Analysis of the use of open technique in Erupted Third Molars

Análise do uso da técnica aberta em Terceiros Molares em Erupção

DOI:10.34119/bjhrv3n4-252

Recebimento dos originais: 03/07/2020
Aceitação para publicação: 17/08/2020

Samuel Rocha França
Dentistry student – Federal University of Ceara Sobral campus
President of the League of Anatomy and Traumatology Maxillofacial Facial - LATIUM
Address: Rua Afonso magalhães, 38 – Derby – Sobral, Ceará - Brazil
E-mail: samuelfranca@outlook.com

Josfran da Silva Ferreira Filho
D. D. S. – UFC – Sobral Campus
Address: Rua Dona Leopoldina, 1045. Centro – Fortaleza, Ceará - Brazil
E-mail: josfranf@hotmail.com

Marcelo Bonifácio da Silva Sampieri
PhD, Department of Stomatology – Federal University of Ceara Sobral campus
Coordinator of the League of Anatomy and Traumatology Maxillofacial Facial – LATIUM
Address: Rua Cel. Estanislau Frota, 563 – Centro – Sobral, Ceará - Brazil
E-mail: mar_sampieri@hotmail.com

Dandara Rodrigues de Vasconcelos
Dentistry student – Federal University of Ceara Sobral campus
Member of the League of Anatomy and Traumatology Maxillofacial Facial – LATIUM
Address: Rua Cel. Estanislau Frota, 563 – Centro – Sobral, Ceará
E-mail: dandaravasc.ufc@gmail.com

Gislayne Nunes de Siqueira
Dentistry student – Federal University of Ceara Sobral campus
Member of the League of Anatomy and Traumatology Maxillofacial Facial – LATIUM
Address: Rua Cel. Estanislau Frota, 563 – Centro – Sobral, Ceará
E-mail: Gislayne.siqueira@gmail.com

Marcelo Ferraro Bezerra
PhD, Department of Oral and Maxillofacial Surgery – Federal University of Ceara Sobral campus
Facial Anatomy and Traumatology League Coordinator - LATIUM
Address: Rua Cel. Estanislau Frota, 563 – Centro – Sobral, Ceará
E-mail: mferraro3@hotmail.com

Rodrygo Nunes Tavares
PhD, Department of Oral and Maxillofacial Surgery – Federal University of Ceara Sobral campus
Member of the League of Anatomy and Traumatology Maxillofacial Facial – LATIUM
Address: Rua Cel. Estanislau Frota, 563 – Centro – Sobral, Ceará
E-mail: rodrygobmf@gmail.com
ABSTRACT
Purpose: To describe the clinical situations in which the open technique was used after the attempt to use the closed technique in surgical procedures for extraction of lower third molars of 1A classification.
Methodology: Lower third molar extractions were performed at the University Department of Sobral Oral and Maxillofacial Surgery and Traumatology from September 2016 to May 2019. Seventy-three patients aged 18 to 38 years, ASA I and II, with indications for extraction of fully erupted vertical IA classification third molars were selected for research. Results: The sample consisted of 73 patients, in which 90 lower 1A vertical molar extractions were performed. Regarding the outline of the surgical technique, of the 90 surgeries performed, only 22 followed the previous planning. Of the 69 surgeries that had alterations in the technique, 64 had failures regarding dislocation and removal of the tooth via the socket and 4 presented trans-surgical accidents such as corono-radicular fractures, leading the surgeon to transalveolar extraction. Conclusion: Root anatomy, previously evaluated by imaging exams, may directly influence the type of technique to be recommended for removal of lower third molars of vertical IA classification, it is necessary to evaluate and question the classification of root types to assist in the preoperative planning of this type of tooth, optimizing the surgical time.

Keywords: Panoramic Radiography, Third Molar, Unerupted Tooth, Tooth Extraction.

