

CASE REPORT

Outcome Of Reduction Of Subcondylar Fracture In Retromandibular Transparotid Approach

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ABSTRACT

Among all mandibular fracture, 25 to 40% fractures are regarded as Condylar and Subcondylar fracture. Commonly, reduction of subcondylar fracture is done under general anaesthesia. Different approaches are found for the surgical treatment of condylar fractures besides intraoral approaches such as the pre-auricular, submandibular, rhytidectomy, retromandibular. To find out the outcome of retromandibular transparotid approach for subcondylar fracture treatment of mandible i.e to find out correction of occlusion and establishment of jaw function, infection, hematoma, salivary fistula, facial nerve damage, hematoma etc. complications. Surgical treatment of subcondylar fractures of 15 patients were done from January 2019 to December 2021 in retromandibular transparotid approach. The patients were evaluated for hematoma, infection, Frey's syndrome, salivary fistula, facial nerve damage, occlusion, fracture site stability, chronic pain in the fracture site and temporomandibular joint movements in the postoperative period. Facial nerve injury was not observed. Postoperative swelling of parotid region developed in first two patients. Single patient developed paresis in zygomatic branch of facial nerve causing left upper eyelid muscle weak and after two weeks of physiotherapy it became normal. Salivary fistula developed in three patients which were resolved spontaneously. Outcome of this approach like good anatomy and function was found in all cases. Good articular function was obtained in all the cases. By this retromandibular approach condylar fracture reduction, fixation and healing were managed comfortably. However, direct vision of facial nerve fibers has limited the risk of facial nerve injury.

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INTRODUCTION

The subcondylar and condylar fractures are common among all mandibular fractures [1] and the rate of this fracture is 20–62% among all fractures of mandibular [2]. Condylar fractures may be considered as highly common although there is some controversy regarding its treatment [3]. Direct trauma to chin may be the cause of most condylar, subcondylar fractures of the mandible. Force of the trauma is transmitted through the condyle to the skull resulting in fracture [4]. But their management remains controversial which one is better, either open reduction or closed reduction [5].

The complications of condylar fracture include pain, restricted mandibular movement, muscle spasm and deviation of the mandible, malocclusion and pathological changes in the TMJ, osteonecrosis, facial asymmetry and ankylosis irrespective of whether treatment was performed or not [6]. Mandibular fossa of temporal bone, tympanic plate may be fractured with or without condylar displacement into the middle cranial fossa, damage to cranial nerves, vascular injury, bleeding, salivary fistula, growth disturbance, arteriovenous fistula [7] and alter the balance in the masticatory muscles [8].

There are two treatment options; open and closed reductions. In closed reduction these fractures may be treated through intermaxillary fixation followed by physiotherapy. Rigid or semi rigid fixation are used in open reduction of condylar fractures by giving extra oral or intraoral incision [9].

Although closed reduction is the most useful method, it can be difficult to achieve anatomical reduction with this technique compared with open reduction and internal fixation (ORIF) [10].

Titanium or titanium coated mini plates and screws or intraosseous fixation wires are used for fixation after open reduction of the condylar fracture. But different wiring methods and inter maxillary fixation are used as conservative treatment. Few benefits like a better recovery of joint function, achievement of a closer to normal anatomical reduction have encouraged the clinicians generally to favor the surgical procedure though there was an increased risk of nerve injury.

Surgical injury can be avoided with conservative treatment and acceptable results can be achieved due to capacity of masticatory system and condylar remodeling. But several complications may develop like pseudarthrosis, temporomandibular joint pain, malocclusion facial asymmetry and lateral deviation which can be avoided by surgical treatment [11].

Different publications have reported that the outcomes of surgical treatment are superior to conservative treatment of this type of fractures; in fact, risk for functional disorders is a concern of conservative treatment [12].

