

Retromandibular approach in the management of condylar fractures by open reduction and internal fixation a prospective study

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ABSTRACT

Aim: To evaluate the efficacy and safety of the retromandibular approach in the management of condylar fractures by open reduction and internal fixation (ORIF). **Materials and Methods:** A total of 20 patients with unilateral mandibular condylar fractures underwent ORIF using retromandibular approach. Pertinent data were collected and subjected to evaluation. **Results:** The retromandibular approach was found to be expeditious in adequately exposing the fracture site and enabling ORIF. The anatomic reduction of the fractured segments and the fixation was satisfactory in all the cases. Average duration of surgery was 39 min (range: 17-56 min) for satisfactory exposure, reduction, and fixation of each condylar fracture. **Conclusion:** The retromandibular approach provides adequate exposure of the subcondylar region and should be considered as commendable alternative in the management of condylar fractures.

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INTRODUCTION

The management of mandibular condylar fractures has remained an enigma for oral and maxillofacial surgeons. In spite of an abundance of literature on the subject, no consensus has been arrived at and surgeons continue to determine a treatment plan based on clinical experience and personal beliefs. The only "progress" that has been made is the increase in the number of patients undergoing open reduction and internal fixation (ORIF) with a significant improvement in the accurate repositioning of fragments.

Long-term follow-up studies on condylar fractures treated conservatively have shown that growth disturbances or

dysfunction of the masticatory system are observed more often in young people. In addition, signs of dysfunction are more frequently observed in adults.^[1]

A randomized prospective study yielded functional results clearly in favor of open reduction and fixation of moderately displaced condylar fractures. In addition, the better results for open (operative) treatment obtained in the study suggest that the current general trend for conservative treatment be discontinued.^[2]

Various surgical approaches have been proposed for the treatment of condylar fractures: The submandibular, preauricular, rhytidectomy, intraoral, and retromandibular. The submandibular approach is very low for subcondylar fractures, and conversely the preauricular approach is very high; the retromandibular approach is described very infrequently in the literature as an alternative for the treatment of subcondylar fractures.^[3]

In view of the limited literature available on the utility of the retromandibular approach for the ORIF of condylar fractures, this prospective study was designed to evaluate

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the efficacy and safety of the retromandibular approach to carry out ORIF for displaced condylar fractures.

MATERIALS AND METHODS

From June 2009 to January 2011, 20 patients (16 males, 4 females) with unilateral extracapsular condylar fractures [Figure 1] indicated for ORIF were included in the present study [Table 1]. The data included the mode of injury, period between injury, and surgical intervention and associated fractures. Postoperative evaluation was done for assessment of ease of surgery, facial nerve function, salivary fistula, fracture stability, and patients' perception of scar.

An informed written consent was obtained from all patients for the surgical procedure and additional documentation required for research and/or academic purposes. The decision to conduct ORIF was based upon clinical and radiological evidence which included deranged occlusion, shortening of ramus height, deviation of mandible, decreased interincisal opening, and limited mandibular excursions. The decision to conduct ORIF and the surgical procedure itself was carried out by a single-trained surgeon.

The patients had a mean age of 34 years, (age range: 21-55 years) who underwent ORIF using a retromandibular approach under nasoendotracheal intubation. The 20 condylar fractures consisted of 8 neck fractures and 12 subcondylar fractures. A total of 16 patients presented with associated fractures of the mandible (10 symphyseal, 2 body fractures, and 4 mandibular angle) [Table 2].

Surgeon was required to comment regarding "ease of operation" immediately following the surgical procedure. Postoperative evaluation was done for

assessment of facial nerve function, salivary fistula, fracture stability, and patients' perception of scar.

