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Modified Blair's (Transparotid) Approach for Open Reduction of Condylar Fractures - Our Experience

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ABSTRACT

The treatment of condylar fractures is complex and controversial.The aim of the present study is to evaluate the treatment outcomes of open reduction of condylar fractures using Modified Blair's (Transparotid) approach.

Materials and Methods: A prospective study was conducted March 2021 to April 2023. Patients reporting to the department with condylar neck/ subcondylar fractures with or without other facial bone fractures and requiring open reduction internal fixation were included in the study. Modified Blair's (Transparotid) approach was used to expose the condylar fracture site. Intraoperative surgical time of exposure, post-operative variables like swelling, pain, status of occlusion, facial nerve dysfunction, salivary leakage (salivary fistula/sialocele), Frey's syndrome, greater auricular nerve damage, subjective assessment of scar esthetics were recorded after immediate post-op day 1, after 1st post-op week, after 1st post-op month, after 3rd post-op month and after 6th post-operative month.

Results: The study included 36 condylar fractures sites in 30 patients, 24 unilateral and 6 bilateral. The mean average time from incision to exposure of fracture site was 22.5 minutes. Mild occlusal discrepancy was recorded in 3 patients which was corrected with elastic traction in the post-operative period. Transient facial nerve dysfunction was recorded in 6 patients with spontaneous recovery of nerve function within 6 months. No other major complications were noted.

Conclusion: The Modified Blairs (transparotid) approach provided sufficient exposure of the condylar fracture site to facilitate anatomical reduction. It is a good technique and provides stable results with low complication rates and acceptable scar.

Keywords: Condylar fractures, Transparotid, Modified Blairs approach, Facial nerve injury, Complications.

INTRODUCTION

Mandible fractures are the most common maxillofacial injuries[1]. The condylar neck and subcondylar fractures constitute around 19-29% and 62-70% of mandible fractures respectively [2]. The management of condylar fractures can be divided into Closed Reduction(conservative) and Open Reduction (surgical). The closed method includes conservative treatment like soft diet, analgesics, functional therapy and intermaxillary fixation (IMF). The open method involves exposing the fracture site, anatomic reduction and stable osteosynthesis [3]. It is difficult to decide which method is better, as both have their merits and demerits. Therefore, whether to choose open or closed method should depend on the fracture site, severity of displacement, status of occlusion, surgeons' preference, level of skills and expertise [4].

Many surgeons prefer open reduction to treat condylar fractures, as there is enough evidence in the literature that open reduction can provide better functional outcomes. It facilitates anatomic reduction, rigid internal fixation and faster restoration of function. Schneider et el conducted a study on 66 patients with displaced condylar fractures. He found that patients who underwent surgical treatment had better functional outcome compared to conservative treatment [5]. Although many surgeons are preferring to opt for surgical treatment, it is still difficult due to various reasons. Firstly, there are complex anatomical structures within the small area around the condyle like parotid gland, facial nerve, maxillary artery, temporal vessels etc. Secondly it is associated with surgical complications like small field of vision, intraoperative bleeding, facial nerve dysfunction, salivary leakage, scar formation etc.

There are a wide variety of surgical approaches to condylar fractures (Table 1). The transparotid approach is considered an easy and direct approach to the condylar neck and subcondylar region, allowing anatomical reduction and stable osteosynthesis. The aim of the present study was to evaluate the treatment outcomes of open reduction of condylar fractures using Modified Blair's (Transparotid) approach which is commonly used at our Center.

MATERIALS AND METHODS

A prospective study was conducted in the Dept. of Oral & Maxillofacial Surgery from March 2021 to April 2023. Ethical approval was sought prior to the commencement of the study (PIMS/IEC-DR/2021/90). The study was conducted in accordance with the ethical standards given in Declaration of Helsinki (revised in 2013). Patients reporting to the department with condylar neck/ subcondylar fractures with or without other facial bone fractures who gave written informed consent and needed open reduction internal fixation were included in the study (Figure 1). The indication for open reduction of condylar neck/subcondylar fractures included presence of deranged occlusion, displacement/ dislocation of the condyle from the glenoid fossa, vertical shortening of the ramus of more than 2 mm. Meeting at least two of these criteria were considered for open reduction.