Different approaches can be adopted for the surgical intervention of extra capsular condylar fractures of the mandible, such as the pre-auricular, submandibular, rhytidectomy, and retromandibular and intraoral approaches [13]. Proper visualization

of the fracture site is always a factor for the surgeon in any approach to allow for optimal anatomical and functional restorations of the mandible [14].

MATERIALS AND METHODS

This study was done on fifteen patients who were treated by open reduction and miniplate fixation in retromandibular approach in Dhaka Dental College and hospital and private centre in between January 2019 to December 2021. The patients were diagnosed clinically and radiologically. The radiological examination combines coronal and axial maxillofacial CT scan with 3D reconstruction with or without an orthopantomogram and posterior/anterior view of skull. Only plain radiograms may be sufficient for the evaluation of postoperative condition. Occlusion, mouth opening and any complication were evaluated in postoperative period. Patients were kept free of arch bar.

During operation one cm below the ear lobule a 2 cm vertical incision was given. However, the incision line was extended distally or proximally in cases of requirements of exposure of the fracture part of condyle. The path of the facial nerve branches was identified via nerve stimulator after passing the cutaneous, subcutaneous tissue and parotid capsule. Then, from both sides of path of the nerve a blunt dissection was done through a curved hemostat and advanced to the masseter muscle. After exposure of masseter muscle it was incised with sharp scalpel upto bone. Periosteum was reflected and fracture part was exposed. After manipulation the fracture ends were approximated and anatomical reduction was achieved, normal occlusion was established. Approximated ends were fixed with titanium coated miniplate and screws. Above the fracture 5mm long, 2mm broad and below 7/2 mm screws were fixed. After proper haemostasis and irrigation wound was closed layer by layer. The parotid capsule was restored with 3/0 absorbable sutures in all patients. The sites were not drained and the skin incisions were covered with 4/0 monofilament sutures.

After surgery, a one week liquid diet followed by soft diet for three weeks was recommended to the patients. On the first postoperative day the patients were discharged and were asked to return for follow-up visits. The end of the first and fourth weeks and at the end of third and sixth months postoperatively is advised for follow up visit. The arch-bars wire patients were advised to visit accordingly for the removal of the arch-bar. The patients were evaluated for infection, salivary fistula, facial nerve damage, Frey's syndrome, occlusion, chronic pain in the fracture site in the postoperative period.

Fracture line

**Picture 1:** Left sided subcondylar fracture screws

Miniplate and screws

**Picture 2:** Fixation with miniplate and

RESULTS

Table 1: Age* of the patients (n=15)

Age group in years	Frequency	Percent
16-20	3	20.0
21-25	4	26.7
26-30	4	26.7
31-35	3	20.0
36-40	1	6.7
Total	15	100.0

*Mean±SD = 25.93±5.74 years

Gender of the patients:

