

Do impacted third molars induce anterior crowding?

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Do impacted third molars induce anterior crowding?

EDUCATIONAL OBJECTIVES

In this educational activity, participants will explore the following:

1. Whether impacted third molars are the fundamental reason for crowding in the anterior of the lower arch
2. Factors that may influence crowding of the lower incisors
3. Classifications of impacted third molars
4. Complications of impacted third molars
5. Mesial drift and its role in the dental arch
6. The role of the dental hygienist in problems related to third molars

ABSTRACT

Despite the risks associated with dental surgery, each year an abundance of healthy, asymptomatic third molars are extracted from dental patients. According to the American Association of Oral and Maxillofacial Surgeons, about 85% of third molars ultimately require removal because of impaction, decay, pain, and/or crowding.⁷ However, evidence supporting the prophylactic removal of third molars is surprisingly sparse. This course will examine the controversy of whether impacted third molars induce anterior crowding and whether crowding truly warrants their removal.



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INTRODUCTION

The relationship between third molars—or “wisdom teeth”—and the crowding of mandibular anterior teeth is controversial. While it seems to make sense that third molars leaning toward second molars would have a pushing and crowding effect, there is evidence suggesting otherwise.

Third molars are the last teeth to erupt and commonly do so between the ages of 17 and 25. They may not erupt completely or may be prevented from erupting in a normal, functional position. Eruption behavior of third molars is determined by many factors, including the angles at which the teeth sit, stages of root formation, extent of impaction, room allowed for eruption, obstruction by other teeth, development in an abnormal position, and the sizes of the third molars themselves.³

According to the American Dental Association, third molars may begin to form obliquely, only partially erupt, semierupt, or remain completely captured under the gum and bone.¹ If third molars are impacted, patients frequently experience no pain or discomfort. In these cases, the third molars are termed “trouble-free” or “asymptomatic.”² However, impaction of third molars can be cause for concern. According to the *Journal of Oral and Maxillofacial Surgery*, “Third molar impaction is found more commonly in the lower jaw and rarely plays any practical or functional role in the mouth—in fact, it most often may increase the risks of caries, periodontal disease and external root resorption correlated with the neighboring second molar.”² Complications of third molar impaction are listed in the next section.

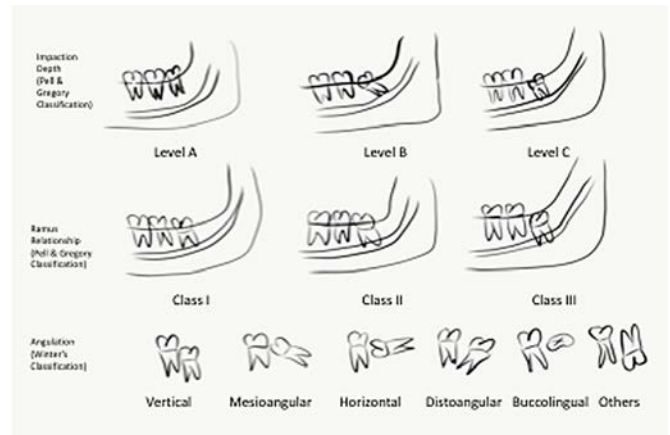
COMPLICATIONS OF IMPACTED THIRD MOLARS

The following are complications of third molar impaction:

- Soft tissue and/or bone defects behind the second molars
- Root resorption of second molars due to pressure exerted on their roots from the impacted teeth
- Decay due to inability to brush and floss properly
- Pericoronitis or operculitis, which is inflammation of the soft tissue surrounding the crown of a partially erupted or impacted crown
- Cysts and tumors around impacted third molars
- Pain or discomfort
- Gingiva that are edematous (swollen), erythematous (red), tender, and/or bleeding
- Inflammation around the jaw
- Halitosis
- Unpleasant taste in the mouth near the affected area
- Headache or jaw ache
- Trismus, lockjaw, or occasional difficulty opening the mouth
- Occasional swollen lymph nodes in the neck

CLASSIFICATION OF IMPACTED THIRD MOLARS

There are a number of third molar classification systems. Winter’s classification system and the Pell and Gregory classification system are the two most common. Each has been extensively adopted and applied in clinical practice.³ They aid in assessing the precise



Pell and Gregory classification.⁶ Illustration by Staci Violante, RDH

third molar positioning for observation, classification, and, if necessary, extraction.

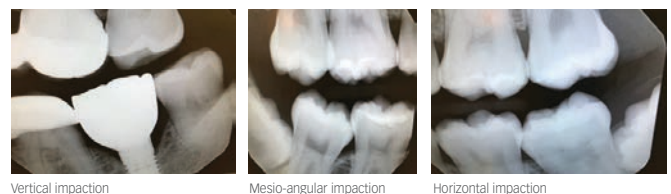
Under these systems, third molars are classified as either developing, erupting, embedded, or impacted. Classification of an impacted third molar and its degree of extraction difficulty enable clinicians to choose optimal treatments and avoid complications.

