Original Article

Correlation between third molar impaction and mandibular anterior segment crowding

Onyinye Dorothy Umeh,[1] Adaku Letitia Ben-Okoye,[2] Sylvia Simon Etim,[3] Ifeoma Linda Utomi[4]

[1]Department of Child Dental Health, Lagos University Teaching Hospital, Lagos, Nigeria.
[2]Department of Child Dental Health, Faculty of Dentistry, University of Calabar, Calabar, Nigeria.
[3]Department of Orthodontics and Paediatric Dentistry, Faculty of Dentistry, College of Health Sciences, University of Port Harcourt, Port Harcourt, Nigeria.
[4]Department of Child Dental Health, Lagos University Teaching Hospital, Lagos, Nigeria.

Abstract

Background: Anterior crowding represents a discrepancy between mesiodistal tooth widths and available alveolar space. The role of third molar eruption in the development of lower incisor crowding remains controversial.

Aim: To evaluate the correlation between mandibular third molar impaction and lower anterior segment crowding.

Methods: A retrospective study was conducted at the Orthodontic Unit, Lagos University Teaching Hospital, over four years (Jan 2019 to Dec 2022). Patients aged 18 years and above with erupted permanent teeth and complete clinical records were recruited. Panoramic radiographs and study casts were assessed for third molar impaction status and tooth-bone ratio. Data were analyzed using SPSS version 23, employing descriptive (frequency and percentages) and inferential (Chi-square) analysis with significance set at $p < 0.05$.

Results: Of 794 panoramic radiographs assessed, 181 adult patients (122 females, 59 males) met inclusion criteria. Lower incisor crowding was present in 72 patients (39.8%), while 74 (40.1%) had unilateral or bilateral third molar impaction. A significant association was found between third molar impaction and crowding ($p = 0.032$), with over 50% of patients with impaction showing crowding. However, the association between impaction symmetry and crowding severity was not statistically significant ($p = 0.066$).

Conclusion: A significant correlation exists between third molar impaction and anterior segment crowding. Patients with impacted third molars are more likely to have mandibular anterior crowding.

Keywords: Third molar, impaction, crowding, mandibular anterior segment, malocclusion, orthodontics, tooth-bone ratio

Address for correspondence: Dr. Sylvia Simon Etim, Department of Orthodontics and Paediatric Dentistry, Faculty of Dentistry, College of Health Sciences, University of Port Harcourt, Port Harcourt, Rivers State, Nigeria.
Email: udypride@yahoo.ca
Phone: +2348023466201

Received: 06-02-2026, **Accepted:** 03-03-2026

Access this article online	
Quick Response Code:	**Website:** www.phmj.org.ng
	DOI: https://doi.org/10.60787/phmj.v20i1.251

How to cite this article: Umeh OD, Ben-Okoye AL, Etim SS, Utomi IL. Correlation between third molar impaction and mandibular anterior segment crowding. Port Harcourt Med J 2026;20(1):46-50.

INTRODUCTION

Crowding is diagnosed when there is a negative arch length discrepancy, that is, when the available space in the dental arch is less than the space needed for proper teeth alignment.[1] According to its severity, crowding is classified as mild, moderate, or severe.[2] While crowding may occur in the anterior or posterior areas of either arch, it is most likely to occur in the anterior area, especially in the mandible.[3] Anterior crowding is identified as the discrepancy between the

mesiodistal tooth widths of the four permanent incisors and the available space in the alveolar process.[4] The cause of incisor crowding is multifactorial: tooth-bone discrepancies, discrepancies involving tooth number, premature loss of deciduous dentition, pressure from erupting molars, and variations in jaw growth.[2] The debate about the involvement of third molars in the development of incisor crowding remains a topic of interest.

