

Research Article

Retromandibular Transmasseteric Anteroparotid Approach versus Retromandibular Transparotid Approach for Open Reduction and Internal Fixation of Mandibular Condylar Fractures: A Comparative Clinical Study

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ABSTRACT

Background: Mandibular condylar fractures are among the most common mandibular fractures and present significant functional and surgical management challenges. Open reduction and internal fixation (ORIF) has become the preferred treatment for displaced mandibular condylar fractures over closed reduction, owing to superior anatomical restoration and earlier functional rehabilitation. Among the various surgical corridors described, the retromandibular approach remains popular; however, concerns regarding facial nerve injury and parotid gland morbidity have led to the development of modified access routes such as the transmasseteric anteroparotid (TMAP) technique. **Aim:** To compare the efficacy of the retromandibular transmasseteric anteroparotid (TMAP) approach and the retromandibular transparotid approach for ORIF of mandibular condylar fractures.

Materials and Methods: Twenty patients with sub-condylar fractures, with or without associated mandibular fractures, were randomly allocated into two equal groups of ten. Group A underwent ORIF via the TMAP approach, and Group B via the transparotid approach, both using a 2 mm delta plate and 2×8 mm screws. Exposure time, occlusal derangement, maximal interincisal opening, protrusive and lateral excursive movements, facial nerve function (House-Brackmann grading), and parotid fistula formation were assessed preoperatively and postoperatively at 1 day, 1 week, 4 weeks, and 3 months.

Results: The mean exposure time was significantly shorter in Group A (18.7 ± 3.1 minutes) than Group B (21.9 ± 2.1 minutes; $p = 0.008$). Both groups showed comparable, statistically significant improvement in maximal interincisal opening, protrusive movement, and lateral excursion over time ($p < 0.001$), with no significant intergroup differences at any interval. All patients in both groups achieved normal occlusion and Grade I (House-Brackmann) facial nerve function by 3 months. One patient (10%) in Group B developed a parotid fistula, which resolved conservatively; none occurred in Group A.

Conclusion: Both the TMAP and transparotid approaches are safe and effective for ORIF of mandibular condylar fractures, providing comparable functional and occlusal outcomes with complete facial nerve preservation. The TMAP approach offers the additional advantages of significantly reduced exposure time and freedom from parotid fistula complications, making it a favorable alternative to the conventional transparotid technique.

Keywords: Mandibular Condylar Fracture, Open Reduction And Internal Fixation, Transmasseteric Anteroparotid Approach, Retromandibular Transparotid Approach, Facial Nerve Injury, Parotid Fistula.

INTRODUCTION:

The mandibular condyle, owing to its low structural stiffness relative to the rigid ramus, is a common site of fracture following indirect trauma transmitted through the mandible, accounting for 17.5–50% of all mandibular fractures¹. Road traffic accidents remain the leading cause worldwide, followed by falls and interpersonal violence.

Management of condylar fractures remains debated, with treatment options divided between closed reduction with intermaxillary fixation (CRIF) and open reduction with internal fixation (ORIF). However, advances in rigid fixation systems have shifted practice toward ORIF for displaced and dislocated fractures, enabling direct anatomical reduction and early functional rehabilitation.³ Zide and Kent's classic indications — displacement into the middle cranial fossa, inadequate occlusal restoration by closed means, lateral extracapsular dislocation, and foreign material at the fracture site — continue to guide surgical decision-making.⁴

Several surgical corridors have been described for condylar access, including preauricular, submandibular, intraoral, and retromandibular approaches, each with trade-offs between exposure, facial nerve risk, and scarring. The retromandibular approach, first described by Hinds and Girotti⁵, remains popular for its short working distance and excellent visualization of the condylar neck. This access may proceed directly through the parotid gland (transparotid approach) or bypass it via the transmasseteric anteroparotid (TMAP) approach, which utilizes a relatively avascular, nerve-free corridor anterior to the gland, between the buccal and marginal mandibular branches of the facial nerve.⁶

Although both techniques are individually well described, direct comparative clinical data remain limited. This study compares the

retromandibular TMAP and transparotid approaches in 20 patients with sub-condylar fractures treated by ORIF, evaluating exposure time, occlusal derangement, maximal interincisal opening, mandibular excursions, facial nerve function, and parotid fistula formation.