Furthermore, these classification systems note the inclinations and positions of the third molars based on their relation to the dental longitudinal axis, occlusal plane, and ascending mandibular ramus.

An impacted mandibular third molar is described in relation to an adjacent anatomical structure or structures, including second molars, the mandibular ramus, the alveolar crest, and the mandibular canal. Spatial position is also noted, and is based on the inclination of the impacted third molar to the long axis of the second molar.

Over time, third molars classification can change. Friedman notes that “[t]hird molars can develop until age of 25, with 50% of root formation completed by age 16 and 95% of all teeth fully erupted by the age of 25. However, tooth movement can continue beyond the age of 25.”¹⁹

EXAMPLES OF IMPACTED WISDOM TEETH⁹



Vertical impaction

Mesio-angular impaction

Horizontal impaction

TYPES OF THIRD MOLAR IMPACTION

The following are types of third molar impaction:

Mesio-angular impaction—This is the most common type of impacted third molar. The tooth is tilted towards the second molar in a mesial direction. This type ranks as the hardest to remove from the upper jaw, but also as the easiest to remove from the lower.

Disto-angular impaction—A disto-angular impaction only occurs in approximately 6% of adults. The tooth has formed at a backward angle and points in the distal direction.

Partial impaction—Partial impactions are particularly the case

with third molars that do not erupt through the gum line and instead remain trapped or impacted beneath the bone in the jaw. This type can be further classified as either a partial bony impaction or complete bony impaction.

- **Partial bony**—The tooth is partially erupted, but a portion of the crown remains below the gingiva.
- **Complete bony**—The tooth is entirely encased by bone.

Horizontal impaction—Horizontal impaction is the least common type of impacted third molar. A horizontal impaction occurs when the tooth forms sideways at a 90-degree angle. While uncommon, a horizontal impaction poses the greatest threat to the health of the teeth, as the tooth can begin to grow into the root of the second molar.

Vertical or bony impaction—Occasionally, a third molar forms at the correct angle but fails to fully erupt from the gum line. With a vertical impaction, the long axis of the third molar is parallel to the long axis of the second molar. The seemingly perfect tooth must be removed to prevent infection around and under the gum line where the tooth is partially emerged. Because vertical impaction doesn't negatively affect the health of surrounding teeth, patients may not wish to have this type of tooth removed. However, partially erupted teeth can collect bacteria and pathogens, which can lead to pericoronitis.

THE DEBATE: TO EXTRACT OR NOT TO EXTRACT

Through the years, third molars have been implicated for many complications. The one most debated is that third molars cause tooth movement when trying to erupt by exerting pressure on other teeth.³ This popular theory says that third molars are to be held accountable for the movement of neighboring teeth and therefore the crowding and rotation of anterior teeth over time.⁸ But is this belief justified?

In 1961, an orthodontist named Dr. Leroy Vego published one of the first articles on this controversial topic. The article, "A Longitudinal Study of Mandibular Arch Perimeter," examined the role of third molars on mandibular incisor crowding. Dr. Vego evaluated plaster stone models of three groups: 65 patients who had never undergone

orthodontic treatment; 40 patients with mandibular third molars present; and 25 patients with mandibular third molars congenitally absent.¹¹ The patient ages spanned six years, from 13 to 19. Dr. Vego reported that there was significantly greater crowding in those patients with third molars, saying "the erupting lower third molar can exert a force on approximating teeth." His conclusion launched a debate that continues to this day.¹¹

A randomized controlled trial in *The Journal of Dental Research* compared the effects of extraction versus retention of asymptomatic, disease-free impacted third molars on the dental arch after five years.²⁴ The 164 participants had previously undergone orthodontic treatment and had crowded third molars. No evidence from the study was found to suggest that removal of asymptomatic, disease-free impacted wisdom teeth had a clinically significant effect on changes in the dental arch.

Based on the literature, one might conclude that there is a lack of sufficient evidence to determine whether third molars should be removed to prevent mandibular crowding. As such, when determining treatment, patient preferences and values should be considered along with a mindful consideration of other clinical risks.¹⁶

MESIAL DRIFT

When looking for a cause to tooth movement or considering third molar extraction, mesial drift must also be considered. Teeth have a natural tendency to drift mesially. This makes sense because chewing motions result in torsions of the lower jaw as well as deflections of the teeth in their sockets, leading to friction on contact points and grinding down of tooth structure.²⁰ If teeth were resistant to their natural mesial drift, there would be an increase of space between the teeth. As Rodrigues et al explain, "Mesial drift is a striking mechanism involving migration of teeth allowed by both bone remodeling and dental resorption."¹⁸ If a tooth is missing, however, a typical consequence is that the adjacent or neighboring teeth will slide into the existing space. It is this natural mesial drift that tends to shift the teeth mesially and cause tooth crowding—specifically the

mandibular anterior teeth. By replacing missing teeth, further drifting is prevented into open spaces. Orthodontic treatment corrects occlusal imperfections and places the teeth into proper positions. This prevents further shifting and crowding.