It has been hypothesized that, while erupting, the third molar could transmit an anterior component of force down the dental arch, concentrating in the areas of canines and incisors, resulting in tooth rotation and misplacement.[5] Based on this theory, Niedzielska suggested that when sufficient space is available for the eruption of third molars, the tooth assumes a normal position in the dental arch and does not cause displacement of other teeth; conversely, when space is deficient, third molars may aggravate dental crowding.[6] Harradine and Richardson observed that the incidence of crowding increases in the dental arch during the period of third molar eruption.[7] A comparative longitudinal study by Vego demonstrated that the prevalence of late mandibular anterior crowding was greater in individuals with third molars compared to those with congenitally missing third molars, concluding that erupting third molars can exert a force on neighboring teeth.[8]

Conversely, other studies found no correlation between mandibular third molar presence and incisor crowding. Sidlauskas and Trakiniene studied a group of 91 subjects with a mean age of 21 years and concluded that there is no evidence to implicate third molars as aetiologic factors in late lower dental arch crowding.[9] Karasawa et al. evaluated 300 subjects with a mean age of 20.4 years on the presence or absence of wisdom teeth and mandibular incisor crowding, concluding that evidence on the role of third molars as an aetiologic factor in late lower arch crowding is lacking.[10] Lindqvist and Thilander found that third molar removal on one side did not relieve anterior crowding three years post-extraction.[11] Similarly, Pirttiniemi et al. did not find a significant change in anterior teeth crowding after extraction of mandibular third molars.[12] This study aimed to evaluate the relationship between the presence and absence of mandibular third molar impaction and lower anterior segment crowding.

MATERIALS AND METHODS

Ethical Considerations

Ethical approval for the study was obtained from the Health Research and Ethics Committee of the Lagos University Teaching Hospital before the commencement of the study. (ADM/DSCST/HREC/APP/5439)

This was a retrospective study, that was conducted over a four-year period at the Orthodontic Unit, Lagos University Teaching Hospital, Idi-Araba, Lagos State, Nigeria (from 1st January 2019 to 31st December 2022). Panoramic radiographs and study models of patients who presented for orthodontic treatment were used for this study. Subjects recruited for the study were at least 18 years of age and had all permanent teeth present, including third molars, either erupted or present on radiographic assessment. Patients with any form of craniofacial anomaly or special needs were excluded from the study. All patients below the age of 18 years, irrespective of whether all permanent teeth were present, were also excluded.

An initial census was carried out using all radiographs of orthodontic patients to obtain a sampling frame. Another assessment was carried out to screen subjects, and final recruits were those who met the inclusion criteria. Socio-demographic data of recruited subjects, including age and gender, were obtained from hospital records. Study casts of these subjects were also retrieved, and tooth-bone ratio was assessed.

The tooth-bone ratio was assessed by measuring the contact displacement between teeth or from one contact point to another. The measurement was from the mesial surface of one canine to the mesial surface of the contralateral canine. Scoring was either crowding or spacing, and the severity was noted. Assessment of third molar impaction

was done using Winter's classification[13] (horizontal, distal, mesial, and vertical) on panoramic radiographs.

Data analysis was performed using Statistical Package for Social Sciences (IBM SPSS) version 21.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics and frequencies of variables were determined. Pearson's Chi-square test was used to determine the relationship between variables. Significance was set at $p < 0.05$.

RESULTS

A total of 794 panoramic radiographs of orthodontic patients were assessed. One hundred and eighty-one adult patients met the inclusion criteria and were recruited for the study, with their corresponding clinical records and study models. This comprised 122 females (67.4%) and 59 males (32.6%). The majority of participants were within the 18–25-year age bracket.

Lower incisor crowding was present in 72 patients (39.8%), while 74 patients (40.1%) were found to have either unilateral or bilateral third molar impaction. Our study revealed that the majority (58.9%) of patients without third molar impaction have spacing. Since the p-value ($p = 0.032$) is less than the chosen significance level of $\alpha = 0.05$, there is a statistically significant association between third molar impaction and tooth-bone ratio ($\chi^2(2) = 6.89$, $p = 0.032$). Patients with third molar impaction are more likely to have crowding in their anterior segment (Table 1).

