

## Are Impacted Third Molars Always Necessary to be Removed? - Part II

**Eber Luis de Lima Stevao\***

Oral and Maxillofacial Surgeon (OMS), Fellowship Training at Baylor University Medical Center, Dallas - Texas, EUA and Member of the American Association of OMS, American Society of TMJ Surgeons and Ohio Society of OMS, USA

**\*Corresponding Author:** Eber Luis de Lima Stevao, Oral and Maxillofacial Surgeon (OMS), Fellowship Training at Baylor University Medical Center, Dallas - Texas, EUA and Member of the American Association of OMS, American Society of TMJ Surgeons and Ohio Society of OMS, USA. **E-mail:** dr.eber.stevao@gmail.com

**Received:** February 26, 2019; **Published:** March 26, 2019

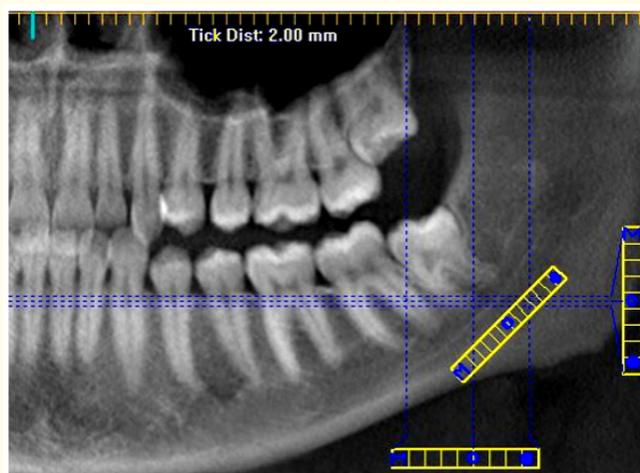
### Abstract

The third molar is the last tooth to erupt in the oral cavity and it is also the most retained/impacted tooth of the jaws. Even though this tooth can remain asymptomatic causing no problems whatsoever to the patient, a series of disorders can be directly related with its presence. Throughout Dentistry history there have always been some doubts concerning the real need for asymptomatic impacted third molar removal and the best time to do it if indicated. In the previous article Part I the specific literature on the topic was extensively reviewed. Now this present article, Part II, will discuss this controversial issue and propose a conclusion. There is unanimity among oral and maxillofacial surgeons to remove impacted third molars when those teeth are involved with pathological conditions. If the concept of third molars prophylactic extraction (meaning indication is not obvious) will be followed, then surgical extraction recommendation must be based on surgeon's clinical experience and in his adequate professional judgment, always taking into account the relation cost/benefit and if patient's systemic condition is adequate for totally recover from the surgical trauma.

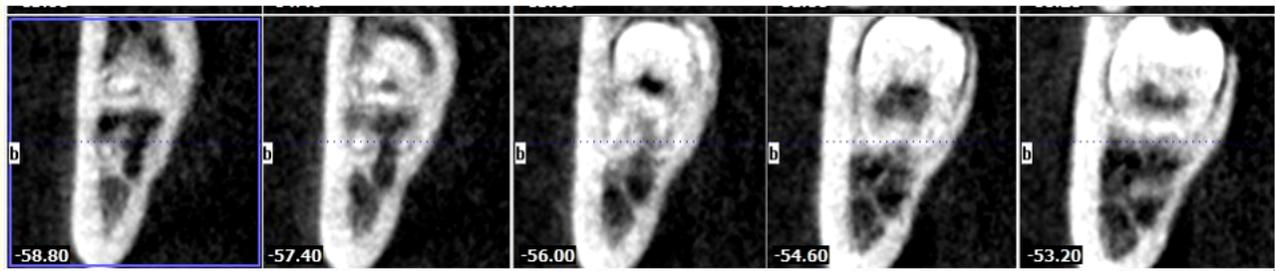
**Keywords:** *Impacted Tooth; Retained Third Molar; Impacted Third Molar; Third Molar Removal*

### Introduction

From the second half of the twentieth century there was a revolution in the whole philosophy of third molars extraction. Accordingly to the authors Lytle [1], Stephens., *et al.* [2], Stavisky [3], Kostopoulou., *et al.* [4] and Flick [5] the explanation for this change was the technological expansion after the Second World War, especially in developed countries with the improvement of surgical techniques, instruments such as the evolution of rotary sharp cutting instruments and high speed motors, improvements in anesthesia and sedation techniques, antibiotics, the use of radiographies as Panoramic to diagnose the presence of third molars totally impacted, and recently, Cone Beam Computed Tomography (CBCT) to better localize teeth root positions.