All patients underwent surgery under general anesthesia. Modified Blair's (Transparotid) approach was used to expose the condylar fracture site (Figure 2). Sharp dissection of the skin and subcutaneous tissue was done. After exposing the parotid capsule, a transverse incision was placed on the capsule, followed by blunt dissection through the parotid gland in the horizontal direction, parallel to the facial nerve branches. The facial nerve was not dissected deliberately, however if it was encountered in the surgical field, it was carefully retracted. Once the masseter muscle was exposed, sharp dissection was done through the muscle and periosteum to expose the fracture site. Intraoperatively the surgical time taken from incision to exposure of the fracture segments was recorded. The fracture was reduced and fixed with either 3D miniplate or conventional straight miniplates (Figure 3). After fixation, a watertight closure of the

parotid capsule was done with 3-0 vicryl (Figure 4) and the wound was closed in layers. The skin closure was done with 5-0 prolene.

In the post-operative period variables like swelling, pain, status of occlusion, facial nerve dysfunction, salivary leakage (salivary fistula/sialocele), Frey's syndrome, greater auricular nerve damage, subjective assessment of scar esthetics was recorded after immediate post-op day 1, after 1st post-op week, after 1st post-op month, after 3rd post-op month and after 6th post-operative month.

RESULTS

A total of 30 patients who met the inclusion criteria and gave written informed consent were included in the study. There were 26(86.6%) males and 4(13.3%) females. The age range was 18-46 years (mean ± SD 29.93 ± 9.39). The most common aetiology was road traffic accidents (RTA) seen in 60% (n=18) of the patients, followed by personal violence in 20%(n=6), self-fall in 10%(n=3), industrial accidents in 6.6%(n=3) and sports related injury in 3.3%(n=1) of the patients (Table 2).

Unilateral condylar fracture was seen in 24(80%) patients and 6(20%) patients had bilateral condylar fractures, therefore in a total of 30 patients, 36 condylar fractures were treated with ORIF under GA. According to Lindahl's classification, out of 36 condylar fractures, 21(70%) were diagnosed with subcondylar fractures and 15(41.6%) were condylar neck fractures. Medial displacement of the condyle was seen in 56.6% (n=17) of the cases, lateral displacement was seen in 46.6%(n=14) of cases. In 5(16.6%) cases the condyle was dislocated from the glenoid fossa. Isolated condylar fractures were seen in 7(23.3%) patients, 18(60%) patients had other mandible fracture sites and 5(16.6%) patients had associated midface fractures (Table 2).

All the patients underwent ORIF under general anesthesia. The Modified Blairs incision (Transparotid approach) was used to expose the fracture site (Figure 2). The mean average time taken to expose the fracture site was 22.5 minutes (range 16-35minutes). The facial nerve branches were encountered in 30.5% (n=11) of fractures. The transparotid approach provided sufficient exposure of the condylar fracture site to facilitate anatomical reduction. In 10 cases 2-hole miniplates (one along the posterior border of ramus and second along the anterior border) were used. In all other cases (n=26) 3-D miniplates were used (Figure 5).

All the patients were evaluated for complications on immediate post-operative day 1, after 1 week, after 1month, after 3 months and after 6 months. Pain and swelling were present in all the patients on immediate post-operative day 1, which gradually subsided after 1 week. In 3 patients' mild occlusal discrepancy was recorded in the immediate post-operative period for which elastic traction was given for 2 weeks. At the end of 3 months, satisfactory occlusion was achieved in all the 3 cases (Table 3) (Figure 5).

In 6 patients facial nerve dysfunction (House & Brackmann Scale- Grade 2 in 4 patients and Grade 1 in 2 patients) was recorded in the post operative period, with spontaneous recovery of nerve function within 6 months in every case (Table 3). Permanent facial nerve damage was not recorded in any patients. There were no cases of salivary leakage, Frey's syndrome and greater auricular nerve damage in the present study. The post-operative scar was subjectively assessed as acceptable by all the 30 patients at the end of the 6th post-operative month (Figure 6).

