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UTICAJA DVAJU EKSTRAKCIONIH TERAPIJSKIH PROTOKOLA PRILIKOM LEČENJA MALOKLUZIJE II/1 KLASE NA ANGULACIJU DONJIH TREĆIH MOLARA U RAZVOJU

THE EFFECT OF TWO DIFFERENT EXTRACTION PROTOCOLS IN THE TREATMENT OF CLASS II, DIVISION 1 MALOCCLUSION ON THE ANGULATION OF DEVELOPING MANDIBULAR THIRD MOLARS

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Sažetak

Uvod: *Ekstrakcije premolara su česte u lečenju malokluzije II/1 klase.*
Cilj rada *je da se ispita nulta hipoteza o nepostojanju statistički značajnih razlika u promeni angulacije donjih trećih molara u razvoju između grupe pacijenata sa malokluzijom II/1 klase lečenih ekstrakcijom gornjih prvih i donjih drugih premolara i grupe pacijenata lečenih ekstrakcijom gornjih drugih premolara.*
Materijal i metod: *Ispitivanje je obuhvatilo ortopantomografske snimke snimljene pre početka i nakon završetka ortodontske terapije dvadeset osam pacijenata uzrasta od petnaest godina do dvadeset dve godine sa malokluzijom II/1 klase koji su podeljeni u dve grupe. Grupu I (n = 14) činili su pacijenti lečeni ekstrakcijom samo gornjih drugih premolara, a grupu II (n = 14) pacijenti lečeni ekstrakcijom gornjih prvih, donjih drugih premolara. Statistička analiza sprovedena je primenom deskriptivne statistike i odgovarajućih inferencijalnih testova (Studentov t-test, Pearsonov χ^2 test i Mann–Whitney test), uz nivo statističke značajnosti $p < 0,05$.*
Rezultati: *Promena srednje vrednosti angulacije donjih trećih molara u razvoju u grupi pacijenata lečenih ekstrakcijom gornih prvih i donjih drugih premolara je pozitivna i statistički značajno se razlikuje od promene srednje vrednosti angulacije donjih trećih molara u grupi pacijenata lečenih ekstrakcijom gornjih drugih premolara bez ekstrakcije u donjem nizu zuba ($p < 0,01$). U obe ispitivane grupe nije pronađena statistički značajna promena angulacije donjih trećih molara leve i desne strane. Procenat zuba kod kojih je došlo do povećanja angulacije je 32,14% u prvoj grupi, dok je u drugoj 71,43%.*
Zaključak: *Nulta hipoteza je odbačena uz zaključak da terapija malokluzije II/1 klase vođena ekstrakcijom gornjih prvih i donjih drugih premolara povećava mogućnost nicanja donjih trećih molara jer dovodi do statistički značajnije promene angulacije donjih trećih molara u razvoju.*

Ključne reči: *ekstrakciona terapija, malokluzija II/1 klase, angulacija donjih trećih molara*

Abstract

Introduction: *The extraction of premolars is a common therapeutic approach in the treatment of Class II, Division 1 malocclusion.*
Aim: *This study aimed to test the null hypothesis that there is no statistically significant difference in the change in angulation of developing mandibular third molars between patients with Class II, Division 1 malocclusion treated with the extraction of maxillary first and mandibular second premolars and those treated with the extraction of maxillary second premolars.*
Materials and Methods: *The study included orthopantomographic radiographs taken before and after orthodontic treatment in 28 patients aged 15–22 years with Class II, Division 1 malocclusion. The patients were divided into Group I (n = 14), treated with the extraction of maxillary second premolars only, and Group II (n = 14), treated with extraction of maxillary first and mandibular second premolars. Statistical analysis was performed using descriptive statistics and appropriate inferential tests (Student's t-test, Pearson's χ^2 test, and Mann–Whitney test), with the level of statistical significance set at $p < 0.05$.*
Results: *The mean change in angulation of developing mandibular third molars in group II were positive and significantly different from that observed in Group I ($p < 0.01$). No statistically significant differences were found between the left and right sides within either group. The percentage of lower third molars showing an increase in angulation was 32.14% in Group I and 71.43% in Group II.*
Conclusion: *The null hypothesis was rejected. Orthodontic treatment of Class II, Division 1 malocclusion involving the extraction of maxillary first and mandibular second premolars increase the likelihood of mandibular third molar eruption by producing a significantly greater change in their angulation.*

Key words: *extraction treatment, malocclusion, Class II, Division 1, lower third molar angulation*

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Introduction

Third molars are the last teeth in the dental arches. They erupt last and frequently lack sufficient space. The prevalence of their impaction in the European population is relatively high, around 25%, while in the Asian populations it exceeds 40%[1]. The etiology of third molar impaction remains not fully understood. Although adequate space is considered one of the most important factors, it does not guarantee eruption in all cases. The developmental pathway of these teeth shows considerable variability in terms of formation, position, calcification, and ultimately eruption[2].

