

# Plating the Posterior Border of the Mandibular Ramus by Retro-Parotideal Approach in the Treatment of a Subcondylar Fracture

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## Abstract

Mandibular condylar fractures have a high incidence but there is no consensus regarding the best method of treatment. The aim of this paper is to describe the surgical management of a subcondylar fracture in a 23-year-old male. The fracture was treated by plating the inferior border of the mandibular ramus with access to the fracture line via a retro-mandibular approach combined with a semi-preauricular incision. The retro-mandibular approach combined with semi-preauricular incision seemed to be a simple and short method. Its other advantages were that it completely exposed the operative field, facilitated reduction and fixation, and reduced the risk of damaging the facial nerve. The main disadvantage was compromised facial aesthetics due to scar tissue formation.

*Key Words: Mandible, Retro-parotideal Approach, Subcondylar Fracture*

## Introduction

Condylar and subcondylar fractures account for 26-40% of all lower jaw fractures [1]. Their treatment is therefore common in a maxillofacial department. Misdiagnosis or inappropriate treatment of condylar fractures can lead to anatomical and functional impairment and the correct anatomical reconstruction of the condylar process is an important prerequisite for re-establishing function [2].

Because of their common occurrence and the different potential advantages and disadvantages of each technique for managing them, various treatment options have been described. However, there remains still a degree of controversy with regard to the optimal treatment method. The two main options for the treatment of condylar fractures are (a) conservative treatment with 10 to 14 days of immobilisation of the lower jaw using a splint-assisted intermaxillary fixation or (b) surgical therapy, including the repositioning and the internal fixation of the fragments.

In the literature, there is increasing evidence that surgically treated condylar fractures have bet-

ter results in terms of occlusion, function, mouth opening, and bone morphology [3-5]. Because of the evidence supporting surgical treatment, there is a need to debate the best method of approach for accessing condylar fractures [6]. The type of osteosynthesis, anatomic positioning of the fracture of the condylar process, the presence of additional jaw fractures, the experience of the surgeon, possible complications, and aesthetic considerations are determining factors in treatment decision making [7]. Preauricular, submandibular, intra-oral, retro-mandibular, and trans-parotid retro-mandibular approaches are all used in the surgical treatment of condylar fractures.

The main objective of open reduction and rigid internal fixation in the management of condylar fractures is to achieve undisturbed healing and immediate restoration of form and function. The use of two plates was thought to provide greater stability compared with the single plate, reducing the possibility of displacement of the condylar fragment [8]. However, internal fixation using a straight four-hole 2.0 mm titanium mini-plate

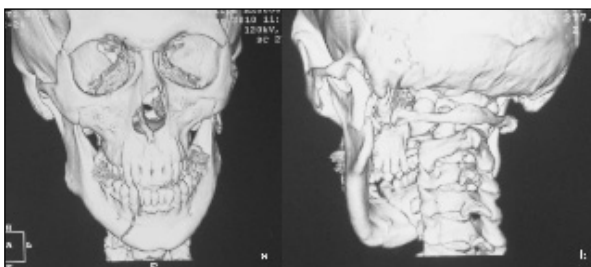
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placed in the posterior border of the external surface of the condylar neck, along its axis, can allow an appropriate distribution of the load concentration [9].

The current report presents the surgical management of a subcondylar fracture in a 23-year-old male treated by plating the inferior border of the mandibular ramus with access to the fracture line via a retro-mandibular approach combined with a semi-preauricular incision.

### Case Report

A 23-year-old male was referred to the Oral and Maxillofacial Surgery Department of the Gulhane Military Medical Academy, Ankara, Turkey, as a victim of a trauma caused by falling on his chin during military training. The patient claimed that he was not able to open his mouth following the injury. An extra-oral clinical examination revealed an anterior open bite, restricted mouth-opening, restricted lateral movement of mandible, slight deviation of the chin to the right side, and mild oedema in the right parasymphiseal region. An intra-oral examination revealed the presence of a malocclusion consistent with the extra-oral findings. Laceration, an occlusal step in the mandibular plane, mobility of the teeth, and bone exposure were absent. The patient was aware and cooperative, showing no neurological damage. A computerised tomograph (CT) with three-dimensional reconstruction was requested. The CT scan showed fractures in the right parasymphiseal region and the left subcondylar area (*Figures 1a and 1b*).