MATERIALS AND METHODS:

This prospective randomized clinical study was conducted in the Department of Oral and Maxillofacial Surgery, Government Dental College and Hospital, RIMS, Kadapa, and included 20 patients aged 18–60 years with sub-condylar fractures, with or without associated mandibular fractures, planned for ORIF. Patients medically unfit for surgery (ASA III/IV), those with haematological disorders, active infection, or psychiatric illness were excluded. Following informed consent, patients were randomly allocated by a simple randomization chart into two equal groups: Group A (n = 10) underwent ORIF via the retromandibular transmasseteric anteroparotid (TMAP) approach, and Group B (n = 10) via the retromandibular transparotid approach. Preoperative evaluation included clinical history, orthopantomogram, computed tomography, and routine haematological and biochemical investigations. All procedures were performed under general anaesthesia with preoperative arch bar placement. In Group A, a retromandibular incision with perilobular and preauricular extension was used; the anterior parotid margin was identified and reflected posteriorly without glandular dissection, and the masseter muscle fibres were split to expose the fracture site. In Group B, the retromandibular incision was extended through the parotid capsule and gland substance, with blunt dissection continued anteromedially to the pterygomasseteric sling, which was then incised to access the fracture.

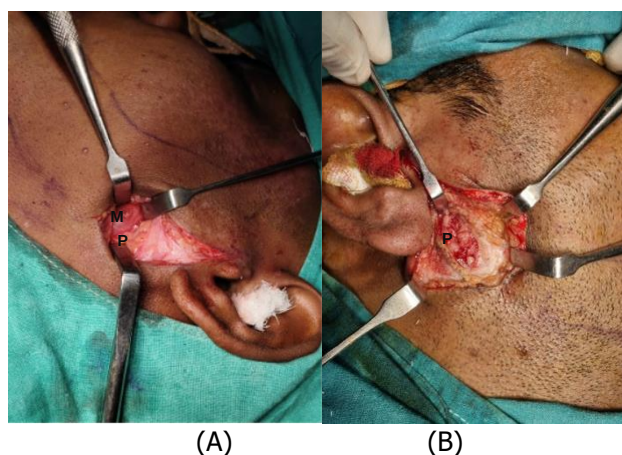


Fig 1: Surgical corridor comparison between (A) TMAP where the parotid gland {P} along with facial nerve within it is carefully retracted superiorly to expose the masseter muscle {M} and (B) transparotid approach where incision was given to SMAS layer to expose the parotid gland substance {P} and blunt dissection was done through it.

In both groups, anatomic reduction was achieved with intraoral manipulation, and fixation was performed using a 2 mm delta plate with four 2×8 mm screws.



Fig 2: 2mm Delta Plate With 2x8mm Screws

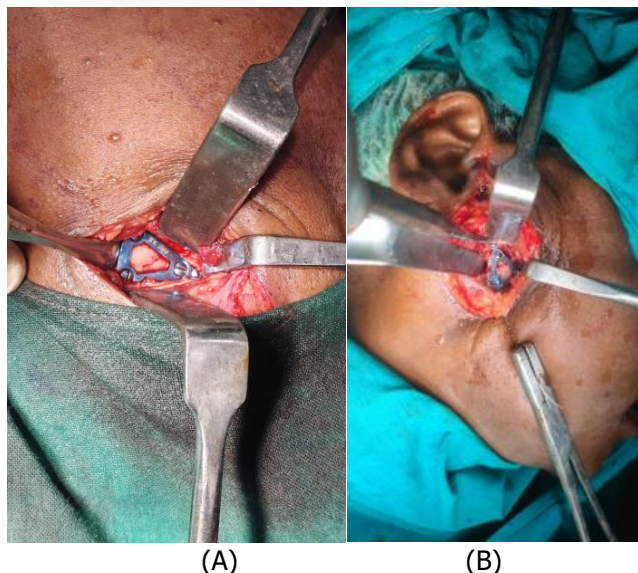


Fig 3: Fixation (A) TMAP and (B) Transparotid Approach

Closure was performed in layers — masseter and parotid capsule with 3-0 vicryl, and skin with 5-0 prolene. Postoperatively, patients received intravenous antibiotics and analgesics for 5 days, with intermaxillary fixation using elastics for one week, followed by supervised

mouth-opening exercises and a graded dietary progression. Clinical parameters — exposure time, occlusal derangement, maximal interincisal opening, protrusive movement, and lateral excursive movement — were recorded preoperatively and at 1 day, 1 week, 4 weeks,

and 3 months postoperatively, while facial nerve function (House–Brackmann grading) and parotid fistula formation were assessed at each postoperative interval.