THE ROLE OF THE DENTAL HYGIENIST IN THIRD MOLAR MAINTENANCE

Proper oral hygiene is the key to preventing third molar problems. These teeth—specifically impacted ones—can be extremely difficult to clean due to their location and decay easily.⁷ Comprehensive oral hygiene care and instruction for partially erupted or impacted wisdom teeth are crucial to maintaining third molars.

Some third molars may have an operculum (soft tissue covering a partially erupted tooth), making them more difficult to keep clean and possibly causing irritation or food impaction. If brushing third molars with a regular toothbrush becomes too difficult, recommending a small sulcus brush or children's brush to patients may be sufficient.

Using mouthwash that contains fluoride can be helpful, particularly when cleaning wisdom teeth is otherwise difficult. Should minor irritation occur, a good course is to recommend warm salt water rinses (1/2 teaspoon of salt in 8 ounces of water).

If it is decided to retain asymptomatic, disease-free impacted third molars, clinical assessment at regular intervals is advisable to prevent undesirable outcomes such as pericoronitis, root resorption, cyst formation, tumor formation, inflammation, and infection.¹²

Unfortunately, many studies come to the conclusion that there are unwanted long-term outcomes arising from the extraction or premature removal of third molars. Negative effects include an increase of pocketing and attachment loss. As such, it is clear that sufficient postoperative hygiene and plaque control are the most crucial elements for decreasing the probability of adverse post-surgical outcomes.¹⁶

CONCLUSION

There is likely not enough evidence to suggest that removal of asymptomatic, disease-free impacted third molars has a

clinically significant effect on changes in the dental arch. As we age, our dentition acquires a natural mesial drift regardless of retention or extraction of third molars.

Although studies from the 1970s found evidence indicating that impacted third molars do indeed cause mandibular anterior crowding, more recent literature reviews show the opposite. They conclude that although third molars may play a small role in tooth movement in late adolescence years and later, they are not the main cause, and several other more important factors—such as residual growth—must be considered.^{2,10} Residual growth is the slight jaw growth that occurs in the late teens that moves the lower teeth forward and upward towards the upper jaw. This additional pressure forces crowding on perfectly straight teeth. Furthermore, when third molars are extracted, it is common to see mesial shifting occur thereafter as a part of the aging process.

Several associations of dental professionals, orthodontists, and oral and maxillofacial surgeons have concluded that it is unjustifiable to extract third molars only to prevent nonessential dental movements.¹³ Extracting asymptomatic third molars will not prevent lower anterior dental crowding, but this does not mean that there are not other reasons to extract third molars.

Patient values and preferences should play a prominent role in deciding whether asymptomatic, disease-free impacted third molars should be removed. As it was stated in the *International Journal of Oral and Maxillofacial Surgery*, “A strong indication for removal of an impacted third molar should be complemented with a strong contraindication to its retention.”^{8,15}