**Figure 1:** Partial Panoramic view of impacted lower left third molar.



**Figure 2:** Sagittal CBCT of the same patient showing the intimate contact of roots tips to the left Inferior Alveolar nerve.

In certain European countries and in the United States of America as well, an increase concerning oral health was detected with a reduction of caries, periodontal problems and consequently reduction of tooth extractions. The decrease of extracted other than third molar teeth resulted in a general lack of space for the eruption of third molars and increased index tooth impaction, mainly of lower third molars. As there was then an enhance in the diagnosis of third molars due to the radiological techniques default presence of third molars in oral cavity, third molar extraction surgery was rapidly widespread due to lower risks to the patient trans and postoperatively. So third molars started to be extracted even before they were present symptoms and/or associated pathologies.

It is only from the 70's that the design of third molars prophylactic extraction was established as preventing future problems they could cause without having professional real concern to cost/benefit, especially for unnecessary surgery as many third extracted molars had favorable potential for eruption and function in the arcades and low risk of developing diseases.

The literature reports aim to try to determine, in addition to the impaction prognosis, the timing on which it is possible to settle on with certainty that such third molar become impacted having all the essential data for that type of diagnosis.

However, third molar depth and angulation, added to the time of surgery may predict, in a limited way, the postoperative morbidity, this supports the idea that the individual's response to the surgical trauma and its repair depends on intrinsic factors not controlled by any professional.

Knowing the risks to which the patient is likely to experience during surgery, the complications of associated pathologies that may develop in the future, which are low and tend to decrease with individual aging, current third molar treatment philosophy aims to determine the actual need for tooth extraction based upon clear indications already irresolute.

The National Institute of Health - NIH conference in 1979 [6] determined impaction and/or malposition are real factors for extraction indications justifiable as abnormal states. But those conditions are decidedly which generates greater doubts among professionals, because it must be taken into account if the tooth in question has characteristics that increase the possibility of developing future diseases in bone or nearby tooth. The conference itself sharply left doubts as far as determining what malposition means for determining the opportunity surgery need.

However, it is known that currently it is not supported subject a patient to unnecessarily risks that any surgery can offer, as many prophylactically extracted teeth have very low risk for future diseases occurrence.

On the other hand though from the moment when surgery is required it is imperative that it be performed at a young age to reduce all discomfort and have the best post-operative repair results.

Accordingly with Gregori, *et al.* [7], the symptoms are due probably to the understanding of vascular and nerve structures and can be carried out directly between the tooth and the nerve fibers, the roots of adjacent teeth or due to the development of dentigerous cysts. However, the most common situation is when it is not possible to exactly establish the triggering mechanism of pain which disappears after avulsion of the impacted tooth.

The maintenance of third molars has been identified as one of the causes for lower anterior crowding after orthodontic completion. The hypothesis is widely discussed in the literature where most authors do not believe in the transmission of mesial forces caused by the third molar leading to crowding of the lower incisors.

In a cross-sectional study with 44 patients Garn, *et al.* [8] showed significant differences between cases of impacted third molars erupted or congenitally absent. Their conclusion was that two third of the molars in the lower arch have no influence on the anteroinferior crowding or protrusion which means that the presence of third molars is not an excuse for orthodontic post-treatment crowding.

In a survey of more than six hundred orthodontists and seven hundred oral surgeons, Laskin [9] found that 65% said that third molars sometimes produced anteroposterior crowding. Previous study like Bergstrom and Jensen [10], which also observed the presence of unilateral third molar seems to have no effect on the midline, Vego [11] and later Kaplan [12] concluded that individuals with congenital absence of third molars showed more dental stability and less anteroinferior crowding than those in the third molar is present.