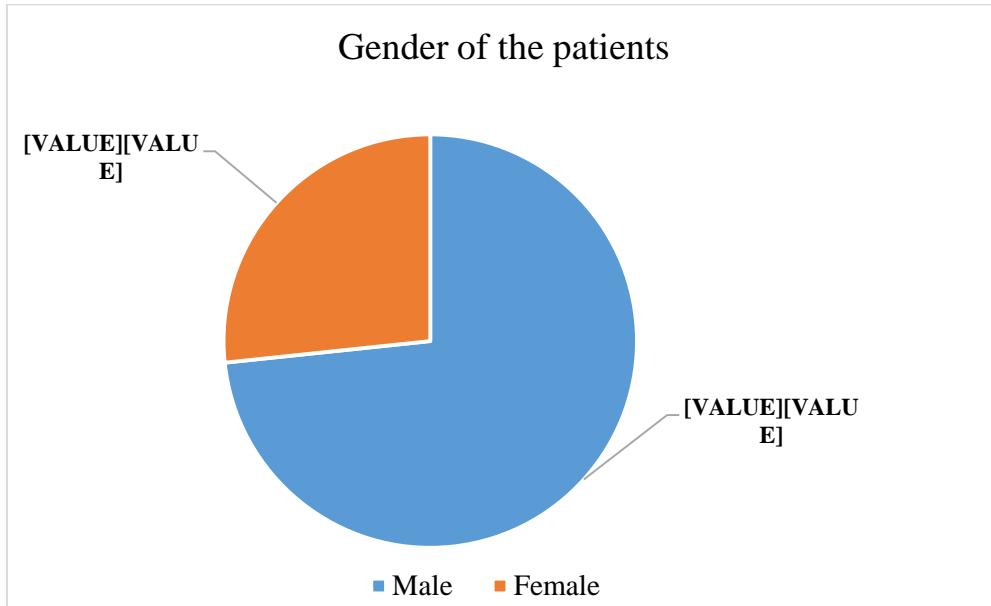


Figure 1: Pie diagram showing gender of the patients (n=15)

Table 2: Sites of fracture:

Fracture site in Mandible	Frequency	Percent
Base of the condyle	Nine	60
Neck of the condyle	Five	26.66
Bilaterally subcondyle	One	13.34

Table 3: Nerve injury

Nerve injury	Frequency	Percent
Positive	3	20.0
Negative	12	80.0
Total	15	100.0

Table 4: Parotid fistula

	Parotid fistula	Frequency	Percent
Valid	Positive	3	20.0
	Negative	12	80.0
	Total	15	100.0

No infection, no Frey's syndrome, no malocclusion, no post-operative TMJ pain.

This study included fifteen patients aged 16-40 years (mean \pm SD 25.93 \pm 5.74 years), of whom four ((26.7%) were females and eleven (73.3%) were male patients. Nine (60%) base of the condyle and five (26.66%) neck of the condyle. were operated. One (13.34%) patient of bilateral subcondylar fracture was operated. In addition to plates and screws intermaxillary fixation was not given with arch-bar. Patient's follow-up was done routinely in every week.

There was no serious bleeding during the operation. No infection, hematoma, Frey's syndrome, malocclusion, TMJ pain, chronic pain in the fracture site, hypoesthesia of the ear was observed post-operatively. Salivary fistula was observed in three patients which were resolved after few days of dressing. Furthermore, the radiologically fracture site was apposed and had no rotation or angulation in the condyle. Further surgery was not needed in any case.

Postoperative occlusion was alright and pre-trauma occlusion was achieved in all patients. Complete damage to the facial nerve was not found in any patient. However, three (20%) patients developed neuropraxia in the temporal branch of the facial nerve resulting in weakness in upper eyelid muscle to close eye. After few days of physiotherapy the problem was resolved. Mouth opening and side to side movement were normal in function without any restriction.

DISCUSSION

Although treatment method of mandibular condylar fractures is a controversy, many studies have demonstrated that open surgical treatment is the more preferred treatment modality at the present time and is superior to closed-method treatments for unfavorable extra capsular fractures [15]. Among the extra oral approaches, the retromandibular, preauricular and submandibular, approaches are used routinely [16].

The preauricular approach is usually suitable for intracapsular condylar fractures and the fracture line can be extended inferior to the ear in subcondylar fractures. The

submandibular approach provides a wide exposure but the length of the incision scar is its most important disadvantage [17].

The retromandibular transparotid approach has great advantages to enter the subcondylar and high ramus fracture area. In this approach, the fracture lines are clearly seen and we can easily extend the incision if required over the preauricular region and up to the mandibular corner. Furthermore, it is aesthetically good as the incision line remains behind the mandibular margin and 2-3 cm incision is sufficient in most cases [18].

Endoscope-assisted intraoral approaches have also advantages over other approaches in both cosmetic and functional purposes preserving the facial nerve, but the cost and lack of equipment such as an endoscope has limited the use of this approach [19]. Kumaran et al. have argued that if a 1.5 mm plate is used, even a 1-cm incision is sufficient for the fractures of these sites [20].