1 INTRODUCTION
Lower Third molar extraction is one of the most common oral surgery procedures; however, it may be complex due to the clinical conditions associated with this tooth, such as the intimate
relationship between its roots and the inferior alveolar nerve or compromising medical condition of the patient. Reported complication rates range from 3.5% to 14.8% for third molar extraction [1-4], ranging from worse complications comprising lower alveolar or lingual nerve injury and mandibular fracture[3,5,6]. Several classifications have been proposed to establish an accurate rate of surgical difficulty, and thus help to take better decision to treatment plan[3,5,6-9]. The Winter, Pell and Gregory classifications are some of the most commonly used in clinical practice, but none of them are completely accurate[10]. With respect to the Winter classification, the angle formed between the lines that correspond to the long axis of the second and third molars, and the impaction is described as vertical, mesio-rectangular, horizontal or distal-angular[7]. According to the Pell & Gregory classification, molars can be divided into three classes - I, II and III - which are related to the space between the mandible branch and the distal side of the second molar. Class III position provides the greatest challenge for removal this kind of tooth. Still according to the classification of Pell & Gregory[10], the depth is classified in three positions, class A, in which the occlusal plane of third molar is level with that of the second molar, class B, in which the occlusal plane is between the occlusal plane of the second molar and its cervical line and class C, in which the occlusal plane of the impaction is below the cervical line of the second molar. Therefore, based on an analysis of relevant historical, clinical and imaging information, the patient's risks and benefits should be considered when deciding on the best surgical technique to perform. Therefore, based on an analysis of relevant historical, clinical and imaging information, the patient's risks and benefits should be considered when deciding on the best surgical technique to perform. In combination with surgical techniques, three fundamentals are required for good extraction: proper access and visualization of the surgical field, an unimpeded path for tooth removal, and the use of controlled force to dislocate and remove the tooth, as a good previous surgical procedure planning[11]. In general, a root that has suddenly invaded space can be extracted using one or two main techniques: closed or open. The closed technique is also known as the routine, often used and is the first consideration for erupted tooth extractions[1,4,6,8]. The open technique is known as the surgical technique or retail technique, being used when we want to avoid the use of excessive force[12]. The correct protocol for extraction should aim at atraumatic manipulation of the tissues and tooth to be removed; the wrong method usually results in an excessively traumatic and long extraction. Several common steps apply to the removal of all impacted teeth, such as the use of appropriate flaps for visibility, dental exposure through removal of overlapping bone, the dental section - if necessary - and its removal prior to the final suture [11]. The aim of the present study is to evaluate the clinical situations in which the open technique was used after the attempt to use the closed technique.
2 METHODOLOGY

Patients and methods

This study was a descriptive and retrospective, which evaluated medical records of patients undergoing lower third molar extractions in the Buccomaxillofacial Surgery and Traumatology department at University of Sobral from September 2016 to May 2019. Patient’s records with aged between 18 and 38 years old, ASA I and II, with indications for lower third molar extraction that had a fully erupted vertical IA classification were selected. The exclusion criteria were patients with active periodontal disease, less than two thirds of root formation present or associated with any pathological lesion not included in the analysis, and only patients who agreed to sign the free and informed consent form, stating about possible complications and benefits of research. The retrospective study was conducted in accordance with the Helsinki statement and approved by the Ethics Committee of the Vale do Acaraú State University (No: 2,434, 518).

Surgical protocol

The included teeth were removed following the initial planning: after regional anesthesia, their initial extraction by the closed technique following the clinical principles: making an envelope mucoperiosteal flap, attempting alveolar dislocation with straight and triangular levers or forceps and case extracted, final alveolar suture. If the closed technique failed, the open or flap surgery method would be recommended: Making a triangular mucoperiosteal flap, using a high-rotation turbine coupled with surgical drill #6 for osteotomy and, if necessary, surgical drill #702 for section, followed by of tooth dislocation and removal by the use of levers / extractors. Analgesics and anti-inflammatory drugs were standardly prescribed in all surgeries performed.

Study design

The medical records analyzed for each patient were evaluated according to the technique used, considering the radiographic classification of the tooth position and the root classification. The reason for the failure or complication that led the surgeon to use one surgical protocol over the other indicated in the medical records was also used for study criteria.

Statistical analyses

The relationship between the techniques used and the type of root anatomy of the extracted teeth was compared by Fisher's exact test using the Microsoft SPSS® 2013 program.
3 RESULTS

From 221 medical records evaluated, only 73 were used by the inclusion criteria. The sample was 73 patients, in which 90 lower molar extractions with position 1A vertical were performed. Of these, 58 were female and 15 male. The study included patients aged 18 to 38 years. Regarding the third molars removed, tooth 48 was more prevalent (n = 52) followed by tooth 38 (n = 38). Regarding the outline of the surgical technique, of the 90 surgeries performed, only 22 followed the previous planning (Table 1). Of the 69 surgeries that had alterations in the technique, 64 presented failures regarding dislocation and removal of the tooth via the socket and 4 presented trans-surgical accidents such as corono-radicular fractures, leading the surgeon to transalveolar extraction (Table 2).