In 1975 Schwartz [13] concluded that the higher frequency of crowding of the lower incisors was the result of sagittal force exerted by the presence of third molars. In 1990 the same author suggested third molars germectomy as a prophylactic measure after orthodontic treatment.

Southard [14] suggested that there seems to be a natural tendency for lower incisors crowding even after the third molar eruption pressure has ceased. Therefore, after orthodontic treatment this predisposition can be controlled by a longer retention period of time [15] and/or the lower incisors interproximal stripping for a smooth correction [16]. The crowding cannot be avoided simply by unerupted third molar removal [17]. The latter author further noted that a simple change in the patient's posture dramatically changes the interproximal forces and, thus, mentioned that third molars have little influence on these forces.

Hixon [18] exempt third molar for causing crowding considering that the continued mandible growth when maxilla has already ceased its growth causes a space constraint to the anterior mandibular teeth and this may be the reason for crowding. Although considered only an adjunct to this problem, third molar should have its extraction indicated to assist in the facilitation and maintenance of orthodontic treatment.

Contrary to previous authors which claim that partially or totally impacted third molars are not the fundamental cause for anteroinferior dental crowding other authors below correlate both conditions.

de Boer, *et al.* [19] and Venta, *et al.* [20] concluded that prophylactic extraction aims to promote health and prevent symptoms and sequelae such as preventing the crowding of the lower anterior teeth caused by third molar eruptive forces, as well as to avoid pathologies development risks expected from the presence of partially erupted third molars. Also they phrased that maxillary third molars should be simultaneously extracted for prophylactic reason too avoiding other problems resulting from the lack of contact between the superior tooth and the mandibular third molar already extracted.

Tooth extraction is part of some orthodontic treatment plans. The use of space is critical to the success of malocclusion correction. Therefore, the presence of impacted teeth, especially third molars may interfere with orthodontic treatment and the extraction should be recommended.

In addition, accordantly with the prophylactic extraction of third molar surgery Kaminishi [21] concluded that one cannot expect that third molars remain free of conditions for their life. The author stated that the risk is much lower if the surgery is performed at a young age while the patient is in good health and at the best of his ability to repair.

For Beeman [22] the primary cause of the third molar impaction is the lack of space in the dental arch between the second molar and the ascending ramus of the mandible.

In a study Kahl, *et al.* [23] observed that the mesiodistal dimensions of the third molars stretched from 9 to 16 mm and the lack of space occurred in 97.4% of impacted third molars.

It is known that impaction rates are correlated with the large tooth size and crowding of anterior and posterior teeth [22]. In addition, arranged in order below are diverse aspects that can influence third molar impaction: 1) Vertical direction of condyle growth as mandibular angle indicator producing greater impaction effects; 2) Reduced mandibular length measured by the distance from chin point to condyle; 3) Subsequent posterior eruption direction of mandibular dentition movement as a determinant of alveolar degree inclination. In individual cases these three variables can amplify or neutralize each other. Another but no less important variable not addressed by Beeman [22] is the delayed formation of third molars.

