

Management of mandibular condylar fractures by the retromandibular approach – An evaluation of its complications



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ABSTRACT

Background: Mandibular condyle fractures are commonly encountered in the practice of maxillofacial surgeon. Even though being a commonly seen fracture, the fracture condyle of the mandible demands meticulous diagnosis and a tailor made treatment plan for each and every patient. The treatment plan largely depends on the age of the patient and the displacement of the fractured fragment. This retrospective study provides an insight in to the management of fracture mandibular condyle by retromandibular approach.

Aims and Objectives: The aim of this study was to evaluate the complications of the retromandibular transparotid approach in surgically operated patients with mandibular condylar fractures. **Materials and Methods:** A retrospective study was performed by analyzing the treatment records of patients who underwent open reduction and internal fixation (ORIF) by the retromandibular transparotid approach for seven years. Thirty-five patients who fulfilled the criteria were included in the study. Clinical parameters such as marginal mandibular nerve weakness, sialocele, occlusal derangement and decreased mouth opening were recorded during the first, fourth and twelfth weeks postoperatively. The retrieved data were analyzed for complications of the retromandibular approach in the management of mandibular condylar fractures. **Results:** In patients (N= 35) who underwent ORIF by the retromandibular transparotid approach, findings recorded at the end of the first week included 5 patients with sialocele, 2 patients with derangement of occlusion, 6 patients with restricted mouth opening and 1 patient with marginal mandibular nerve weakness. However, postoperatively, at the end of 4 weeks, the only complication observed was sialocele in 3 patients. Furthermore, at the end of 12 weeks, sialocele had completely resolved in all 3 patients, and they were free of complications. **Conclusion:** The retromandibular transparotid approach is a reliable and straightforward technique with manageable complications.

Key words: Condylar fracture; Facial nerve injury; Mandible fracture; Sialocele

INTRODUCTION

Mandibular condylar fracture management is a debatable topic. There is a history of controversial theories regarding the evolution of maxillofacial surgery. Mandibular condylar fractures were routinely treated by conservative management two decades ago due to the potential

complications of open reduction. Treatment outcomes such as occlusal derangement, asymmetry of the mandible and mandibular deviation were observed after closed reduction due to suboptimal management.¹

The clarity on adopting open reduction techniques was accepted due to varied number of studies worldwide

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supporting open reduction. A retrospective study on complications of retromandibular approach in mandibular condylar fractures over a period of seven years was conducted at the Department of Dentistry, IGMC & RI from 2011 to 2018. The results were analyzed for complications.

MATERIALS AND METHODS

A retrospective study on complications of management of condylar fractures with the retromandibular transparotid approach was conducted in the Department of Dentistry, IGMC & RI from 2011 to 2018 (7 years). The Ethical Committee approval number is (IEC no: 17/163/IEC/PP/2018). The pre- and postoperative inpatient records, follow-up records, CT, radiographs and photographs were retrieved. The tabulated data were analyzed for complications of the retromandibular approach in the management of condylar fracture.

The clinical parameters assessed during the 1st week, 4 weeks and at the end of 12 weeks were - Marginal mandibular nerve weakness, Sialocele, Decrease in mouth opening (inter incisal distance < 45 mm) and Occlusal derangement.

The **Inclusion criteria** of the patients included for the study were- 18 to 65 years, Unilateral condylar neck/subcondylar fracture, Condylar / Subcondylar fractures with associated mandibular fractures, Condylar / Subcondylar fractures with associated Zygoma fractures. The **Exclusion criteria's** were- Condylar head fractures or intracapsular fractures, Fractures of mandibular condyle with Lefort fractures, comminuted fractures of the condylar head and neck, bilateral condylar fractures, fractures involving completely edentulous mandible and maxilla. Those patients who fulfilled the above criteria were included in the study.

Surgical procedure

Facial N divides into temporo facial and cervico facial divisions at a point inferior to the external auditory meatus. The average distance between the external auditory meatus and the bifurcation is $2.3 \text{ cm} \pm 0.28 \text{ cm}$. The two divisions move forward and enter into the substance of the parotid gland to divide into their terminal branches. The marginal mandibular branch crosses the mandible at the lower end of the ramus. A retromandibular incision was designed in the gap between the marginal mandibular N and the buccal branch of the facial nerve. Through this anatomical void, the mandible can be approached safely without damaging the Facial nerve.

