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Evaluation of Retromandibular Transparotid Approach in Open Reduction and Internal Fixation (ORIF) for Subcondylar Fracture of Mandible- A Prospective Clinical Study

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ABSTRACT

Aim: To Evaluate the Retromandibular transparotid approach in open reduction and Internal Fixation (ORIF) for Subcondylar Fracture of Mandible.
Objectives: To report on - Maximum Mouth Opening (MMO), Occlusal derangement (OD), Deviation of mandible on mouth opening (DOM), scaring, salivary fistula, and facial nerve weakness (FNW) associated with Retromandibular transparotid Approach in open reduction and Internal Fixation (ORIF) for Subcondylar Fracture of Mandible.
Methodology: The prospective study with sample of 16 subjects fulfilling the stated inclusion and exclusion criteria were subjected to RMTP Approach in open reduction and ORIF for Subcondylar Fracture of Mandible based on Eckelt and Rasse Criteria. The stated objectives were evaluated by comparing maximum mouth opening and scar lengths before and after surgery follow up of 3 months. The other complications are presented in percentages with recovery time in months.
Results: RMTP approach was successfully employed in 16 cases. No post-operative incidence of salivary fistula, OD and DOM on mouth opening were noted. Facial nerve weakness was observed in 4 cases during immediate post-operative review. In all the cases the mouth opening significantly increased from 20.06±4.33 mm to 39.88±4.13 mm postoperatively. Post-surgery scaring significantly reduced in 3 months follow-up review.
Statistical analysis: paired t tests.
Conclusion: The open reduction and internal fixation method of subcondylar fracture with the Retromandibular transparotid approach was found to be an effective and safe technique having a good access, esthetic and functional results with low morbidity.. Facial nerve weakness was found to be transient change which was lost in 3-4 months.

Keywords: Condyle fractures, facial nerve, mandibular fractures, open reduction and internal fixation, Retromandibular Transparotid approach

INTRODUCTION

Fractures of the mandibular condyle are common and account for 25% to 50% of all mandibular fractures. There exists no universal consensus regarding this and debates have been continuing for six decades[1]. The condylar fractures are the most commonly missed fractures during diagnosis[2]. An ideal treatment for condylar fracture should enable the TMJ or muscles of mastication to function normally and prevent shortening of ramus, facial asymmetry and TMJ arthrosis. Currently there are three schools of through, available for treating condylar fracture -Functional, conservative and Surgical. The conservative treatment consider the risk and morbidity

of surgical procedure too great and only recommend the application of intermaxillary fixation for approximately three weeks and mouths opening exercise afterwards achieve good results[1].

Advocates of surgical treatment on the other hand, argue that only precise open reduction and internal fixation (ORIF) can prevent unwanted long term effects. Though conservative management remained as the main stay in condylar fracture management, the development of recent techniques and armamentarium over the past 30 years has made open reduction a better mode of treatment. The open reduction has the advantage of Anatomic repositioning and good Internal fixation of fracture fragments, occlusal stabilization, rapid return to function, maintenance of posterior vertical dimension, no airway compromise and minimal long term effects on the TMJ .

The hesitation to choose open reduction as the choice still persists due to complex anatomy, extra oral scar, fear of facial nerve damage and inadequate training in maxillofacial surgery. Neff *et al* in his clinical study has showed that the risk of permanent facial nerve damage is negligible and there is no reason to refuse open reduction of condylar fracture[3]

The first report in the literature of open reduction of condylar fracture via an intra-oral approach way by Silverman (1925) and Aison (1926) .[4] A metal urethral sound was used along with maxillomandibular fixation[4]. Stein Hauser described transoral open reduction and wire Osteosynthesis for low condylar fracture of mandible. Extra orally, preauricular and submandibular approach are widely used for open reduction and internal fixation of condyle fracture. Retromandibular approach is being used now widely used for its safety and good exposure. It was first described by Hinds. EC, Girotti. WJ[5] in 1967 in relation to vertical sub sigmoid osteotomy and was later popularized for management of ORIF of condylar fractures by Ellis E, Dean J[6] in 1993 and as Retromandibular transparotid approach (RMTP). This was later modified as 'short Retromandibular approach' by Cyrille chossegross[7] et al in 1996 G.Widmark[8] et al in 1996 where they do not transgress the parotid gland.