Surgical technique

Under general anesthesia, arch bars were placed to obtain satisfactory intraoperative occlusion. Following standard scrubbing, painting, and draping, the surgical procedure was commenced. A 3-cm long incision was marked posterior and parallel to the posterior border of the ascending ramus from a point just below the lobe of the ear inferior to a point just above the angle of the mandible [Figure 2]. The incision was vertical, parallel to the posterior border of the mandible, and was about 2 cm behind the posterior border of the mandible and 0.5 cm below the ear lobe. The initial incision was made with a No. 15 surgical blade extending through the skin and subcutaneous tissue to the level of the scant platysma muscle. The skin was undermined with scissor dissection in all directions for ease of retraction and closure.^[4] The platysma muscle was sharply incised in the same plane as the skin incision. At this point, the superficial musculoaponeurotic system (SMAS) and parotid capsule were incised. Blunt dissection was then followed within the gland in an anteromedial direction following the anticipated course of the facial nerve toward the posterior border of the mandible. The pterygomasseteric muscular sling was sharply dissected. Blunt dissection superiorly and stripping of periosteum exposed the fracture ends [Figure 3].^[5]

In all patients, the reduced fragments were stabilized using 2-mm stainless steel/titanium plate with a minimum of two screws engaging each fragment [Figure 4]. The wound was closed in layers. Closure of the parotid capsule/SMAS and platysma layer is important to avoid salivary fistulas.^[6] Intermaxillary training elastics were given to all patients for a period of 1 week, postoperatively.

