



Pre-auricular Transparotid Approach for the Management of Mandibular Condylar Fracture: An Experience of 82 Cases

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Abstract

Purpose This paper retrospectively analyses the functional outcomes and complications associated with pre-auricular transparotid approach for the management of mandibular condylar fractures.

Material and Methodology The retrospective data of 82 condylar fractures were analysing in 73 patients who underwent open reduction and internal fixation with pre-auricular transparotid approach. Evaluation of post-operative complications and the post-operative occlusion status, maximal inter-incise opening, adequacy of reduction and stability of fixation were assessed clinically and radiographically.

Results The exposure of fracture segment was adequate in all the cases, and fixation was easy with 2 mm delta miniplate. Transient facial nerve palsy occurred in 2 patients (2.43%). 1 patient developed sialocele which was managed conservatively. There were slight occlusal discrepancies in 10 patients at the end of 1-week follow-up which was corrected with guiding elastics at the end of 1-month follow-up. The reduction was adequate, and fixation was stable. The functional outcomes were satisfactory in term of mouth-opening and range of motion.

Conclusion The pre-auricular transparotid approach provides direct access to the fracture site resulting in less retraction of the tissue containing facial nerve and also less amount of periosteal stripping is required, thus it maintains good vascularity to the fracture segments. It provides direct visualization of the fracture without much retraction of the tissue containing facial nerve branches. It allows better fixation of the fracture with very less complication which results in good functional outcomes.

Keywords Condylar fracture · Pre-auricular approach · Transparotid approach

Introduction

Condylar process is a relatively thin portion of the mandible situated against cranial base. It is one of the most susceptible sites to fracture in the maxillofacial area and incidence accounts for 25–50% of all mandibular fractures [1, 2]. With the advancing technology and its obvious advantages over close reduction; whenever possible open reduction and internal fixation is now the first choice of treatment in any type of fracture; and condylar fracture is no more exception for the same. There are so many approaches to condyle were discussed in literature to fulfil ideal requisite for incision to surgically open the condylar area. Still newer surgeons are not feeling much confident to open condyle surgically due to its relation to parotid gland more specifically parotid gland containing branches of facial nerve and its potential injury [3–5]. Preauricular transparotid approach is simple and easy option to open the condyle with minimal risk to injuring facial nerve and its branches and other complications associated with the procedure [6]. This study retrospectively analyses our

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experience of 82 cases in 73 patients operated with pre-auricular transparotid approach in term of functional outcomes and complications for open reduction and internal fixation of mandibular condylar neck and condylar base fracture.

Materials and Methodology

The retrospective analysis of patients having condylar fracture was done in various private hospitals treated by the same surgeon with 10 years of surgical experience during 2018–2019. This study followed the principles outlined in the Declaration of HELSINKI. The patients were selected on the basis of inclusion criteria i.e., condylar neck & condylar base fracture according to Neff classification with moderate displacement (10° – 45°) and severe displacement ($> 45^{\circ}$) having ramus shortening more than 2 mm and age ranging from 18 to 60 years. The comminuted condylar fracture, which underwent close reduction were excluded. We retrospectively analyzed the record of 82 condylar fractures in 73 patients who underwent open reduction and internal fixation. Out of 73 patients, 9 patients were having bilateral condylar fractures. Pre-operatively patient underwent radiographical assessment including Orthopantomogram and computed tomography with axial and coronal slices (Figs. 1, 2).

Surgical Technique

After induction of general anesthesia, nasotracheal intubation was done. All the other concomitant mandibular fracture was treated with open reduction and internal fixation first. The pre-auricular incision was marked in pre-auricular skin crease along the entire length of ear

extending from the crest of helix superiorly to ear lobule inferiorly. The incision was given in skin and subcutaneous tissue. The blunt dissection done in anterior, superior and inferior direction in subdermal fat to increase the exposure. The parotid fascia was identified. The fractured condyle was palpated and horizontal incision given directly over the fracture site in parotid fascia parallel to the expected course of facial nerve. The blunt dissection carried out in parotid gland and masseter muscle to expose the fracture site. The nerve stimulator was not used. If the branches of facial nerve were encountered, it was carefully protected and retracted either superiorly or inferiorly. The fracture was visualized; the fractured condyle was retrieved and reduced. The temporary maxillomandibular fixation was done. The fixation done with 2.0 mm delta plate and 6 mm screws (Fig. 3). The maxillomandibular fixation was released; occlusion and mandibular movements were checked. The parotid fascia was meticulously approximated with vicryl 3–0 to prevent parotid fistula formation or Frey syndrome. The layer wise closure done with 3–0 vicryl and 4–0 ethilon (Fig. 4). The sutures were removed between 7 and 10 days. All the patients were advised to take soft diet for 1 month. Early functional mouth opening and closing physiotherapy was encouraged.

