



## CRB modification to retromandibular approach for management of subcondylar fractures.

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### ABSTRACT

The aim of this study was to evaluate the efficacy of CRB modification of retromandibular approach to gain surgical access for open reduction and internal fixation of mandibular subcondylar fractures. A total number of 264 sustained extra-capsular subcondylar fractures from 230 patients were selected for the study over the period of 5 years. Evaluation of intraoperative accessibility, postoperative facial nerve function, postoperative complications and scar was carried out. All the patients were treated using CRB Curvilinear approach. Patient follow up was recorded for 1 year on a regular interval basis. Symptoms of postoperative facial nerve injury were seen in 2 patients which recovered with time, postoperative complications were not encountered in any case and minimum scar mark hidden in the cervical skin crease. Hence open reduction and internal fixation for Subcondylar fracture of mandible by using the CRB modification of retromandibular approach is a good alternative for other conventional approaches in having ease of access, ease of fixation, reduced incidences of injury to facial nerve and its branches with good aesthetic outcome.

**Keywords:** Subcondylar fracture; CRB modification of retromandibular approach; Retromandibular approach; Aesthetic outcome.

### INTRODUCTION

Among the facial fractures, mandibular fractures are the most common. In mandibular fractures the subcondylar and condylar fractures account for 25–35% and are generally clinically challenging (Mohan et al., 2012; Salgarelli et al., 2013). Condylar fractures are associated with severe functional impairment including deprived occlusion, reduced mouth opening with deviation and limited lateral mandibular movements (Manisali et al., 2003).

Before proceeding for open reduction internal fixation (ORIF) the choice of surgical approach must be taken into consideration (Biglioli & Colletti, 2008). Most commonly used extra oral approaches for fixation of subcondylar fractures are preauricular, submandibular and post-ramal approach (Salgarelli et al., 2013; Manisali et al., 2003; Nam et al, 2013; Ellis et al., 1995; Kempers et al., 1999). The possible incidences of facial nerve injury and restricted access are always associated with extra oral approaches (Salgarelli et al., 2013; Manisali et al., 2003; Ellis & Throckmorton, 2000).

In the management of subcondylar fractures, in comparison with other approaches, retromandibular approach has an advantage of shorter working distance from the skin incisions to the condyle, feasible access to the posterior border of mandible and sigmoid notch, less facial scar and easy reduction of fracture site. However, it requires dissection through parotid gland tissue, which increases the incidences of facial nerve injury and salivary fistula (Salgarelli et al., 2013).

To overcome these complications, the present study was designed to evaluate the effectiveness of CRB modification of retromandibular approach for management

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of mandibular subcondylar fractures with objectives of assessment of intraoperative access for the procedure, postoperative facial nerve function with other surgery related complications and the esthetic acceptability of the scar mark by patients.

