Journal of Cranio-Maxillo-Facial Surgery 42 (2014) 1102–1105

Contents lists available at ScienceDirect

Journal of Cranio-Maxillo-Facial Surgery

journal homepage: www.jcmfs.com

Impacted mandibular third molars and their influence on mandibular angle and condyle fractures – A retrospective study

Rajasekhar Gaddipati*, Sudhir Ramisetty [1], Nandagopal Vura [2], Rajeev Reddy Kanduri [2], Vinay Kumar Gunda [3]

Department of Oral and Maxillofacial Surgery (Head: Prof. Rajasekhar Gaddipati), Mamata Dental College & Hospital, Giriprasad Nagar, Khammam, Andhra Pradesh 507002, India

ARTICLE INFO

Article history:
Paper received 19 September 2013
Accepted 6 January 2014

Keywords:
Angle
Condyle
Impacted third molar
Mandible

ABSTRACT

Background: Previous retrospective analyses prove that impacted mandibular third molars (M3s) increase the risk of angle fractures and decrease the risk of concomitant fractures to the condyle.
Study design: A retrospective cohort was designed for patients reported to the Department of Oral and Maxillofacial Surgery from January 2011 till June 2013. The study variables are presence or absence of third molar, if it is present, their position, classified using the Pell and Gregory system; angulation, classified using Shiller's method. The outcome variables were angle and condyle fractures.
Materials and methods: Hospital records and panoramic radiographs were used to determine and classify these variables.

The study sample comprised of 118 mandibular angle and condyle fractures in 110 patients.

Database was constructed and analysed using SPSS version 10.0.
Conclusion: This present retrospective study concluded that the presence of impacted third molar predisposes the angle to fracture and reduces the risk of a concomitant condylar fracture. However absence of impacted third molar increases the risk of condylar fracture. The highest incidence of angle fracture was observed in position A impacted mandibular third molars. And there is no significant relationship, concerning ramus position and angulation of impacted mandibular third molars with the angle fracture.

1. Introduction

The most common isolated fracture site among the facial bones is the nasal bone, followed by mandible, orbital bone, zygoma, maxilla and frontal bone. This high incidence of mandibular fractures could be related to its prominent position and exposed situation (Rudderman and Mullen, 1992; Banks and Brown, 2005; Hwang and You, 2010; Thangavelu and Yoganandha, 2010). The fractures of the mandible are usually influenced by factors such as direction, severity and impact of force, presence of soft tissue bulk, occlusal loading pattern and biomechanical characteristics such as bone density, mass and anatomic structures creating weak areas (Lee and Dodson, 2000; Meisami et al., 2002). Mandibular condylar fractures are more frequent accounting for 29–52% of all mandibular fractures (Zhou et al., 2013). Reitzik hypothesized that, as sharp angulation concentrates stress, the angle of the mandible becomes a weak area and certain injuries deform the mandible beyond its yield point (Reitzik, 1995). The weakest area of the dentate mandible is the condyle and forces inflicted remain well absorbed at the angle, the mandible fractures at the angle sparing the condyle.

Third molars are the last to erupt in the permanent teeth series. These teeth are the most likely to be impacted (Peterson, 2003). They occupy different positions and angulations in relation to the anterior border of ramus and occlusal level of the second molar. Studies have shown that fractures occurred at significantly lower forces when the mandibular third molar teeth were buried within the bone (Huelke et al., 1962). Tevepaugh and Dodson showed that patients with mandibular third molars were 2.8 times more likely to have an angle fracture than those without third molars, irrespective of eruption status (Tevepaugh and Dodson, 1995). Safdar

* Corresponding author. Tel.: +91 9000018128.
E-mail addresses: drrajasekharg@gmail.com (R. Gaddipati), drsudhir_007@hotmail.com (S. Ramisetty), vura_gopal@yahoo.co.uk, drgopalbds@gmail.com (N. Vura), rajivreddy_dr291@yahoo.co.in (R.R. Kanduri), vinay_gunda777@yahoo.co.in (V.K. Gunda).
[1] Tel.: +91 9963117979.
[2] Tel.: +91 9908296688.
[3] Tel.: +91 9963054606.

1010-5182/$ – see front matter
http://dx.doi.org/10.1016/j.jcms.2014.01.038

and Meechan also asserted the association between the position of third molars and the risk of mandibular angle fractures (Safdar and Meechan, 1995). Recent clinical studies showed that the risk of angle fracture is greater for superficially placed third molars, and decreased for deeper impactions (Reitzik et al., 1978; Safdar and Meechan, 1995). Based on the current biomechanical model, it has been hypothesized that the third molar weakens the angle by decreasing the bone mass in the region making the mandibular angle more susceptible to fracture (Lee and Dodson, 2000).

