

Systematic Review
Trauma

Late mandibular fracture occurring in the postoperative period after third molar removal: systematic review and analysis of 124 cases

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Abstract. Factors associated with the diagnosis, aetiology, and treatment of mandibular fractures occurring during the postoperative period following the removal of a lower third molar are discussed. The following databases were searched using specific key words: PubMed/MEDLINE, LILACS, Embase, and Scopus. The search yielded 124 cases. Sex, age, side, tooth position and angulation, bone impaction, relationship between the tooth and the inferior alveolar nerve, local pathological conditions, aetiology of the fracture, symptomatology, and time between surgery and fracture, as well as any displacement of the fracture and the treatment of the fracture, were evaluated. Data were tabulated and the χ^2 statistical test was applied ($P < 0.05$). Male patients aged >35 years, with teeth in positions II/III and B/C, complete bony impaction, and local bone-like alterations, were found to have a higher frequency of fracture and pericoronitis ($P < 0.05$). Late fractures generally occurred between the second and fourth postoperative weeks ($P < 0.05$). They were generally not displaced and the typical treatment was the non-surgical approach ($P < 0.05$). It is concluded that the risk of mandibular fracture after extraction is associated with excessive osteotomy and/or local alterations. At-risk patients should be thoroughly briefed on the importance of a proper postoperative diet.

Key words: third molar; mandibular fractures; fractures; spontaneous.

Accepted for publication 6 September 2016
Available online 28 September 2016

The surgical removal of a lower third molar is a common procedure in the dental clinic. Potential complications include infection, bleeding, haemorrhage, lesion of

the inferior alveolar nerve, trismus, and mandibular angle fractures.^{1–8} A mandibular angle fracture is the most serious complication occurring during surgery;

however, this is very rare, with an incidence of 0.0034 to 0.0075%.¹ The incidence of late mandibular angle fracture occurring in the postoperative period after

the surgical removal of a lower third molar is less than 0.005%.^{2,3}

Factors contributing to the risk of mandibular angle fracture after the extraction of a third molar include the level of impaction on the bone around the tooth,³ the dental anatomy and the dental root characteristics,³ the side of the fracture,³ previous local infections,² age,³ sex,^{2,3} amount of time postoperative,^{2,3} bruxism,² and whether the patient is an active athlete.²

The choice of treatment depends on the fracture characteristics and the surgeon's preference, and includes more conservative approaches such as a soft diet,⁴⁻⁶ maxillomandibular fixation,^{5,7} and surgical treatment by means of reduction and fixation of the fracture.⁴

The aim of this systematic review was to report and discuss the factors associated with the aetiology and treatment of mandibular fractures in the postoperative period following lower third molar removal.

Methods

The PRISMA statement was followed for the systematic review,⁹ as well as models proposed in the literature.^{10,11} The articles were selected individually by two of the authors (WRP and JPB) and there was no disagreement in the selection of the articles.

Eligibility criteria

The studies selected for this systematic review met the criteria established by the PICO framework: (1) population: patients presenting for the extraction of a lower third molar; (2) intervention: patients undergoing lower third molar extraction; (3) comparison: patients presenting with mandibular angle fractures after lower third molar extraction; (4) outcome: the main outcome of the study was the relationship between lower third molar removal and the incidence of mandibular angle fracture.

Literature search strategy

An electronic search without date or language restriction was performed in January 2016 in the following electronic databases: PubMed/MEDLINE, LILACS, Embase, and Scopus.

The key words "Molar, Third" and "Mandibular Fractures" were selected, which are available in the medical subject headings (MeSH, PubMed). These search terms were then used in the following combinations: ("Molar, Third"[Mesh]) AND ("Mandibular Fractures"[Mesh]),

("Dental Extraction") AND ("Mandibular Fractures"), and ("Tooth Extraction") AND ("Mandibular Fractures") for the PubMed database; "Dental Extraction" AND "Mandibular Fractures", "Tooth Extraction" AND "Mandibular Fractures", and "Molar, Third" AND "Mandibular Fractures" for the Scopus database; "Dental Extraction" AND "Mandibular Fractures", "Tooth Extraction" AND "Mandibular Fractures", and "Molar, Third" AND "Mandibular Fractures" for the Embase database; (Dental Extraction) AND (Mandibular Fractures), (Tooth Extraction) AND (Mandibular Fractures), (Molar, Third) AND (Mandibular Fractures), (Exodontia) AND (Fratura mandibular), (Extracção dental) AND (Fratura mandibular), (Extracción dental) AND (fractura mandibular), and (Exodontia) AND (fractura mandibular) for the LILACS database.

Study selection

Inclusion criteria encompassed the following: systematic reviews that included new cases, randomized studies, prospective studies, retrospective studies, clinical cases, case series, letters to editor, and expert opinions on late fractures after lower third molar extraction, with no restrictions on age or sex.

Articles that reported fractures without specification of the time of occurrence (preoperative or postoperative period) and those that did not report any of the data required for this review were excluded.

The selection of studies was conducted independently by two calibrated examiners (WRP and JPB). The inter-examiner (kappa) test was used to evaluate the selection of titles and abstracts and full-texts for reading and interpretation, resulting in concordance test values of $\kappa = 1$, 1 for PubMed/MEDLINE, $\kappa = 1$, 1 for LILACS, $\kappa = 1$, 1 for Embase and $\kappa = 1$, 1 for Scopus. Finally, a total of 36 articles were considered eligible for this review.

Data items

The following data, when available, were extracted from the studies included in the final analysis: year, number of cases, sex, age, side of the extracted tooth (fracture side), tooth position (Pell and Gregory classification¹²), tooth angulation (Winter classification), degree of impaction (partial or complete bony impaction), relationship of the tooth to the mandibular canal (adjacent or superimposed), local pathological conditions, fracture aetiology,

symptomatology, time between surgery and the fracture, and fracture displacement and treatment.

Risk of bias in individual studies

The selected manuscripts were analyzed according to the clinical evidence. The manuscripts were separated into the following categories: systematic review/case series, case series, case report, retrospective study, letter to the editor, and expert opinion on a case series. The systematic review/cases series, case series, cases report, and retrospective studies were sorted according to their level of evidence, as proposed by the National Health and Medical Research Council of Australia (NHMRC).¹³

With regard to summary measures, the relationships between the frequency of fractures and the following parameters were analyzed: the kind of inclusion, the aetiology of the fracture, the side of the fracture, age, and the time between surgery and the fracture.

Risk of bias across studies

A few studies reported mandibular fractures occurring through an external trauma during the postoperative period following third molar extraction. Thus, it was not possible to claim that these fractures occurred entirely due to the tooth extraction, since the external trauma would be an aetiological factor.¹⁴

Statistical analysis

Data were tabulated in Microsoft Excel 2013 and analyzed by descriptive statistics (distribution frequency). Associations between the occurrence of fracture and other sample factors, such as age, sex, and third molar position, were analyzed by χ^2 test, considering a significance level of 5% ($P < 0.05$). These tests were run using the statistical software SigmaPlot 12.3 (Systat Software Inc., San Jose, CA, USA).

Results

The database search returned 476 articles after the removal of duplicates. Following the screening of titles and abstracts, 423 records were excluded. Fifty-three full-text articles were assessed for eligibility (Fig. 1). Finally, 36 articles were selected; these articles included 124 clinical cases associated with mandibular fracture after the removal of a lower third molar (Table 1).^{2-8,15-43}

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