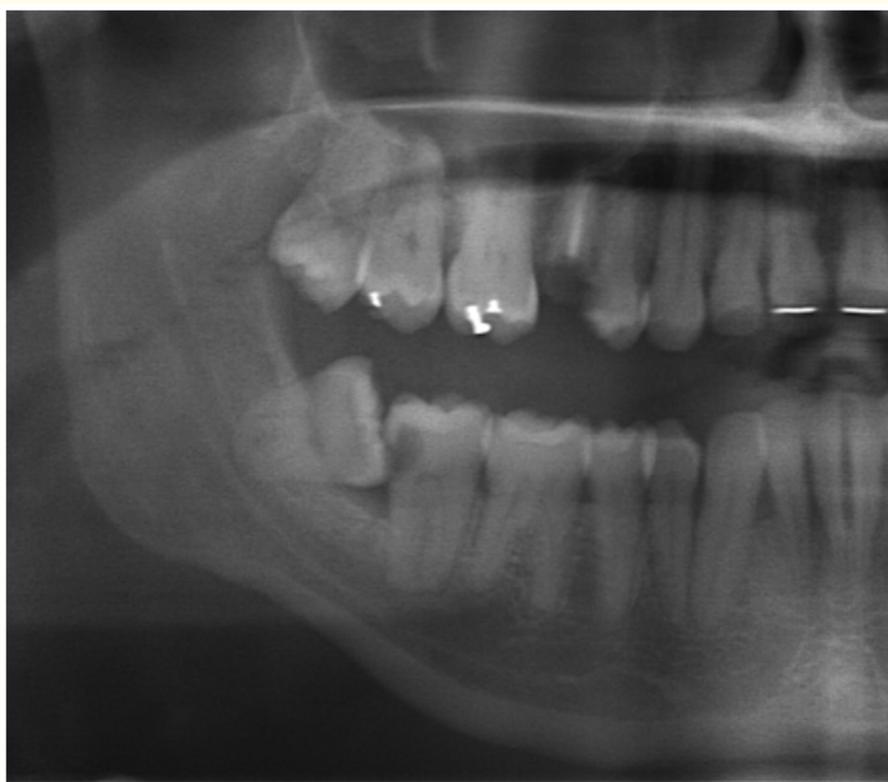
Thus, according to Cappelli Jr. [24] patients with vertical facial pattern (dolichofacials) are more likely to impaction of third molars and crowding of lower incisors.

According to Bjork, *et al.* [25] the risk of impaction is estimated by the degree of inclination of third molars in preadolescence stage. On the other hand, Richardson [26] found that, in general, the original angulation of third molar occlusal surface in relation to the mandibular plane is significantly small in people whose third molar erupted precociously.

The root resorption of adjacent teeth to included tooth are observed and reported in literature. It is believed that the eruption pressure (force) caused by the impacted tooth over other tooth root surface would cause this pathological resorption. The most frequent cases are second molars reabsorbed by mesial-angled third molars.

Another type of resorption found is the itself impacted tooth idiopathic internal resorption. Usually the affected patients have more advanced ages and can refer pain secondary to the resorption process. The surgical procedure of extracting the teeth becomes extremely difficult due to the apparent lack of space for periodontal ligament and increase the density of the alveolar bone around the involved tooth.

Cariou lesions on the second molars can be caused by the impaction of third ones determining root canal treatment on them.



**Figure 3:** Panoramic X-ray close-up showing extensive carious lesion on second right inferior molar due to the presence of the third molar.

There are several cysts and tumors of odontogenic origin with variable forms of growth and behaviors that may be related to impacted teeth with higher incidence for third molars since these teeth have higher inclusion incidence. When the tooth remains entirely within the alveolar bone dental follicle can undergo cystic degeneration and become an odontogenic cyst. The same dental follicle epithelium can generate odontogenic tumors.

Among the odontogenic cysts associated with impacted teeth these can be highlighted: 1) Dentigerous or Follicular which is the most frequent; followed by 2) Keratocyst which is very recurrent.

Concerning tumors of odontogenic origin related to unerupted teeth are these ones: 1) Ameloblastoma which is the most common and can be present in various forms; 2) Calcifying epithelial odontogenic, 3) Ghost cell odontogenic which is a group of transient tumors subdivided in Calcifying cystic Odontogenic tumor, Dentinogenic ghost cell tumor, and Ghost cell odontogenic carcinoma; 4) Ameloblastic fibroma, 5) Ameloblastic fibro-odontoma; and 6) Adenomatoid odontogenic, which in most cases is related to impacted canine.

Odontogenic tumors and cysts, mostly, have slow growth and are asymptomatic. Because of that can achieve great proportions having then great importance for early diagnosis. Thus, removal of impacted teeth is indicated.

Lower impacted third molar maintain area of least resistance to mandibular fractures and increase the risk of fractures in regions of their locations. Thus removal of mandibular impacted teeth can be justified for the prevention of mandibular fractures.

Facial pain with unidentified etiology are frequent complaints of many patients. This cause, in many cases, is related to temporomandibular joint dysfunction but the chance of an impacted tooth to be related to this pain cannot be ruled out since both conditions might cause preauricular pain. Therefore, third molar extraction is considered as an attempt of solving the problems.

