

# Is the recommendation for the enucleation or the extraction of 3<sup>rd</sup> molars in subjects during or at the end of dento-facial orthopedic treatment always justified? The viewpoint of a practitioner after 40 years of orthodontic practice

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## ABSTRACT

*Orthodontists frequently prescribe prophylactic enucleation of the lower third molars. These teeth are mostly totally asymptomatic. This practice is being recommended more and more frequently, even though published studies are more reserved in this respect. Orthodontists have to reconsider their recommendations for prophylactic enucleation of the lower third molars, but they have to make sure whether or not these teeth will erupt into their correct positions in the arch.*

## KEY WORDS

*Prescription for enucleation of the lower 3<sup>rd</sup> molars in orthodontic practice*

## INTRODUCTION

Extraction or conservation of the 3<sup>rd</sup> molars, also known as wisdom teeth, is a recurring question in DFO, discussed for many decades, still unresolved, and

continues to be an object of great controversy, that may very well explain the great variability for its indication and practices. Orthodontists are heavy prescribers of

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enucleations of the 3<sup>rd</sup> molars with a three-fold prophylactic objective (sometimes curative for some of us!) for:

- preventing the development of delayed mandibular incisor-canine crowding due to a “mesial pressure” from the third molars;
- treating or preventing “posterior discrepancies”;
- preventing accidents of eruption: inflammations, cellulitis, ganglions, thrombophlebitis, tumors, neural accidents, development of dentigerous cysts. . .

But is our prescription for extractions solely based on the **presumption that wisdom teeth are the cause?**

Over time, this presumption of responsibility for the 3<sup>rd</sup> molars has become a certainty that allows us to hide our lack of understanding of the cause of late incisor-canine crowding. Unfortunately (or fortunately), the implication of the 3<sup>rd</sup> molars is commonly accepted among practitioners and by the general public alike. And it's in good faith and with a clear conscience that some practitioners prescribe their removal and patients accept this! This certitude is so strong that some patients wonder and insist on their extraction: “These wisdom teeth shouldn't ruin all the work that you've done!”

This conviction is reinforced by two widespread and generally accepted ideas that over time and as a consequence of evolution, the human jaws will become shorter and there will not be enough room for the 3<sup>rd</sup> molars, and that eventually these teeth will no longer serve any purpose and hence they will be useless!

These “new truths” are in addition to emerging paramedical specialties that blame these teeth for a whole variety of problems. We can then understand why there is a runaway inflation of prescriptions for the removal of the 3<sup>rd</sup> molars whether or not they have erupted.

But *la vox populi* has never had probative scientific value!!!

All experienced practitioners have:

- noticed that young adolescents report, many times prior to the eruption of the 3<sup>rd</sup> molars, various sensations of pushing, tension, pressure, primarily in the region of the anterior mandible that are often concomitant with the appearance of incisor-canine crowding;
- noted that the appearance of late incisor-canine crowding is associated with the agenesis of the 3<sup>rd</sup> molars, and with the presence of diastemas in the lateral (buccal) sectors;
- heard patients complain of pain in the TMJ after enucleation of the 3<sup>rd</sup> molars;
- discovered with surprise and regret following a clinical exam, many years after enucleation, sufficient space for the 3<sup>rd</sup> molars behind the 2nd molars.

Enucleation of the wisdom teeth has become the most frequent procedure performed by oral surgeons. It is prescribed before, during and at the end of orthodontic treatment and in most cases involves **totally asymptomatic teeth**. Enucleation is performed far more often than extraction of erupted 3<sup>rd</sup> molars. It's indication involves essentially the lower 3<sup>rd</sup> molars but almost routinely

leads to the removal of the maxillary 3<sup>rd</sup> molars. The prevalence of prescribing has become virtually automatic for some practitioners, but varies greatly based on the region and depending on the schools, the orthodontic techniques used and the mindset of practitioners regarding facial growth especially of the mandible.

It appears that this procedure is prescribed increasingly more often in younger children and involves the enucleation of the four 3<sup>rd</sup> molars performed under general anesthesia, and frequently without any other examination beyond finding them on the panoramic xray!