Now a days, retromandibular transparotid approach has reported very low rates of complication [21]. In this study, infection and hematoma were not observed in any patient. In case of the retromandibular transparotid approach the complications that may be called method-specific includes salivary fistula, Frey's syndrome, restriction in mouth opening and pain in temporomandibular movements, hypoesthesia of the ear and facial nerve injury.

Bindra et al. have reported that they did not observe any salivary fistulas. Ellis et al. have reported a rate of 2.3% for salivary fistulas in their study. In the present study, three salivary fistula was observed which were resolved after few days of dressing. As an opinion it can be said that if parotid capsule is repaired, a salivary fistula will not appear.

Frey's syndrome was also observed and no cases were found in this series, which is consistent with the literature. Sverzut et al. have reported Frey's syndrome in one case treated with the retromandibular approach [22]. No other study in the literature reported Frey's syndrome in this approach.

Regarding the temporomandibular joint movements, there were no significant restricted mandibular movements in the patients during the follow-up. In advanced period no patient experienced pain in the temporomandibular region.

In these patients the main reason of the temporal branch injury was excessive traction at the superior border of the incision, near the earlobe. Usually, the facial nerve divides into two main trunks at the posterior border of the ramus of the mandible, an upper (temporofacial) trunk and a lower (cervicofacial) trunk. The upper trunk gives off temporal, zygomatic and buccal branches, whereas the lower trunk gives off marginal mandibular and cervical branches [21]. But the rules are made to be broken. Many studies have shown that pattern of branching of the facial nerve is highly variable [23]. Indeed, it is our belief that zygomatic and temporal branches are both injured in some patients. Yet, zygomatic branch injury remained asymptomatic because of the buccal

branch interconnections. The reported anastomosis among the zygomatic and buccal branches varies 70% to 100% [24, 25].

The mean inter incisal distance at the maximal mouth opening was remained within normal limits. General acceptance for normal limits is between 40–50 mm [20].

Yang and Patil argue that subcondylar fractures may also be successfully treated by using a single miniplate [15]. Usually a 2-mm double miniplate is generally recommended for the fixation of the mandibular fractures [26]. Sometime, a single plate can be used in cases of more restricted exposure of the subcondylar fracture areas so that facial nerve damage can be avoided and if there is a lack of space to place two plates.

Extension of the incision about 1 cm proximal or distal to previous 2-cm incision reduced over-traction with in other cases. One cm more incision scar would not be a serious problem in cosmetic terms, but it is clear that serious problems may arise due to facial nerve injury in both cosmetic and medico legal aspects.

In spite of the incision length, the retromandibular transparotid approach is very safe in terms of facial nerve injury [27–29]. In the retromandibular approach here were no occlusal defects in any of the patients after the operation and the anatomic fixation of the fracture can be achieved nicely.

We prefer two 2-mm miniplates with four holes for fracture fixation. However, if the second miniplate cannot be properly placed into the fracture line or if excessive traction is applied to the facial nerve branches in particular, an arch-bar in combination with a single miniplate is used for fracture fixation and the bar was removed two weeks after.

Therefore, complete reduction in each plane of the mandible for subcondylar fracture will avoid minimal gap at the anterior margin which could result in modifications to the contact surface of the cartilage tissue within the temporomandibular joint, thereby causing degeneration in the long term period. This gap may result from one-point fixation with a single plate. But two-point fixation (two plates or a single plate and an IMF) provides a complete reduction in the anterior and posterior planes of the condyle.

Our experience with fifteen patients suggested that the retromandibular transparotid approach was a safe and effective method. In the present study, no major complications were found, except for temporary injury to the temporal branch of the facial nerve in three patients.

CONCLUSION

We believe that the retromandibular transparotid approach is the most appropriate method for extra oral surgical intervention in subcondylar fractures due to the easy access to the fracture area, the site of scar is behind the mandible for cosmetic purposes and a very low complication rate. Moreover, we believe that the retromandibular transparotid approach using two-point fixation will reduce the risk of temporomandibular joint degeneration in the following years.

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