Association between radiographic classification and surgical technique in extractions of third lower molars

Associação entre classificação radiográfica e técnica cirúrgica nas exodontias de terceiros molares inferiores

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Abstract

Introduction: establish an association between the radiographic classification and the surgical technique related to the lower third molars. Materials and method: a retrospective study was carried out, with the descriptive analysis of the data. The sample consisted of 100 patients (n = 100) from the spontaneous demand who sought out the Dental Clinic of UFC (Ceará's Federal University) – *Campus* Sobral, between december 2017 to july 2018, and who followed the inclusion criteria: patient with panoramic radiography, free of active periodontal disease and tooth with at least two thirds of root formation; and as exclusion criteria: patients with associated bone pathologies, teeth with less than two thirds of root formation and patients who did not wish to participate in the study. Results: patients included in the study were from 18 to 25 years of age, most of them male, with complaints of pain. Using the radiographic classification of Pell & Gregory, the most found positions were 1A (35%), 2B (28%) and 2A (17%). The most prevalent surgical techniques were the open ones. Could be done the extraction by closed surgical technique (forceps or lever) (n = 27), with flap preparation plus osteotomy (OST) (n = 25) and flap plus osteotomy plus odontostomy (ODS) (n = 48). Conclusion: teeth with radiographic classification, grade of inclusion and different preoperative plans had the same protocol (flap + OST + ODS) in the surgical act. It is evident that radiographic classification stills an effective method to aid in operative planning, but it can be complemented by other diagnostic standards, such as a specific classification of the root anatomy.

Keywords: Oral surgery. Panoramic radiography. Third molar.

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Introduction

The third molar surgeries represent an important chapter among the oral and maxillofacial surgical modalities. Panoramic radiography has been the most used method by dentists for diagnosis, preoperative planning and choice of technique to be used for this type of surgery[1-4]. The establishment of third molar positioning is extremely important for the surgical planning, evaluation of the grade of difficulty of the procedure, correct diagnosis and selection of the treatment plan[5,6]. Non-eruption is commonly related to the lower third molars, followed by the third upper molars, upper canines and supernumerary teeth[2-4,6]. The higher prevalence of third molars inclusion favors the prominence in the literature[1,3,4,6,7]. Its importance increases because of the wide variety of positioning, difficulty in surgical treatment and because it is more frequently associated with pathological lesions[6,7]. As a way of identifying the grade of accessibility, classifications for impacted teeth were created[7,8]. The most commonly used classifications for dental retentions related to lower third molars are: in relation to the angle of the tooth[7] and the grade of impaction[8]. Variations in the dental position in relation to the bone tissue can result in difficulties in its removal, necessitating specific techniques for each case. The surgical technique for the extraction of third molars requires respect for basic surgical principles, such as flap preparation and manipulation, osteotomy and/or odontostomy[9].This study aims to associate radiographic classification and surgical technique to third molars erupted, semi-embedded and embedded, as well as to compare the data found in the present study with the data described in the current national and international literature.

Materials and methods

Type of study, population and sample

A retrospective study was accomplished with data analysis and descriptive analysis of clinical records. The sample consisted of 100 clinical records of patients who underwent surgery of lower third molars in the surgical clinic of the course of Dentistry of UFC – *Campus* Sobral from the spontaneous demand that sought out the UFC – *Campus* Sobral dental clinic in the period of December 2017 and July 2018, and followed the inclusion criteria: complete patient data, panoramic radiography, patients aged between 18 and 40 years; patients with indication for removal of the lower third molars; patients considered healthy or with mild to moderate systemic diseases (ASA I and II), analysis based on clinical records; patients without active periodontal disease; tooth with at least two thirds of root formation; patients who agreed to the free and informed consent term. And as exclusion criteria: patients with acute pericoronaritis and suppuration at the time of the intervention, bone pathologies associated with lower third molars, patients ASA III, IV, tooth with less than two thirds of root formation, patients on medication that compromise the cicatricial process (Corticosteroids, Antineoplastics, Bisphosphonates).

