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Retromandibular Approach to Treat Mandibular Subcondylar and High Ramus Fracture

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Abstract: ***Objective:*** The retromandibular approach for open reduction and internal fixation (ORIF) of mandibular subcondylar and high ramus fractures has gained attention for its direct access and cosmetic advantages. This study aims to evaluate the efficacy, complications, and functional outcomes associated with this surgical technique. ***Methods:*** A prospective study was conducted involving 32 patients with unilateral or bilateral subcondylar fractures who underwent ORIF via the retromandibular transparotid approach between January 2017 and December 2024. Demographic data, etiology, surgical details, and postoperative outcomes—including complications such as facial nerve palsy, salivary fistula, malocclusion, and scar appearance—were systematically recorded and analyzed. ***Results:*** The mean age of the patients was 23.93 years, with a male predominance (90.63%). Road traffic accidents (93.75%) were the leading cause of injury. A 2 cm retromandibular incision provided sufficient access in most cases, with minimal extension required for complex fractures. No cases of facial nerve palsy, Frey's syndrome, or unacceptable scarring were observed. Postoperative complications included transient salivary fistula in three patients (9.37%) and malocclusion in two (6.25%), both of which resolved with conservative management. All patients achieved satisfactory fracture healing and functional recovery at follow-up. ***Conclusion:*** The retromandibular transparotid approach is a safe, effective, and cosmetically favorable technique for the management of subcondylar and high ramus fractures. It offers direct visualization of the fracture site, minimizes the risk of facial nerve injury, and results in minimal complications when performed with meticulous surgical technique. This approach is highly recommended for selected cases in maxillofacial trauma surgery.

Keywords: Retromandibular Approach, Subcondylar Fracture, Open Reduction and Internal Fixation (ORIF), Facial Nerve, Salivary Fistula, Mandibular Trauma.

Research Paper

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INTRODUCTION

Mandibular condyle fractures account for 25% to 30% of all mandibular fractures, making it one of the most frequent facial fractures [1]. Some controversial issues remain in regard to their treatment [2]. Traditionally, closed methods have been used to treat condylar and subcondylar fractures, but the open-method treatment has recently begun to replace the closed-method treatment due to reasons, such as the lack of achieving an accurate reduction and the occurrence of occlusion problems [3]. Open surgical intervention is superior to closed-method treatments in terms of the appropriate anatomic fixation of the fracture, early mobilization, fracture healing, and norm occlusion and in terms of avoiding some of the latter's undesirable complications, such as hematoma, infection, salivary fistula, and problems with facial nerves. Additionally,

extraoral surgical interventions also result in scars due to the surgical incision [4]. For these reasons, caution is recommended when selecting a method for the treatment of condylar and subcondylar fractures. The recommended approaches for access to condylar and pericondylar fractures include intraoral, coronal, preauricular, postauricular, endoscopic, endaural, retromandibular, and submandibular approaches and rhytidectomy [5]. Easy access to the fracture segment, potential nerve injury, and the length of the incision scar appear to be the most important factors in determining the surgical approach. [6] For subcondylar fractures, the submandibular approach has a very poor success rate, while the preauricular technique has a very high success rate. The retromandibular method is mentioned in the research as a possible option relatively occasionally [7]. Hinds and Girottirst suggested the retromandibular incision in 1967 [8]. It is chosen by surgeons because it offers clear visibility of the whole ramus and the lower subcondyle from the posterior edge [9]. This incision is closer to the subcondyle than the submandibular incision, allowing for easier fracture care and direct accessibility to the subcondyle's fractured line, which facilitates the subcondyle's reduction. Additionally, it enables the operator to operate perpendicular to the fracture, preventing the need for a transfacialtrochar and minimizing excessive retraction [7]. Additionally, it can prevent direct contact with the facial nerve, protect the function of the parotid gland and its capsule, and create a scarcely perceptible scar at a location that is largely covered. Mandibular subcondylar fractures are idented by a fracture line that is lower than the level of the sigmoid notch's most inferior portion [8]. In this study, open reduction and internal reduction for mandibular subcondylar fractures using the retromandibular technique were evaluated for effectiveness and results.