DISCUSSION

Mandible fractures are very common due to maxillofacial trauma and account for 36% to 59% of all maxillofacial fractures [7,8]. The condylar neck and subcondylar fractures constitute around 19-29% and

62-70% of mandible fractures respectively [2]. Road traffic accidents are the most common cause of condylar fractures followed by self-fall etc [9]. In the present study, the most common cause of condylar fractures was RTA, followed by personal violence, self-fall, industrial accidents sports in descending order. The treatment of condylar fractures is complex and controversial. Whether to choose open or closed reduction depends on multiple factors. These factors include degree of displacement or dislocation, level of the fracture, vertical shortening of the ramus length, status of occlusion, uni- or bilateral condylar fractures, presence of other mandible or facial fractures and age of the patient [2,10]. If the occlusion is undisturbed or minimally deranged, then a closed method may involve soft diet, regular check-up, or even placement of arch bars and elastic traction [11,12].

Open method is opted according to surgeons' preference, skills, and experience. There are various surgical problems associated with the open method which include, limited access, damage to facial nerve and its branches, post-operative auricular paraesthesia due to damage to greater auricular nerve, damage to parotid gland (fistula/sialocele) [12]. However, if open reduction is indicated (according to Zide & Kent [13-15]), there is no doubt that open reduction and internal fixation will give better functional results. Therefore, many surgeons are preferring open method for the treatment of condylar fractures. Once the open method is chosen, the next dilemma the surgeon faces is which surgical approach to use. In the literature, various approaches to the condylar region are described (Table 1). It is difficult to decide which among these approaches is the ideal technique as each has its own merits and demerits.

Submandibular approach is preferred in subcondylar and ramus fractures. Exposure of high condylar neck fractures needs aggressive retraction which can damage the facial nerve branches and tightening of the proximal screws can be difficult [16]. The incidence of facial nerve injury is reported to be 5.3% to 48.1% [17].

Retromandibular transmassetric approach gives a good exposure of the posterior border of ramus and subcondylar region. It provides a direct visual field and nearly straight-line access to the fracture site as the working distance between the incision and fracture site is short [18,19]. The incidence of post-operative transient facial nerve weakness is around 12% to 48%. This approach is not suitable for high condylar neck fractures [20].

Guven et el, in his case report of 2 cases of transcutaneous transparotid approach emphasized that, the fracture site can be exposed through the parotid tissue and masseter muscle, without damaging the branches of the facial nerve [21]. In a study by Croce et el, on 32 mandibular condylar fractures that were treated with transparotid approach, transient paresis of facial nerve was seen in 27% of the cases with full recovery within 6 months [22]. Similar study done by Ellis et el, he observed that at 6th week, facial nerve weakness was observed in 17.2% of the cases, with full recovery at the end of 6 months [23].

Al-Moraissi et al, in his study evaluated the risk of injury to facial nerve in various surgical approaches to the condyle. They concluded that the retromandibular approach with either trans-masseteric anteroparotid or subparotid dissection for condylar base and condylar neck fractures and the deep subfascial approach for condylar head fractures are associated with the lowest risk of facial nerve damage [24].

In the present study, transient facial nerve dysfunction was seen in 20%(n=6) of the patients, mainly the buccal and marginal mandibular branches, with full recovery after 6 months. The facial nerve weakness observed in the present study could be due to the traction exerted on the soft tissues during retraction for visualization of the fracture site. These findings were similar to that of Sikora et el [25].

Yang et el in his study used the transparotid approach for the treatment of 42 patients with condylar base fractures. They found the following complications: occlusal disturbances in 3 cases (7%), post-operation