Prescribing the enucleation of the 3<sup>rd</sup> molars under these conditions makes light of the psychological trauma to the child, the risks incurred, and the costs to the public health system.

This significant increase in the indications for enucleation or extraction of the 3<sup>rd</sup> molars often creates a problem for practitioners and can cause a shift in public opinion as shown by some articles published recently in various newspapers (for example the articles by Dr. Pierre Jacquemart<sup>11</sup> in the magazine *Le Point* of November 16, 2006 "SOS wisdom teeth," and by Dr. Jean-Baptiste Kerbrat<sup>12</sup> "Is it really necessary to remove my wisdom teeth?" in the November, 2013 edition of the newspaper *Ouest France*.

Their prophylactic sacrifice can only be acceptable if their responsibility for the appearance of crowding in the anterior regions and their harmfulness to the dento-skeletal equilibrium has been reliably assessed and proven.

## FEATURES OF THE APPEARANCE OF MALPOSITIONS OF THE LOWER INCISOR-CANINE REGION

It seems that their cause is multifactorial. In fact, they occur:

- in subjects during strong overall growth, especially of the cervical spine with elongation of the neck, descent of the hyoid bone, lowering of the lingual mass, downward and rearward traction from the digastric muscles, strengthening of muscle tone, etc;
- at the time of intense anterior-posterior mandibular growth and significant realignment in the region between the second molar and the entrance of the dental

canal. The lengthening of this canal allows for the eruption of the molars. Izard<sup>9</sup> wrote: "*just below and in front of the angle, there exists an area of spongy bony mesh with large medullary spaces that lends itself perfectly to osseous remodeling. From now on, let's be aware of the importance of this area during certain therapeutic modifications;*"

- when the transverse growth of the mandibular condyles ends, this separates the two ascending rami of the mandible and

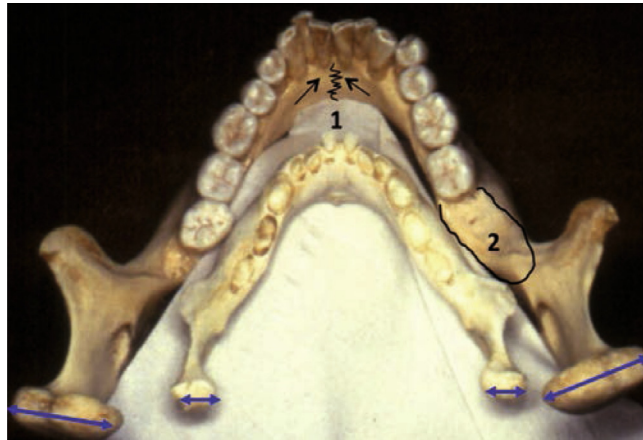


Figure 1: 1. Transverse growth of the condyles isolated from the ascending rami of the mandible. The muscles inserted in the symphysis exercises restraining forces in the symphyseal region that can explain the appearance of pre-pubertal malpositions of the incisor-canines. (After J.M. Salagnac).

2. The internal posterior limit of the dento-alveolar arch is situated just in front of the Spine of Spix.

increases the pressure on the symphysis. The mental symphysis is thus a "seismic" zone, which could explain the dental shifting in this area (fig. 1).

- prior to or sometimes at the time when the 3<sup>rd</sup> molars appear.

Then is this cause and effect or just simple coincidence?

The arguments of different authors for and against the recommendation for prophylactic removal of the 3<sup>rd</sup>

molars are summarized in the following table.

Indications for the enucleation of the 3<sup>rd</sup> molars in a child or adolescent all goes back to the question of the **responsibility of the 3<sup>rd</sup> molars for the appearance of late crowding of the incisors**. The clinical cases treated by DFO and published in specialized literature show the nearly systematic absence of the 3<sup>rd</sup> molars on radiographs presented at the end of treatment.

## REVIEW OF THE LITERATURE

A study of the odonto-stomatological literature merits particular attention because the articles as published seem to contradict the evolution of current practice and to demonstrate a lack of scientific proof of the responsibility of the 3<sup>rd</sup> molars for the appearance of lower incisor-canine crowding. Enucleation as a precaution-

ary measure does not appear to be medically justified. Many studies were biased and the methodology was not sufficiently rigorous.