A large number of orthodontists and oral surgeons believe that third molars generate an ananteriorly directed force that may contribute to late mandibular crowding[3] and therefore recommend their prophylactic removal[4]. Although third molars are not typically included in active orthodontic treatment, they represent an important factor to be considered during treatment planning[5]. While a substantial body of literature addresses the causes of third molar impaction[6,7], fewer studies have focused on predicting their eruption potential[7,8].

From a clinical perspective, there is a strong tendency to preserve as many teeth as possible; therefore, the influence of premolar extractions on the eruption and positioning of third molars represents an important orthodontic concern. Despite its clinical relevance, relatively few studies have addressed this topic, and those available provide inconsistent conclusions[8–10]. To date, no study has specifically investigated the effect of Class II, Division 1 malocclusion treatment involving the extraction of the maxillary first and mandibular second premolars on the angulation of mandibular third molars.

Class II Division 1 malocclusion is relatively common. Several treatment protocols are available depending on patient age, sagittal jaw relationships, growth pattern, incisor inclination, degree of crowding, and facial profile. Both non-extraction and extraction approaches are used, with premolar extractions performed either in the maxillary arch alone or in both arches[11]. Given the distal occlusion, extraction of maxillary first and mandibular second premolars is often preferred to achieve a Class I molar relationship at the end of treatment.

The aim of this study was to evaluate the effect of two different extraction-based treatment protocols for Class II, Division 1 malocclusion on the angulation of developing mandibular third molars.

Aim

The performed study aimed to test the null hypothesis that there is no statistically significant difference in the change of angulation of developing mandibular third molars between patients with Class II Division 1 malocclusion treated with the extraction of maxillary first and mandibular second premolars and those treated with the extraction of maxillary second premolars only.

Materials and Methods

Ethical approval of the study was obtained from the Ethical Committee of the Clinic for Dental Medicine in Niš with reference No. 14/6-2023-2 EO. It was a retrospective longitudinal cohort study.

The study included 28 patients (8 males, 20 females) aged 15 to 22 years with Class II Division 1 malocclusion, treated at the Clinic for Dental Medicine. All patients were divided into two groups according to the treatment protocol. Group I (n = 14; 5 males, 9 females; mean age 17.79 ± 2.78 years) consisted of patients treated with the extraction of maxillary second premolars only. Group II (n = 14; 3 males, 11 females; mean age 17.07 ± 2.37 years) included patients treated with the extraction of maxillary first and mandibular second premolars (Table1). The duration of treatment in the entire sample ranged from 26 to 39 months.

The effect of mandibular second premolar extraction on the angulation of mandibular third molars was assessed using orthopantomographic (OPG) radiographs taken before the start and after the completion of orthodontic treatment (Figure1).

Strict inclusion and exclusion criteria were applied during patient selection.

Inclusion criteria: High-quality orthopantomograms obtained before and after treatment; radiographs taken no more than one month prior to treatment initiation and within seven days after treatment completion; presence of Class II, Division 1 malocclusion with a half-cusp Class II molar relationship prior to treatment (assessed using study models); presence of mandibular third molar germs at least at Nolla stage 5 (crown almost completed)[12]; and complete closure of

extraction spaces at the end of treatment. Exclusion criteria: Patients with syndromes.

Orthopantomogram radiographs were obtained under standardized conditions using the same equipment, Sirona Axeos CBCT Ceph (Sirona Dental System GmbH, Bensheim, Germany) and Sidexis 4 software, Galileos Viewer (Dentsply Sirona, USA).

The influence of the two treatment approaches on the angulation of mandibular third molars was assessed using OPG analysis according to the methods described by Tarazona et al.8 and Jain et al.[9].

Contours of the mandibular ramus, corpus, sigmoid notch, and mandibular third molars were traced on transparent acetate paper (A4 size, 90 g/m²) using a 0.50 mm technical pencil. A line connecting the lowest points of the sigmoid notch bilaterally was used as the reference line. The angulation of mandibular third molars was determined relative to this line by measuring the external angle formed between the reference line and the long axis of the mandibular third molar, according to Jain et al.[9].

In cases where the mandibular third molar had not reached Nolla stage 6, the long axis of the tooth was determined as shown in Figure 1. In cases where the mandibular third molar had reached Nolla stage 6 or higher, the long axis was determined as shown in Figure 2.

All angles were measured using an angle grinder by the same investigator (orthodontist).