In edentulous patients the alveolar process undergoes continuous resorption and coronary exhibitions can occur in the presence of an impacted teeth causing discomfort and local ulceration which can generate by its turn an odontogenic infection.

Most of the systemic problems of patients candidate to dental surgical procedures relates to advanced ages, although some younger patients can present a compromised health too. Cardiovascular or respiratory functions compromised, weakened immune system and the acquired or congenital coagulopathies can be considered as factors that could derail the realization of an elective surgical procedure.

It can be taken as a relative contraindication any surgical procedure with possibility of risk to anatomical structures such as the inferior alveolar nerve, mental foramen and maxillary sinus. Therefore cases involving important anatomical structures must be carefully analyzed.

Laskin [9] and Robinson [27] agree to wait for an ideal age to assess whether there is need for third molar extraction. Normally during the ages between 8 and 10 years when a patient could present for third molar germectomy it is agreeable that several information to diagnose a possible future tooth impaction are missing. Also these authors mentioned that mandibular growth with resorption of the anterior border of the ramus and maxillary growth will be only complete between 16 and 17 years of age. Therefore diagnosis of the presence or absence of third molar eruption space can be done at this time, accompanied by the decision of prophylactic extraction or retention of the tooth in the mouth. Until the age of 25 most symptoms caused by eruption and impaction should have appeared.

Similarly, Venta [20] stated that predictions made by Panoramic radiographs before 20 years of age are not accurate because the lower third molar angle changes during the development of both mesial as to distal directions. The analysis of impacted third molar horizontally inclined accordingly to Garcia and Chauncey [28] do not present possibility of eruption, in contrast with vertically third molars retained by soft tissue. However Ganss, *et al.* [29] stated that there will only be eruption of a third molar if the relationship of space for this tooth in the posterior portion of the arch and the mesiodistal distance of the crown is equal or greater than to 1 cm measured through the panoramic radiograph.

von Wowerin [30] affirmed that after 19 years of age patient may have unpredictable changes in third molar's position which may influence decisions regarding tooth extraction or its preservation unless this tooth is horizontally positioned. After all, the potential for third molar eruption is present longer beyond dental maturity and ending of skeletal growth accordingly to Mercier and Precious [31].

Lytle [1] was the unique author who boldly affirmed with more certainty that third molar removal would have a much greater benefit than non-extraction based on the large number of problems related to its retention. Similarly Garcia and Chauncey [28] advised the extraction of these teeth for lack of function and high possibility of developing diseases.

Nordenram., *et al.* [32] stated that the 70.3% of the studied third molar cases with high risk for developing diseases there was a frequency of 41.4% of pericoronitis. Although the literature stating that the risk of developing pathology associated as cysts, tumors, resorption of roots of adjacent teeth, infection, cavities in the third molars and the second molars are low as cited by Stanley., *et al.* [33], Eliasson., *et al.* [34], von Wowerin and Nielsen [30], Stephens., *et al.* [2]; Sands., *et al.* [35], Chiapasco., *et al.* [36], Lopes., *et al.* [37] and Kostopoulou., *et al.* [4]. Accordingly with Mercier and Precious [31] it is not possible to make accurate third molar eruption predictions or probable tooth impaction before full bone development of both jaws. However, they determined that the best treatment adopted by surgeon is extraction of those third molars which present minimal chances for eruption in developing patients usually between 14 and 22 years of age. The best strategy after this age is the periodic patient examination already informed on relevant risks and benefits during a consultation.

The relationship between patient's age and third molar extraction morbidity was studied by Bruce., *et al.* [38], Osborn., *et al.* [39] and Chiapasco., *et al.* [40] which all concluded that there is a significant increase in complications such as excessive bleeding, inferior alveolar nerve exposure and consequent paresthesia, root fracture, fracture of lingual cortex bone, alveolitis and infection during surgery when related to the patient's age. When the studied factors were required such as time for surgery, number of trans and post-operative problems, number of postoperative visits, total number of days for patient to become asymptomatic, alveolitis, paresthesia, there were no doubts that older patients had a higher morbidity compared to younger ones.