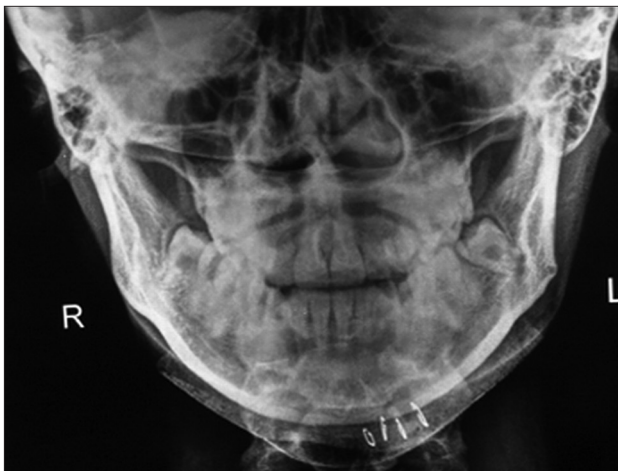


Figure 1: PA skull showing right condylar fracture



Figure 2: Marking of incision

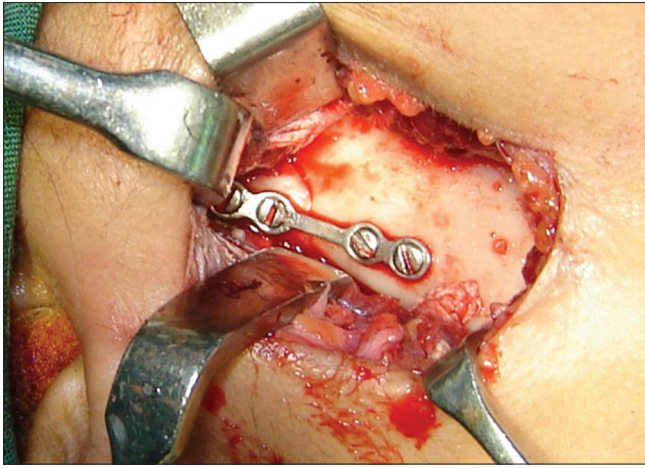


Figure 3: Bone plating for condylar fracture

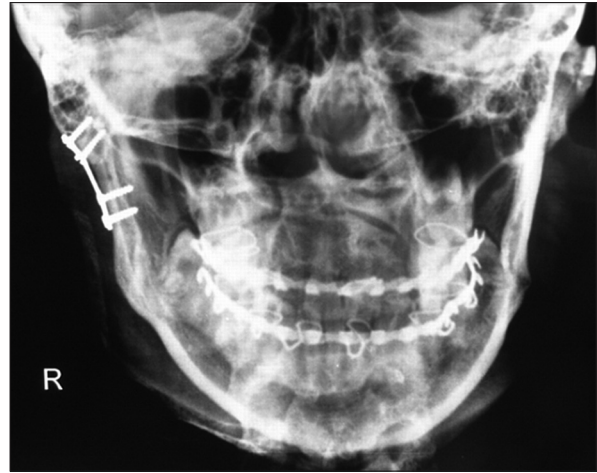


Figure 4: Postoperative radiograph

RESULTS

The retromandibular approach was found to be expeditious in adequately exposing the fracture site and enabling ORIF. The most common mode of injury in our series was road traffic accidents (16 patients) followed by interpersonal assault (three patients) and sports injury (one patient). The mean duration between injury and surgical intervention was 3 days (2-7 days). Sixteen patients had associated fractures of the mandible (symphysis/parasymphysis-10, body-2, and angle-4) [Table 2].

The single experienced operating surgeon opined that the access to the fracture site and subsequent fixation was “uncomplicated” in 17 cases (85%). In the remainder three cases (15%), the difficulty was encountered in the placement of the superior most screw in condylar neck fractures. The anatomic reduction of the fractured segments and the fixation was satisfactory in all the cases. The average duration of surgery was 39 min (range: 17-56 min) for satisfactory exposure and reduction of each condylar fracture.

Incidence of facial nerve injury or transient facial nerve weakness was nil (0%). The facial nerve was encountered on three occasions but was easily retracted away from the operative site without damage [Table 3].

Of 20 patients, two (10%) cases reported with salivary fistula which responded to conservative management [Table 3]. Conservative management consisted of pressure dressings and medications to reduce salivary secretion.

The fracture stability was evident in all the cases (100%) [Table 3]. Only four patients were provided intermaxillary elastics for a period of 2 weeks in the immediate postoperative period. All patients were permitted to start soft diet within 24 h of the surgical procedure. All

Table 1: Distribution of cases

Fracture	Unilateral	Bilateral	Displaced	Deviated	Dislocated
Subcondylar	20	00	13	05	02

Table 2: List of associated mandibular fractures

Associated fractures	Number
Symphysis/parasymphysis	10
Body	02
Angle	04
Total	16

Table 3: Predetermined variables

Ease of operation	Facial nerve injury	Salivary fistula	Fracture stability	Scar acceptability
17	00	02	20	18

patients had returned to their normal diet within 6 weeks of the surgical procedure.

The resultant scar was well-hidden and was considered satisfactory by 18 (90%) patients [Table 3]. Two patients were dissatisfied with the scar, however, declined a secondary surgical procedure for scar improvement .

The patients did not have any postoperative complaints regarding occlusion, maximum interincisal opening, and other range of mandibular movements. All the patients are on a regular follow-up regime.

DISCUSSION

The retromandibular approach was one of the techniques first described by Hinds and Girotti^[7] in 1967 and modified by Koberg and Momma^[8] in 1978. The marginal mandibular branch courses obliquely downward and anteriorly as it branches from the cervicofacial trunk of the facial nerve. It frequently arises from the main trunk

well behind the posterior border of the mandible and crosses the posterior border in the lower one-third of the ramus. The retromandibular approach utilizes the void left between the buccal branches and the marginal mandibular branch or branches, thus avoiding damage and further morbidity to the patient. The resultant scar through a retromandibular approach is quite inconspicuous and almost always hidden in the retromandibular shadow.