There are few studies on this subject and the most probative were done in the United States and in Scandinavia. However, the articles listed below show how relevant this

Objective	Arguments in favor	Arguments against
1. Prevent the appearance of late malpositions (post orthodontic and/or late, pre and pubertal) 2. Prevent or heal a posterior DDM 3. Prevent accidents due to eruption of the third molars	<ul style="list-style-type: none"> <li>• Performed + easier to accomplish than in adults</li> <li>• Postoperative morbidity + lesser</li> <li>• Little or no loss of work</li> </ul>	<ul style="list-style-type: none"> <li>• No relation demonstrated between pressure from the 3rd molars and the appearance of incisor crowding</li> <li>• Often performed under GA, in young adolescents (between 13-20 years)</li> <li>• At times, psychological repercussions</li> <li>• Not insignificant public health costs</li> </ul>

question is for French practitioners, dentists and stomatologists and for all sectors of public health.

**1977** Charron, M.C.<sup>5</sup> ("Is there a relation between incisor-canine crowding and the eruption of the 3<sup>rd</sup> molar?") studied the relationships between age, incisor-canine crowding and the state of eruption of the 3<sup>rd</sup> molars in 131 subjects aged from 17 to 75 years and concluded that there wasn't any significant link between the crowding and the status of the 3<sup>rd</sup> molars and found that the only link was an increase in mandibular crowding with age.

**1981** Lerondeau J.C., Schnirer, M.C., Verdier, M., Scheffer, P.<sup>13</sup> ("Is the enucleation of the wisdom teeth truly useful in orthodontics?") concludes that:

1. late developing lower incisor malpositions are accompanied by a lingualization of the incisors;
2. the lingualization of the incisors might be related to a strengthening of the tone of the lips in the pre- and post-pubertal period;
3. The "mesial" pressure from the 3<sup>rd</sup> molars has never been clearly demonstrated;
4. Prophylactic enucleation does not protect patient from incisor malpositions later on . . . **This is a**

**procedure that is certainly useless in many cases!**

**1983** Fraudet, J. R.<sup>7</sup>, in response to the article by Bassigny, F.<sup>2</sup> published in *Le concours medical* ("Let's retain wisdom teeth"), wrote: "*crowding in the anterior incisor region, when it appears, is not due to posterior pressure, but on the contrary, is due to pressure from front to back because of a modification in the muscle tone of the orbicularis muscles of the lips, the buccinators and the masseters that occurs during puberty. It is a mistake to perform enucleations.*"

**1984** Lindqvist and Thilander<sup>14</sup>, in an experiment involving 52 patients with a median age of 15 and one-half years, performed enucleation of one 3<sup>rd</sup> molar on one side and the effects were observed over 3 years. The effect is positive in 70% of cases (appearance of tertiary crowding on the non-extraction side and not on the extraction side). They conclude that, in cases of severe crowding, enucleations are indicated. However, their study was not able to predict which patients would respond favorably to enucleation.

**1989** The French Society of Dento-Facial Orthopedics asked Bertrand, G., Darque, F., Duhart, A.M., Le Petit,

Ohayon-Farouz, R., Oriez, D., Truchot G.<sup>4</sup> to develop a discussion paper in response to their question concerning "The wisdom tooth".

One of the conclusions of the authors was: *"the wisdom teeth participate without a doubt in a minor way to the etiopathogenic chain responsible for anterior crowding. Its cause is multifactorial and should lead the orthodontist to make a well-considered decision and to reconsider their extraction on a case by case basis."*

**1978** Horn, A., Vaugeois M., Scheck, G.<sup>8</sup> ("Indication for enucleation of the wisdom tooth.") The authors conclude; *"Enucleation of the wisdom teeth is necessary in all cases treated with multi-banded techniques that require maximal or crucial anchorage preparation for solving the problem of posterior crowding."* **The indication for an enucleation is directly related to the technique used.**

**1997** L'ANAES<sup>1</sup> in its report "Indications and non-indications for the removal of the mandibular 3<sup>rd</sup> molars" shows the variability in treatment practice and publishes the following remarks and works:

- the proportion of the subjects with one 3<sup>rd</sup> molar, included, retained or impacted was on the order of 16% for subjects with full dentition and approximately 11% for subjects with an incomplete arch of teeth;
  - the frequency of included or impacted mandibular 3<sup>rd</sup> molars was on the order of 15 to 25%, compared with all mandibular 3<sup>rd</sup> molars.
- In the study by Knutsson, 30 general dentists received duplicate files and gave their opinions on 36 asymptomatic mandibular 3<sup>rd</sup> molars to extract in a range from 0 to 26. There was not a single case in which all the practitioners proposed the same exact treatment. The intra-individual reliability averaged 92% with a range from 69% to 100%!
  - Brickley *et al.* 1979 compared the clinical decision of *six oral surgeons* using the indications established during a consensus conference on the "Removal of third molars," National Institute of Dental Research. Each practitioner had to establish a treatment plan for 72 patients aged from 15 to 44 years who were referred to the National Health Service Teaching Hospital for the assessment of the 3<sup>rd</sup> molars, 139 of which were mandibular 3<sup>rd</sup> molars. The 6 *oral surgeons* planned an intervention for 30 patients under general anesthesia, for 36 other patients an intervention using local anesthetic, and for 6 other patients no intervention. Based on the criteria of the conference consensus, 30% did not correspond to the indications for removal.
  - Brickley in a study sought out the personal observations of 201 dentists and registrants at university hospitals concerning their mandibular 3<sup>rd</sup> molars. *"Virtually all the respondents thought that the prophylactic extraction was not in their best interests."*

*Thus they chose to have their 3<sup>rd</sup> molars removed solely in cases of well-defined problems."*

- The studies of Brickley *et al.* demonstrated that the **optimal strategy**, for a patient who has an asymptomatic mandibular 3<sup>rd</sup> molar, is almost **always non-intervention**. (Recommendation grade A.)
- The study by Tulloch *et al.* tends to prove that, in young adolescents, in good health with an asymptomatic mandibular third molar, erupted or partially erupted, including root development between half and 2/3, conservation of the tooth is preferable to prophylactic extraction. The indication for extraction will only be requested later if the tooth is implicated in a pathological process (recommendation grade A).

*"The variability of treatment practice is explained by the habits, beliefs, the type of training, the method of remuneration and all these factors make us think that the medical decision is not sufficiently based on the facts, on the clinical facts and on evidence-based proof.*

- An investigation performed by Hazelkorn involving 79 practitioners with 4 different modes of practice shows that the indications of extraction of four 3<sup>rd</sup> molars are directly linked **to the type of practice and to the method of payment to the practitioners**.

The ANAES<sup>1</sup> report concluded:

*"That the effectiveness of the removal of the 3<sup>rd</sup> molars, for the*

*prevention of mandibular crowding, is not confirmed by the studies currently available. The enucleation of the bud of the 3<sup>rd</sup> molar in the child, justified by predictive studies, is not an acceptable practice in light of current knowledge."*

2005 Jacquemart P. and Diart T.<sup>10</sup>, in their article "Conservation or extraction of the wisdom teeth," remind us that *"the efficacy of the prophylactic removal of the 3<sup>rd</sup> molars for the prevention of crowding of the mandibular incisors is not confirmed by the studies presently available. Enucleation of the bud of the 3<sup>rd</sup> molar in the child, recommended by predictive studies is therefore not justified."*

### Costs to the public health system, recommendations for best practices

- In France, there is no published cost for enucleation of four 3<sup>rd</sup> molars under general anesthesia.
- In England, the global costs for prophylactic extractions for the years 1995-1996 amounted to 5.2 million pounds. The removal of an asymptomatic 3<sup>rd</sup> molar is 33% more expensive than that linked to abstention, after taking into consideration follow up treatment;
- In England, the implementation of the RPCs has translated into a 32% reduction in extractions. A strict respect for the RPC recommendations could lead to a reduction of 60% in the number of extractions.

