



## A Novel Technique to Treat Traumatic Lateral Displacement of Condyle of the Mandible by Using a Fabricated Titanium Cage

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### Abstract

Lateral displacement of condyle of the mandible is a rare, debilitating condition. It is most often associated with trauma and its management is challenging. We discuss a new technique to handle lateral displacement of mandibular condyle by using a titanium cage that we fabricated and obtained a good final outcome.

**Keywords:** Condylar dislocation; Pan facial fracture; TMJ; Lateral displacement; Fabricated titanium cage

### Introduction

The main purpose of management of facial bone fractures is restoration of near normal skeletal framework with optimum function. The important requirements for these are, an accurate anatomical reduction of fracture/dislocated segments, and retention of these segments in alignment by osteosynthesis. Failure to address these problems results in malunion and suboptimal functional outcome.

The Temporomandibular Joint (TMJ) is a sliding hinged type of joint between the mandible and temporal bone of the skull. The condyle of the mandible articulates bilaterally in a concavity known as the glenoid fossa. The mandible can dislocate in the anterior, posterior, lateral, or superior directions following trauma [1]. Anterior dislocation is the commonest while lateral dislocation is rare and usually associated with mandibular fractures. Condylar and subcondylar fractures constitute 26% to 40% of all mandible fractures [2]. The condylar head migrates laterally and superiorly and can often be palpated in the temporal fossa whenever there is a severe impaction trauma to the skull base [3,7].

Treatment options for condylar fracture dislocation have changed from a conservative approach towards surgical treatment. Once anatomical reduction is achieved with good osteosynthesis, early mobilization within three weeks is imperative for functional recovery of the jaw and to prevent stiffness. Rigid fixation of the condylar fracture prevents lateral displacement.

Enormous strides have been made in development of osteosynthesis techniques. The ideal implant material to achieve osteosynthesis should be biocompatible, easy for structural adaptation and fix the fracture segments in a stable fashion. Various studies have shown that, titanium is the most suitable implant material [4,5].

### Case Presentation

A 33 year old gentleman Mr. R.M was initially managed at a district hospital with an alleged history of road traffic accident. Previous records showed that the patient had a traumatic brain injury. CT face showed nasal bone fracture, bilateral Le Fort II maxillary fractures, right parasymphiseal fracture mandible and left condyle dislocation (Figure 1-3). After initial stabilization and tracheostomy, patient was taken up for Open Reduction and Internal Fixation (ORIF) of facial bone fractures by Inter Maxillary Fixation screws (IMF) for achieving preliminary occlusion and titanium miniplates and minis crews for osteosynthesis. Owing to the condylar dislocation on left side, conservative management was carried out initially. Rubber bands were applied on the first postoperative day to maintain proper occlusion and continued for two weeks (Figure 4).

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Figure 1: Pre-op CT (Frontal).



Figure 2: Lateral dislocation of condyle.



Figure 3: Pre-op CT (Lateral).

When the patient consulted our unit after a span of three weeks from the time of initial surgery, he had an anterior open bite. Repeat CT scan showed persistent lateral condylar dislocation of left TMJ. In view of this, patient was once again taken up for open reduction and internal fixation, utilizing pre-auricular approach (Figure 5). On exploration, the condyle was unstable and after successful reduction, it was getting repeatedly dislocated laterally from the glenoid fossa. We were not able to achieve good occlusion, because of ligamentous disruption, especially on the lateral side of TMJ, which was preventing a satisfactory anatomical reduction and retention of fracture segments in the glenoid fossa (Figure 6).

At this juncture, we decided to fabricate a titanium cage (Figure 7). A rectangular piece of titanium mesh, measuring about 1.5 cm ×



Figure 4: Post ORIF CT.



Figure 5: Pre-auricular approach.



Figure 6: Laterally dislocated condyle with ligament disruption.



Figure 7: Fabricated Titanium cage.

3.5 cm, was shaped into a rectangular trough shaped box with folded anterior and posterior pillars. It was assumed that this cage which was open only medially and closed in other directions would prevent further dislocation of TMJ out of the socket laterally, anteriorly and posteriorly (Figure 8).

The fracture was reduced anatomically and retained in position by use of our titanium cage. The upper border of the fabricated titanium cage was fixed to the zygomatic arch with two titanium mini screws of 1.5 mm × 6 mm, to prevent any dislocation of reduced fragments anteriorly, laterally and posteriorly (Figure 9).

Post operatively, rubber bands continued for two weeks. We achieved a good occlusion, without TMJ dislocation, by this ingenious



Figure 8: End on view of the cage.



Figure 9: Positioning & fixation of the cage.

