

Fixation of Condyle with Delta Plate: A Case Report

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Abstract

Condyle fractures account for 25-35% of mandibular fractures and deserve special care from the rest of the mandible due to their anatomical distinctions and capacity for healing. Past clinical and biomechanical trials have suggested the use of two miniplates for condyle fracture fixation. Two miniplates allow the proximal condyle fragment to a certain scale, and thus are useful in low fractures. This present case report shows the use of delta-shaped mini plates (titanium) in ORIF of subcondylar fracture.

Keywords: Condyle fractures; Titanium delta shape miniplates; fracture fixation.

Introduction

Case Report: Patient came to the department of oral and maxillofacial surgery, Institute of Dental Sciences, SUM Hospital, S'O'A University with a history of restricted mouth opening for one month.

History of present illness: The patient had a road traffic accident one month ago due to a collision with another vehicle. There was no history of loss of consciousness, vomiting or nasal bleed. Bleeding present from left ear.

On examination:

Extra-oral examination: No gross facial asymmetry present. Laceration present in the lower chin region. The left side temporomandibular joint is tender and palpable on the left side of the face.

Intraoral examination: Mouth Opening restricted (21mm). Derangement of occlusion present.



Figure 1a. Frontal View b. Right Lateral View; c. Left Lateral View; d. mouth opening measuring 21 mm

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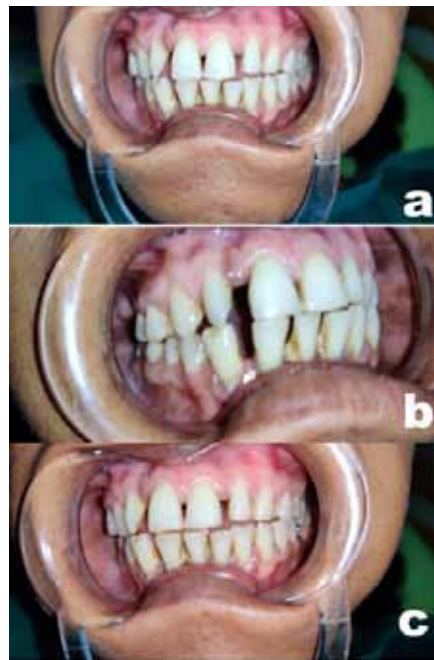


Figure 2a. Derangement of occlusion b. Occlusion w.r.t. right side; c. Occlusion w.r.t. left side.



Figure 3a. 2D Axial view; b. AP view; c. 3D CT skull view

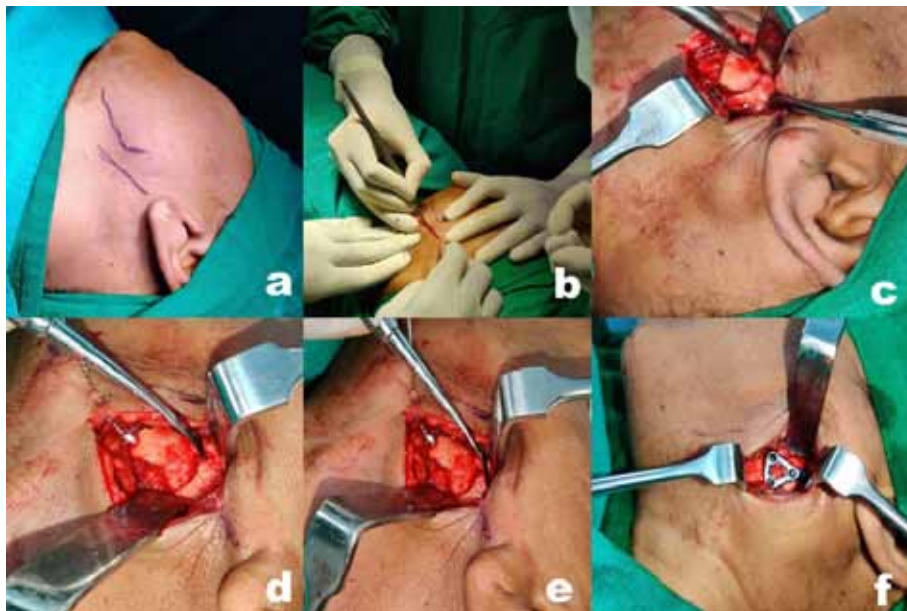


Figure 4a. Incision line drawn; b. Incision given; c. fracture site exposed; d. IMF screw placed; e. Fracture fragments reduced; f. 2mm Delta palate fixed.



