

## Comparison of Retromandibular Transparotid [RMTP] and Transmasseteric Anteroparotid [TMAP] Approach for Mandibular Condylar Fractures

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### Abstract:

**Introduction:** The intended aim of surgical treatment of fracture is to restore the pre-existing anatomic relationships and acceptable function by stable fixation. This study evaluates immediate and late post-operative complications as well as the time taken for approaching the condyle in treating subcondylar fractures by two approaches; namely the RMTP and TMAP. A TMAP technique offers rapid access with reduced risk to the facial nerve along with elimination of the complications associated with RMTP approach.

**Materials & Methods:** This study was carried out on total of 15 patients with 20 condylar fractures and randomly divided into 10 each in group I (RMTP approach) and group II (TMAP approach) respectively. For the statistical analysis the data were analyzed with computer-run statistical program.

**Results:** The operating time taken in minutes for the group II i.e., Transmasseteric Anteroparotid Approach [22.70(mean) + 2.21(std deviation)] was far less than that for group I i.e., Retromandibular Transparotid Approach [59.40(mean) + 5.58(std deviation)]. Other Post-operative parameters like Inter-incisal Opening, Pain, Swelling, Function of Facial Nerve, Scar, Fistula are also compared in the present study.

**Conclusion:** Both the approaches have good results in managing condylar fractures with TMAP approach having lesser time in gaining access to the condyle.

**Keywords:** Access, Condylar Fractures, Parotid Approach, TMJ, Transmasseteric.

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### Introduction

Fracture of the condylar process accounts for one third of all the mandibular fractures [1]. In an investigation by Renato et al (2010) revealed that 14% of the maxillofacial trauma patients sustain at least 1 condylar fracture caused by a variety of mechanisms [2]. Splitting of condyle along the sagittal plane can also occurred due to trauma but it's a rare entity [3]. In adults motor vehicle accidents account for most condylar fractures followed by interpersonal violence, work related incidents, sporting accidents [4]. This type of fracture has not escaped the attention of clinicians attempting to achieve improved and more predictable outcomes by techniques of open reduction and internal fixation [5]. Closed techniques can leave an architectural aberration in the mandible (malunion) [6].

The aim of surgical treatment is to restore the pre-existing anatomic relationships and acceptable

function by stable fixation. Bone plating through pre-auricular, submandibular or retromandibular approaches are the most commonly employed techniques [7]. These approaches have limited access and injury to the facial nerve. A Trans masseteric anteroparotid (TMAP) technique described by Wilson et al (2005), offers swift access to the condylar neck and reduced risk to the facial nerve [8].

The aim of the study was to compare the efficacy, Retromandibular transparotid (RMTP) and Transmasseteric Anteroparotid (TMAP) approaches for subcondylar fractures and condylar neck fractures, to assess clinical outcome, immediate, late post-operative complications and time taken for approaching and treating condylar fractures.

### Material & Methods:

This study was carried out from June 2021 to July 2023 on total of 15 patients with 20 condylar fractures (4 with bilateral and 11 with unilateral mandibular condyle fracture) between age of 17 to 45 years. 20 fractures were randomly divided into group I and group II (10 each). Group I patients underwent ORIF using retromandibular transparotid approach whereas group II patients underwent transmasseteric anteroparotid approach.

Patient with subcondylar, condylar neck & displaced fractures [Lindahl classification, 1977] [9] were included in the study except intracapsular high condylar fractures, comminuted fracture and patients who refused for the consent. After routine investigations patients were given antibiotics, analgesics with chlorhexidine / betadine mouthwashes. They were operated for ORIF under general anaesthesia with nasotracheal intubation within 72 hours with pre-op arch bar fixation.

In group I, the fracture site was exposed via extraoral RMTP approach as described by Ellis. Incision was given from 1 cm below mastoid process of approximately 3–3.5 cm downward and not extending below the angle of the mandible [Fig 1]. Dissection was carried out through the skin, subcutaneous fat to the level of scant platysma muscle. The scant platysma muscle was incised in the same plane as the skin. The parotid capsule was entered and blunt dissection was carried through the parotid gland in an anteromedial direction towards the posterior border of the mandible. Nerves were identified and secured to avoid injury to facial nerve branches. Pterygo-masseteric sling was incised and tissues were stripped from the lateral surface of the mandible. The fracture was reduced. The main method of retrieval of condylar fragment was retraction of ramus in downward direction by manual pressure as it gives an access to medial aspect of the condylar fragment and in cases where retrieval of condyle was difficult, lateral pterygoid was stripped [4,10,11].