## CAN WE MAKE AN EARLY AND RELIABLE PREDICTION ABOUT THE DEVELOPMENT OF THE THIRD MOLARS

### What can we expect from conventional radiographic examinations?

#### Recap of the development of the bud of the lower 3<sup>rd</sup> molars:

- begins formation around 4-5 years;
- begins radiologic visibility around 10-11 years;
- end of mineralization and crown formation between 13-15 years;
- beginning eruption into the arch is very variable among individuals and from one side with the other, with an average around 17-21 years. It usually lasts from 1 to 2 years between the beginning appearance into the arch and complete eruption.

**Periapical film:** correctly done, it provides a good quality image, with slight distortion . . . but it is often difficult to obtain correctly in a child and must be taken for each side.

**Orthopantomogram:** it accurately locates the anterior-posterior and vertical position of the 3<sup>rd</sup> molar but not transversely and there can be significant distortions. The image of the anterior border of the ramus does not correspond to the posterior limit available and therefore is not a reliable landmark.

**Lateral profile head film:** it gives a good idea of the orientation of the buds of the 3<sup>rd</sup> molars in relation to the 2<sup>nd</sup> molars, which for some authors allows them to make a prognosis for the development of the buds of the 3<sup>rd</sup> molars, but does not

give any indication for the transverse position of the bud of the 3<sup>rd</sup> molar. The bud often appeared radiologically situated first over the plane of occlusion of the other molars (fig. 2).

The image of the anterior border of the ramus is external in relation to the image of the bud of the 3<sup>rd</sup> molar and does not correspond to the available posterior limit. In effect, the internal posterior limit of the dento-alveolar arch is positioned just in front of the spine of Spix (fig. 1).

The individual variations of the shapes of the arch, more or less divergent in front and in the rear, induce different relations between the superimpositions of the images of the 3<sup>rd</sup> molars that often show vertical gaps, rendering impossible precise identification of the buds.

By just observing the position of the buds of the 3<sup>rd</sup> molars on the lateral profile head film, the practitioner cannot, except for the position and any aberrant morphology of the buds, conclude that there is an indication for prophylactic enucleation.

**Frontal head film (fig. 3).** This view is not **sufficiently utilized and exploited** prior to prescribing enucleation of the buds of the 3<sup>rd</sup> molars even though it clearly shows the transverse position of the 3<sup>rd</sup> molar. In effect, the bud of the 3<sup>rd</sup> molar is **normally positioned transversely outside** in relation to the 2<sup>nd</sup> molar from the moment when it begins its movement towards its site of eruption, in this case at around 14-15 years. The bud of the 3<sup>rd</sup> molar then