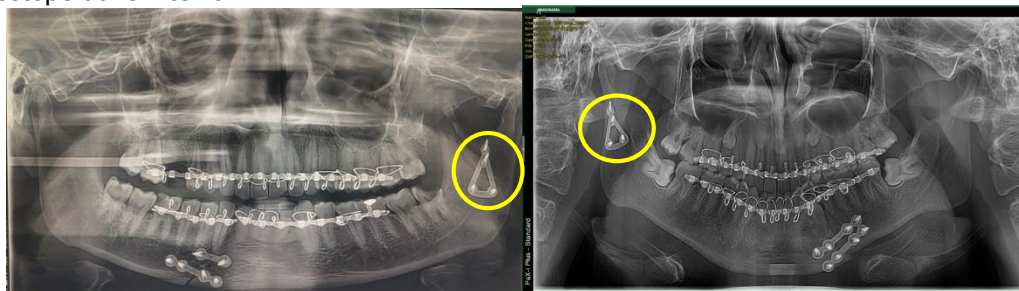


Fig 4: Post Op OPG (A) TMAP and (B) Transparotid Approach

RESULTS:

Twenty patients (17 males, 3 females) with a mean age of 31.8 ± 6.8 years (range 22–45 years) were included, with road traffic accidents accounting for the majority of injuries (75%), followed by physical assault (15%) and accidental falls (10%). Group A (TMAP) had a mean age of 32.8 ± 6.6 years and Group B (transparotid) 30.1 ± 7.1 years, with comparable gender distribution between groups.

The mean exposure time was significantly shorter in Group A (18.7 ± 3.1 minutes) than Group B (21.9 ± 2.1 minutes; $p = 0.008$). All patients presented with severe occlusal derangement preoperatively; this improved progressively in both groups, with 100% achieving normal occlusion by 3 months and no significant intergroup difference at any interval. Maximal interincisal opening improved from 23.4 ± 3.5 mm to 43.1 ± 2.6 mm in Group A and from 25.2 ± 4.3 mm to 44.7 ± 2.8 mm in

Group B over the follow-up period ($p < 0.001$ within each group), with no significant difference between groups at any time point. Similarly, protrusive movement improved from 2.8 ± 1.2 mm to 7.1 ± 1.3 mm in Group A and from 3.7 ± 1.2 mm to 7.7 ± 1.2 mm in Group B, and lateral excursive movement improved from 4.9 ± 1.4 mm to 9.5 ± 1.1 mm in Group A and from 5.3 ± 1.6 mm to 8.9 ± 1.2 mm in Group B, both showing significant within-group improvement ($p < 0.001$) but no significant intergroup difference.

All patients in both groups demonstrated Grade I (House–Brackmann) facial nerve function at every postoperative interval, indicating complete preservation of facial nerve function irrespective of the approach used. One patient (10%) in Group B developed a parotid fistula at 1 week postoperatively, which resolved with conservative management (pressure dressing and anti-sialagogue therapy); no fistula occurred in Group A.

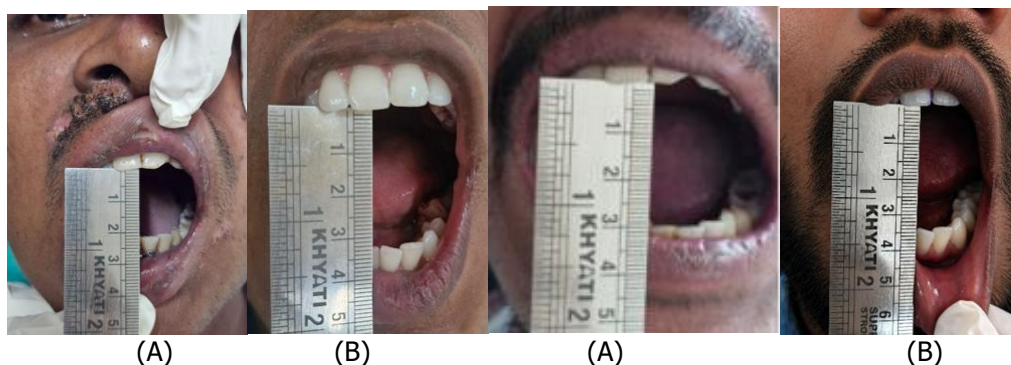


Fig 5: Pre Op Mouth Opening (A) TMAP and (B) Transparotid Approach

Fig 6: 3 months Post op mouth opening (A) TMAP and (B) Transparotid approach

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Table 1: Overall Comparison of Outcomes between Group A (TMAP) and Group B (Transparotid) Approaches

Parameter	Group A (TMAP) (Mean ± SD / N %)	Group B (Transparotid) (Mean ± SD / N %)
Exposure Time (Minutes)	18.7 ± 3.1	21.9 ± 2.1
Laterotrusive (3 Months, Mm)	9.5 ± 1.1	8.9 ± 1.2
Protrusive (3 Months, Mm)	7.1 ± 1.3	7.7 ± 1.2
Maximal Interincisal Opening (3 Months, Mm)	43.1 ± 2.6	44.7 ± 2.8
Parotid Fistula	0 (0%)	1 (10%)
Facial Nerve Injury	0 (0%)	0 (0%)
Occlusal Outcome	100% Normal	100% Normal

Overall, the TMAP approach demonstrated a significant advantage in operative time, while both approaches produced comparable functional, occlusal, and neurological outcomes with minimal and similar complication rates.

