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Extraction of mandibular third molars: proposal of a new scale of difficulty

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Abstract

We evaluated the accuracy of a new scale of surgical difficulty for the extraction of impacted mandibular third molars, which includes consideration of previously underestimated variables. Two hundred patients with impacted third molars were enrolled, and a preoperative clinical and radiographic assessment of difficulty was made by an oral surgeon using the new index. Five oral surgeons with similar degrees of experience then evaluated the surgical difficulty during operation. The kappa test and weighted kappa were used to evaluate the level of agreement between the preoperative and postoperative evaluations. This was 0.73, which indicated a substantial concordance between the preoperative and postoperative assessments of difficulty indicated by the new scale. The linear weight of kappa was 0.8 and the quadratic weight 0.87. We recommend this new scale of surgical difficulty for the extraction of impacted third molars for use in clinical practice.

Keywords: tooth extraction; risk assessment; intra-operative complications; taurodontism; inferior alveolar nerve

Introduction

Extraction of mandibular third molars is one of the most common procedures in oral surgery and, as with all surgical operations, appropriate clinical and radiographic evaluations are essential to avoid (or reduce the incidence of) any complications, and to prepare an appropriate plan for treatment. The most serious complications are injury to the inferior alveolar nerve (IAN)[1] or lingual nerve, and mandibular fracture. To reduce these, several classifications have been proposed to establish an accurate index of surgical difficulty, which we hope will lead to an ideal treatment plan.

The classifications of Winter,[2] Pell and Gregory,[3] WHARFE,[4] and Pedersen[5] are some of the most commonly used in clinical practice, but none of them is completely accurate.

The objectives of the present study were therefore, first, to review the clinical and radiographic variables before extraction of an impacted third molar, and, secondly, to propose and validate a new scale of surgical difficulty based on variables not previously considered (relating to morphological abnormalities, the type of undercut, and the transverse position of the tooth).

Methods

Variables considered

Angulation

Winter's classification considers the angle that is formed between the lines that correspond to the long axis of the second and third molars, and the impaction is described as vertical, mesioangular, horizontal or distoangular.[2] However,

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vestibular, lingual, inverted, and transverse inclinations were not taken into account. A distolingual inclination is thought to be more difficult than a vestibular one because of the difficult surgical access, the thinning of the lingual cortical plate compared with the vestibular one, and the serious risk of complications (such as migration within the floor of mouth, and lingual nerve damage).

There is a relation between the pattern of impaction and injury to the inferior alveolar nerve (IAN), the incidence of which seems to be highest in horizontally-impacted molars (1.7%) followed by distally-inclined (1.4%), mesially-inclined (1.3%), and vertically impacted (1.1%).[6,7]

Available space

According to the Pell Gregory classification,[3] impacted third molars can be divided into three classes in the horizontal plane - I, II, and III impactions - which are related to the space between the ramus of the mandible and the distal side of the second molar. Class III is considered to be the most difficult.

Depth

According to the Pell Gregory classification,[3] the depth is measured in three positions - A, B, and C - according to the position of the highest portion of the third molar related to the occlusal plane and the cervical line of the second molar. The risk of inferior alveolar nerve injury increases with the depth of impaction of the third molar.[8]

Bone density

According to Misch's classification,[9] bone density can be divided into five categories: D1 -1250 Hounsfield units (HU); D2 (850-1250 HU); D3 (350-850 HU); D4 (150-350 HU); and D5 (<150 HU).

The presence of dense bone, particularly in elderly patients, makes the operation more difficult because the bone is less elastic and it can be difficult to distinguish between the tooth and the surrounding bone.

Relation with the mandibular canal

The relation between the impacted third molar and the IAN is one of the most important factors to consider in the surgical treatment planning. A panoramic radiograph may be examined for signs that are indicative of an increased risk of damage to the nerve.[10] Rood and Shehab stated that a diversion of the inferior alveolar canal, a darkening of the root of the third molar, an interruption of the cortical white line, a narrowing of the inferior alveolar canal, a deflected root, and a narrowing of the root are all significantly associated with injury to the IAN.[11] All these require detailed evaluation of the relation between the tooth and the IAN by dental 3-dimensional computed tomography (CT), particularly by cone-beam CT.[12]

Fig. 1. Lingual position of the third molar.

Buccolingual position (Fig. 1)

A buccolingual position of most of the tooth in relation to the mandibular lingual and buccal walls is another important factor to consider when calculating the scale of surgical difficulty.

Iatrogenic injury to the lingual nerve can occur during extraction of a third molar when it is close to the lingual wall because of the proximity of the lingual nerve. It lies in the cortical plate, and is sometimes separated from it only by the periosteum.[13] Injury to the lingual nerve has been reported in between 0.15%[14] and 6.6% of cases,[15] where such damage may lead to hyperaesthetic paraesthesia.

Dental morphology

One of the most important factors that may complicate the extraction of mandibular third molars is the presence of morphological abnormalities such as an abnormally curved root, and the width and number of roots and abnormalities of the crown, all of which should be assessed before the operation. According to our experience, the dental morphology can be divided into two degrees of difficulty – low and high. Low consists of "hourglass undercut", taurodontism, and multiple, curved or convergent roots (or both), or fused apices. High covers taurodontism in conjunction with other abnormalities, bulbous or curved roots (or both), divergent roots, curved roots with apical fusion, an IAN that passes through them, and any combination of two or more abnormalities.

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