The relationship between tooth-bone ratio and third molar impaction symmetry (unilateral or bilateral) was also assessed (Table 2). Half of the patients with unilateral impaction were noted to have crowding. Similarly, half of the patients with bilateral impaction had crowding. However, the association between molar impaction symmetry and tooth-bone ratio was not statistically significant ($p = 0.066$).

DISCUSSION

Inadequate space in the dental arch for erupting teeth (tooth size–arch size discrepancy) is the ultimate common cause of most anterior dental crowding.[14] The cause of reduced arch space in many contemporary populations has a multifactorial basis. In orthodontics, the most controversial role of third molars is whether they can contribute to the development of malocclusion or relapse after orthodontic treatment, particularly in the anterior segment of the dental arch. Several authors have observed that anterior crowding was found more frequently in patients with third molar impaction than in subjects with correctly positioned third molars.[15,16]

A study by Lindqvist et al. involving a group of 52 patients with bilateral third molar impactions used a "split mouth" design, with extraction of impacted molars on one side and use of the contralateral quadrant as a control side.[11] Their data indicated the existence of less crowding on the extraction side in 70% of patients. This finding is similar to what was obtained in our study, though the figures are higher; over 50% of subjects with crowding were found to have at least one impacted third molar. Genetic and environmental differences may account for the difference in severity seen in both results.

Another study by Forsberg was conducted to determine the relationship between the eruption status of third molars and the relative space in the dental arches.[17] Two groups of 75 adult, non-orthodontic patients were used: one group with patients who had all third molars erupted and another group with all third molars missing due to extraction. The degree of crowding was found to be higher in the first group, although only with a small difference. While this study did not involve patients who were to undergo third molar extraction, the observations are similar in that crowding was found to be more prevalent in patients who had not undergone third molar extraction.

Table 1: Relationship between third molar impaction and tooth-bone ratio

Third molar impaction	Normal n (%)	Crowding n (%)	Spacing n (%)	Total n (%)	p-value
Yes	8 (10.8)	37 (50.0)	29 (39.2)	74 (40.9)	**0.032***
No	9 (8.4)	35 (32.7)	63 (58.9)	107 (59.1)	

**Statistically significant ($p < 0.05$)*

Table 2: Relationship between tooth-bone ratio and third molar impaction symmetry

Third molar impaction	Normal n (%)	Crowding n (%)	Spacing n (%)	Total n (%)	p-value
Unilateral	2 (5.9)	17 (50.0)	15 (39.2)	34 (44.1)	0.066
Bilateral	6 (15.0)	20 (50.0)	14 (35.0)	40 (59.1)	

**Statistically significant ($p < 0.05$)*

The association between tooth-bone ratio and third molar impaction was also assessed in this study. It was found that the majority (58.9%) of patients without third molar impaction have spacing. Correlational analysis showed a significant association between the presence of third molar impaction and crowding. This is in contrast to a study by Hasegawa et al., who studied a group of 60 Mongolian subjects with a mean age of approximately 21 years to evaluate the influence of mandibular third molar space and angulation on lower anterior crowding.[18] The analysis of their data did not reveal any significant relationship between the presence and angulation of mandibular third molars and lower incisor crowding. Differences in parameters used in the assessment of tooth-bone discrepancies, as well as racial differences, may account for this.

The relationship between the presence of unilateral or bilateral third molar impaction in lower anterior crowding was also assessed in this study. We found no statistically significant difference in crowding between the presence of unilateral or bilateral third molar impaction ($p = 0.066$). This is consistent with the study by Hasegawa et al., which found no significant relationship between the angulation of third molars, the presence of unilateral or bilateral third molar impaction, and the Little's irregularity index.[18]

Based on our study findings and comparisons with previous research reports, extracting impacted third molars could benefit orthodontic patients with mild to moderate crowding who are undergoing or have completed orthodontic treatment. This method may help reduce the likelihood of relapse in these patients.