A 2 cm long incision was placed 0.5 cm below the ear lobule and 1 cm behind the posterior border of the mandible. An incision with a BP blade (no. 15) was placed in the skin and subcutaneous tissue followed by the parotid capsule. Below the parotid capsule, blunt dissection was performed with due care taken not to injure the facial nerve. The masseter was located, and an incision was placed in the posterior border of the mandible to relieve the pterygomasseteric sling. Furthermore, the masseter was elevated in the antero-superior direction parallel to the facial nerve fibers to reach out to the fractured segments. A subperiosteal dissection below the masseter leads to condylar neck, sigmoid notch, subcondylar and superior ramus of the mandible. A retraction in the sigmoid notch or ramus with counter pressure in the contralateral third molar region by the assistant relieves the impacted and displaced condyle; this is the maneuver that is routinely followed for reduction. Further reduction is facilitated by traction with a towel clip or stainless steel wire in the angle of the mandible to restore the reduced ramus height. A langenback retractor posterior to posterior border of ramus helps in easy fixation of fractures, protects the nerve and aids in adequate exposure. A 2 mm four hole titanium straight plate with a gap was fixed with 6 mm screws, as shown in Figures 1-5. Only one plate was used in 13 patients. Two miniplates were fixed in 22 patients who had severe displacement. The wound was approximated in layers with special care to close the parotid capsule with interrupted horizontal mattress resorbable sutures. This ensures a watertight closure. The skin is closed with 5 monofilament subcuticular sutures or interrupted sutures.

No surgical drains were used. A layer wise closure and meticulous surgical procedure was performed. This procedure minimised fluid collection and the need for surgical drain in all cases.

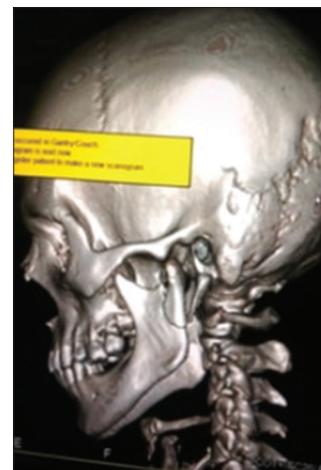


Figure 1: Preoperative CT scan



Figure 2: Fixation with titanium miniplate



Figure 3: Closure with horizontal mattress suture



Figure 4: Sialocele aspiration

The restriction of opening of mouth during the first week of post-operative period was mostly due to fear of pain during opening and swelling in the surgical site. After 5 days of surgery, patients were educated with rapid mouth



Figure 5: Postoperative scar one year

opening exercises using stacks of wooden tongue blades. The thickness of each blade is 2 mm. Sequentially, the piles of sticks were increased in number to a maximum of 25 blades. The frequencies of this exercise were 2 to 3 times daily with a request to hold their maximum mouth opening for 2 to 3 minutes. With this maneuver, trismus considerably decreased in one week, and all patients achieved a post-operative mouth opening of 40 to 45 mm.

Sialocele were largely amenable to pressure dressing and repeated aspirations, which was done a maximum of three times at an interval of 5 to 7 days. Closure of the parotid capsule by interrupted horizontal mattress resorbable 3/0 suture in our experience largely helped in preventing this complication. No medical management was advocated.

Marginal mandibular nerve weakness recovered without any medical management. The basis could be justified by the fact that the temporary paresthesia was due to neurapraxia and not due to neurotmesis. Furthermore, the cause of neurapraxia in the retromandibular transparotid approach can be attributed to surgical traction during reduction and fixation of displaced or dislocated condyles. No intervention or medical management was done.

Minor occlusal discrepancies were treated by selective grinding on the second post-operative day. Patients who had marked occlusal discrepancies were treated with maxillo mandibular fixation for 2 weeks.

RESULTS

The total number of patients enrolled in the study was 35 (N=35). The number of male patients was 26, and the number of female patients was 9. Patients were followed up in the following sequence: at the end of the 1st week, 4 weeks and at the end of 12 weeks (Table 1).

Table 1: Post-Operative complication in patients (1 week–12 weeks)

| Complications | 1 st Week | 4 weeks | 12 weeks |
|------------------------------------|----------------------|---------|----------|
| Marginal Mandibular nerve weakness | 1 | 0 | 0 |
| Decrease in mouth opening | 6 | 0 | 0 |
| Occlusal derangement | 2 | 0 | 0 |
| Sialocele | 5 | 3 | 0 |

At the end of the first week, 5 patients had sialocele, 2 patients had derangement of occlusion, 6 patients had restriction in mouth opening, and 1 of the patients had mandibular nerve weakness. Postoperatively, at the end of 4 weeks, the only complication observed was sialocele in 3 patients. At the end of 12 weeks, sialocele had completely resolved in all 3 patients, and they were free of complications (Table 1).

Minor occlusal discrepancies were treated by selective grinding on the second postoperative day. Only one patient required IMF with elastics for 2 weeks due to severe shortening of ramus and condylar displacement. None of the patients suffered permanent occlusal deformity.

In all our patients, postoperative CT scans demonstrated restoration of condylar height due to adequate reduction and fixation of dislocated/displaced condyles to the ramus. This helped us achieve pre-morbid occlusion without premature contact of teeth on the same side or open bite on the contralateral side.