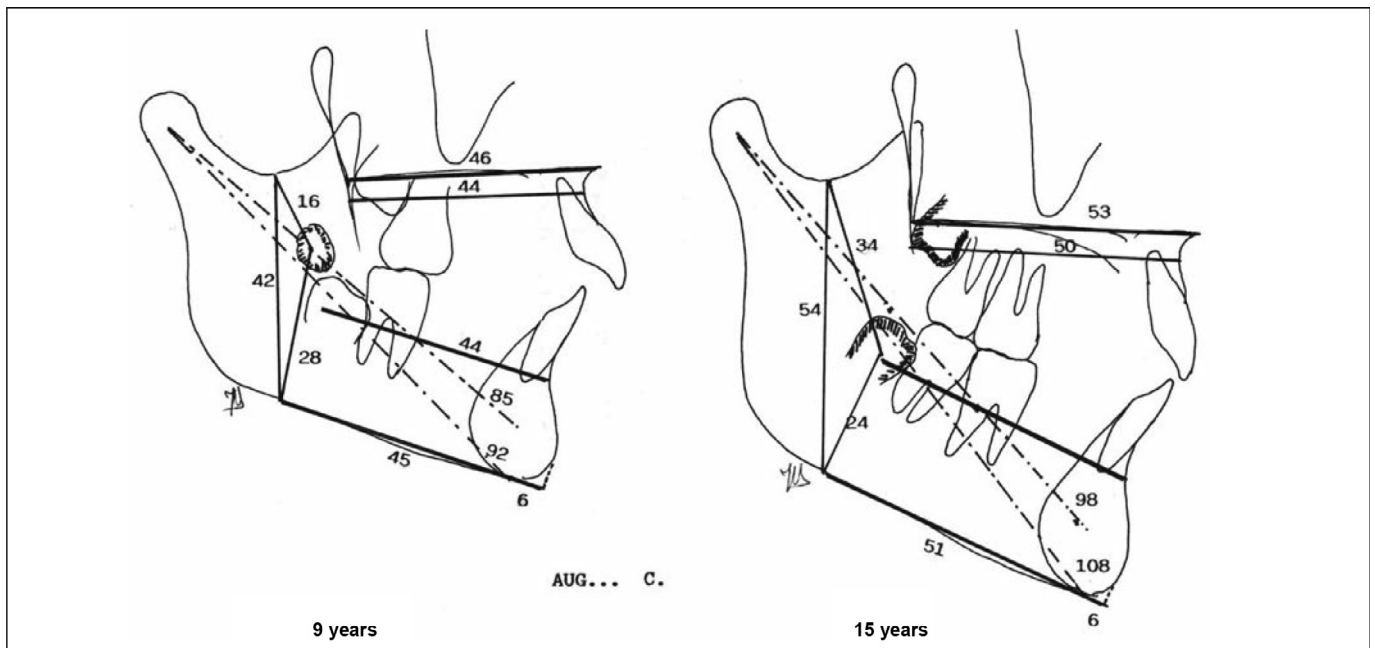


Figure 2

The bud often appears radiologically positioned first above the plane of occlusion then it descends progressively below the plane of occlusion of the other molars.

migrates in a vestibular-lingual direction and bottom up and eventually reaches its position behind the second molar. At this stage, it does not represent any hindrance to the orthodontic treatment, particularly to any distal movement.

This view also allows us to assess both the transverse space available and the position of the anterior border of the mandibular ramus.

**Cone beam:** it makes it possible to clearly view the morphology, the volume, the position of the roots and the apices of the 3<sup>rd</sup> molars and their relations with the inferior dental nerve, the dimensions and the size of a potential dentigerous cyst.

Since they were aware of the reservations expressed above, several authors logically and usefully

proposed some methods to evaluate the space necessary for the eruption of the lower 3<sup>rd</sup> molar before establishing a favorable or non-favorable prognosis for these teeth. All of these methods rest principally on the observation of the inclination of the image of the buds at the "t" cephalometric landmark on the panoramic image and/or lateral profile head film. Among the authors cited: Ricketts<sup>16</sup>, Croquet and Delachapelle<sup>6</sup>, Richardson<sup>15</sup>, Begtrup, Gronastoo, Christiansen and Kjaer<sup>3</sup>, established a mathematical formula to predict the probability of the eruption of the 3<sup>rd</sup> molars for each side. All these assessments require taking a series of images that must be carried out in the exact same way in order to be reliable and reproducible. Despite all this, the different methods remain imprecise. Based on current



Figures 3

*P-A Frontal head film is **not sufficiently utilized and exploited**. It clearly shows the transverse position of the 3<sup>rd</sup> molar. The bud of the 3<sup>rd</sup> molar is normally positioned transversely outside in relation to the 2<sup>nd</sup> molar at the moment when it begins its movement towards its site of eruption, namely at around 14-15 years of age.*

findings, it is not possible to predict with sufficient probability the chances of eruption before the age of 14-15 years especially since the eruption of the 3<sup>rd</sup> molars is full of surprises, both good and bad, given how complex its eruptive mechanism is.

Personal method based on the following facts:

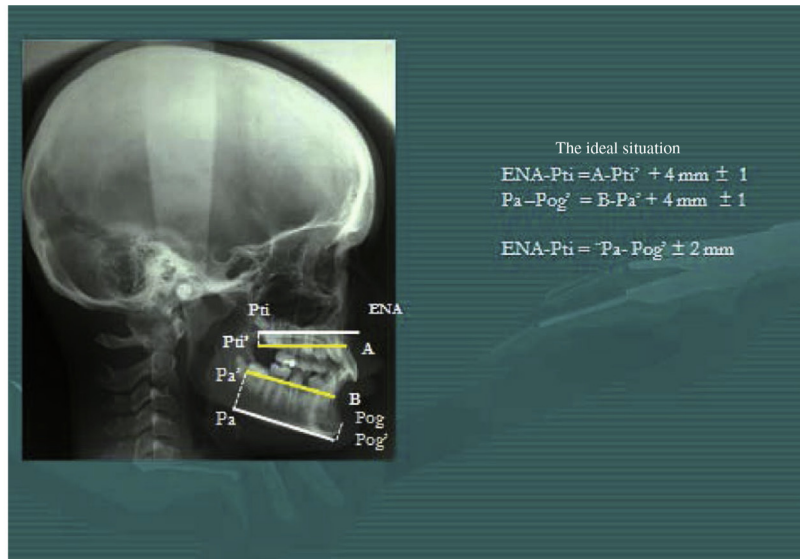
- a subject presenting with good skeletal equilibrium and complete dentition has the distal faces of the 3<sup>rd</sup> molars positioned

on the same vertical plane. The upper and lower alveolar lengths are thus equivalent on a lateral profile head film.

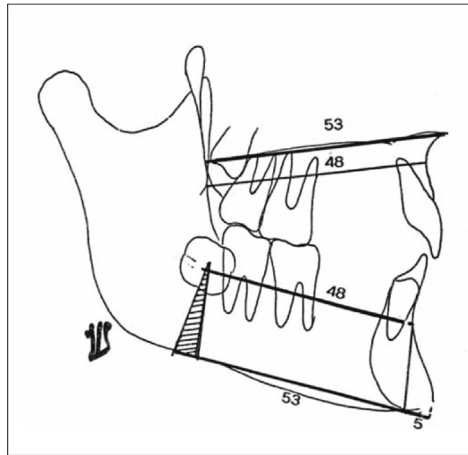
- The proportions between the length of the upper and lower alveolar processes and their skeletal bases are well defined by the dento-skeletal analysis<sup>17</sup> (fig. 4A). In a child subject, with a developing dentition, it is easy to measure, with a profile head film using the "cephalometric landmark," the alveolar maxillary and mandibular alveolar lengths and to evaluate their dimensions in relation to their skeletal bases and to provide evidence for the potential deficits in the length from one to the other. The observation of the position of the bud of the lower 3<sup>rd</sup> molar by using a triangle whose upper or lower apex allows for an assessment of the favorable or unfavorable position of the bud without pretending to predict a prognosis for eruption (fig. 4B and 4C).

While still imperfect, this procedure, a quick and simple process, has the advantage of being strictly individualized and not dependent on statistical values.

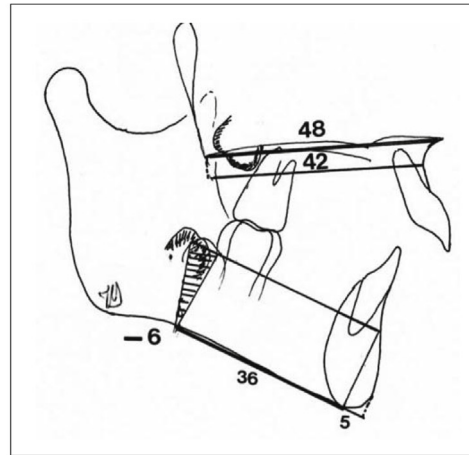
However none of the methods are valid and the practitioner still has to perform both the clinical observation and the palpation of the osteo-muscular and mucosal triangle in which the 3<sup>rd</sup> molars must erupt especially the area of the insertion of the soft tissues behind the 2<sup>nd</sup> molars (fig. 5). An attentive examination of this zone, as a follow-up to orthodontics shows that as the bud of the



a



b



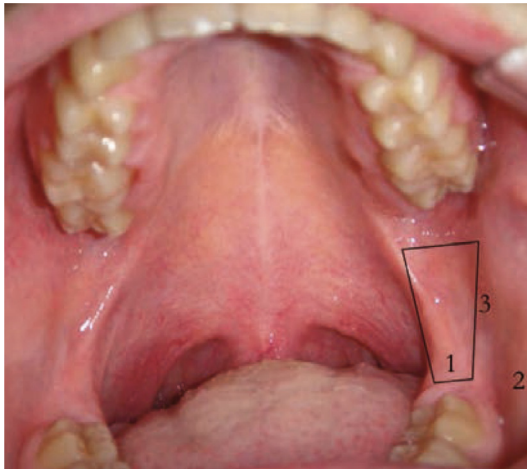
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Figures 4

