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Facial nerve injuries associated with the retromandibular transparotid approach for reduction and fixation of mandibular condyle fractures

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A B S T R A C T

Purpose: To document facial nerve (FN) injuries after surgical treatment of mandibular condylar fractures using the retromandibular transparotid approach and to identify risk factors associated with these injuries.
Materials and methods: A retrospective study of patients surgically treated for mandibular condylar fractures using the retromandibular transparotid approach over seven years was conducted. The primary study variable was the postoperative change in FN function after fracture fixation. Risk factors were categorized as demographic, anatomic, experience of the operator, fracture displacement/dislocation and number of miniplates placed at the fracture site. Appropriate statistics were computed.
Results: Ninety patients with 102 fractures were analysed. Thirty two fractures (31%) were located in the condylar neck and 70 fractures (69%) were subcondylar (located below the sigmoid notch). The condylar segment was undisplaced in twelve cases (12%), displaced medially in thirty five (34%), laterally displaced in thirty (29%) and dislocated in 25 (24.5%). In 18 fractures (18%), postoperative examination revealed various degrees of damage to the FN. All nerve injuries recovered completely in 8–24 weeks. In a multivariate model, condylar neck fractures, fracture dislocation and operator inexperience were associated with a statistically significant risk of postoperative deterioration of FN function ($P \leq 0.05$).
Conclusion: The majority of facial nerve injuries after surgical treatment of condylar fractures by the retromandibular transparotid approach are transient in nature. Condylar neck fractures, fracture dislocation and operator inexperience were associated with an increased risk for FN injury.
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1. Introduction

Mandibular condyle fractures are reported to be the most common fractures of the mandible (Chrcanovic et al., 2012). Non-compressive miniplate fixation of mandibular condyle fractures has gained popularity as a standard treatment around the world due to attributes such as low morbidity and ability to prevent complications such as shortening of the ramus, facial asymmetry, arthrosis of the temporomandibular joint, impaired mastication and speech (Vesnaver et al., 2005). Amongst the several approaches to the mandibular condyle, the retromandibular transparotid approach is the most widely used. The retromandibular approach was first described in 1967 (Hinds and Girotti, 1967) and modified in 1978 (Koberg and Momma, 1978). Advantages reported with this approach include minimal working distance from the incision to the fracture site, less morbidity to the facial nerve which can be identified and retracted under direct vision, excellent exposure, aesthetically pleasing results from a less conspicuous scar and ease of fracture reduction/fixation (Zide and Kent, 1983; Manisali et al., 2003).

However, surgical treatment of mandibular condyle fractures can pose a risk to the branches of the facial nerve. Nerve damage may result from manipulation of the fracture fragments, tissue dissection and retraction or the application of hardware (Yamamoto et al., 2013). The prevalence of facial nerve (FN) injury after surgical fracture treatment of the mandibular condyle ranges from 12% to 48% (Downie et al., 2009; Yang and Patil, 2012). These are unpleasant conditions which may lead to the surgeon facing litigation.

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The long-term goals of this retrospective study were to document the incidence of FN injuries, to identify risk factors associated with injury, and to optimize treatment approaches. The results of this study may indicate the factors that can be predictive of FN injury and appropriate steps to reduce the risk.

2. Materials and methods

We designed a retrospective study using a sample derived from the series of patients with mandibular condyle fractures evaluated and treated by the Department of Oral and Maxillofacial Surgery at the School of Dental Sciences, Sharda University, India between July 2007 and August 2014. The Institutional Review Board approved the study. Inclusion criteria for study enrolment were: 1) the presence of an extracapsular mandibular condyle fracture; 2) the availability of preoperative and postoperative panoramic radiographs; 3) a level of mental status permitting an adequate neuromotor examination; 4) No post injury/pre-treatment FN functional deficit; and 5) patients who had a follow up of 6 months. Patients were excluded if they had an intracapsular condylar fracture, lacked the requisite imaging, presented with signs of FN damage prior to treatment, or were incapable of completing an adequate FN functional examination postoperatively due to intoxication, severe head injury or inability to communicate (sedated or intubated patients). Patients who did not complete 6 months follow up were also excluded.

The predictor variables were grouped into the following sets: demographic (age and gender), anatomic (fracture location and displacement), post injury/pre-treatment neurosensory status (normal or abnormal), experience of the operator and number of miniplates applied for fixation of fractures. Fracture location was divided into two categories: fracture located at the condylar neck (location 1) and subcondylar fractures located below the sigmoid notch (location 2). Fracture displacement was categorized as undisplaced, medially displaced, laterally displaced or dislocated out of the glenoid fossa. One examiner reviewed the panoramic radiographs to determine degree and direction of fracture displacement (Fig. 1). Based on the FN examination, post injury/pre-treatment FN neural status was classified as being normal or abnormal. Those with abnormal FN examinations were considered to have primary FN injuries and were excluded from the study.