MATERIALS AND METHODS

The present study was included thirty-two patients with subcondylar fractures treated through open reduction and internal fixation using the retromandibular approach in Enam Medical College Hospital and another institute between January 2017 and December 2024. This study was conducted according to the guidelines of the Declaration of Helsinki, and the study protocol was approved by the Ethical Committee of Enam Medical College. The patients were diagnosed by taking history, physical examination and radiological evaluation. The radiological evaluation combines coronal and axial maxillofacial CT scan with any of following like as orthopantomogram, lateral cephalogram, or posterior/anterior mandibular radiograph. Plain radiographs were preferred for the postoperative evaluation. Patients were intubated nasotracheally and operated on under general anesthesia. The operation was initiated with the planned incision at a length of two cm, placed approximately0.5 cm posterior to the mandibular border from 0.5 cm inferior to the ear lobule (Fig. 1). A two cm incision was sufficient for favorable superior ramus and subcondylar fractures. However, the incision line was extended distally or proximally in cases of more superior fractures or segmental fractures. After passing the cutaneous, subcutaneous, and parotid capsulea blunt dissection was performed through a curved hemostat to access the masseter muscle (Fig. 2). Following the incision of the pterygomasseteric sling, force was exerted on the fracture line by subperiosteal dissection using a periosteal elevator. After having achieved anatomic reduction (Fig. 3), the fracture line was fixated with a single, double or Y-shape titanium miniplate after fixed arch bur and intermaxillary fixation. In cases in which the combination of a single miniplate and arch-bar was used, the arch-bar was removed after two weeks. The pterygomasseteric sling was not restored routinely, but the parotid capsule was restored with 5/0 absorbable sutures in all patients. The sites were not drained, and the skin incisions were covered with 4/0monofilament sutures. After surgery, a four weeks liquid diet was recommended to the patients. The patients were discharged postoperatively and were asked to return for follow-up visits at the end of the first and fourth postoperative weeks and at the end of the third and sixth postoperative months. The patients with arch-bars returned for an additional follow-up at the end of the second postoperative week for the removal of the arch-bar. The patients were evaluated for excessive bleeding during the operation and for hematoma, infection, Frey's syndrome, salivary fistula, facial nerve damage, occlusion, fracture site stability, chronic pain in the fracture site, hypoesthesia of the ear, and temporomandibular (TME) joint] movements in the postoperative period.

RESULT

Table 1: Demographic Characteristics of the Study Participants (N=32)

Gender	(N=32)	Percentage
Male	29	90.63
female	3	9.37
Age group		
11-20	9	28.12
21-30	18	56.25
31-40	4	12.5
>40	1	3.12

A total 32 patients with unilateral (24) and bilateral (8) subcondylar fracture follow upswere treated with retromandibular incision. The mean age of the subjects was 23.93 years. The range for age of fracture were 16- 42 years. There were 29 (90.63%) male patients and 03 (9.37%) females. The most common age group

was 21-30 years (n=18, 56.25%) followed by10-20 years (n=9, 28.12%) (Table 1).

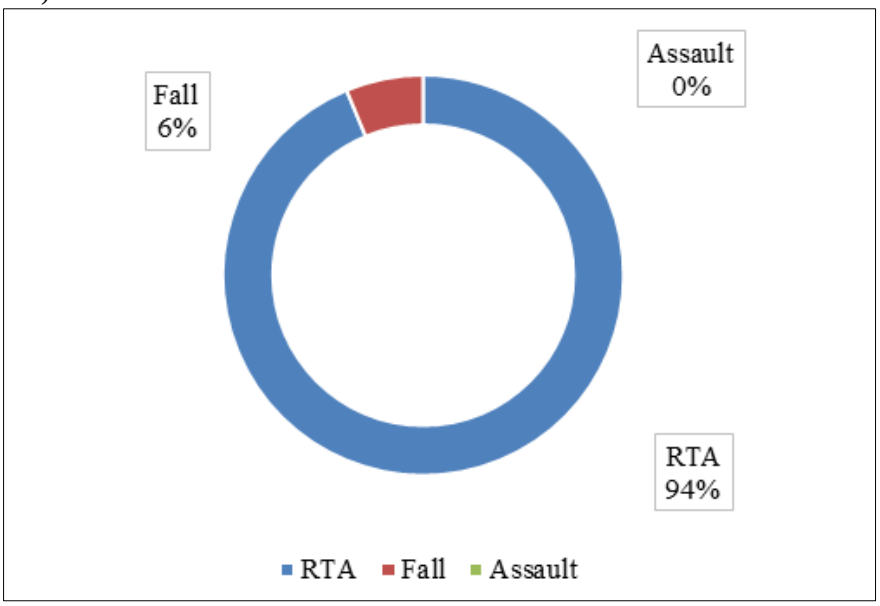

Figure 1: Proportional Distribution of Etiologies for Traumatic Injury

RTA was the most common mode of injury seen among patients (93.75%), followed by fall (6.25%). Details of mode of injury are mentioned in figure 1.