DISCUSSION:

The management of mandibular condylar fractures remains one of the most debated topics in maxillofacial trauma surgery. While closed reduction with maxillomandibular fixation historically minimized surgical morbidity, prolonged immobilization is associated with malocclusion, restricted mandibular mobility, and temporomandibular joint dysfunction.¹ Advances in fixation systems have therefore shifted practice toward ORIF, which permits direct anatomical reduction and early functional rehabilitation. Schneider et al.² and the meta-analysis by Al-Moraissi and Ellis³ both demonstrated superior functional outcomes with ORIF compared with closed treatment, particularly in displaced fractures, and Neff et al⁸ considers ORIF the current gold standard for displaced condylar base and neck fractures in adults.

Among the surgical corridors available, the retromandibular approach, first described by Hinds and Girotti⁵ and later modified by Koberg and Momma,⁷ offers a short working distance and excellent visualization of the condylar neck. However, concerns regarding facial nerve injury and parotid morbidity prompted the development of the TMAP approach by Wilson et al.,⁶ which accesses the fracture site through a relatively avascular corridor anterior to the parotid gland, between the buccal and marginal mandibular branches of the facial nerve.

In the present study, the demographic profile — a predominance of young adult males (85%) with a mean age of 31.8 years, and road traffic accidents as the leading etiology (75%) — is consistent with previous reports by Ellis and

Dean et al⁹ and Haug and Assael et al¹⁰ reflecting greater exposure to high-impact trauma in this population.

The TMAP approach demonstrated a significantly shorter exposure time (18.7 ± 3.1 minutes) than the transparotid approach (21.9 ± 2.1 minutes; $p = 0.008$), consistent with findings by Elhadidy et al.¹¹ and Satpathy et al.,¹² though Parihar et al.¹³ reported no significant difference, a discrepancy likely attributable to variation in fracture pattern and surgeon experience. This advantage likely stems from the TMAP technique bypassing glandular dissection altogether, in contrast to the transparotid approach, which requires careful dissection through parotid parenchyma and identification of facial nerve branches.

Both approaches produced comparable and statistically significant improvement in occlusion, maximal interincisal opening, and protrusive and lateral excursive movements over the follow-up period ($p < 0.001$ within groups), with no significant intergroup differences at any interval — findings that closely mirror those of Satpathy et al.¹² and Elhadidy et al.,¹¹ and are further supported by the broader ORIF literature reported by Schneider et al.² and Palmieri et al.¹⁴ This suggests that long-term functional recovery is governed more by the accuracy of fracture reduction and stability of fixation than by the specific surgical corridor used to reach the fracture site.

Facial nerve preservation is arguably the most critical safety consideration in condylar fracture surgery, given the intimate relationship between the nerve, parotid gland, and condylar region. Wilson et al⁶ described the “facial nerve-free corridor” exploited by the TMAP technique, and Narayanan et al¹⁵ similarly reported a low incidence of nerve injury using this approach. In the present study, all patients in both groups maintained Grade I (House–

Brackmann) facial nerve function throughout follow-up, in contrast to Satpathy et al¹², Elhadidy et al¹¹, and Parihar et al¹³, who each reported transient nerve weakness in a subset of transparotid patients that resolved spontaneously. This suggests that meticulous technique and careful nerve identification can achieve comparable safety outcomes even with the more nerve-adjacent transparotid corridor. Parotid fistula, a recognized complication of glandular dissection, occurred in one patient (10%) in the transparotid group and resolved with conservative management; no cases occurred in the TMAP group. This is consistent with the lower incidence of parotid-related complications reported with TMAP by Satpathy et al¹² and Elhadidy et al¹¹, and likely reflects the TMAP technique's avoidance of direct parenchymal dissection. Taken together, our findings suggest that while both approaches yield equivalent functional, occlusal, and neurological outcomes, the TMAP approach offers measurable advantages in operative efficiency and freedom from parotid-related complications, without compromising surgical access or safety.

This study is limited by its small sample size and single-institution design, which may obscure subtler differences between techniques. Larger multicentric trials with extended follow-up are warranted to validate these findings.

CONCLUSION:

Both the retromandibular transmasseteric anteroparotid (TMAP) and retromandibular transparotid approaches provide safe and effective surgical access for open reduction and internal fixation of mandibular sub-condylar fractures, yielding comparable improvement in occlusion, maximal interincisal opening, and mandibular excursions, with complete preservation of facial nerve function in both groups. However, the TMAP approach demonstrated a significantly shorter exposure time and was free of parotid-related complications, whereas one patient in the transparotid group developed a parotid fistula that resolved conservatively. Given its equivalent functional outcomes combined with greater operative efficiency and lower morbidity, the TMAP approach may be considered a favorable alternative to the conventional transparotid technique for the surgical management of mandibular condylar fractures. Larger, multicentric studies with extended follow-up are recommended to validate these findings.

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