| Technique    | N = 90 |
|--------------|--------|
| Open         | 68 (75%) |
| Close        | 22 (25%) |

| Surgical planning                              | N = 90 |
|------------------------------------------------|--------|
| Surgeries without changes in surgical planning | 22(25%) |
| Alteration due to tooth dislocation and removal | 64 (71.1%) |
| Alteration for trans-surgical coronoradicular fracture | 4(3.9%) |

| N = 90                      | Regular anatomy | Root anomalies | Total (p value) Fisher's exact test |
|-----------------------------|-----------------|----------------|-----------------------------------|
| Open Technique              | 4               | 64             | 68                                |
| Close Technique             | 22              | 0              | 22                                |
| Total (p value)             | 26              | 64             | 90                                |

p < 0.000001

4 DISCUSSION

Even in erupted third molar, their extractions have complex peculiarities when compared to the other teeth in the arch. Location, time of eruption (the last teeth to erupt) and, consequently, less physiological space for eruption and maintenance of third molar[13] are factors that may influence the surgical planning. Bone cortical density is an important factor to consider. When the patient is young, their bone density is lower and, therefore, easier to achieve tooth dislocation in tooth extractions[13,14,22]. Thus, a dental extraction procedure in patients over 35 years old, with higher bone density, will reflect a lower cortical expansion, which will result in lower tooth mobility and greater chance of using surgical drills to perform osteotomies. total tooth removal. The presence of anatomical structures - such as the external oblique line - in this region may affect the use of the closed
technique because the buccal cortical wall is thick and rigid compared to the lingual one, and the anterior border of the mandibular ramus is closely related to the distal face of the third molar, also having the narrowest periodontal ligament[16]. Due to the principles of closed extraction, buccal and lingual expansion is necessary for the tooth to be removed, however, the third molar is positioned in an area that is difficult to support for forceps, and straight and triangular levers are commonly used for dislocation in the distal and mesial directions of the socket, diverging from the standard closed technique. When analyzing the present study, the removal of vertical third 1A molars may present some variations in their root classification justified by the fact of the inconstant and irregular anatomy that this tooth can provide, which considerably alters its surgical planning. A fully erupted third molar may show, on radiographic examination: mesial, distal or both directions root dilution, larger root space diameter than crown diameter, hypercementosis, divergence, and extensive root length[10,17]. The most prevalent classification was third molars with two roots and anatomical variations present, justifying the presence of the majority of tooth extractions that failed when initially outlined by the closed technique[10,18]. The root anatomy of third molars becomes an important factor in the surgical technique employed during extraction, which may facilitate or hinder extraction during the surgery[7,10,18]. Thus, the most appropriate time to extract an impacted tooth is when the root is not fully formed: one to two thirds of its formation. In teeth with fully formed roots, may be more sensitive to coronary or root fractures during the procedure. On the other hand, if less than one third of the root is formed, extraction will be difficult, since the tooth may cause the rotation movement inside the socket due to the lack of apprehension and support that would exist if there was minimal root structure.

In cases of divergent roots, the likelihood of osteotomy and dental removal for tooth removal will increase[19]. In the present study, the presence of 2 roots (n = 70) with root variations (n = 68) prevailed over the presence of 2 or 1 root with regular anatomy or anomalies (Table 3), justifying that the presence of anomalies may have influenced the change in surgical planning. In the current literature, cases of hypercementosis in third molars are uncommon, but once presenting this characteristic, it may make the surgical procedure difficult and prolong. Regarding the erupted third molars, depending on the root anatomy and the number of roots[10,18-21], it is justifiable need to begin surgical planning of erupted lower third molars 1A vertical with ostectomy and odonto-section for atraumatic and injury-free removal[10,21]. It can be stated, from the present study: with the failure of the closed technique, the use of the open technique should be a viable alternative to facilitate the extraction of the tooth (Fig. 1) and, in cases of evident root anomalies, open technique may be justified as the first option for removal of vertical third molars 1A. (Fig. 2A)
5 CONCLUSION

Root anatomy, previously evaluated by imaging tests, may directly influence the type of technique to be recommended for removal of lower third molars of vertical AI classification. Thus, it is necessary to evaluate and question the classification of root types, optimizing the surgical time of this procedure.

Figures

Figure 1: Extraction of tooth 48, classification IA, through the open technique

Figure 2: Dental elements 38 and 48 of different individuals with the same radiographic classification (1A) and different root anatomies, indicating different surgical protocols, tooth 38 (flap + ostectomy) and tooth 48 (flap + ostectomy + tooth section)

Compliance with Ethical Standards:

Funding: No funding received

Conflict of Interest: All the authors declare no conflict of interest.
Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: “Informed consent was obtained from all individual participants included in the study.

ACKNOWLEDGEMENTS

We thank you for all member of the League of Maxillofacial Anatomy and Traumatology - LATIUM for your contribution in this study.

REFERENCES

1. Badenoch-Jones EK, Lynham AJ, Loessner D. Consent for third molar tooth extractions in Australia and New Zealand: a review of current practice. Aus Dent Journal 2016; 61: 203–207.