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QUESTIONS

1. **Third molars are the last to erupt and commonly do so between:**
 - a. ages 17 and 25
 - b. ages 15 and 18
 - c. ages 19 and 21
 - d. ages 16 and 19
2. **Third molars do not completely erupt for reasons such as:**
 - a. insufficient room to grow in the jaw
 - b. when complete eruption into a normal functional position is prevented
 - c. are not present
 - d. a and b
3. **Complications of impacted third molars are:**
 - a. soft tissue and or bone defects behind the second molars
 - b. root resorption of second molars, pressure exerted on the root from the impacted tooth
 - c. pericoronitis, operculitis, inflammation of the soft tissue surrounding the crown of a partially erupted or impacted crown
 - d. all of the above
4. **What is one of the most commonly used third molar classification systems?**
 - a. Leader and Toppel
 - b. Grant and Arthur's
 - c. Pell and Gregory
 - d. Smith and Fawn
5. **The third molar classification systems aid in:**
 - a. assessing the precise third molar positioning for observation
 - b. classification
 - c. extraction
 - d. all of the above
6. **According to the American Dental Association, third molars may:**
 - a. begin to form obliquely
 - b. only partially erupt
 - c. semi-erupt
 - d. all of the above
7. **95% of all teeth are fully erupted by the age of:**
 - a. 18
 - b. 20
 - c. 23
 - d. 25
8. **Classification systems describe wisdom tooth relation to which adjacent anatomical structure(s)?**
 - a. second molar
 - b. mandibular ramus
 - c. first molar
 - d. a and b
9. **Third molar impaction is found more commonly in:**
 - a. the lower jaw
 - b. the upper jaw
 - c. both a and b
 - d. none of the above
10. **The most common type of impacted third molar is:**
 - a. partial impaction
 - b. horizontal impaction
 - c. mesio-angular impaction
 - d. disto-angular impaction
11. **The least common type of impacted third molar is:**
 - a. partial impaction
 - b. horizontal impaction
 - c. disto-angular impaction
 - d. mesio-angular impaction
12. **This type of impaction only occurs in approximately 6% of adults:**
 - a. partial impaction
 - b. mesio-angular impaction
 - c. disto-angular impaction
 - d. horizontal impaction
13. **A partial bony impaction is:**
 - a. partially erupted, but a portion of the crown remains below the gingiva
 - b. is entirely encased by bone
 - c. unerupted
 - d. both a and c
14. **A complete bony impaction is:**
 - a. is entirely encased by bone
 - b. partially erupted, but a portion of the crown remains below the gingiva
 - c. not encased in bone
 - d. none of the above
15. **In a vertical impaction, the long axis is parallel to the long axis of which tooth?**
 - a. third molar is parallel to the long axis of the second molar
 - b. third molar is parallel to the long axis of the first molar
 - c. third molar is parallel to the long axis of the second premolar
 - d. all of the above
16. **Partially erupted teeth can collect bacteria and pathogens, which could lead to:**
 - a. gingivitis
 - b. pericoronitis
 - c. periodontitis
 - d. all of the above
17. **Teeth have a natural tendency to move or drift:**
 - a. mesially
 - b. distally
 - c. lingually
 - d. facially
18. **Mesial drift is a striking mechanism involving migration of teeth allowed by both bone remodeling and:**
 - a. root resorption
 - b. bone resorption
 - c. dental resorption
 - d. PDL resorption
19. **If a tooth is missing, a typical consequence is that the neighboring teeth will:**
 - a. begin to migrate to close the gap
 - b. not move at all
 - c. preserve the bone of the tooth missing
 - d. a and b
20. **Residual growth:**
 - a. maintains the refinement of the teeth
 - b. occurs at an adolescent age
 - c. creates pressure that will now force crowding on perfectly straight teeth
 - d. none of the above

Do impacted third molars induce anterior crowding?

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EDUCATIONAL OBJECTIVES

- To explore if impacted third molars are the fundamental reasoning of crowding in the anterior of the lower arch
- To explore and identify other factors that may influence lower incisor crowding
- To identify classifications of impacted third molars
- To identify complications of impacted third molars
- To identify mesial drift and its role in the dental arch
- To discuss the role of the dental hygienist in problems related to third molars

COURSE EVALUATION

1. Were the individual course objectives met?

Objective #1:	Yes	No	Objective #2:	Yes	No
Objective #3:	Yes	No	Objective #4:	Yes	No
Objective #5:	Yes	No	Objective #6:	Yes	No

Please evaluate this course by responding to the following statements using a scale of "excellent" = 5 to "poor" = 0.

2. To what extent were the course objectives accomplished overall?	5	4	3	2	1	0
3. Please rate your personal mastery of the course objectives.	5	4	3	2	1	0
4. How would you rate the objectives and educational methods?	5	4	3	2	1	0
5. How do you rate the author's grasp of the topic?	5	4	3	2	1	0
6. Please rate the instructor's effectiveness.	5	4	3	2	1	0
7. Was the overall administration of the course effective?	5	4	3	2	1	0
8. Please rate the usefulness and clinical applicability of this course.	5	4	3	2	1	0
9. Do you feel that the references were adequate?		Yes		No		
10. Would you participate in a similar program on a different topic?		Yes		No		

11. If any of the continuing education questions were unclear or ambiguous, please list them.

13. Was there any subject matter you found confusing? Please describe.

14. How long did it take you to complete this course?

15. What additional continuing dental education topics would you like to see?

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Endeavor maintains records of your successful completion of any exam for a minimum of six years. Please contact our offices for a copy of your CE credits report. This report, which will list all credits earned to date, will be generated and mailed to you within five business days of receipt.

EDUCATIONAL DISCLAIMER

Completing a single CE course should not provide enough information to give participants the feeling that they are experts in the field related to the course topic. It is a combination of many educational courses and clinical experience that allows the participant to develop skills and expertise.

CANCELLATION AND REFUND POLICY

Any participant who is not 100% satisfied with this course can request a full refund by contacting Endeavor in writing.

IMAGE AUTHENTICITY

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