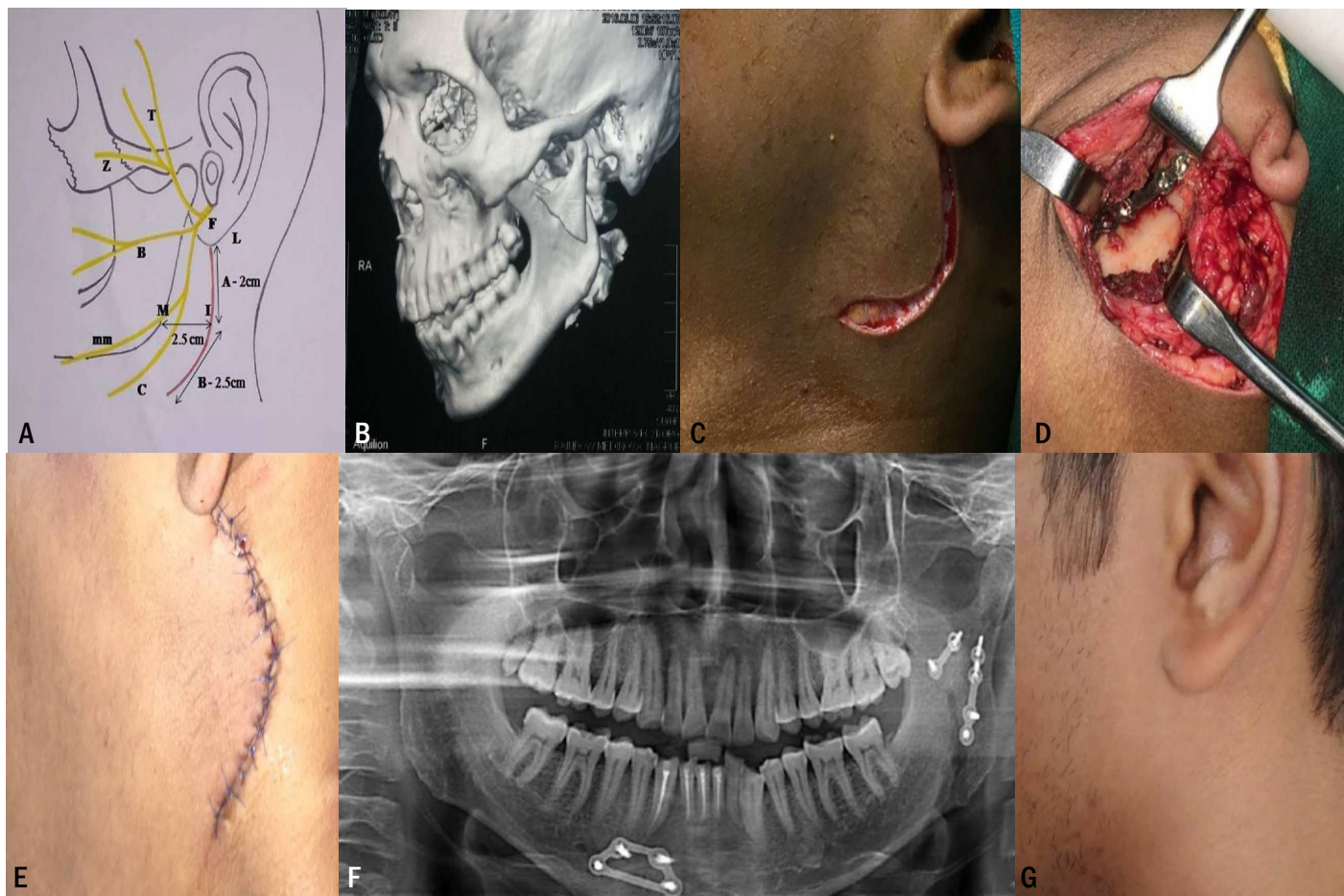
## MATERIALS AND METHOD

This prospective clinical study was performed at the Department of Oral and Maxillofacial Surgery from June 2013 to June 2018 after achieving the approval from institutional ethical committee.

Patients were included if they had unilateral or bilateral subcondylar fractures, were dentulous with enough dentition present bilaterally for maxillomandibular fixation and were willing to participate. A total of 264 subcondylar fractures in 230 patients were included in the study. 196 of them were patients who had unilateral subcondylar fractures and 34 patients had bilateral subcondylar fractures. All the fractures were managed with CRB modification of retromandibular approach and semi rigid fixation was performed.

After taking the detailed case history, a general physical examination, routine hematological and radiological investigations were performed. Preoperative three dimensional (3D) CT scans were obtained to assess the fracture patterns. An informed written consent was obtained from each patient preoperatively. All the surgical procedures were performed by same surgeon under general anesthesia with nasotracheal intubation.

The surgical technique (*Figure 1*) was performed under general anesthesia, after standard surgical painting and draping, the incision was marked. Intermaxillary fixation was done to achieve the pre-morbid occlusion. The skin incision of nearly 4.5 cm was marked approximately from just below the ear lobe and 2.5 cm posterior to the posterior border of ramus. It is continued in a curvilinear fashion extending up to the angle region to get merged with cervical skin crease. The approximate length of upper part of incision was 2 cm while that of lower part was 2.5 cm. The skin and subcutaneous tissue was incised along with the platysma muscle to expose the superficial layer of deep cervical fascia. Posteriorly, the anterior border of sternocleidomastoid muscle guided the dissection.



**Figure 1.**

**A.** Showing schematic representation. **B.** Preoperative radiograph. **C.** CRB Curvilinear incision. **D.** Showing miniplate osteosynthesis. **E.** Postoperative closure. **F.** Postoperative radiograph. **G.** Showing no scar marks.

Superficial musculoaponeurotic system investing the parotid gland and masseter muscle was identified. The blunt dissection was continued in the supra-parotid area until parotidomasseteric fascia, after which the masseter muscle was transected and reflected superiorly to avoid any damage to parotid gland and facial nerve. The fractures were identified. The fractured fragments were reduced and fixed with stainless steel or titanium miniplates and screws. Closed circuit suction drain was placed to avoid the dead space formation.