The long axis of mandibular third molars was determined depending on the stage of tooth development. In early developmental stages, when only the crown was formed, the long axis was constructed by connecting the midpoint of the line defined by the most convex points of the mesial and distal crown contours with the midpoint of the line defined by the mesial and distal cervical regions of the developing root (Figure 2).

In cases of completed root development, the long axis of the tooth was determined by connecting the midpoint of the line defined by the most convex points of the mesial and distal crown contours with the midpoint of the line defined by the apices of the mesial and distal roots of the third molar (Figure 3).

Changes in angulation of mandibular third molars were calculated by subtracting pre-treatment values from post-treatment values.

All measurements were performed twice using an angle grinder by the same examiner, and their mean values were used for statistical analysis.

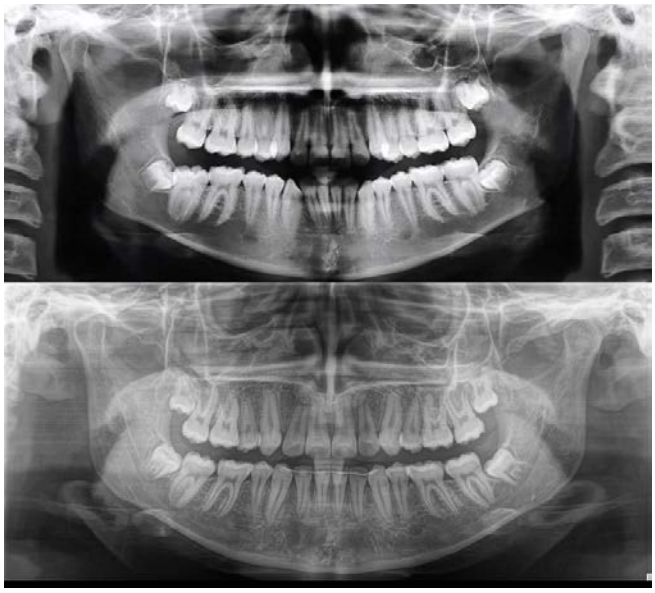

Figure 1. Pre- and post-treatment orthopantomograms of a patient treated with the extraction of the upper first and lower second premolars

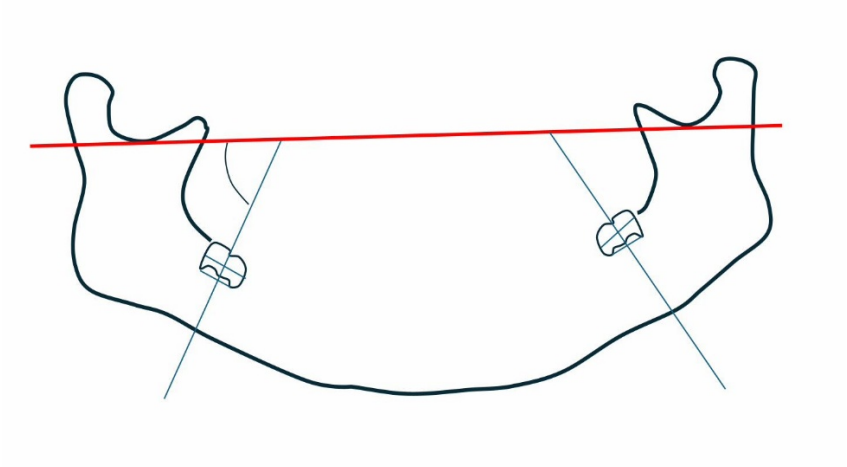

Figure 2. Determination of the long axis of the third molar at the developmental stage when only the crown is formed. The external angle formed between the long axis of the molar and the line connecting the lowest points of the sigmoid notch was measured to assess the inclination of developing mandibular third molars

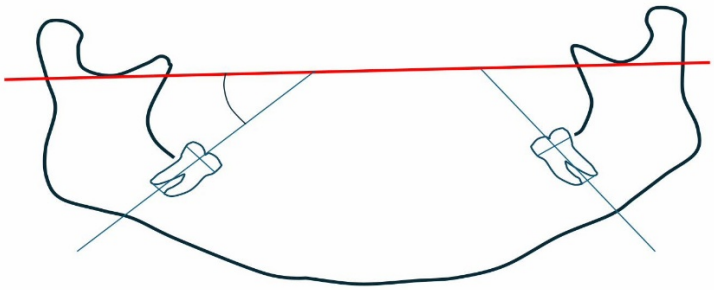

Figure 3. Determination of the long axis of the third molar at the developmental stage when both the crown and root are formed. The external angle formed between the long axis of the molar and the line connecting the lowest points of the sigmoid notch was measured to assess the inclination of developing mandibular third molars

Statistical Analysis

Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA; version 15.0 for Windows). Data analysis included the application of descriptive statistics and appropriate inferential tests. The Student's t-test for independent samples was used to compare mean values between two independent groups.