In group II, a preauricular incision and retromandibular or cervicomastoid skin crease with

extension followed the curvature of the ear was given [Fig 2]. The subdermal fat plane was dissected, in the area of the preauricular component did not go below the subdermal plane, and was done mainly to facilitate retraction of the flap. The retromandibular component was further dissected, and the anterior parotid margin was identified and retracted posteriorly. If the buccal branch of the facial nerve was encountered it was retracted carefully. The fibres of the masseter were identified and incised along their direction. The condyle and posterior border of the ramus were exposed by subperiosteal dissection in a posterolateral direction. The assistant then applied firm downward pressure intraorally to the ipsilateral third molar to depress the mandible, thereby facilitating reduction [8,12]. After anatomic reduction of all the fractures in both the groups, direct fixation was achieved with 2 mm two miniplate titanium osteosynthesis system, the proximal segment being fixed first [13]. IMF was released and occlusion checked. Layer by layer closure of soft tissue was done.

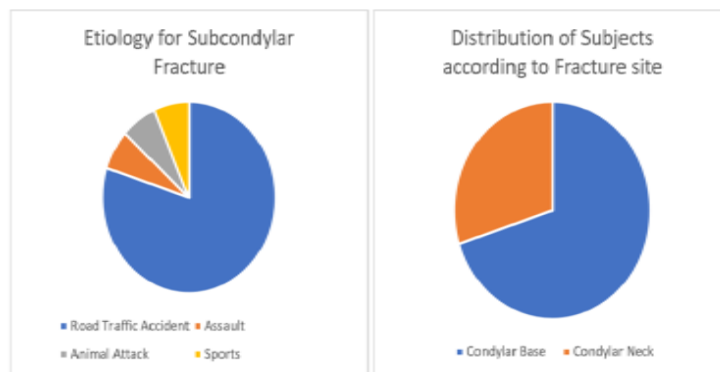
Following data were recorded; Intra-operative assessment of facial nerve encountered [14], operative time to expose fractures, its reduction and fixation [1] and surgeon's comfortability. Post-operatively pain (VAS) (1-10) [1,15,16], swelling, inter-incisal distance and facial nerve dysfunction were evaluated at 1st day, 7th day, 1st month, 2nd month and 3rd month post operatively and recorded. Clinical testing of facial nerve function was evaluated by using House-Brackmann six grade scale [17]. Parotid Fistula, and miscellaneous (Wound dehiscence, Plate dehiscence, Osteolysis of plate or screws, Malunion/ Non-union, Osteomyelitis or hardware failure) were recorded. For the statistical analysis the data were analyzed with SPSS® version 8. Significance was set up at  $p < 0.05$ . Following hypothesis was formed to evaluate the results: The null hypothesis was taken as  $H_0: \mu_1 = \mu_2$ .

### Observation Table

Fig 1: Retromandibular Transparotid approach



Fig 2: Transmasseteric Anteroparotid approach



Graph 1a: Etiology for Subcondylar Fracture

Graph 1b: Distribution of Subjects according to Fracture Site

Table 1a: Operating time taken by the two surgical approaches

Group	Number of Subjects	Mean	Std. Deviation	t	df	Significance (2-tailed)
I	10	59.40	5.582	19.328	18	.000
II	10	22.70	2.214	19.328	11.763	.000

Group I Mean operative time = 59.40 ± 5.58  
 Group II Mean operative time = 22.70 ± 2.21  
 \*p\* value < 0.05 (Statistically significant)

Table 1b: Interincisal Distance at various intervals

	Group	Number	Mean	t	df	Significance (2-tailed)
Preop Inter-incisal distance	I	10	2.190	.745	18	.466
	II	10	1.990	.745	14.646	.468
Day 1 Inter-incisal distance	I	10	1.730	-2.410	18	.027
	II	10	2.160	-2.410	17.474	.027
Day 7 Inter-incisal distance	I	10	2.33	-3.443	18	.003
	II	10	2.88	-3.443	13.404	.004
Month 1 Inter-incisal distance	I	10	3.520	-.179	18	.860
	II	10	3.540	-.179	17.890	.860
Month 2 Inter-incisal distance	I	10	3.650	.116	18	.909
	II	10	3.640	.116	17.985	.909
Month 3 Inter-incisal distance	I	10	3.650	.116	18	.909
	II	10	3.640	.116	17.985	.909