The objective of this study was to systematically analyse the relationship between the status and position of third molars, angle and condyle fractures in a group of patients treated for mandibular fractures.

2. Materials and methods

2.1. Study design and sample

Retrospective study based on patients records and radiographs (Orthopantomograms). 110 individuals of age group 18 years–55 years, with mandibular fracture at angle and condyle who reported to the Department of Oral and Maxillofacial Surgery, Mamata Dental College & Hospital (Khammam, A.P., India), between January 2011 and June 2013 were included in the study.

2.2. Study variables

Hospital records and panoramic radiographs were used to assess the presence, position and angulation of impacted third molars (predictor variables) and the incidence of mandibular angle and condyle fractures (outcome variables). Winter's classification was used to classify third molars into mesioangular, distoangular, vertical and horizontal (Winter, 1926). The classification of Sciller (Sciller, 1975) was used to classify angulations of third molars as vertical, ±10°, mesioangular and distoangular, ±11°–70° and horizontal, more than 71°.

The relationship of third molar to the ramus of the mandible was grouped according to the classification of Pell and Gregory (Sciller, 1975). At level 1, sufficient space is present between the ramus of the mandible and the second molar to accommodate the crown of the third molar. At level 2, space is insufficient. At level 3, the third molar is located all or mostly within the vertical ramus.

The relative depth of third molar was grouped according to the classification of Archer (Archer, 1975). At position A, the highest point of the third molar is on the same level as, or below the occlusal plane of the adjacent second molar. At position B, the highest point of third molar is below the occlusal plane but above the cervical line of the second molar. At position C, the highest point of third molar is below the cervical line of the second molar.

2.3. Variable outcomes

Mandibular angle fracture was determined using the definition given by Kelly and Harrigan: A fracture located posterior to the second molar extending from any point on the curve formed by the junction of the body and ramus in the retromolar area to any point on the curve formed by the inferior border of the body and posterior border of the ramus of the mandible (Kelly and Harrigan, 1975).

The condyle fracture was defined as a fracture with the fracture line superior to the sigmoid notch.

2.4. Data management and analysis

The database was constructed and analysis performed using SPSS version 10.0. Data were analysed by calculating the means and standard deviation, and cohort comparisons were made using the x^2 test. p values less than 0.005 were considered statistically significant.

3. Results

Cohort group consists of 110 patients with 125 mandibular angle and condyle fractures caused by road traffic accident (98; 89%), assault (7; 6.3%), fall (5; 4.5%) as mentioned in Table 1. The only method for assessing severity of trauma force was on the basis of the number of fracture sites. A bilateral fracture pattern was seen in 84 patients (76.3%), a unilateral fracture pattern was seen in 26 patients (23.6%).

Mandibular angle fractures were 72, isolated fractures were 21 (26.1%) and associated fractures were 51 (73.9%). Mandibular condyle fractures were 53, isolated fractures were 3 (5.6%) and associated fractures were 50 (94.4%).

The cohort of 110 patients with 125 fractures of the mandible had third molar absent in 7, with the remaining 118 fractures of the mandible having a third molar.

As shown in Table 2, out of 118 fractures of the mandible associated with a third molar, an impacted third molar was found in 66 fractures and an erupted third molar was found in 52 fractures. In this study, the incidence of mandibular fracture was high when associated with third molars, the unerupted third molar present group had a higher proportion of angle fracture (58 fractures, 87.8%) than those in unerupted third molar absent group (8 fractures, 12.2%). Condyle fractures were more common in third molar absent group (43 fractures, 82.6%) than those in third molar present group (9 fractures, 17.4%).

Table 3 shows, details of ramus position, occlusal position, angulation of third molars were determined. Tables 4 and 6 shows that there was no significant relationship with the angle fractures taking into consideration the ramus position and angulation of impacted third molars (see Table 4).

Table 7 shows that condyle fractures are more commonly associated with other mandibular fractures.

Table 5 shows that the highest incidence of angle fracture was observed in position A followed by position B (see Table 8).

4. Discussion

The most common cause of mandibular fracture is traffic related followed by the violence (Chrcanovik et al., 2012). Accordingly in the present study road traffic accident is the main cause for mandibular fractures followed by an assault/violence. The external oblique ridge provides strength for the mandible in that region of the jaw, when a tooth is completely in occlusion, the widest portion of the tooth is in the mouth and the external oblique ridge remains unaltered there by strengthening the mandible in that area. When the tooth is completely impacted, the widest portion of the tooth is generally found below the external oblique ridge. When the tooth is

Table 1
Etiology of angle and condyle fracture.

Cause of injury	Angle and condyle fractures $n = 110$
Road traffic accident	98 (89%)
Assault	7 (6.3%)
Fall	5 (4.5%)