**Figure 1.** The pre-operative CT scan revealed the fracture. a. At the right parasymphiseal region. b. In the left subcondylar area.

Surgery was performed under general anaesthesia, using naso-tracheal intubation. The incision line was marked before injecting the vasoconstrictor (*Figure 2*). The incision began 0.5 cm below the ear lobe and continued inferiorly for 3-3.5 cm. It ran parallel to the posterior border of the mandible and extended anteriorly to the lower third of the

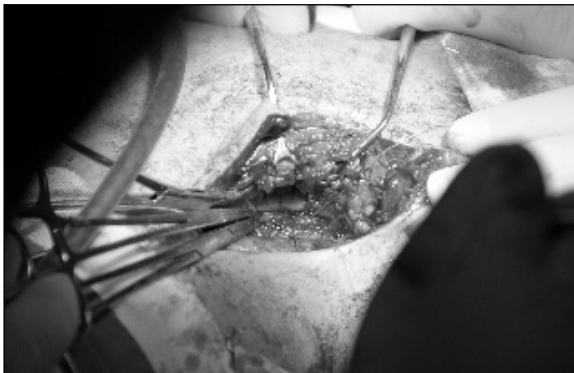
lobe of the ear. The incision was carried downward and slightly forward so that the mandible could be approached well above the angle, depending on the amount of exposure needed. The initial incision was made through the skin and subcutaneous tissue. The platysma muscle was incised in the same plane as the skin incision and this exposed the superficial musculo-aponeurotic layer (SMAS) and the parotid capsule. At this stage, the dissection was performed at the rear of the parotid bed. Further dissection as described by Chossegross *et al.* (1996) [10], who advocated a slightly posterior incision starting 1 cm below the mastoid apex, was performed. The parotid was retracted without entering the gland (*Figure 3*). The cervico-facial trunk of the facial nerve was encountered and dissected free from the tissues and retracted inferiorly. Posteriorly, the retro-mandibular vein was identified lying in the same plane as it emerges from the medial aspect of the mandible. However, it was not in the field of dissection. The anterior tissues were retracted anteriorly along with the nerve and a large retractor was placed underneath the posterior border of the ramus to retract the posterior tissues medially and the pterygomasseteric sling was visualised. This was then incised along the posterior portion of the sling from as far superiorly as possible to the gonial angle. The tissues were then stripped from the posterior margin of the ramus keeping an intimate contact with the bone. The posterior surface of the ramus was then exposed. The fracture line was identified and reduced (*Figure 4*). A straight four-hole 2.0 mm titanium mini-plate was then placed at the posterior border of the external surface of the condylar neck along its axis.



**Figure 2.** Marking of the incision. The incision began 0.5 cm below the ear lobule and continued inferiorly 3-3.5 cm. It ran parallel to the posterior border of the mandible and reached anteriorly to the lower third of the lobe of the ear.



**Figure 3.** Retraction of the parotid gland.

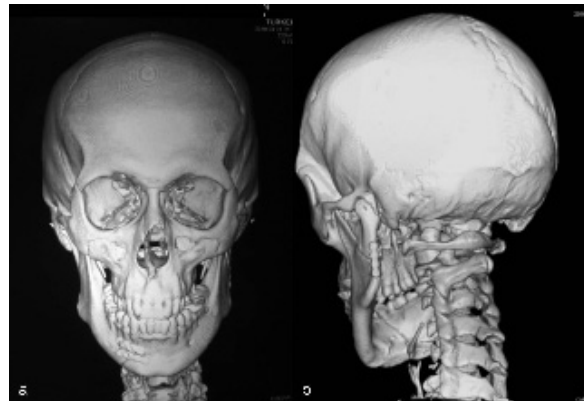


**Figure 4.** The exposure and reduction of the fracture line.

The pterygomasseteric sling was repaired with resorbable sutures. The SMAS layer, the parotid capsule, and the parotid gland were repaired meticulously and in a watertight fashion to avoid salivary fistula formation post-operatively. Placement of subcutaneous sutures was followed by skin closure. A hemovac drain was placed for two days post-operatively. The fracture on the parasymphiseal region was fixed with two titanium mini-plates via intra-oral approach. The healing period was uneventful. An extra-oral review of the patient six days after surgery revealed that nerve damage was absent (*Figure 5*). A post-operative CT scan of the patient showed a favourable alignment of the fragments (*Figures 6 and 7*).



