible.

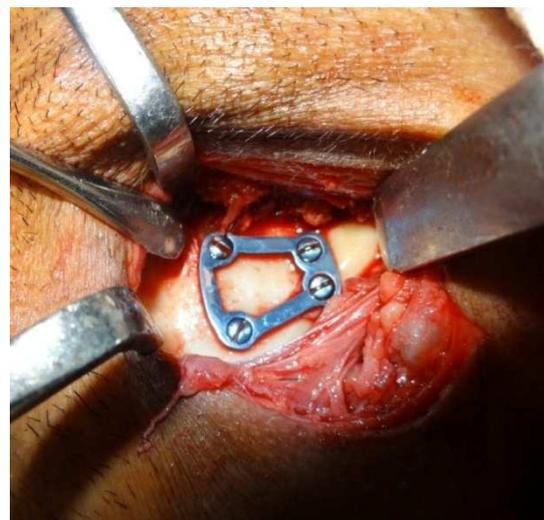


Figure 2: Intra operative photograph revealing the placement of the trapezoidal plate over the lateral border of condyle of mandible.



Figure 3: Post operative PA view of the skull revealing reduction of fracture and placement of the trapezoidal plate.



Figure 4: Post operative mouth opening of the patient.

Results

The study comprises of 11 male and 4 females with age ranged from 21 to 54 years with a mean age of 35.06 years.

All patients met with trauma due to road traffic accident and also had an associated fracture of body or angle of the mandible. In total 15 patients with 17 subcondylar fractures were included in the study. All 15 patients were managed by ORIF of subcondyle. Mouth opening of all operated patients ranged from 30.8mm to 42mm (Figure 4) with mean mouth opening recorded as 35.2mm following plate placement. None of the patients developed facial nerve palsy and 2 patients with bilateral condylar fractures reported pain on opening and lateral excursive movements of the jaw. But this resolved following 3 weeks of post operative MMF.

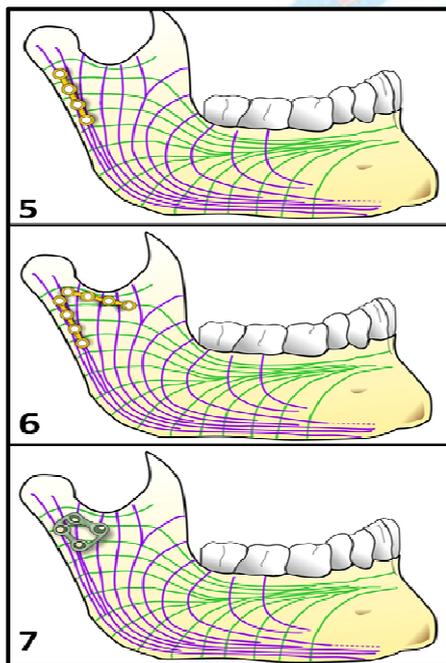


Figure: 5) Presence of single 4 hole plate in compression strain lines resulting in compression but not dynamic osteo-synthesis; **6)** Presence of 2 single 4 hole plate; 1 plate in compression line and 1 in tension strain lines thus providing dynamic osteosynthesis; **7)** Adaptation of a single trapezoidal plate thus playing the role of two 4 hole straight plates.

Table 1: Summary of results

Gender	
Male	11
Female	4
Diagnosis	
Right	7
Left	6
Bilateral	2
Occlusion	
Normal	13
Disturbed	2
Pain on jaw opening & lateral excursive movements	2
Complications (e.g; facial nerve paresis)	0

Discussion

Open reduction and internal fixation of condylar fractures is an acceptable method in the management of condylar fracture in the current scenario. The complications of closed reduction like shortening of ramus, deviation of jaw on opening, occlusal discrepancies, formation of false joint which functions for condylar movement in glenoid fossa and late term complications can even lead to internal derangement of the jaw.^{4,5,6,7,8,9}

The principles behind open reduction and internal fixation with miniplate osteosynthesis is “functionally stable osteosynthesis” as proposed by Champy et al (1975)¹⁰ and Champy and Lodde (1976).¹¹ Champy determined the ideal line of osteosynthesis in the region of mandibular body but no such lines was proposed in the region of condyle because of limited data. Meyer et al (2002)¹² attempted to fill this void to determine the ideal line of osteosynthesis in the region of condyle. During biting forces in the region of molars, strain lines were detected in the condylar region. 4 hole miniplates parallel to the condylar axis was found to provide compression osteosynthesis (Figure 5) and similar plates in the region parallel to mandibular notch provide dynamic osteosynthesis.

Hence, adaptation of single 4 hole miniplate, as was initially proposed didnot provide dynamic osteosynthesis and resulted in fracture of the plate during function.^{13,14,15} 2 plate fixation^{16,17,18} (1 miniplate parallel to condylar axis and second miniplate parallel to mandibular notch) met with the fulfilment of dynamic osteosynthesis. Single plate parallel to condylar axis is used as fracture reduction and second plate parallel to mandibular notch provides dynamic osteosynthesis. But adaptation of 2 miniplates in the region of condylar axis is difficult due to constriction of condylar neck (Figure 6). Hence, we propose the use of trapezoidal

condylar plate in open reduction and internal fixation of condylar fractures.

Trapezoidal condylar plate¹⁹ is shaped for adaptation in the anatomically constricted region of condylar neck. Trapezoidal condylar plate is placed with one arm parallel to the condylar axis and second arm parallel to the mandibular notch (Figure 7). Hence, this plate mets the criteria of 2 single miniplates with reduced hardwares. This plate also provides dynamic osteosynthesis of functionally stable osteosynthesis. Because of reduced hardware, this provides lesser infection rate, loosening of screws and requires reduced exposure as compared to 2 4-hole straight miniplates.

In our present study, only 2 patients developed pain on opening and lateral excursive movements. Both the patients suffered from bilateral condylar fractures and trapezoidal condylar plate was adapted in only single condyle which met with the criteria of open reduction and internal fixation. The second condyle was treated under closed reduction. Hence the pain on opening and lateral excursive movements. But this subsided following 3 weeks of post operative MMF (maxillo-mandibular fixation).

Conclusion

Small fixtures are better for the management of condylar fractures because of small size of fragments. On the other hand, dynamic osteosynthesis principles as proposed by Champy should be applied during open reduction internal fixation of condylar fractures. Hence we advocate the placement of trapezoidal condylar plate for open reduction and internal fixation as it fulfils the criteria of dynamic osteosynthesis. Minimum hardware specially with respect to 2 miniplates provides lower infection rate and reduced exposure, thus preventing facial nerve damage.

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