To explain this increased postoperative morbidity in patients with advanced age Koerner [41] showed that local anatomical characteristics of patients aging from 35 to 40 years as having: a) higher density adjacent to the tooth bone; b) narrow or atrophied periodontal ligament; c) possibly divergent roots, dilacerated and very close to mandibular canal. Therefore all these features would cause: a) higher local tissue manipulation; b) increasing perioperative time; c) increasing risks of injuring mandibular nerve by its closer proximity; d) risk of fracture of the roots by the high bone density and root divergence.

Also according with de Boer., *et al.* [19] bone tissue of an older person is much denser than in a youngest and erupted third molars in elderly have suffered masticatory forces then making tooth more attached to alveolar because of less periodontal ligament present requiring heightened strength and increased surgical time.

Accordingly to Sisk., *et al.* [42] and Berge and Boe [43] the factors that contribute to the complications are complex and some unknown but many are related to the inflammatory process initiated by surgical trauma. The basic principles of surgery do not prevent the process. They affirmed that the professional has responsibility to be aware of the complications which patient is subject to, measuring them and counterbalance them with benefits an impacted third molar removal will provide. All this information must be passed on to patient because the choice decision of surgical treatment should always be clarified with the patient and upon his/her acceptance. Authors like Sisk., *et al.* [42], Nordenram., *et al.* [32], Eliasson., *et al.* [34], Sands., *et al.* [35] and Koerner [41] are pro-choice treatment with patient acceptance. Patient satisfaction is always an important criteria in treatment plan cost/benefit analysis in health areas.

Currently, patients expect and have the right of knowing what is involved and related to their treatment. Thus, patient should be informed of the effects of treatment on life quality when any professional requires informed consent for a mandibular and/or maxillary impacted third molar surgical removal.

Finally one topic which should be evaluated by an oral and maxillofacial surgeon when the surgical removal is opted is flap design. In 1997 van Gool, *et al.* [44] concluded that avoiding mucoperiosteal flap decreases most of all postoperative symptoms and chances of postoperative complications too. It is not necessary to administer antibiotics due to the low frequency of later abscesses. However an oblique relaxing incision to better access to an impacted third molar facilitates mucoperiosteal flap reflection preventing tissue sloughing improving surgeon's surgical view too.

### Discussion and Conclusions

According to the literature presented in the article Part I and here discussed in Part II, it is very clear that the presence of impacted teeth, especially lower third molars, can cause various disorders.

Surgical procedure for general impacted third molars removal generates a trauma in itself and, consequently, patient is likely to suffer trans and postoperative complications but to decrease all related risks to which any surgery is bound to it is very important for oral surgeons to clearly access all information given by patient itself as well by accurate clinical and radiographic (i.e. CBCT) examinations.

Always the fundamental objective is to prevent or diminish such complications as far as possible since it is known that there are few factors of one's body's response on which the professional has no control.

The negative effects arising from dental impactions can locally and systematically compromise patient's health. Thus, the diagnosis becomes important to be done by competent and well trained professionals who practice Oral and Maxillofacial specialty.

The oral and maxillofacial surgeons should correctly guide their patients explaining the pros and cons of such surgical extractions and he/she this way will not be negligent when acting in accordance with the practice accepted as proper and most adequate.

The choice of treatment of impacted third molars should be done together with the patient after a detailed evaluation of complications which he/she will be submitted to, risks of developing associated diseases in the future when option for maintaining an impacted third molar and the benefits that a surgical procedure will bring for him/her.

Certainly treatment procedure usually depend upon the disorder caused by the impaction but as a rule choice should be opting for surgical removal of an impacted tooth when its orthodontic treatment is indicated.

There is little evidence today that an extraction of impacted third molar would minimize present or future crowding of lower anterior teeth, both in patients undergoing or not on orthodontic treatment. If that is the case it would be expected the same for maxillary anterior teeth when impacted maxillary third molar would be present. So, crowding by itself is not a situation that indicates mandibular or maxillary third molar extraction for having no relation whatsoever with its retention/impaction.