2. Barbosa-Rebellato NL, Thomé AC, Costa-Maciel C, Oliveira J, Scariot R. Factors associated with complications of removal of third molars: a transversal study. Med Oral Patol Oral Cir Bucal 2010;16 (3):376-80

3. Baqain ZH, Karaky AA, Sawair F, Khraisat A, Duaibis R, Rajab LD. Frequency estimates and risk factors for postoperative morbidity after third molar removal: a prospective cohort study. J Oral Maxillofac Surg 2008; 66:2276-83.

4. Carter K. Worthington S. Predictors of third molar impaction: a systematic review and meta-analysis. J Dent Research 2016; 95(3):267–76.

5. Chuang SK, Perrott DH, Susarla SM, Dodson TB. Risk factors for inflammatory complications following third molar surgery in adults. J Oral Maxillofac Surg. 2008; 66: 2213-8.

6. Lee CTY, Shinan Z, Yiu YL, Li KYS, Cissy CT, Chun-Hung C. Patients’ satisfaction and prevalence of complications on surgical extraction of third molar. Patient Prefer Adherence 2015; 9:257–263.

7. Winter GB. Impacted mandibular third molar. St. Louis: American Medical Book; 1926

8. Johnson TM, Badovinac R, Shaefer, J. Teaching alternatives to the standard inferior alveolar nerve block in dental education: outcomes in clinical practice. J Dent Educ. 2008; 71:1145–52.

9. Ellis E 3rd, Hupp JR, Tucker MR. Contemporary Oral and Maxillofacial Surgery. 6ª ed.Guanabara Koogan: Rio de Janeiro; 2016.

10. Sampieri MBS, Viana FLP, Cardoso CL, Vasconcelos MF, Vasconcelos MHF, Gonçales ES. Radiographic study of mandibular third molars: evaluation of the position and root anatomy in Brazilian population. Oral Maxillofac Surg 2018; 22(2):163–8
11. Juodzbalys G, Daugela P. Mandibular third molar impaction: review of literature and a proposal of a classification. J Oral Maxillofac Res 2013;4:e1.

12. Ruga E, Gallesio C, Boffano P. Mandibular Alveolar Neurovascular Bundle Injury Associated with Impacted Third Molar Surgery. The Journal of Craniofacial Surgery 2010; 21(4): 1175-7

13. Komerik N, Mughlali M, Tas B, Selcuk U. Difficulty of Impacted Mandibular Third Molar Tooth Removal: Predictive Ability of Senior Surgeons and Residents. J Oral Maxillofac Surg 2014; 72:1062.e1-1062.e6.

14. Osunde OD, Saheed BD. Effect of Age, Sex and Level of Surgical Difficulty on Inflammatory Complications After Third Molar Surgery. J Maxillofac. Oral Surg 2015; 14(1):7–12.

15. Patel S, Mansuri S, Shaikh F, Shah T. Impacted Mandibular Third Molars: A Retrospective Study of 1198 Cases to Assess Indications for Surgical Removal, and Correlation with Age, Sex and Type of Impaction—A Single Institutional Experience. J. Maxillofac. Oral Surg 2017; 16(1):79–84.

16. Ghaeminia H, Meijer GJ, Soehardi A, Borstlap WA, Mulder J, Bergé SJ. Position of the impacted third molar in relation to the mandibular canal. Diagnostic accuracy of cone beam computed tomography compared with panoramic radiography. Int J Oral Maxillofac. Surg 2009; 38: 964–71.

17. Hasegawa T, Ri S, Shigeta T, Akashi M, Imai Y, Kakei Y, et al. Risk factors associated with inferior alveolar nerve injury after extraction of the mandibular third molar—a comparative study of preoperative images by panoramic radiography and computed tomography. Int J Oral Maxillofac Surg 2013; 42:843–51.

18. Barreiro-Torres J, Diniz-Freitas M, Lago-Méndez L, Gude-Sampedro F, Gándara-Rey JM, García-García A. Evaluation of the surgical difficulty in lower third molar extraction. Med Oral Patol Oral Cir Bucal. 2010 1;15 (6):e869-74.

19. Uribe S. Radiographic prediction of inferior alveolar nerve injury in third molar surgery. Evid Based Dent 2017; 18(3):88-89.

20. Peker I, Sarikir C, Alkurt MT, Zor ZF. Panoramic radiography and cone-beam computed tomography findings in preoperative examination of impacted mandibular third molars. BMC Oral Health 2014,14(3):71.

21. Maruthingal S, Mohan D, Maroli RK. A comparative evaluation of 4% articaine and 2% lidocaine in mandibular buccal infiltration anaesthesia: A clinical study. J Int Soc Prev Commun Dent 2015;5(6): 463–9.

22. Maria, L. et al. Brazilian Journal of health Review Complicated coronorradicular fracture: Brazilian Journal of health Review. n. 21, p. 2231–2242, 2020.