The RMTP approach minimizes the risk of permanent damage to the branches of facial nerve as opposed to other surgical approaches to the condyle. The advantages of this approach is working at a shorter distance from incision to the condyle, greater access to the level of sigmoid notch which negates the use of transfacial trocar, accurate anatomic & easy reduction, less conspicuous facial scar and negligible temporary facial nerve paresis. Thus our study was done to evaluate the RMTP approach for ORIF of subcondylar fracture of the mandible. This aim of the study is to evaluate the access to the mandibular condyle by RMTP approach with objectives of the assessing - Maximum Mouth Opening (MMO), occlusal derangement (OD), Deviation of mandible on mount opening (DOM), scaring, salivary fistula, and facial nerve weakness (FNW) were evaluated for all cases.

METHODOLOGY

Sample and settings: The study was conducted over the span of 6 months at the Department of Oral and Maxillofacial Surgery, Tamilnadu Government Dental College and Hospital, Chennai. Sample size was 16 calculated conveniently recruiting subjects consecutively as and when they were fulfilling the stated inclusion and exclusion criteria

Inclusion criteria of the study: (i) The subjects who reported to the OPD of Tamilnadu Government Dental College & Hospital, diagnosed with subcondyle fracture of mandible according to the Eckelt's and Rasse criteria[9] (ii) those subject indicated for ORIF of subcondylar fracture of mandible and treated only by Retromandibular Transparotid approach (iii) who gave informed consent in English and local language.

Exclusion criteria included those patients with (i) gross medical or systemic illness contradicting to admission to or surgery itself. (ii) Uncooperative And unwilling patients (iii) subcondylar facture with multiple facial fractures / head trauma needing neurosurgical intervention. (iv) where in the Retromandibular Transparotid approach was not planned.

A brief case Proforma was recorded with general, extraoral and intraoral findings. The surgical procedure, post-operative course and complications are reported. Ethical clearance and needed permissions, patient consents were duly obtained. The criteria for surgical management were based either on clinical examination that found shortening of ramus associated with ipsilateral molar prematurity or radiographic findings that showed subcondylar fracture with displacement and Eckelt and Rasse Criteria such a medical dislocation of the condyle more than 30 degree / displaced fractures with more than 5 mm overlap /complete loss of bone contact. The associated zygoma fracture was treated by Gillies temporal approach.

Standard procedure:

The procedures were performed under general anaesthesia, induced and maintained by naso-endotrachel intubation. Eyelets /Arch bar were placed in the mandible to achieve fracture reduction and occlusion. Inter maxillary fixation done as needed. An incision was placed 0.5 below the lobe of the ear and continues placed just behind the posterior border of the ramus for about 3 cm[figure 1]. The dissection is carried through the skin, Subcutaneous fat, superficial musculoaponeurotic system (SMAS) and parotid fascia. The parotid fascia was incised, parallel and 5 mm anterior to the posterior rim of facial incision, blunt dissection with a haemostat was employed, parallel to the anticipated direction of facial nerve branches. The dissection was carried posteriorly, to the posterior rim of ramus, and in this way, the Retromandibular vein was avoided, as it was retracted incised on the posterior rim of ramus and periosteal elevators were used to expose the fracture site[Figure 2]. When the reduction was achieved, the condyle was fixed with stainless steel miniplate and monocortical screws [figure 3]. The Pterygomasseteric sling was reconstructed using resorbable vicryl suture. The paratoid fascia and SMAS were repaired with a single watertight suture using 3-0 vicryl to reduce the risk of salivary fistula. Teh skin was closed with 4-0 nonresorbable polypropylene sutures.

Figure 1: Marking for surgical incision for retromandibular transparotid approach.

Figure 2: Surgical exposure of subcondylar fracture site.