Fully impacted third molars should be removed when there is evidence of common pathological conditions, increased follicular space and always associated soft tissue removed be sent for histopathological analysis.

The simple fact of other specialty professionals group having an opposite view not recommending surgery simply because they prefer a conservative approach does not mean it is scientific nor correct by itself. Instead, on the other hand, legitimate scientific communities should identify ways to disseminate knowledge to facilitate trial among professionals to diagnosis and correct treat an asymptomatic impacted third molar. Decisions should be taken according to each case and for each patient.

More research is needed to estimate the long-term risks, potential benefits, complications caused by third molar impaction.

## Bibliography

1. Lytle JJ. "Indications and contraindications for removal of the impacted teeth". *Dental Clinics of North America* 23.3 (1979): 333-346.
2. Stephens RG., et al. "The unerupted or impacted third molar-a critical appraisal of its pathological potential". *Journal of the Canadian Dental Association* 55.3 (1989): 201-207.
3. Stavisky E. "Clinical justification for the prophylactic removal of impacted third molars". *Pennsylvania Dental Journal* 56.3 (1989): 8-9.
4. Kostopoulou O., et al. "Intra-observer reliability regarding removal of asymptomatic third molars". *British Dental Journal* 184.11 (1998): 557-559.
5. Flick WG. "The third molar controversy framing the controversy as a public health policy issue". *Journal of Oral and Maxillofacial Surgery* 57.4 (1999): 438-444.
6. "Removal of Third Molars". *National Institutes of Health Consensus Development Conference Summary* 2.11 (1979): 65-68.
7. Gregori C., et al. "Propedêutica clínica - cirurgia: oportunidade cirúrgica". In: Gregori C. Cirurgia Buco-dento-alveolar. São Paulo: Sarvier (1996): 8-14.
8. Garn SM., et al. "Third Molar Formation And Its Development Course". *The Angle Orthodontist* 32.4 (1962): 270-279.
9. Laskin DM. "Indications and contraindications for removal of impacted third molars". *Dental Clinics of North America* 13.4 (1969): 919-928.
10. Bergstrom K and Jensen R. "Responsibility of the third molar for secondary crowding". *Dental Abstracts* 6 (1961): 544.
11. Vego L. "A longitudinal study of mandibular arch perimeter". *The Angle Orthodontist* 32.3 (1962): 187-192.
12. Kaplan RG. "Mandibular third molars and post-retention crowding". *American Journal of Orthodontics* 66.4 (1974): 411-430.
13. Schwartz CW. "Transactions of Third International Orthodont Congress". In: Crosby Lockwood Staples, Hertfordshire, England (1975): 551-562.
14. Southard TE. "Third molars and incisor crowding: when removal is unwarranted". *Journal of the American Dental Association* 123.8 (1992): 75-79.
15. Bishara SE. "Third molars: a dilemma! Or is it?" *American Journal of Orthodontics and Dentofacial Orthopedics* 115.6 (1999): 628-633.
16. Martins DR and Ramos AL. "Agenesia, impacção e extração dos terceiros molares versus apinhamento ântero-inferior". *Revista Dental Press de Ortodontia e Ortopedia Facial* 2.2 (1997): 71-76.
17. Bishara SE., et al. "Changes in the maxillary and mandibular tooth size-arch length relationship from early adolescence to early adulthood". *American Journal of Orthodontics and Dentofacial Orthopedics* 95.1 (1989): 46-59.
18. Hixon E. "Cephalometrics : a perspective". *Angle Orthodontist* 42.3 (1972): 200-211.
19. de Boer MPJ., et al. "Complications after mandibular third molar extraction". *Quintessence International* 26.11 (1995): 779-784.
20. Venta I. "Predictive model for impaction of lower third molars". *Oral Surgery, Oral Medicine, Oral Pathology* 76.6 (1993): 699-703.
21. Kaminishi R. "A case for prophylactic removal of impacted third molars in young patients". *Journal of Oral and Maxillofacial Surgery* 58.3 (2000): 359.