LIMITATION

The limitation of this study was its inability to take into consideration other factors that may play a role in third molar impactions.This was due to the fact that the study was a retrospective study.

CONCLUSION

The conflicting clinical literature on the relationship between third molars and anterior crowding may be due to a lack of data addressing not only the presence of third molars but also the presence or absence of impaction and its significance in population variation. Results from this study support a cause-and-effect relationship between third molar impaction and anterior segment

crowding. It is worthwhile to consider third molar extraction to avoid anterior tooth crowding or post-orthodontic relapse.

Financial Support and Sponsorship:

Nil

Conflict of Interest:

There are no conflicts of interest.

REFERENCES

1. Little RM. The irregularity index: a quantitative score of mandibular anterior alignment. Am J Orthod 1975; 68(5):554–563.
2. Jain S, Sharma P, Shetty D. Comparison of two different initial archwires for tooth alignment during fixed orthodontic treatment: a randomized clinical trial. J Orthod Sci 2021; 10(1):13.
3. Husain S, Rengalakshmi S. Correlation between mandibular third molar and mandibular incisor crowding: a retrospective CBCT-based study. J Dent Res Dent Clin Dent Prospects 2021; 15(4):247 - 250.
4. Sanin C, Savara BS. Factors that affect the alignment of the mandibular incisors: a longitudinal study. Am J Orthod 1973; 64(3):248–257.
5. Zawawi KH, Melis M. The role of mandibular third molars on lower anterior teeth crowding and relapse after orthodontic treatment: a systematic review. Sci World J 2014; 2014; (6):6-12
6. Niedzielska I. Third molar influence on dental arch crowding. Eur J Orthod 2005; 27(5):518–523.
7. Harradine NW, Pearson MH, Toth B. The effect of extraction of third molars on late lower incisor crowding: a randomized controlled trial. Br J Orthod 1998;25(2):117–122.
8. Vego L. A longitudinal study of mandibular arch perimeter. Angle Orthod 1962; 32(3):187– 192.
9. Sidlauskas A, Trakiniene G. Effect of the lower third molars on the lower dental arch crowding. Stomatologija 2006; 8(3):80–84.
10. Karasawa LH, Rossi AC, Groppo FC, Prado FB, Caria PHF. Cross-sectional study of correlation between mandibular incisor crowding and third molars in young Brazilians. Med Oral Patol Oral Cir Bucal 2013; 18(3): 505–509.
11. Lindqvist B, Thilander B. Extraction of third molars in cases of anticipated crowding in the lower jaw. Am J Orthod 1982; 81(2):130–139.
12. Pirttiniemi PM, Oikarinen KS, Raustia AM. The effect of removal of all third molars on the dental arches in the third decade of life. Cranio 1994; 12(1):23–27.
13. Winter GB. Principles of exodontia as applied to the impacted mandibular third molar, 1st edition. St Louis: American Medical Book Co, 1926.
14. Proffit WR, Fields HW, Sarver DM. Contemporary orthodontics, 5th ed. St Louis: Mosby Elsevier, 2013.
15. Santiesteban-Ponciano FA, Gutiérrez-Rojo MF, Gutiérrez-Rojo JF. Severidad de apiñamiento relacionado con la masa dentaria [Severity of crowding related to tooth mass]. Rev Mex Ortod 2016;4(3):165–168.
16. Harris EF, Vaden JL, Williams RA. Lower incisor space analysis: a contrast of methods. Am J Orthod Dentofacial Orthop 1987; 92(5):375–380.
17. Forsberg CM. Tooth size, spacing, and crowding in relation to the eruption or impaction of third molars. Am J Orthod Dentofacial Orthop 1988; 94(1):57–62.
18. Hasegawa Y, Terada K, Kageyama I, Tsuchimochi T, Ishikawa F, Nakahara S. Influence of third molar space on angulation and dental arch crowding. Odontology 2013;101(1):22–28.