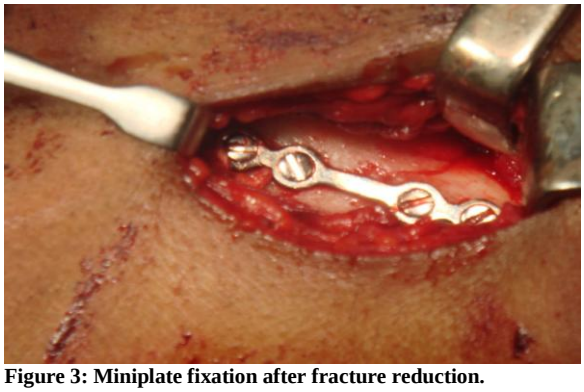

Figure 3: Miniplate fixation after fracture reduction.

Postoperatively, patients were recommended to take a soft diet for 6 weeks. Intermaxillary fixation was released after 1 week. They were encouraged to practice mouth opening and closing. Radiological evaluation was performed, using the same views as preoperatively and Patients were discharged 3-5 days postoperatively. Sutures were removed 7 days postoperatively. Subsequently patients had regular follow up 1, 3 and 6 months postoperatively. Mean duration of follow - up was 6 months. Follow up was consisted of clinical and Radiological examination. Clinical examination included occlusion, mouth opening, and deviation of mandible on mouth opening, Facial nerve weakness, scar and salivary fistula. Radiological examination included OPG, and Towne's view. The stated objective were evaluated by comparing - Maximum Mouth Opening (MMO) and facial nerve weakness (FNW). Scaring was evaluated based on Vancouver scar score (VSS) on postoperative day and 3 months follow up review appointment day.

Statistical analysis: The descriptive data were represented as mean or percentages for POOD, DOM, Scar, Salivary fistula and FNW. The scores of the MMO and Scaring were compared by paired t tests for before and after surgery. A significance were considered when $p<0.05$ in comparisons.

RESULTS

In the study, sixteen patients with a mean age of 25 to 30 years were with a 100% male population noted. All cases were due to road traffic accidents (RTA) with 50% having reported a history of alcohol consumption. All of the cases were diagnosed with 'unilateral left subcondylar fracture of mandible'. Out of the 16 patients, 14 had associated Parasymphysis fracture of mandible and 2 patients had zygomatic bone fracture. Out of the 16 cases, we encountered marginal mandibular branch of facial nerve in 13 cases and it was retracted gently and mobilized without compromising its function or impeding the access to the fracture site. However transient facial weakness was observed in 4 cases during immediate post-operative review. At 3 months post-operative follow up, facial nerve weakness recovered in all the cases[Table 1]. In all the cases the mouth opening significantly increased with a 20.06± 4.33 mm to 39.88±4.13 mm postoperatively. ($P<0.0001$). The scaring was scored based on Vancouver scar score (VSS) showed 6.06±2.83 for postsurgical scars and 2.18±2.14 on the review appointment 3 months later (0.001) Table 2

Table 1: Incidents of complications after RMTP ORIF surgery for subcondylar fractures.

Complication- post surgical	Total number of cases	Number of cases With complication	Percentage of cases With complication
Salivary fistula	16	0	0%
Facial nerve weakness (FNW)*	16	4	25%
Deviation of mandible while opening (DOM)	16	0	0%
Post surgical Occlusal dearrangements (OD)	16	0	0%
Facial nerve weakness (FNW)* was auto corrected in 3-4months duration.			

Table 2: Mouth opening and scar length comparisons after RMTP ORIF surgery for subcondylar fractures.