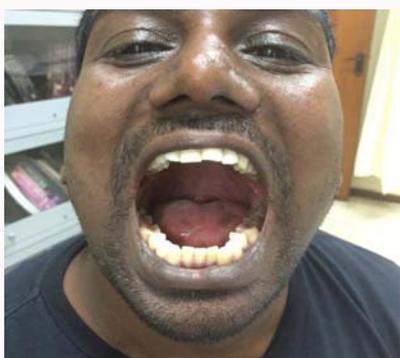


Figure 10: Post-op mouth opening.



Figure 11: Post-op occlusion.



Figure 12: Post-op CT showing cage in position.

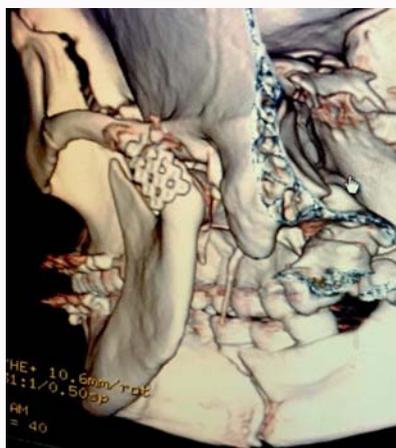


Figure 13: Posterior view showing excellent condylar position.

method. In addition, there was complete range of movements at TMJ level (Figure 10 and 11). Repeat CT at the end of three months showed excellent position of the condyle, TM joint and protective positioning of the titanium cage (Figure 12 and 13).

**Discussion**

The Temporomandibular Joint (TMJ) is a sliding hinge joint. During mandibular movements, the left and right joints move synchronously with each other and in association with dental occlusion.

Temporomandibular joint dislocation is the dislodgement of the head of the condyle from its socket which can be partial or complete [6]. Dislocation can be anterior, superior, medial, lateral or posterior. Anterior dislocations usually happen when the mouth closes from extreme opening like yawning coupled with weakened per joint fibrous capsule. Posterior dislocations typically result due to a direct blow to the chin. Superior dislocations can occur from a direct blow when the mouth is slightly open. Medial dislocations are rare.

Complications of untreated mandibular condyle dislocations

include malocclusion, internal derangement of TM joint, traumatic arthritis, ankylosis of TMJ, growth disorder and facial asymmetry [8,9].

Different modalities of treatment are in use for lateral displacement of TMJ. Conservative management includes closed reduction with intermaxillary fixation using arch brand wire or rubber bands for 2 to 4 weeks. Surgical methods are indicated in those cases where patients have not responded well to conservative methods [10].

The main surgical indication for adults is a dislocated condyle with or without associated fracture especially, if it is bilateral, as it becomes difficult to bring in satisfactory anatomical reduction and alignment through conservative treatment [11]. In 1933, Mayer described that surgically created downward displacement of the zygomatic arch by

aligned osteotomy prevents further dislocation by obstructing the anteroinferior movement of condyle [11,12].

LeClerc and Girard [12] performed a vertical osteotomy of the zygomatic arch and lowered the proximal segment and placed a thicker part of the zygoma into the path of the condyle. The procedure was refined by Gosserez and Dautrey in 1967 and is currently known as Dautrey's procedure. In this, the zygomatic arch is osteotomized anteroinferiorly in front of the articular eminence to create a mechanical obstruction for the movement of the condyle [13,14]. It must be emphasized here that all these procedures are a sort of static procedures while the procedure described by us varies slightly in that some amount of condylar mobility is maintained.

Pan facial fracture surgery is one of the most demanding procedures in Plastic surgery. Whenever there is fixation of multiple comminuted fractures involving TMJ, if other fractures like body, parasymphysis and ramus of the mandible are not reduced properly and there is a disruption of TMJ ligaments, there is a chance of subcondylar fracture causing lateral dislocation of condylar head. In this situation, the surgeon is in a dilemma whether to refix the other part of the mandible or to keep the condyle in place. Most of the time, if there is a high condylar fracture with ligamentous disruption and recurrent dislocation, refixing the other fractures is not a good idea instead, one can plan to keep the condyle in position.

In this article, we have discussed a novel method by fabricating a titanium mesh as a cage around the condylar head, which prevents lateral, anterior and posterior dislocation of the condyle and leaves the TMJ untouched. By this ingenious technique, we have achieved excellent functional outcome, with adequate mouth opening and good occlusion.

## Conclusion

Our technique offers an excellent method for the treatment of lateral displacement of the condyle of TMJ, when accompanied by total disruption of supporting ligaments.

To the best of our knowledge, we have not found a similar method to treat lateral condylar displacement in our review of literature. Our method offers an easy way to fabricate a titanium cage, depending on the level of condylar fracture (intracapsular, extra capsular, low and high) in each patient. The upper portion of the cage can be fixed to the lateral border of zygomatic arch giving an excellent and stable barricade. This method helps in excellent functional recovery with complete range of movements of the TMJ and also addresses common problems like postoperative jaw stiffness and TMJ ankylosis.

Hence, we strongly recommend this handy new technique, in indicated patients.

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