haematoma in 2 cases (4.8%), a salivary fistula in 3 cases (7%), and transient paresis of the facial nerve in 8 patients (19%). Stable osteosynthesis was achieved in all the cases. The authors concluded that transparotid approach allows proper fracture reduction and stable osteosynthesis with good aesthetic results and has a low complication rate [26]. Kim et el in their study highlighted the advantages of transparotid approach which include direct visualization of the fracture site, short time of surgical procedure, a high probability of achieving stable occlusal relationships in the post-operation period [27].
In the present study, the transparotid approach utilized the Modified Blairs incision to expose the condylar neck or subcondylar fractures. This incision helps in exposing a wider field of view. The parotid capsule was identified, and a small transverse incision was placed to expose the parotid gland, above the level of the fracture site. Thereafter only blunt dissection was done to expose the fracture site directly from above, through the gaps between the branches of the facial nerve. The aim was to dissect through the nerve-sparing spaces between the major branches, usually present between the zygomatic and buccal branches or the buccal and marginal mandibular branches. Cautery should be avoided during parotid dissection.
Choi et el in his case report of 3 cases of subcondylar fractures, used facelift incision for transmassetric antero-parotid approach. Facial nerve palsy was seen in 2 out of the 3 cases due to the severe retraction, other complications included Frey's syndrome [28]. However, in the present study, the transparotid approach does not demand severe retraction of the facial nerve branches, therefore incidence of facial nerve injury is minimised. In the present study dissection of the facial nerve was not done deliberately, therefore the normal anatomy of the nerve was preserved. If a major branch was encountered during dissection, it was gently retracted or protected by changing the direction of dissection away. The facial nerve branches were encountered in 11 cases.
Zide et el has reported that facial nerve dissection is not always necessary [14]. In another study by Girotto el et on retromandibular transparotid approach, no facial nerve dissection was done. They used a nerve stimulator [29]. Therefore it can be concluded that facial nerve dissection is not mandatory. If the surgeon prefers, a nerve stimulator can be used. However, we did not use a nerve stimulator.
Stable osteosynthesis was achieved in all the cases. In the post-operative period, 3 cases had mild occlusal discrepancy for which elastic traction for a period of 2weeks was done. At the 6^{th} post-operative month, occlusion was satisfactory in all the cases. The wound closure was done in layers, especially the parotid capsule, which minimized the risk of salivary leakage. No other major complications were reported in the post-operative period.

CONCLUSION

The modified Blairs (transparotid) approach is a suitable technique for the open reduction of condylar neck and subcondylar fractures. This technique provides a wider field of view for anatomic reduction and stable osteosynthesis. The incidence of transient facial nerve dysfunction is minimal if careful blunt dissection through the parotid gland is performed. The wound closure should be done in layers, with special emphasis on the parotid capsule closure to avoid salivary leakage. The scar is acceptable to the patient. This technique is simple to master and if done properly can provide stable and esthetic results with low complication rates.

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CONFLICT OF INTEREST STATEMENT
The authors have stated explicitly that there are no conflicts of interest in connection with this article.

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Legends for Tables
Table 1 – Various surgical approaches to the condyle.
Table 2- Patient distribution according to gender, etiology, site of fracture.
Table 3- Post-operative complications

Legends for Figures
Fig 1- CT scan of patient with unilateral left Subcondylar fracture with medial displacement along with fracture of left angle of mandible.
Fig 2- Skin marking of Modified Blair's incision.
Fig 3- Anatomical reduction of the subcondylar fracture and fixation with two 2-0 hole miniplates.
Fig 4- watertight closure of the parotid capsule to avoid salivary leakage.
Fig 5- Post-operative OPG.
Fig 6- Post-operative healing.

Tables

Table 1

Sr. No.	Approaches to Condyle
1	Preauricular
2	Endaural
3	Retroauricular
4	Submandibular
5	Retromandibular
6	Rhytidectomy
7	Face-lift incision
8	Modified Blairs incision
9	Transparotid
10	Transmasseteric antero-parotid
11	Intraoral
12	Endoscopic

Table 2

Variables	Total no of patients (n)	Percentage (%)
Gender		
Male	26	86.6
Female	4	13.3
Total	**30**	
Etiology		
RTA	18	60
Personal violence	6	20
Self fall	3	10
Industrial accidents	3	6.6
Sports	1	3.3
Unilateral	24	80
Bilateral	6	20
Total	**36**	
Lindahl's classification		
Condylar Neck	15	41.6
Subcondyle	21	70
Medial displacement	17	56.6
Lateral displacement	14	46.6
Dislocation	5	16.6
Isolated condyle fracture	7	23.3
Associated mandible fractures	18	60
Associated midface fractures	5	16.6

Table 3

Complications		Post-op Day1 (n)	Post-op Week 1 (n)	Post-op Month 1(n)	Post-op Month 3(n)	Post-op Month 6(n)
Facial Nerve Injury (House Brackmann Scale)	Grade 2	4	4	4	0	0
	Grade 1	2	2	0	0	0
Occlusal discrepancy		3	3	0	0	0
Others- salivary leakage, Frey's syndrome and greater auricular nerve damage		0	0	0	0	0