Treatment was rendered by a group of surgeons which included consultants (>3 years of experience) and residents (<3 years of experience). The surgical site was infiltrated with a solution

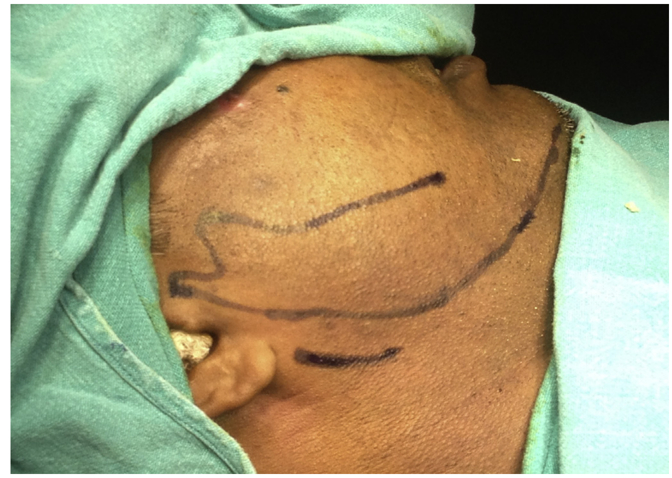

Fig. 2. Skin incision marked.

containing 1:50,000 concentration of epinephrine diluted in normal saline. The retromandibular incision was made, starting 0.5 cm below the ear lobe, posterior and parallel to the posterior border of the ramus of the mandible, 3 cm in length (Fig. 2). This was followed by dissection in a superomedial direction through skin, subcutaneous fat, a thin layer of platysma muscle, parotid capsule and the substance of the parotid gland. Blunt dissection was utilized parallel to the branches of the facial nerve, taking extra precautions to avoid injury to any of them. When any branch of the FN was encountered, Fig. 3, it was dissected free for 1 cm posteriorly and 2 cm anteriorly, allowing it to be retracted away from the surgical site. The posterior border of the ramus was then identified and the pterygomasseteric sling incised. The site of the fracture was exposed sub periosteally and suitable retractors placed to allow easy visibility and access for open reduction internal fixation (ORIF) of the fractured condyle. Medially displaced fractures required an assistant to push down the ipsilateral molar region to give enough space to reduce the medially displaced condylar segment by holding it with Kocher's bone holding forceps. Maxillomandibular fixation (MMF) was utilized to place the teeth into occlusion. Fracture fixation was achieved using one or two 4-hole titanium miniplates and screws of 2×8 mm dimension, based on operator preference, location and degree of displacement (Fig. 4). Once the

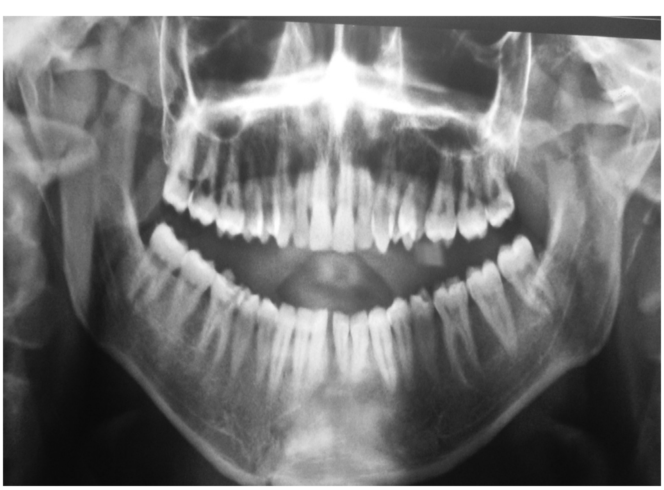

Fig. 1. Preoperative radiograph of a right condyle fracture.

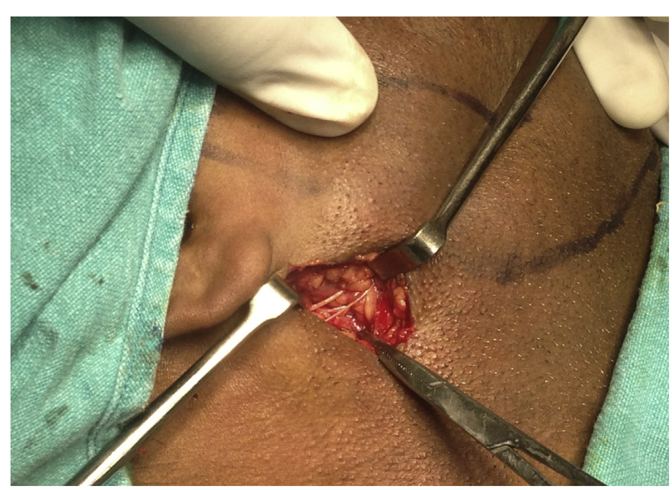

Fig. 3. Buccal and marginal mandibular branches of the facial nerve observed during dissection.

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