Fractures of the condylar region can disrupt the main vascular supply to the condyle. Even though the condyle receives blood supply from various sources, surgical access to the condylar process to perform open reduction and internal rigid fixation requires exposure and dissection of some of the soft tissues from the condylar process. Therefore, surgery further diminishes the blood supply to the condyle. Maintaining the blood supply to the condyle, therefore, becomes an integral factor in the selection of the surgical approach. The preauricular approach probably leads to compromising the blood supply to the condylar fragment and also falls short in terms of exposure of the mandibular ramus, very much essential in placement of screws in the distal fragment. The angle of the mandible is also inadequately exposed which may make reduction of the fragments difficult. It also results in stripping of the soft tissues which are important in terms of the compromised blood supply. The submandibular approach does not compromise the blood supply to the condylar fragment but falls short in providing adequate exposure for ORIF.

Conservative treatment of condylar fractures in both young people and adults has long been the method of choice. The reason for adopting a less aggressive surgical approach was the difficulty in manipulating the fragments in a small area with risk of damaging the facial nerve or vessels such as the internal maxillary artery. Long-term follow-up studies on condylar fractures treated conservatively have shown that growth disturbances or dysfunction of the masticatory system was seen in young people, although signs of dysfunction were more frequently observed in adults.^[1]

Eckelt *et al.*,^[2] conducted a randomized prospective study which yielded functional results which were clearly in favor of open reduction and fixation of moderately displaced condylar fractures. In addition, they suggest that the better results for open (operative) treatment obtained in their study suggest that the current general trend for conservative treatment be discontinued.

The submandibular approach is very low for subcondylar fractures, and conversely the preauricular approach is very high; the retromandibular approach is described very infrequently in the literature as an alternative for the treatment of subcondylar fractures. The retromandibular

approach was chosen, because it allows adequate visualization of the surgical field enabling the reduction and fixation of the bone fragments and reducing the surgical time in comparison with other approaches.^[3]

Ellis and Dean^[4] reviewed the anatomy and various surgical approaches for treating fractures of the mandibular condyle with plate and screw fixation. He presented advantages and disadvantages of the preauricular, submandibular, intraoral, retromandibular, and rhytidectomy approaches and concluded that the retromandibular approach is advantageous over the other in that it has shorter working distance from the incision to the condyle, greater access as the tissue can be retracted till the level of sigmoid notch, excellent exposure even in face with marked edema, and the facial scar is produced in less conspicuous location.

The correct anatomical reconstruction of the condylar process is an important prerequisite for reestablishing function. Narayanan *et al.*,^[9] in their series of 31 patients with 35 condylar fractures using the retromandibular approach encountered the facial nerve in six cases (17%), one case with temporary facial nerve weakness and four cases with salivary fistula.

Chossegras *et al.*,^[10] observed that one-third of all mandibular fractures involve the condylar region. There is a consensus that the method of choice in cases without displacement is conservative treatment by immobilization of the mandible. Indications for surgical management in adults are controversial. When surgery is indicated, surgical methods include open reduction and osteosynthesis with a miniplate, wire, or lag-screw. The classic submandibular Risdon approach that was used for several years achieves poor exposure of the fracture and is associated with a high rate (30%) of transitory facial nerve palsy. In an attempt to avoid these problems, they used a modified retromandibular approach in a prospective series of 20 patients. The aim of their article was to describe clinical and radiologic results in 19 patients with follow-up longer than 6 months. Their experience suggests that the short retromandibular approach is an easy and safe technique for displaced subcondylar fractures.

Silvennoinen *et al.* observed that laterally displaced, steeply oblique fractures in condylar neck region need a better exposure of the site to fix the condyle using axial anchor screw. They found that the retromandibular approach provides the most sufficient exposure.^[11]

The retromandibular approach provides satisfactory exposure for most condylar fractures. Branches of the facial nerve and retromandibular vein may be encountered in the substance of the parotid gland. There

are chances of a salivary fistula as the approach traverses the gland, which can be prevented by transfixation of the gland capsule. Most of the fistulas heal spontaneously. The retromandibular approach provides an admirable exposure of the subcondylar and the neck region expeditiously and should be considered as an excellent alternative in the management of condylar fractures.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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