Evaluation of post-operative complications such as haemorrhage, facial nerve palsy, parotid fistula, post-operative infection, Frey syndrome, sialoceles formations. The post-operative occlusion status, maximal inter-incisal opening, adequacy of reduction and stability of fixation were assessed clinically and radiographically at the interval of 1 week, 2 weeks, 1 month, 3-month, 6 month and 1 year.

Results

A total of 82 condylar fractures in 73 patients were treated with open reduction and internal fixation. Male patients were 51 and female 22 with an age range from 18 to 60 years. Mean age was 36.09 years. Out of 82 fractures, 9 were bilateral condylar fractures. 48 fractures were condylar neck, and 34 were subcondylar fractures. (See Table 1).

Both condylar neck fracture and subcondylar fractures were adequately exposed and visualized through pre-auricular transparotid approach. The retrieval of fractured condylar segment was easy and was reduced adequately in all the cases. There was no haemorrhagic complication intra-operatively and post-operatively in any cases. The facial nerve weakness occurred in 2 patients (2.43%) post-operatively. One patient had inability in closing the eye, and other had facial asymmetry while laughing and

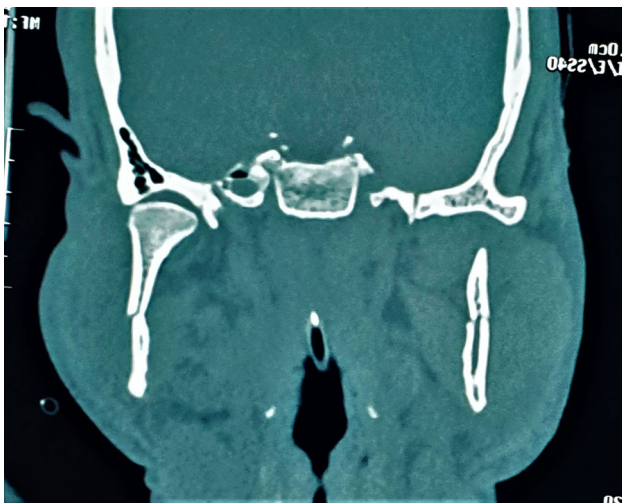


Fig. 1 Pre-operative computed tomography scan (coronal)

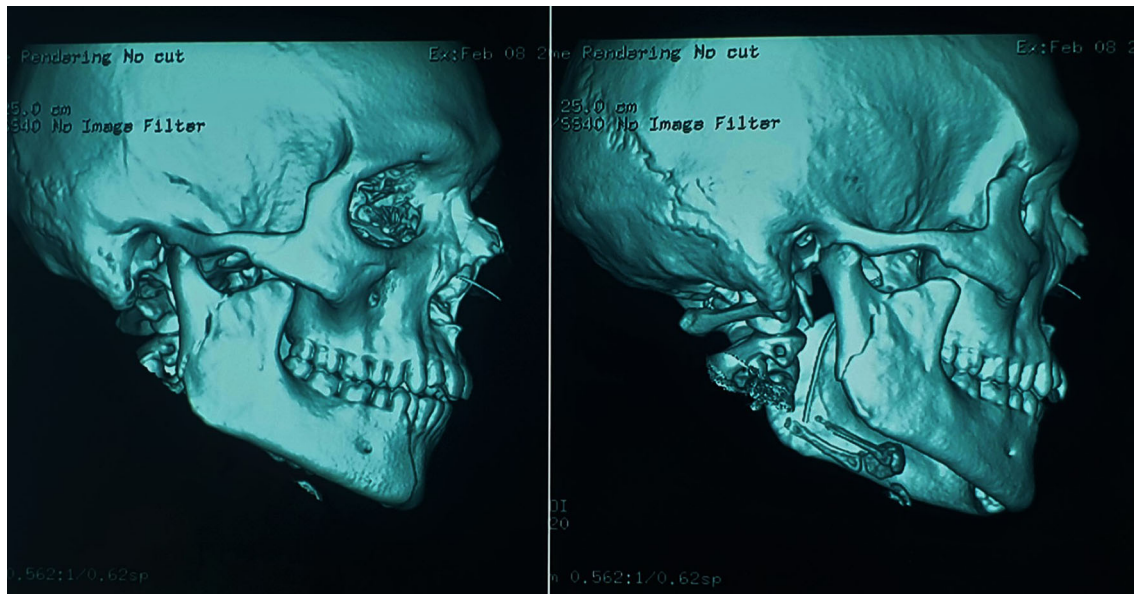


Fig. 2 Pre-operative computed tomography scan (3-D reconstruction)



Fig. 3 Exposure of fracture site and fixation of delta plates



Fig. 4 Closure

inability to blow. It was transient and eventually resolved in both the patients at 3 months follow-up.