Data collect

To record and collect data from patients and selected charts, specific clinical files were used. The contents of this record include identification data, main complaint, historical of the current complaint, previous medical and dental history, radiographic evaluation of third molars and the surgical technique used. The radiographic evaluation was performed by two oral and maxillofacial surgeons. The teeth were classified according to the classification of Pell & Gregory[9], after observation of the panoramic radiograph the surgical procedure was performed by two professor from the dentistry course of the UFC - *Campus* Sobral and by two academics (4th and 5th year of graduation) of the League of Anatomy and Oral and Maxillofacial Traumatology - (LATIUM) under the strict guidance of its coordinators, both with more than 10 years of clinical experience. After analyzing the medical records, the surgical data were recorded in a specific surgical file for the study.

Ethical and regulatory considerations

This research will be conducted in accordance with current Brazilian legislation for research on human beings, Resolution CNS No. 466/12.

In addition, this study was approved by the Research Ethics Committee of Vale do Acaraú State University. - View No: 2,454,518

Results

Table 1 – Specification of the study regarding gender, age and teeth to be removed

Gender (n = 100)	
Men	65 / 65%
Women	35 / 35%
Age (n= 100)	
18-25 Years	71/ (71%)
26-40 Years	29 / (29%)
Removed teeth (n =100)	
Tooth 48	52 / 52%
Tooth 38	48 / 48%

Table 2 – Specification of the study regarding the main complaint of the patients

Main Complaint (n = 100)	
Pain Complaint	68 / 68%
Orthodontic Indication	13/13%
Chronic Pericoronitis*	10 / 10%
Prevention of pathologies	6/6%
Tooth decay	2/ 2%
Reabsorption of 2nd molar	1 / 1%

Table 3 – Specification of the study in relation to the type of anesthetic bases used and the type of thread used in the suture

Anesthetics (n = 100)	
Articaine	63/ 63%
Mepivacaine	21/ 21%
Lidocaine	6/ 6%
Suture thread (n = 100)	
Silk 3.0	52 / 52%
Cotton 3.0	48/ 48%

Table 4 – Specification of the study regarding the surgical technique, procedure time

Surgical Technique (n = 100)	
Closed or Simple	27 / 27%
Flap + OST*	25 / 25%
Flap + OST + ODS**	48 / 48%
Surgical Procedure Time*** (n = 100)	
Over 30 minutes	67 /67%
Below 30 minutes	33 / 33%

Legend: *Osteotomy/** Odontosection/*** Procedure timed from anesthesia to final suture.

Table 5 – Specification of the study regarding the dental eruption

Classification of the grade of eruption (n = 100)	
Semi-embedded	58 / 58%
Erupted	35 / 35%
Embedded	7/ 7%

Table 6 – Specification of the study regarding the classification of Pell & Gregory

Classification of Pell & Gregory (n = 100)	
Class I, position A	35 / 35%
Class I, position B	13 / 13%
Class I, position C	2 / 2%
Class II, position A	17 / 17%
Class II, position B	28 / 28%
Class II, position C	1 / 1%
Class III, position A	1 / 1%
Class III, position B	1 / 1%
Class III, position C	2 / 2%

Table 7 – Specification of the study regarding the surgical technique used by the classification of Pell & Gregory

Classification x Surgical technique (n = 27)	Closed
Class I, position A	16 / 16%
Class I, position B	3 / 3%
Class II, position A	5 / 5%
Class III, position B	1 / 1%
Class II, position B	2 / 2%

Table 8 – Study specification for open surgical techniques used by Pell & Gregory classification

Classification x Surgical technique (n = 73)	Flap + OST (n=25)	Flap + ODS + OST (n=48)
Class I, position A	9 / 9%	10 / 10%
Class I, position B	2 / 2%	8 / 8%
Class I, position C	0 / 0%	2 / 2%
Class II, position A	1 / 1%	11 / 11%
Class II, position B	12 / 12%	14 / 14%
Class II, position C	0 / 0%	1 / 1%
Class III, position A	0 / 0%	1 / 1%
Class III, position B	0 / 0%	0 / 0%
Class III, position C	1 / 1%	1 / 1%

Discussion

The factors that influence the surgical complexity of the extraction of impacted mandibular third molars can be divided into three main groups: related to tooth shape and

position, operative variables (surgical technique and operator experience)[10-12] and demographic variables (age, sex, ethnicity)[10-13].