Table 2a: Subjective pain at various intervals

Post op	Approach	Number	Mean rank	Sum of ranks	Mann Whitney's U	Significance (2-tailed)
Day 1	I	10	12.90	129.00	26.000	.05
	II	10	8.10	81.00		
Day 7	I	10	14.40	144.00	11.000	.002
	II	10	6.60	66.00		
Month 1	I	10	11.80	118.00	37.000	.353
	II	10	9.20	92.00		
Month 2	I	10	11.00	110.00	45.000	.317
	II	10	10.00	100.00		
Month 3	I	10	10.50	105.00	50.000	1.000
	II	10	10.50	105.00		

Table 2b: Post Operative Swelling at various intervals

	Group	N	Mean	Std. Deviation	t	df	Sig
Day1	I	10	13.1000	.31358	.106	18	.917
	II	10	13.0850	.31890	.106	17.995	.917
Day7	I	10	13.4950	.22042	13.367	18	.000
	II	10	12.2550	.19358	13.367	17.705	.000
Month1	I	10	13.1450	.29482	14.236	18	.000
	II	10	11.5300	.20440	14.236	16.028	.000
Month2	I	10	12.0000	.48419	4.609	18	.000
	II	10	11.1400	.33731	4.609	16.070	.000
Month3	I	10	11.2150	.35281	1.091	18	.290
	II	10	11.0650	.25391	1.091	16.351	.291

## Results

15 patients with 20 condylar fractures were included in the study with age range of 17 to 42 years [27.85(mean) + 7.6 (SD)] and male were predominantly affected with road traffic accidents (Graph 1a). Subcondylar fractures were seen in 14 out of 20 instances (70%) and condylar neck were found to be fractured in 6 out of 20 instances (30%) (Graph 1b). The operating time for the group II (TMAP) was far less than group I (RMTP). Unpaired t test was applied and the two-tailed 'p' value < 0.05 (statistically significant). Confidence interval when calculated, the mean of group I minus group II was equal to 36.70. 95% confidence interval of this difference was from 32.71 to 40.68 (Table 1a). Inter-incisal distance at various intervals for all the subjects were found to be more in Group II subjects on postoperative Day 1 and Day 7th. Unpaired t test was applied to evaluate the inter-incisal distance. Later, from 1st month post-

operatively to 3rd month post-operatively there was no major difference in both the groups. The minimum value of Inter-incisal distance was 1.7 (mean) + 2.41 (std deviation) in group I on 7th post-operative day. The maximum mouth opening was 3.6 (mean) which were found in both the groups at 3rd month postoperatively (Table 1b).

The presence of facial nerve dysfunction was evaluated by using House-Brackmann six grade scale. In this, 2 subjects of Group I were having transient (Grade III) facial nerve dysfunction as per assessment criteria (20%), and none of the subjects of Group II had facial nerve dysfunction. The post-operative fistula formation was found in only 1 subject of Group II (10%) and was not present at all in Group I.

### Statistical Analysis:

Post-operative subjective assessment of pain of group I and II in periodic follow-up by VAS Scale

and Mann Whitney's U test was applied. It was found that, pain was more perceived by patients involved in group I postoperative 1st day of follow-up, compared to Group II subjects. ('p' value = 0.05) (Statistically significant) (Table 2a). Pre-operative and post-operative swelling measurement were carried out at various intervals. The unpaired t test was applied and found similar values in both groups (two tailed 'p' value > 0.05) (statistically non-significant). Later it was constantly more in Group I, compared to the subjects involved in group II in same time interval (two tailed 'p' value < 0.05) (statistically significant) (Table 2b).

### Discussion

Condylar fractures are a unique subset of traumatic injuries to the maxillofacial skeleton. The oral and maxillofacial surgeon must balance the principles of maxillofacial fracture management with the functional requirements of the condylar area, along with restoration of temporomandibular joint's function and injury's potential impact on growth & development [18]. On studying in 129 patients in 2011, Narayan V et al stated TMAP to ensure shorter working distance from the incision to the condyle and reduction with minimal risk of facial nerve damage [19].

Thus, considering the many advantages of above-mentioned approach, our study was carried out to evaluate the efficacy of retromandibular transparotid approach (RMTP) versus transmasseteric anteroparotid approach (TMAP) for subcondylar and condylar neck fractures. In our study we used Lindahl classification (1977) for condylar fracture, who divided condylar fracture according to its anatomical location as condylar head, condylar neck and subcondylar fracture [9]. The skin incision for TMAP approach is placed so as to utilize the 'window' between the lower buccal and marginal mandibular branch of the facial nerve. Owing to this safe placement of this approach in Group II, we encountered the branches of the nerve in only 1 out of 10 subjects (10%) and protected them safely. In group I, facial nerve was encountered in 3 out of 10 subjects (30%).