22. Beeman CS. "Third molar management: a case for routine removal in adolescent and young adult orthodontic patients". *Journal of Oral and Maxillofacial Surgery* 57.7 (1999): 824-830.
23. Kahl B., et al. "A long term follow-up radiographic evaluation of asymptomatic impacted third molars in orthodontically treated patients". *International Journal of Oral and Maxillofacial Surgery* 23.5 (1994): 279-285.
24. Cappelli Jr J. "Mandibular growth and third molar impaction in extraction cases". *Angle Orthodontist* 61.3 (1991): 223-221.
25. Björk Arne., et al. "Mandibular growth and third molar impaction". *Acta Odontologica Scandinavica* 14.3 (1956): 231-272.
26. Richardson M. "Changes in lower third molar position in the young adult". *American Journal of Orthodontics and Dentofacial Orthopedics* 102.4 (1992): 320-327.
27. Robinson PD. "The impacted lower wisdom tooth: to remove or to leave alone?" *Dental Update* 21.6 (1994): 245-248.
28. Garcia RI and Chauncey HH. "The eruption of third molars in adults: a 10-year longitudinal study". *Oral Surgery, Oral Medicine, Oral Pathology* 68.1 (1989): 9-13.
29. Gans C., et al. "Prognosis of third molar eruption". *Oral Surgery, Oral Medicine, Oral Pathology* 76.6 (1993): 688-693.
30. von Wowerin N and Nielsen HO. "The fate of impacted lower third molar after the age of 20. A four-year clinical follow-up". *International Journal of Oral and Maxillofacial Surgery* 18.5 (1989): 277-280.
31. Mercier P and Precious D. "Risks and benefits of removal of impacted third molars". *International Journal of Oral and Maxillofacial Surgery* 21.1 (1992): 17-27.
32. Nordenram A., et al. "Indications for surgical removal of the mandibular third molar". *Swedish Dental Journal* 11.1-2 (1987): 23-29.
33. Stanley HR., et al. "Pathological sequelae of neglected impacted third molars". *Journal of Oral Pathology* 17.3 (1988): 113-117.
34. Eliasson S., et al. "Pathological changes related to long-term impaction of third molars. A radiographic study". *International Journal of Oral and Maxillofacial Surgery* 18.4 (1989): 210-212.
35. Sands T., et al. "Third molar surgery: current concepts and controversies". *Oral Health* 83.5 (1993): 11-30.
36. Chiapasco M., et al. "Estrazione dei terzi molari inferiori: germectomia o avulsione tardiva?" *Minerva Stomatologica* 43.5 (1994): 191-198.
37. Lopes V., et al. "Third molar surgery: an audit of the indications for surgery post-operative complaints and patient satisfaction". *British Journal of Oral and Maxillofacial Surgery* 33.1 (1995): 33-35.
38. Bruce RA., et al. "Age of patients and morbidity associated with mandibular third molar surgery". *Journal of the American Dental Association* 101.2 (1980): 240-245.
39. Osborn TP, et al. "A prospective study of complications related to mandibular third molar surgery". *Journal of Oral and Maxillofacial Surgery* 43.10 (1985): 767-769.
40. Chiapasco M., et al. "Germectomy or delayed removal of mandibular impacted third molars: the relationship between age and incidence of complications". *Journal of Oral and Maxillofacial Surgery* 53.4 (1995): 418-423.
41. Koerner KR. "The removal of impacted third molars. Principles and procedures". *Dental Clinics of North America* 38.2 (1994): 255-278.

42. Sisk AL., *et al.* "Complications following removal of impacted third molars-the role of the experience of the surgeon". *Journal of Oral and Maxillofacial Surgery* 44.11 (1986): 855-859.
43. Berge TI and Boe OE. "Predictor evaluation of postoperative morbidity after surgical removal of mandibular third molars". *Acta Odontologica Scandinavica* 52.3 (1994): 162-169.
44. van Gool AV., *et al.* "Clinical consequences of complaints and complications after removal of the mandibular third molar". *International Journal of Oral Surgery* 6.1 (1977): 29-37.

**Volume 18 Issue 4 April 2019**

**© All rights reserved by Eber Luis de Lima Stevao.**