The anatomy and position of the tooth have been considered for several years the main parameters to be evaluated in the pre-surgical planning: Winter[7] (1926) and Pell and Gregory[8] (1933) are still the most used classifications to define the grade of inclusion of mandibular third molars on panoramic radiographs.

These classifications considerably help the professional regarding to identification of inclusion, communication with other dental surgeons and the delineation of inclusion criteria in scientific studies, but do not provide a standardized stratification of surgical complexity, correlated with clinical reality[14-17].

For procedures in dental clinics, the use of anesthetic bases is essential for the conduction of the surgical procedure[18,19]; the professional can use a variable range of anesthetics with their respective vasoconstrictors, however, 4% articaine with 1:100,000 epinephrine, 2% mepivacaine with 1:100,000 epinephrine and 2% lidocaine with epinephrine 1:100,000 are the devices more commonly used for anesthetic induction[20], as can be seen in the present study.

Due to the efficacy of anesthesia, hemostasis and transoperative bone perfusion[20] articaine was the most prevalent anesthetic base for inferior alveolar nerve block and lingual and buccal nerves. It is established that – in erupted teeth – the surgical technique to be used is the closed or simple technique, which has as characteristics the use of elevators and forceps to extract the dental element[10,11,18,19].

In the present study, can be noted a higher prevalence of teeth in Class I Position A (35%), in this case, totally erupted and, according to the radiographic classification, with a lower grade of surgical complexity compared to teeth more inserted in the mandibular ramus and inferior to the occlusal plane of the second mandibular molar[21].

Even in simpler teeth, the most commonly used surgical planning (Flap + OST + ODS 48%) was the same used in more complex teeth: the use of complicated extraction principles[22], demonstrating that during the surgical procedure the planning may change according to the complexity of the case[23,25].

The results of the study made by Komerik et al., showed that resident surgeons and experienced oral and maxillofacial surgeons demonstrated a similar ability to estimate the difficulty of removal of third molars, although it has been affirmed that surgical difficulty can only be appreciated with certainty during the procedure[26]. Comparison of surgical skills in extractions among fourth and fifth year students did not show significant differences[27], according to Majid's study in 2018. As expected, in this study and reinforced by the study made by Komerik et al. in 2014, operational complexity correlated positively with the duration of surgical time[26].

However, operative time does not always reflect the complexity of the surgery. When operations take longer than expected, almost half of the reasons cited by surgeons were factors that can not be evaluated preoperatively, such as the inability of the patient to maintain an adequate mouth opening during the surgical procedure and the patient's anxiety with the procedure.

It can be noted that even a dentist with experience in the extraction of lower third molars can alter the preoperative planning due to failure in the closed technique in a tooth radiographically classified as simple because it is not considered an important item of the dental anatomy: the position, shape and dilaceration of its roots.[23]

It is important to note that the root anatomy must be analyzed during radiographic examination, but there is no worldwide and historically radiographic classification such as Pell and Gregory's and Winter's[13,24].

Thus, the questioning of an erupted third lower molar is considered simple because it has a position and angulation similar to that of other permanent teeth is necessary, so that, there is no neglect of the root morphology. There was, in 2018[23], a Brazilian study that standardized the root anatomy of 1,205 third lower molars analyzed in panoramic radiographs, being the most relevant research up to the present moment in relation to how much the root morphology can change the planning of a third molar to be removed.