In another study by Biglilo et al [20], they encountered facial nerve branches in approximately 50% cases operated by TMAP approach, which was more than our study. Similar to our study Narayan V et al encountered buccal branch of facial nerve only in 7% of the patients using TMAP approach [19]. Manisali et al in their clinical and cadaveric study on RMTP approach, encountered the nerve in 35% cases which was still more than our study [7]. Biglilo et al stated that considering the rapidity of exposure with ease of the access with the TMAP approach, as demonstrated by the operative time of 33 minutes [20], can be the approach of choice.

In our study, 22.70 minutes was the mean time required to identify and expose the fractured fragments. The mean mouth opening postoperatively was greater in the follow up intervals of Group II on the 1st and 7th postoperative day. Minimum inter-incisal distance was found as 1.73 cm (mean) in Group I and 2.16 cm (mean) in group II, with statistically significant difference. The maximum post-operative inter-incisal distance achieved was 3.6 cm (mean) + 0.1 (SD) on 3rd month of follow up in both the groups. Our results indicated, that the patients operated through TMAP approach achieved more & earlier inter-incisal opening than the patients of group I. This might be possible due to lesser pain and swelling found in the group II subjects producing earlier functional restoration of the mandible. Even the measurement of facial swelling post-operatively at various intervals, it was found that the subjects of group II presented with noticeably lesser swelling than Group I. Gupta et al in their study measured only linear swelling after the ORIF and at 3 months of follow up it was 12.15 (mean) + 7.4 (SD) in the RMTP approach group [21].

Facial nerve dysfunction was seen in 2 subjects (20%) of Group I and not found at all in Group II. This may be due to transient neuropraxia of the facial nerve or its branches during manipulation of soft tissue while retracting the tissues, reduction & fixation of the fractured fragments. Our results indicate TMAP approach has safer edge over the retromandibular transparotid approach. Facial nerve dysfunction was evaluated at already mentioned intervals, according to House and Brackmann grading scale [17]. They have proposed six grades in which Grade I is normal (100%), Grade II is mild dysfunction (80%), Grade III is Moderate dysfunction (60%), Grade IV is Moderately severe dysfunction (40%), Grade V is severe dysfunction (20%) and Grade VI is total paralysis (0%) (here percentages denotes estimated function present).

The extent of scarring varies with the extent of the incision, the aesthetic acceptability of the scar depends on its size as well as its obviousness. In a clinical study by Rao JKD et al open treatment with RMTP approach did not have any complain of scar visibility [22]. The visibility and obviousness were also acceptable by all the patients (100%) in Group I in our study. Rather, the skin incision scar was not acceptable by Group II patients (50%), obviousness of the scar just below the lobe of the ear. In only 1 subject of Group II (10%) a formation of postoperative fistula formation was found. It might be due to the missed parotid capsule suturing or unintentional injuring/ rupturing of the parotid capsule by the surgeon. The patient complained of draining fluid from the surgical wound, on post-operative 3rd day. A pressure dressing was then immediately applied using the dynaplast adhesive

bandage. The dressing was regularly changed. Still the discharge was continuous, the sutures were reopened, incision was given again and proper layered suturing of ruptured parotid capsule done using 4-0 vicryl sutures. No further complain of the discharge was noted in next follow ups. Considering surgical reduction of subcondylar fractures, TMAP approach served as near ideal technique being less invasive, simple and comfortable for the surgeon, direct visibility of the fractured fragments, easy reduction, time effective, safe with respect to facial nerve preservation and minimal scarring capacity. This approach has an edge over the RMTP approach by giving early functional restoration of the mandibular movements, increased inter-incisal distance, less facial swelling and lesser amount of pain susceptibility to the patient.

### Conclusion

TMAP is an excellent approach to the condyle, though it does not fulfil all the requirements of an ideal approach but is an alternative. It can therefore be advocated as a rapid, easy, versatile technique which is free from complication in the treatment. It is an alternative to other extraoral approaches rather than a replacement of other approaches to the mandibular condyle. The TMAP approach was versatile for extracapsular condylar fractures. However, elaborated clinical studies are required along with extensive implementation of this technique to a large scattered diverse sample of patients having condylar fractures at varying levels followed by thorough clinical and radiographic follow up analysis and interpretation to convincingly prove the efficacy of this approach.

### Declarations:

**Funding:** None

**Conflicts of interest/Competing interests:** None

**Availability of data and material:** Department of Dentistry, LN Medical College J.K. Hospital Bhopal

**Code availability:** Not applicable

**Consent to participate:** Consent taken

**Ethical Consideration:** There are no ethical conflicts related to this study.

**Consent for publication:** Consent taken

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