DISCUSSION

Mandibular condylar fractures are not uncommon and account for 30 percent of mandibular fractures.² Open reduction is considered superior to conservative management.^{3,4} Conservative management does not address shortening of the ramus, dislocation of the condylar head or facial asymmetry. ORIF leads to accurate anatomic reduction, early mobilization, good occlusion and acceptable scar.⁵ Additionally, conservative management does not give equivocal prognosis with open reduction in the cases of mandibular condyle fractures. It often leads to suboptimal treatment results, such as trismus, asymmetry, occlusal disturbance, internal derangement of the TMJ and, most alarmingly, TMJ ankylosis. ORIF is now considered the gold standard norm in the indicated cases of condylar fractures.⁶

Approaches for access to the condylar region include intraoral, coronal, preauricular, postauricular, endoscopic, endaural, retromandibular, submandibular and rhytidectomy.⁷ The type of incision was decided based on the level of fracture.⁸

The preauricular approach is reserved for high condylar fractures as the exposure to the subcondylar region and ramus is less.⁹ Facial nerve damage encountered during this approach was recorded to be 3.2 to 42.9%.¹⁰ Submandibular incisions are widely advocated for subcondylar fractures but have the disadvantages of wider incision and excessive retraction. Facial N weakness recorded with this incision is 5 to 48%.^{11,12} Retromandibular incision was first introduced by Hinds and Girotti¹³ and modified by Koterg and Momma in 1978.¹⁴ Mini-retromandibular approach¹⁵ is a relatively new approach in which a 2 cm long incision is placed 1 to 2 cm behind the posterior border of ramus. The incision was designed in the anatomical space between the buccal and marginal mandibular branches of the Facial nerve. This approach is found to be associated with various intraoperative and postoperative advantages, such as adequate access, visibility, reduced operation time, minimal facial nerve morbidity, and better cosmetic and occlusal results.¹⁵ Kumaran and Tambiah argued that the 1 cm incision is suitable for 1.5 mm plate fixation.¹⁶

Endoscopic assisted management of mandibular condyle fracture is a novel technique with minimal complications. Endoscopic assisted mandibular condyle fixation was first introduced by Jacobovicz et al¹⁷ in 1998.

Endoscopic assisted mandibular condylar fracture reduction through an intraoral approach is widely advocated for mandibular subcondylar fractures. The advantages of this approach include no damage to facial N and the parotid gland. However, the disadvantages listed were expensive instruments, extensive learning curve and longer operating time.^{18,19} According to the study by Akdag O²⁰ in 2020, the following criteria were not suitable for endoscopy-guided condylar fracture reduction: medial dislocation of the condyle more than 45 degrees, children below 11 yrs, high-risk patients for general anesthesia (ASA IV), intracapsular fractures, panfacial fractures, open fractures and fractures more than 10 days old.

Permanent marginal nerve palsy was never observed in the study by Choi et al.²¹ A study by Manisali et al²² reported damage to the branches of the facial nerve in 30% of cases during dissection. Facial nerve damage was largely due to neurapraxia rather than neurotmesis.²³ The anaesthesia between the buccal and zygomatic branches is 87% to 100%. Even if the buccal branch is injured, anaesthesia helps in the reestablishment of function.^{24,25} Transient facial nerve damage, the most feared complication in our experience, is due to excessive traction in cases of displaced condyles. Parasthesia of the ear lobule and over the angle of the mandible due to injury of the greater auricular N were reported in the

literature with retromandibular transparotid approach.²² However, we had not encountered this complication in any of our cases in the institute even before the study was conducted.

Sialocele and temporary parotid fistula are the nagging complications of this technique. It occurs due to damage to the substance of the gland, damage to the duct or inadequate closure of the parotid capsule. Sialocele was observed in 5 patients, and our study is in accordance with Kim et al.²⁶

A retro mandibular approach is considered a direct approach to the mandibular condyle with minimal distance to the surgical site. Alignment of displaced and dislocated condyles can be easily performed with this surgical procedure due to direct access to the fractured fragments. Lee et al²⁷ stated that the establishment of preoperative ramus height and preoperative anatomical alignment can be easily achieved by the retromandibular transparotid approach. However, he added that the achievement of premorbid ramus height and alignment becomes difficult in severely dislocated condyles on the medial aspect. In all our patients, postoperative CT scans demonstrated restoration of condylar height due to adequate reduction and fixation of dislocated/displaced condyles to the ramus. This helped us achieve pre-morbid occlusion without premature contact of teeth on the same side or open bite on the contralateral side.

Rozeboom et al^{28,29} performed a review on complications of the open approach and devised a protocol for the open treatment of mandibular condyle fractures. His systematic review on open treatment of the mandibular condyle reiterated that the retro mandibular approach is a highly recommended technique. Furthermore, he added that the technique renders a predictable yet completely manageable complication.

The limitations of this study are the relatively small sample size and relatively short follow-up of patients. A multicentre trial in a particular region is also highly recommended, as it is difficult to obtain ideal samples to perform a retro mandibular approach for mandibular condyle fractures.

CONCLUSION

The retromandibular transparotid approach as the first choice is a reliable procedure for the management of condylar neck and subcondylar fractures. It leaves the surgeon with expected and manageable complications, although it demands repeated reassurances to the patient. To infer, complications of the retromandibular transparotid

approach do not lead to permanent morbidity in the treated patients.

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DK-Conception and design of the work; **ND**-Data collection, manuscript preparation; **VP**- design of the study and Critical revision of the article; **AM**-manuscript preparation Critical revision of the article; **DSD**- Data analysis and interpretation; **DM**- reviewed the literature and final approval of the version to be published.

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