n- total number of patients

Figures

Fig 1

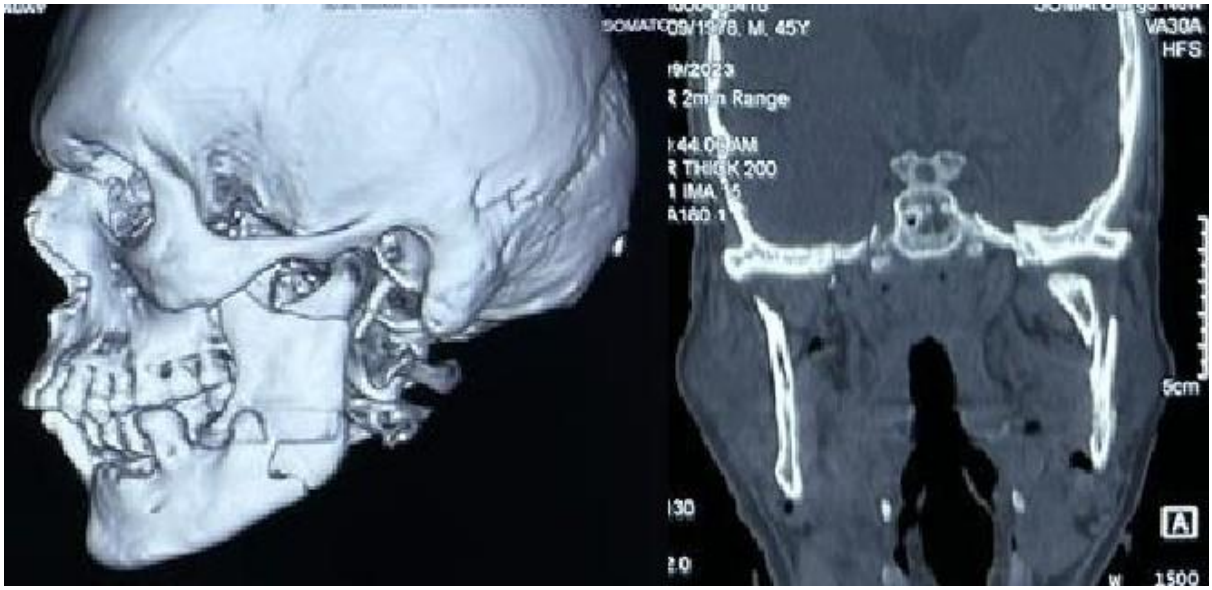

Fig 2

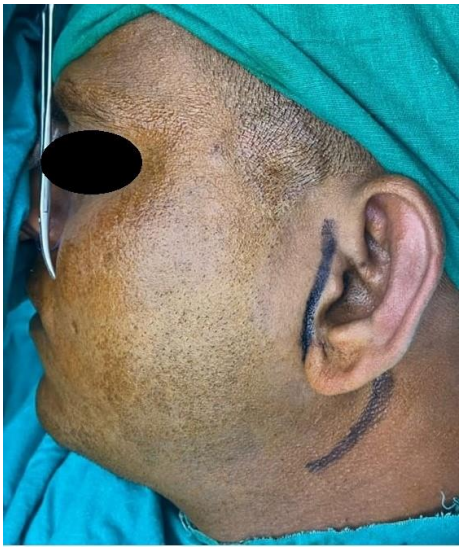

Fig 3

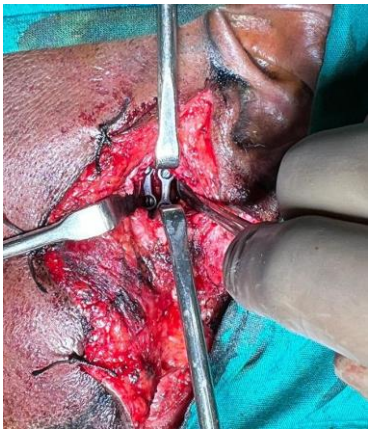

Fig 4

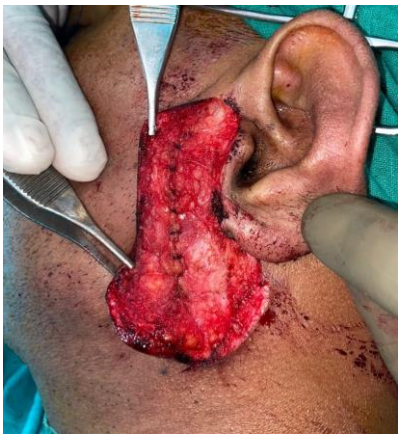

Fig 5

Fig 6