Table 2: Postoperative Complications among Patients (N=32)

Complications	Number of patients	Percentage
Malocclusion	2	6.25
Facial nerve palsy	0	-
Salivary fistula	3	9.37
Ugly Scar formation	0	-

No serious bleeding was experienced during the operation, which could have resulted from an injury to the intermaxillary artery or the retromandibular vein. All the patients followed up with minimal postoperative complications. Two patients (6.25%) had malocclusion with 1 month follow up. Postoperative IMF could resolve it. Rest of patients had initially good occlusion. Three patients (9.37%) had salivary fistula initially but it resolved it following visit. All the patients were satisfied with scar. No additional surgical intervention was performed.

DISCUSSION

The management of mandibular subcondylar fractures remains a topic of debate among maxillofacial surgeons, balancing the benefits of open reduction and internal fixation (ORIF) against the risks of surgical complications such as facial nerve injury and visible scarring. This study evaluated the outcomes of the retromandibular transparotid approach for ORIF in 32 patients with subcondylar or high ramus fractures. Our findings suggest that this approach provides direct access to the fracture site with a low complication profile and excellent functional and aesthetic outcomes. Both conservative and surgical approaches have been advocated for subcondylar fractures. While closed treatment was historically favored, the trend has shifted toward open reduction, particularly with advancements in plating systems that allow stable fixation and early mobilization [10, 11]. Open reduction is especially beneficial in displaced fractures, where accurate anatomical repositioning is crucial for restoring occlusal relationships and temporomandibular joint function [12]. Among the various surgical approaches, the retromandibular technique offers a favorable balance between accessibility and cosmesis. Unlike the submandibular approach, which often leaves a conspicuous scar and carries a higher risk to the marginal mandibular nerve, the retromandibular incision is shorter, more concealed, and provides a relatively straight path to the condylar neck [7-13]. The preauricular approach, though effective for intracapsular fractures, often requires extension for subcondylar exposure, increasing the risk to the temporal branch of the facial nerve [5]. In contrast, the retromandibular approach, as used in this series, allowed clear visualization of the fracture line with a minimal 2 cm

incision in most cases, consistent with reports by Kang [9], and Lee *et al*., [11]. In the present study, no instances of facial nerve palsy were observed. This is a significant advantage and aligns with several previous studies that reported minimal transient nerve weakness with this approach [3-16]. For instance, Klatt *et al*., [5], reported a low rate of temporary facial nerve weakness (4.2%) that resolved spontaneously. The careful blunt dissection through the parotid and masseteric layers, as performed in our technique, likely contributes to preserving the facial nerve branches. The most common complication in our series was salivary fistula, observed in 3 patients (9.37%). However, all cases resolved spontaneously with conservative management. This rate is slightly higher than the 2.3% reported by Ellis *et al*., [18], but lower than some other series. We attribute this complication to minor parotid capsule violation, and we emphasize meticulous closure of the parotid capsule with absorbable sutures to minimize this risk. Notably, no patient developed Frey's syndrome, a known long-term complication of parotid surgery. This is consistent with the low incidence reported in the literature for this approach [3-16], though Bindra *et al*., [2], emphasized the need for careful parotid handling to prevent such complications. Malocclusion was observed in two patients (6.25%) postoperatively, which was successfully managed with short-term postoperative intermaxillary fixation (IMF). This highlights the importance of achieving stable intraoperative fixation and the utility of postoperative IMF as a salvage procedure when needed. The absence of other common surgical complications such as hematoma, infection, or unacceptable scarring further supports the safety and cosmetic efficacy of this approach. When compared to the endoscopic-assisted intraoral approach, which offers excellent cosmesis and nerve preservation [13], the retromandibular approach provides a more direct visualization and tactile feedback without the need for specialized equipment or a steep learning curve. This makes it a particularly valuable technique in settings where endoscopic systems are not readily available.

Study Limitations

This study has several limitations, including its relatively small sample size and its design as a single-center case series without a comparative control group. The follow-up period, while adequate for detecting early complications, may not capture long-term issues such as condylar resorption or late-onset Frey's syndrome. Future prospective comparative studies with larger cohorts and longer follow-up are warranted to validate these findings. Despite these limitations, the strength of this study lies in its detailed reporting of a standardized surgical technique and its consistent outcomes in a consecutive patient series.

Conclusion and Clinical Implications

In conclusion, the retromandibular transparotid approach is a reliable, safe, and effective surgical method for the open reduction and internal fixation of mandibular subcondylar and high ramus fractures. It offers excellent fracture exposure, minimizes the risk of facial nerve injury, and results in a cosmetically favorable scar. With careful surgical technique and attention to parotid capsule closure, the risk of specific complications like salivary fistula can be minimized. This approach should be considered a valuable option in the armamentarium of the oral and maxillofacial surgeon.

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