**Figure 5.** The extra-oral view of the patient revealed that the nerve damage was absent.



**Figure 6 a, b.** Post-operative CT scans of the patient showed favourable adaptation of the fragments.

### Discussion

The various types of surgical approaches to managing condylar fractures of the lower jaw are all associated with specific advantages and disadvantages. Extra-oral approaches to the treatment of condylar fractures facilitate better exposure of the operating field and simplify fracture repositioning compared to the cosmetically more favourable intra-oral approaches. However, they are still associated with some unresolved issues such as the potential risk for the facial nerve and unsightly scars [6,11]. The preauricular approach is usually preferred in the treatment of high condylar neck fractures. However, the management of subcondylar fractures by preauricular approach can be problematic for treating lower fractures such as subcondylar and may compromise stabilisation.

An intra-oral approach in the treatment of the subcondylar fractures has advantages over extra-oral interventions. They include avoidance of the scar tissue formation and lack of the nerve damage risk. However, adequate manipulation for the application of the rigid internal fixation materials is not possible using an intra-oral approach to the condylar process.

Submandibular, retro-mandibular and trans-parotid retro-mandibular approaches are mainly used for more posterior fractures of the condylar process [7,12]. Nevertheless, the risk of damage to the facial nerve, secondary to trauma during retraction and dissection, especially to the buccal, zygomatic, and the marginal mandibular branches, is more likely when accessing the condyle via a retro-mandibular approach [2,13]. Additionally, the Frey syndrome secondary to a retro-mandibular approach has been reported by Sverzut *et al.* (2004) 14.

In a study by Klatt *et al.* (2010), 16% of the study group had malocclusion six months post-operatively following the trans-parotid retro-mandibular approach [7]. Biglioli and Colletti (2009) have suggested that the trans-parotid approach should be avoided owing to the higher risk of facial nerve injury and post-operative infection [6].

In the technique presented in this case study, similar to the modified Blair incision [15], the retro-mandibular approach combined with a semi-preauricular incision and the retraction of the parotid gland and the adjacent branches of the facial nerve negated the need for a complex dissection of the facial nerve. This approach resulted in a short operation time and less risk of nerve damage. Additionally, the extension of the incision to the preauricular region allowed the release of the soft tissues and ensured a less traumatic retraction and preservation of the nerves.

Surgical management of condylar fractures by open reduction and internal fixation must follow biomechanical principles and be in accordance with the principal stress trajectory during rigid internal fixation [16]. Therefore, during the surgical procedure, it is important to ensure that the operator is able to achieve rigid internal fixation and anatomic reduction under direct vision of the completely exposed fractured ends [16]. From a recent literature review, it is evident that the technique used most frequently for fixation is the placement of a single plate, even though complications concerning plate fracture or screw loosening have been report-

ed by various authors [17]. However, the review also suggested that two plates provide greater stability than a single plate and reduce the possibility of displacement of the condylar fragment.

Many of the extra-oral approaches can become technically demanding and present definite risks of facial nerve injury and unpleasant scarring [6]. The approach presented in this case report allows rapid management of subcondylar fractures while minimising the risks to the facial nerve; however, scar tissue formation and some aesthetic impairment remain unavoidable.

Re-establishment of the previous normal tension and compression functional bone trajectories is the fundamental prerequisite for the full recovery of the mechanical integrity of the mandible [18,19]. In the case presented, treating the linear non-comminuted condylar fracture with a single 2.0 mm mini-plate allowed sharing of masticatory compressive and tension forces among the bone, plate, and screws and a conversion of these forces to shear stress at the bone-plate interface, which increased stability. The 2.0 mm mini-plate placed at the posterior border of the mandibular ramus seemed capable of neutralising compression and tensile forces, thus making unnecessary the use of a second plate at the lateral cortex of the ramus.

## Conclusions

Although the technique described in this case report is promising, further studies comparing the biomechanical behaviour of the conventional plating techniques with the single plate placed at the posterior border of the ramus are necessary

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