Closure was achieved in layers with 3-0 polyglactin suture for muscles and 5-0 polypropylene sutures for skin. The intraoperative access was evaluated by surgeon and assistant's subjective acuities on the basis of adequate exposure of fracture site and ease of reduction and fixation of the fractures.

Postoperative facial nerve function was evaluated with pin prick nociceptive test. The postoperative complications like infection and hardware failure were recorded in subsequent follow ups at first month, second month and third month postoperatively. Evaluation of scar was performed using visual analogue scale (VAS) ratings given by patients for their acceptance of scar marks.

## RESULTS

Two-hundred and thirty patients were included; characterization is shown in Table 1. No hardware failure was reported.

**Table 1:** Characterization of the sample.

Variables	N (%)
<b>Age (Years)</b>	
16-25	49 (21.30%)
26-35	61 (26.52%)
36-45	56 (24.34%)
46-55	38 (16.52%)
Above 55	26 (11.30%)
<b>Gender</b>	
Male	173 (75.21%)
Female	57 (24.79%)
<b>Etiology</b>	
Road traffic accidents	123 (53.48%)
Interpersonal Violence	33 (14.35%)
Fall	74 (32.17%)
<b>Paresthesia</b>	
1st Month	2 (0.87%)
2nd Month	1 (0.44%)
3rd Month	0 (%)
<b>Infection</b>	
1st Month	5 (2.17%)
2nd Month	3 (1.30%)
3rd Month	0 (0%)

The esthetic acceptance of the scar was evaluated on VAS score, scores were given as excellent for 0-3, good for 4-7 and poor acceptance for 8-10. In first month, 63.26% patients accepted scar mark as excellent, means scar marks were absolutely not seen. 34.85% patients scored for good, while in 1.89% patients, the poor scar was seen. At the 2nd month of follow up, 89.39% patients accepted the scar as excellent, 10.61% patients scored as good. Poor scar was not encountered in the 2nd month. At the 3rd month follow up, 94.32% patients scored as excellent, 5.68% scored as good for the esthetic acceptance of the scar.

## DISCUSSION

For management of condylar fractures, the choice of the surgical approach is always influenced by the individual maxillo-facial surgeons' experience with the technique and their personal beliefs. Some opt for open reduction and rigid fixation of condylar fractures, while others choose conservative methods (Kumaran & Thambiah, 2012). According to literature, submandibular and retromandibular approaches permit better reduction. However, threat to traumatize the facial nerve fibers, especially the marginal mandibular branch, is always associated with these surgical approaches (Villagra et al., 2006). The retromandibular approach was first reported by Hinds and Girotti (1967). The retromandibular approach was used successfully by Narayanan et al. (2009) in a series of 35 fractured condyles. They encountered the facial nerve in 6 cases, and 3 reported temporary facial nerve palsy. Two patients had chronic sinuses at the site of incision, and 4 developed salivary fistulas (Hinds & Girotti, 1967). Al-Moraissi et al. (2018), in their systematic review and meta-analysis, reported the facial nerve injury incidence after open reduction and fixation of condylar fractures. The transient facial nerve injury with conventional preauricular approach had an overall rate of 10% and for the retromandibular transparotid approach 14.4%. Although the temporal and zygomatic branches were more susceptible to injury with the preauricular approach, the marginal mandibular branch was most often injured with the retromandibular approach. While utilizing the retromandibular approach for condylar fracture management, it is obligatory mostly to opt for a trans-parotid approach, working in the restrained space between the marginal mandibular branch and lower buccal branch of the facial nerve. Therefore, incidences of damage to the facial nerve, retromandibular vessels, and the parotid gland leading to facial nerve damage, salivary fistulae, Frey syndrome are evident (Li et al., 2016).

Taking these factors into consideration, CRB modification of traditional retromandibular approach was performed. The facial nerve and its branches are well protected in this approach as the incision bends in curvilinear fashion starting from the ear lobe going posteriorly and inferiorly to protect the parotid gland

substance. The incision in the angle region is approximately 2.5 cm posterior to protect the cervical and marginal mandibular branches of the facial nerve. As the whole parotid gland remains intact during the management of subcondylar fractures with CRB modification of retromandibular approach, the chances of salivary fistula formation and Frey's syndrome gets eliminated. Tractional nerve injury was seen in 2 cases in our study, which was completely reverted back to normal within two months. CRB modification of retromandibular approach provided optimum access to the surgical field with ease of performing surgery. An uneventful healing with minimum scar marks was seen with this approach. Hence, CRB modification of retromandibular approach can be considered as an adjunct to traditional retromandibular approach for management of subcondylar fractures of mandible.

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