Figure 5a. Closure done with vicryl 3-0 and ethilione 4-0. b. Post op OPG

Radiological examination: To scan accurately for the possibility of fracture of mandible, the utmost 2 views are given perpendicular to each other.^[1] “Typical radiographic findings in the presence of a condylar fracture are: a) decreased condylar-length, b) presence of radiolucent fracture line, or in cases of overlapping segments, presence of radio-lucent density and evidence of premature contact on the side of the fracture if the radiograph was taken in occlusion with the patient.¹ In 2D axial section we see dislocation with left sub-condylar region. For this patient we had taken an orthopantomogram, an AP view and a 3D CT skull showing dislocation of left sub-condylar region.

Treatment Done: Under all aseptic condition general anesthesia administered via naso-endotracheal intubation. Fracture site exposed via retromandibular incision which was given 2 cm from the angle of mandible. Periosteum is reflected and the fracture site was seen. An IMF screw was placed in the lower ramus and the segment was pulled downward and the distal segment was reduced in its anatomic position and fixed with one 2mm delta plate and four 8 mm screws. Through irrigation was done with normal saline and betadine. Layer by layer closure was done with vicryl 3-0 and ethilione 4-0.

The way to repair condylar fracture is either by open or closed reduction, that often has provoked debate.^{2,3} Though various rigid fixations has been identified, this is the most acceptable modality today with miniplates. Miniplate osteosynthesis produces a fixation (rigid) which can easily be adjusted to bone curvature, which involves a basic procedure only. “Choi and Yoo

compared the biomechanical reliability of four different positioning strategies (4-screw monocortical miniplate, 4-screw bicortical mini dynamic compression plate, 4-screw 2.4 mm plate, and a double monocortical miniplate) in formalin-fixed corpse mandibles, and considered the double miniplate to be the best.⁴⁻⁶ A 2-plate modality is easier if there is sufficient bone on both side of the fracture, but fixation with two miniplates might be a more painful treatment than fixation with a single miniplate”. 2 miniplates (double-plate technique) is the most effective as they better neutralize the forces of tension/compression and pressure and provide greater stability.⁷ The 2 plates are positioned with an some amount of gap between the fracture line and screws to achieve more stability. This drawback was resolved by Meyer et al.’s decision, taking into account the anatomical conditions, to choose a different type of trapezoidal shaped plate. Use of one single resorbable plate is not accepted in condyle mechanically loaded sites where the osteosynthesis has shown to be fragile and low.⁸ In the early 1990s the 3D osteosynthesis plate was incorporated in maxillofacial surgery. The benefits are: reduced size paired along with the more rigidity of the plates. Special designed plates like the delta plate or the trapezoid plate are available as an alternative to the modified 2-miniplate technique, and bio-mechanical & clinical trials has shown that such plates require adequate strain neutralization. Thus, such plates offer adequate stabilisation with the benefit of a smaller plate for ORIF of fractures of condyle and sub-condyle.^[4] The surface is bent towards the inclination of the mandible in the delta-shaped plate; therefore, the tensile lines and the compressive force distribution extend parallel to