Divergence, dilaceration, expressive volume increase or hypercementose and root anomalies may require ostectomy and tooth sectioning of a Class I position A tooth, as seen in the present study, justifying the questioning of different techniques in dental elements with similar positions.

The grade of root formation also has an influence on the extraction: the lower the formation, the greater the ease of removal of the developing tooth. The third molar with less than two thirds of root formation makes surgery easier than complete root formation, thus, teeth with root formation less than 66% were not included in the present study because they became a bias in the research.

Figure 1 – Tooth 38 and 48 with radiograph classification class 1 and position A (most prevalent 35%)

Figure 2 – Tooth 38 and 48 with different radiographic classifications that required different preoperative planning and the same surgical acts (Retail + OST + ODS)

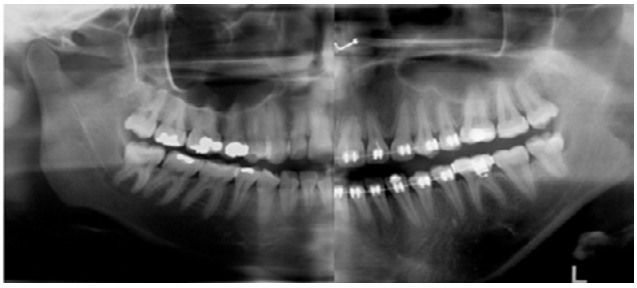

Figure 3 – Dental elements 38 and 48 with the same radiographic classification (1A) and different root anatomies, indicating different surgical protocols, tooth 38 (flap + OST) and tooth 48 (flap + OST + ODS)

Figure 4 – Dental elements 38 and 48 with less than two thirds of root formation, contraindicating the exodontia as inclusion criterion of the research

Conclusion

Teeth with radiographic classification, grade of inclusion and different preoperative plans had the same protocol (Flap + OST + ODS) in the surgical act. Becomes evident that radiographic classification stills an effective method to aid in operative planning, but it can be also complemented by other diagnostic standards, such as a specific classification of the root anatomy. Despite the questions raised in the present study, lower third molar surgery stills a safe and effective procedure for the patient, following the correct indications and surgical planning based on current and relevant evidence.

Resumo

Objetivo: realizar uma associação entre a classificação radiográfica e a técnica cirúrgica relacionada aos terceiros molares inferiores. Materiais e método: foi realizado um estudo retrospectivo, com a análise descritiva dos dados. A amostra foi constituída de 100 pacientes (n = 100), provenientes de demanda espontânea, que procuraram o ambulatório de Odontologia da Universidade Federal do Ceará (UFC) – *Campus* Sobral, no período de dezembro de 2017 a julho de 2018, e que seguiram os seguintes critérios de inclusão: presença de radiografia panorâmica, ausência de doença periodontal ativa e dentes com no mínimo dois terços de formação radicular. Já os critérios de exclusão foram: pacientes com patologias ósseas associadas aos terceiros molares inferiores, dentes com menos de dois terços de formação radicular e pacientes que não desejassem participar do estudo. Resultados: os pacientes incluídos no estudo tinham idades entre 18 e 25 anos, a maioria do sexo masculino, com queixas álgicas. Em relação à classificação de Pell & Gregory, as posições mais encontradas foram 1A (35%), 2B (28%) e 2A (17%). As

técnicas cirúrgicas mais prevalentes foram as abertas (73%). Em relação às técnicas cirúrgicas, foram encontradas: técnica cirúrgica fechada (fórceps ou alavanca) (n = 27), com confecção de retalho mais osteotomia (OST) (n = 25) e por retalho mais osteotomia e odontossecção (ODS) (n = 48). Conclusão: é evidente que a classificação radiográfica ainda é um método eficaz para auxiliar no planejamento operatório, mas pode ser complementada por outros padrões de diagnóstico, como uma classificação específica da anatomia radicular.

Palavras-chave: Cirurgia oral. Radiografia panorâmica. Terceiro molar.

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