Favorable position of the bud of the lower 3<sup>rd</sup> molar. a) Ideal alveolar-skeletal relation. b) Favorable alveolar and skeletal dimensions for the eruption of the 3<sup>rd</sup> molar. c) Unfavorable alveolar and skeletal dimensions for the eruptions of the 3<sup>rd</sup> molar.

3<sup>rd</sup> molar approaches its place of eruption, the insertion of the anterior pillar migrates distally allowing for the passage of the tooth. Just as accidents in the eruption of the 3<sup>rd</sup> mo-

lars involve the soft tissues, it's these same tissues that allow or do not allow the correct placement of the lower 3<sup>rd</sup> molar. However, an isolated episode or accident in the



Figures 5

Observation and palpation of the osteo-muscular-mucous triangle in which the 3<sup>rd</sup> molar will erupt. The disposition of the soft tissues is the determinant for the possibility or not of the placement of this tooth. The mucosal territory for the eruption of the mandibular 3<sup>rd</sup> molar: 1: elongation of the anterior pillar of the palatal veil. 2: buccinators. 3: anterior border of the mandibular ramus and tendon of the anterior temporal fascia.

eruption does not automatically condemn all 3<sup>rd</sup> molars.

### Questions to consider before making a diagnosis about the indications for enucleation of the 3<sup>rd</sup> molars

Is the enucleation of the 3<sup>rd</sup> molars indispensable before orthodontic treatment? In certain cases, it is often preferable to consider the removal of the 2<sup>nd</sup> molars.

Are other extractions necessary in order to proceed with the treatment? Do we have the right to sacrifice a quarter of the dentition of a young child in order to align the other teeth? . . . and to say afterwards in case malpositions appear that the perfect alignment of the incisors is no longer the rule of thumb for modern humans? If this is the case, aren't we really admitting how ineffective orthodontic techniques are?

Where then is the patient in his mandibular growth? Are the maxillary-mandibular skeletal relationships normal? We cannot hope to have sufficient space to conserve all the teeth without good development of the osseous maxillary and mandibular supports. Think orthopedics before orthodontics.

Is my patient mature enough to accept the procedure?

Is enucleation of the 3<sup>rd</sup> molars indispensable right after orthodontic treatment?

Is the anatomic environment truly unfavorable?

Is the position of the buds of the upper and lower 3<sup>rd</sup> molars surgically accessible without risk?

Is the quality of the hygiene and the general state of the dentition of the patient satisfactory? If the molars have been treated earlier or restored, it's preferable to keep the 3<sup>rd</sup> molars "in reserve."

## CONCLUSION

Late incisor crowding has a multifactorial origin and the 3<sup>rd</sup> molars seem to have limited responsibility.

The indication for prophylactic removal is however dependent on the orthodontic technics that are utilized.

The lack of room for the 3<sup>rd</sup> molars often appears due to a deficit in the development of the mandible and the maxilla. Think orthopedics before thinking orthodontics.

The indication for enucleation of the 3<sup>rd</sup> molars must be thought of on a case by case basis after confirmation of the clinical examination and radiographs.

The clinical examination is the determining factor.

The different methods for predicting the eruption of the 3<sup>rd</sup> molars are random.

It is difficult to predict the risks of impaction before the age of 14-15 years, therefore there are no indications (without exception) for enuclea-

tion or of extraction before this age and **never** before the complete eruption of the 2<sup>nd</sup> molars.

All the 3<sup>rd</sup> molars cannot erupt normally, some will have to be extracted, but orthodontists must rethink their indication pre- per- and post-orthodontics for enucleations or prophylactic extractions. Many of these indications are **not medically justified** during this period.

But it is the **duty of the orthodontist** to verify clinically and radiographically whether or not the 3<sup>rd</sup> molars are properly positioned in the arches.

Conflicts of interest: The author declares no conflict of interest.

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