either sides of the plate. "The plate is 1 mm thick, 20 mm long, and 5 mm broad at the top and 12 mm wide at the surface. There is an arm with 2 longitudinally spaced holes at the top of the plate; two more holes in the 2 corners of the base of the plate.⁹ Using the new delta-shaped plate for condylar neck fractures has 3 major advantages: i) neutralization of the different strains at the anterior, lateral and posterior borders; ii) extra stability offered by a compression miniplate; and iii) a small osteosynthesis plate".⁹ The Delta plating device is capable of distributing the necessary loads in every directions. This plate allows for stable osteosynthesis in the mandible's condylar neck area and this form of osteosynthesis can withstand physiological strains inside the injured temporomandibular joint as defined by Lauer et al.⁹ He showed, in 9 cases, 2 incisions of risdons & 7 incisions of retro-mandibular were administered to reveal the condyle, found fracture area & repaired using delta plate. All the observed clinical subjects showed excellent stabilization and decrease in the condylar region. Recovery to function was rapid with a brief duration of postoperative intermaxillary fixation. The condyle was medially displaced in one subject, and was displaced out from glenoid fossa. Extracorporeal approach was performed & the head of the condyle was attached to remainder of the ramus. After 2 weeks this individual presented with signs of plate contamination and then the contaminated plate was removed. Fracture of the plate or bending and loosening of the screw are known indicators of either insufficient stabilisation of the fracture or inappropriate reduction of the fracture. We have not found any of these concerns in all the topics tested.^[10] Because of the involvement of internal maxillary artery and superficial temporal artery, postoperative edema and hemorrhage was typically seen in the condylar area, in this case the postoperative edema and swelling was considerably less. Just one patient had an prolonged edema cycle in which extracorporeal plating approach was performed. He was prescribed post-operative steroids. Antibiotics and hormones play an significant part. Higher antibiotics were given to all patients. In every cases steroids were avoided except one that involved extracorporeal approach. Postoperative wound infection hasn't happened in any of the cases.¹⁰ Five patients from 9 cases were put in intermaxillary post-operative fixation for a period of 1 to 2 weeks. Within one week of surgery, restoration of function and immediate functional loading are possible. ^[11]Facial nerve branches, retromandibular vein and parotid fluid can be detected intra-operatively, & also at the same

time they should be removed safely to prevent injury to essential structures. For neither of our cases we have experienced any temporary facial nerve palsy. For all nine cases, post-operative follow-up was conducted over a span of six months to one year. Radiographical testing has shown that the osteosynthesis is fairly stable. Functionally stable and well rehabilitated, all patients diagnosed with delta plating device were. Just one patient had plate contamination, and eventually removed the contaminated layer. In our view, condyle fracture reduction is best treated with the current 3D delta plate method, that provides excellent stabilization & neutralizes the condylar region's changing strains.¹¹

Conclusions

While separate study agree that closed reduction and immobilization is the treatment of choice for condylar fractures, modification of ORIF usually yields better outcomes. The retromandibular approach has been used as the traditional and favoured approach to the condyle's face. ORIF with 3D plate stabilizes for any sub-condylar fractures is completely important for early functional regeneration.^[12] 3D plates are known as having greater stability than traditional mini plates. The geometrical structure of the 3-dimensional disk, that adapts easily to the fracture, provides greater stability and work. The delta plate which was used in our analysis is a titanium-formed non-compression layer. The scale and shape of the plate helps the surgical surgeon to adjust and repair sub-condylar fractures quickly. Revised delta plate with compression holes, trilock system provides more advantages to the new system. This delta plate can also be used in an intra-oral technique, which was aided endoscopically. The risks associated with this plating device are very small, as is the case with all other condyle surgical procedures. After a week of immobilization, early recovery and practical activation became feasible. The condylar fracture handled by delta plate had a good feature and aesthetics on a long-term follow-up. These platelets achieved surgical speed, relaxed adaptation and adequate stability. With this technique, the practical and cosmetic result has proved that this plating device is one of the latest developments in the management of sub-condylar fractures. No special armamentarium was needed as only the plate shape varies, and the holes in the screw and screw are the same as the standard mini plate method. A basic mouth opening procedure and variety of motions without intensive physiotherapy rehabilitated all of our patients at the earliest possible time. Most of the analysis was performed on a small sample size

during this review. For prospective research studies with greater sample sizes will be helpful.

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Conflicts of Interests: None

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