Criteria	Before surgery	After surgery*	P value^
Maximum mouth opening (MMO)	20.06±4.33	39.88±4.13	0.0001
Scar (VSS)	6.06±2.83	2.18±2.14	0.001
After surgery* inclusive of a + 3 moths follow up. Paired t tests for intragroup comparisons^			

DISCUSSION

Fractures of the condyle can be consequence of an indirect below as when the external force being applied in an antero-posterior direction and from below upwards upon the chin[10]. Condylar fractures are very common representing about 25 to 50 % of all mandibular fractures. The treatment policy for condylar injuries has aroused more controversy than any other

subject in maxillofacial trauma. Fracture of condyle heal by bony union regardless of any therapy, unlike the rest of the mandible where non-union is always a possibility. The Three main schools of treatment have evolved for management of condyle fracture, namely Conservative, Functional and Surgical.

Arch bars and wires have long been used to treat mandibular fractures. In spite of long history, some fractures could not be satisfactorily treated with closed technique, no matter how ingenious is the technique. Conservative management of most fractures of condylar process of mandible by maxillomandibular fixation and physiotherapy has been a satisfactory approach [11,12, 13]. The advantage of conservative treatment over surgical repair is elimination of complications such as injury to facial nerve, scars and haemorrhage. However late complications were observed after conservations treatment such as pain, TMJ arthritis, open bite, deviation of mandible on opening and closing movements of the mouth and ankylosis[14-16]. For these reasons, a large number of studies regarding surgical treatment have been published [17,18]. It is agreed that in adults, the management of displaced condylar fractures should be surgical [19,20]. Currently, the only way to reposition the displaced condyle to its normal position is by surgery and adequate approach is necessary to avoid complications. Many authors favour ORIF for subcondylar fractures in current literature [21,22,23.]

Intra oral approach by Silverman (1925) and Aison (1926) who described transoral open reduction and wire Ostesynthesis of low condylar fracture of mandible. It had major disadvantages like limited access, hard to reduce medially displaced fracture, difficult to temporarily stabilize the fracture while applying the fixation, adequacy of reduction is difficult to ascertain and precise positioning of plate is not possible.[24]

Risdon's Submandibular approach likewise, makes retraction difficult for medially displaced condylar fracture. It also makes fixation with miniplates extremely difficult. So it is not routinely used for treatment of condylar fracture. The incidence of temporary facial nerve paresis is 11 to 37% (Zide and Kent 1983)[25].

Prearuicular approach has been advocated by many for treatment of high condyle fractures, but always requires transcutaneous trocar to fix the most inferior screws of the bone plate as the access is extremely limited with these techniques.

Although, there are several approaches to the open treatment of condylar fracture, the Retromandibular transparotid (RMTP) approach is the most reliable for internal fixation of bone plates and it is now used in the vast majority of open reduction of condyle fracture of mandible.

Retromandibular approach was first described by Hinds E.C, Girotti.WJ, in 1967 and was popularized for the management of open reduction and internal fixation of condylar fractures. The results of this study, concerning mouth opening (MMO), deviation of mandible upon opening, occlusion and facial symmetry were better. The degree of postoperative transient facial palsy is 25%, but it recovered in 3 months. We did not encounter the complication of salivary fistula.

After a condyle fracture has been diagnosed the decision to treat the fracture surgically or conservatively was made according to Eckelt and Rasse criteria[9] i.e. medial angulation of condyle more than 30 degrees, displaced fractures with more than 5mm bony overlap and complete loss of bone contact. This criterion is in agreement with other authors [26].

According to Raveh[17] *et al* the facial nerve damages is caused chiefly by excessive traction of retractors or electro cauterization of vessels adjacent to the facial nerve. So when the branches are identified within the parotid tissue overlying the ramus, they have to be dissected anteriorly for 10-15mm

and posteriorly for 5-10 mm. After dissection the branches are retracted with less tension and danger of post-operative facial weakness is reduced[27,28,29]

The Vancouver scar scale [30] is one amongst the commonly used tools to qualitatively asses on scaring and esthetic results after surgeries. It was employed for first time in evaluating the scaring in RMTP ORIF of subcondylar fractures in our study.

CONCLUSION

In conclusion, the open reduction and internal fixation method of subcondylar fracture with the Retromandibular Transparotid approach was found to be an effective and safe technique having a good access, esthetic and functional results with low morbidity. Facial nerve weakness was found to be transient change which was lost in 3-4 months.

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