There were slight occlusal discrepancies in 10 patients at the end of 1-week follow-up. The guided elastics were placed in those cases. At the end of 1-month follow-up there was no occlusal discrepancies in any cases.

The average maximal interincisal opening was 34.3 mm at the end of 2nd week follow-up which increased progressively to 38.9 mm after active physiotherapy at

1 month to 1-year follow-up. After active physiotherapy and training, the protrusive movements were free 12.6 mm (mean), and the lateral excursion was pain free for 10.4 mm (mean) at the end of 3-month follow-up in all the patients. The post-operative radiograph at the end of 6 month and 1-year follow-up has shown adequate reduction of fracture with no complication in implant fixation like screw loosening or resorption near the fixation.

Table 1 Demographic data of the study population

Parameters	Value
<i>Age</i>	
Mean	36.09 years
Range	18–60 years
<i>Gender</i>	
Female (%)	30.1%
Male (%)	69.9%
Female: male ratio	1: 2.32
<i>Site</i>	
Unilateral (%)	87.67%
Bilateral (%)	12.32%
<i>Level of condylar fracture</i>	
Condylar neck fracture (%)	58.5%
Condylar base fracture (%)	41.5%

One patient developed sialocele which was managed conservatively with pressure dressing which was resolved at the end of 1-month follow-up. On 1-year follow-up none of the patient had formation of parotid fistula, no incidence of Frey's syndrome in any patient or any other complications.

Discussion

The mandibular fractures are more frequent fractures in facial trauma, the condyle are involved in 30–40% of the cases [7–9]. In our study, the incidence of condylar fracture was most commonly seen in 2nd–4th decade age group with a mean of 36.09 years, were similar to the previously published data [10–12]. The incidence of condylar neck fracture was common (58.5%) followed by subcondylar fracture (41.5%) in present study which is contradictory to the data in previous studies [13].

The open reduction and internal fixation are preferred treatment modality for condylar fracture. The recent evidence and meta-analysis suggest the better outcome in term of mouth-opening, range of motion and occlusion with the use of open reduction and internal fixation over the closed reduction [14, 15]. Early functional rehabilitation occurs in open reduction and internal fixation because of shortened time period for remodeling and neuromuscular adaptation as compared to closed reduction [16, 17].

Selection of surgical approach for condylar fracture depends on various factors like location of fracture and displacement of fracture segments [18]. Many surgical approaches are based on their location over the skin and route of dissection to the fractured segment. The surgical approach to the condylar neck includes pre-auricular

approach, post-auricular, submandibular approach, peri-angular approach, retromandibular transparotid approach, retromandibular antero-parotid transmasseteric approach, rhytidectomy approach, mini-parotid approach, preauricular transmasseteric anteroparotid approach, transparotid approach, retroparotid [3, 19–24].

In classical pre-auricular approach, the condyle is approached above the zygomatic arch which requires downward traction of zygomaticofacial branch of facial nerve which may cause transient facial nerve palsy [25–27]. Moreover, the joint capsule is incised and opened to approach the condylar head and condylar neck which causes stripping of the temporomandibular joint capsule from the lateral pole of condylar head and may require stripping of lateral pterygoid muscle [25]. This may cause vascular compromise to the proximal fracture segment which results in resorption of proximal segment. The retrieval of displaced or dislocated proximal segment is quite easy but the fixation through this approach is difficult [28, 29]. In our study, through described pre-auricular transparotid approach, the retrieval of the fractured condylar segment was quite easy, and fixation of the segment was adequate.

When the condylar fracture is approached from the inferior side such as submandibular approach or high submandibular approach having the small proximal fracture segments requires the excessive periosteal stripping to expose the fracture segment which may compromise the vascularity of fractured segment [17]. The exposure of high condylar or condylar neck fracture and fixation is very difficult through submandibular approach [30]. Moreover, through this approach the retraction is required in superior direction which may cause compression over the marginal mandibular branch of facial nerve, may result in transient facial nerve palsy [31, 32]. The retrieval of medially dislocated or displaced proximal segment is very difficult.

The retromandibular approach is quite easy and proximity of incision to the posterior border of ramus makes it a choice for subcondylar fractures [24]. It has two popular variants- trans-parotid and transmasseteric antero-parotid. The retrieval of proximal segment is difficult but the fixation is easy [28], but for condylar neck fracture, more amount of periosteal stripping is needed which may cause vascular compromise to the proximal segment.

In this preauricular transparotid approach, as the condyle is approached via incision given directly over the fracture, the injury to the temporomandibular joint capsule is avoided. Thus, the blood supply to the fracture segments is maintained from superior direction and inferior direction without hampering their periosteal source.

The concern anatomical structure of surgical importance in this region is facial nerve and its terminal branches. It enters the parotid gland and divides into two divisions or in

rare instance three divisions, and these divisions give terminal branches. There are various types branching pattern of facial nerve described in literature. The most common is type 3 branching pattern which has the one anastomosis between the zygomatic branch and buccal branch which is present more anteriorly from the gland [33]. The temporozygomatic branch of facial nerve is closely related to condylar neck region and about 5.5 mm of tissue separates it from condyle [34]. Thus, approaching the condyle from superior aspect in classical pre-auricular approach dissection, the temporozygomatic branch is retracted inferiorly in the flap. According to recently published metanalysis [35], the incidence of transient facial nerve using this subfascial routes of dissection are 8.5% for condylar head fracture and 11% for condylar neck fracture, and overall incidence was 10%. Subfascial dissection and downward retraction of flap containing facial nerve limit the exposure of the inferior part condyle because it requires more force for retraction of flap which results in increased incidence of transient facial nerve injury.

In this approach, the dissection is carried out between the nerve free anatomic windows between the branches of facial nerve. Anatomically in most of the cases the fibers of buccal and zygomatic branches have either 1 or 2 anastomoses [36], but it occurs quite anterior to the parotid gland thus nerve free window is available to dissect the parotid gland and reach the condyle in this approach. The incision on parotid fascia is given directly over the fracture parallel to the anticipated course of facial nerve. Thus, less retraction of flap containing facial nerve is needed for the fracture exposure and osteosynthesis. In this study, the transient facial nerve palsy occurred post-operatively in 2 patients, the most common branches involved were zygomatic and buccal branch. The incidence of transient facial nerve injury in this study was 2.43%, which is quite less than traditional preauricular with subfascial dissection which usually resolved in 3 months. There was no permanent facial nerve injury.

The exposure of the fracture was adequate without more traction force over the facial nerve which allowed easy retrieval of fracture segment and adequate reduction. The undermining of subdermal fat in anterior, inferior and superior direction around the incision allows good exposure with small incision. This allows adequate fixation of the delta miniplates and screws which provides good fracture stability and proper healing of the fracture segment. There were slight occlusal discrepancies in few patients which were due to muscle imbalance. Post-operative guiding elastics were placed, and occlusion was stabilized within 1 month.

The early mobilization and active physiotherapy allow the patient to achieve pre-traumatic range of motion sooner as compared to immobilization with maxilla-mandibular

fixation which was well evident in our study [37]. The functional outcomes were excellent in terms of mouth-opening, protrusive movement and lateral excursion.

There are various complications associated with this approach such as hematoma, parotid fistula, sialocele or Frey's syndrome as of transparotid dissection. This can be avoided by proper dissection and water tight closure of parotid fascia. In this study, 1 patient had sialocele formation post-operatively which resolved after 1 month with pressure dressing. There were no other complications noted.

The advantages of this pre-auricular transparotid approach are (1) The incision in pre-auricular region hides the scar in skin crease in front of ear. (2) The horizontal incision is made directly over the fracture in parotid fascia, which allows adequate exposure of fracture segment with less periosteal stripping and less amount of traction needed for retraction even for high subcondylar fracture. (3) Direct vision to the fracture in perpendicular direction allows easy retrieval of fracture segment, and reduction can be easily visualized, and continuation to posterior border of mandibular condyle can be verified. (4) As the good retraction is gained till subcondylar region, it allows proper fixation of stable osteosynthesis device.

The main limitation of this study is retrospective analysis. Further prospective randomised controlled trial should be done to compare this approach with other available approaches to the condyle in future with large number of samples. Despite of fewer complications in this study, the decision for selection this preauricular transparotid approach solely depends on the choice, skill and experience of operating surgeon. Visualising the fracture in direct vision and reducing it adequately and rigid fixation gives better functional adaptation without stretching the tissue containing facial nerve.

Conclusion

Taking the advantage of nerve free window between the branches of facial nerve in parotid gland, this pre-auricular transparotid approach provides direct access to the fracture site resulting in less retraction of the tissue containing facial nerve and also less amount of periosteal stripping is required, thus it maintains good vascularity to the fracture segments. It provides good direct visualization of the fracture in perpendicular direction. It allows rigid fixation of the fracture with very less complication which results in better functional outcomes.

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Declarations

Conflict of interest The authors certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

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