The Pearson χ^2 test was applied to analyze differences in the distribution of categorical variables. The Mann–Whitney test was used to assess differences in age between the groups. The level of statistical significance was set at $p < 0.05$.

Results

In the present study, intra-observer variability and measurement reproducibility were assessed by re-measuring 10 randomly selected OPG radiographs after a 7-day interval. The method error was calculated using Dahlberg's formula[13].

To evaluate the reliability of repeated measurements, the method error was compared with biological variability. The reliability of repeated measurements of the angulation of developing mandibular third molars ranged from 0.94 to 0.96.

The effects of Class II, Division 1 malocclusion treatment with the extraction of maxillary first and mandibular second premolars, as well as treatment with the extraction of maxillary second premolars, on the angulation of developing mandibular third molars are presented in Table 1. The mean value of the measured angle increased by 6.43 ± 9.45 in Group II, whereas in Group I, without mandibular premolar extractions, it decreased by -1.11 ± 8.71, with a statistically significant difference between the groups ($p < 0.01$) (Table 2).

Following the extraction of mandibular second premolars in Group II, the mean angulation of mandibular third molars increased on both the right and left sides (6.43 ± 8.05 and 6.43 ± 10.99, respectively). In Group I without mandibular premolar extractions, the mean angulation slightly decreased on both sides (-0.64 ± 8.48 and -1.57 ± 9.23, respectively), with no statistically significant difference between the right and left sides in either group (Table 3).

Among all evaluated mandibular third molars in Group I, angulation increased in 32.14% of cases, decreased in 46.43%, and remained unchanged in 21.43%. In Group II, angulation increased in 71.43% of third molars, decreased in 17.86%, and remained unchanged in 10.71% of cases (Table 4).

Table 1. Mean age of patients by groups

	Group I	Group II
	17.79 ± 2.78 (16.00)	17.07 ± 2.37 (16.00)

Data are presented as mean ± standard deviation (median)

Table 2. Descriptive parameters of changes in the angulation of mandibular third molars in the examined groups

	Group I	Group II
Changes in the angulation of mandibular third molars	-1.11 ± 8.71 (0.00)	6.43 ± 9.45 (5.00) *

Data are presented as mean ± standard deviation (median) * – $p<0.01$

Table 3. Descriptive parameters of changes in the angulation of left and right mandibular third molars in the examined groups

Lower third molars	Group I	Group II
Right	-0.64 ± 8.48 (-1.50)	6.43 ± 8.05 (6.50)
Left	-1.57 ± 9.23 (0.00)	6.43 ± 10.99 (3.50)

Data are presented as mean ± standard deviation (median)

Table 4. Distribution of changes in angulation of mandibular third molars by group

Changes in the angulation of mandibular third molars		Group I		Group II
Increase	9	32.14%	20	71.43%
No change	6	21.43%	3	10.71%
Decrease	13	46.43%	5	17.86%
Total	28	100.00%	28	100.00%

Data are presented as frequencies and percentages

Discussion

The extraction approach represents a common therapeutic option in orthodontics, with premolars being the teeth most frequently extracted. Their extraction enables the resolution of dental crowding, the retraction of anterior teeth, the improvement of the facial profile, and the establishment of proper sagittal relationships.

Before deciding on premolar extraction, it is essential to consider the presence, position, and morphology of third molars. The issue of their eruption and proper alignment is particularly pronounced in the mandible, as third molars are located within a limited space between the distal surface of the second molar and the mandibular ramus. Nance et al. reported that unerupted third molars are more likely to reach the occlusal plane when positioned more vertically, compared to those with greater mesial inclination[14]. Literature data also suggest that the extraction of mandibular premolars may favorably influence the inclination of mandibular third molars and increase the likelihood of their proper positioning in the dental arch[2,8,15].

Impaction of mandibular third molars may lead to numerous complications, including late mandibular crowding, pericoronitis, and periodontal damage to adjacent second molars, while their surgical removal is often complex and associated with prolonged recovery[16]. The present study evaluated the effect of two extraction protocols of Class II, Division 1 malocclusion with and without the extraction of mandibular premolars on the angulation of mandibular third molars.

Based on the comparison of angulation values before and after orthodontic treatment, a positive mean change in angulation was observed in Group II with the extraction of maxillary first and mandibular second premolars, whereas a negative change was observed in Group I without mandibular premolar extractions, with a statistically significant difference between the groups ($p < 0.01$). These findings indicate that the extraction of mandibular second premolars has a favorable effect on the uprighting and eruption of mandibular third molars. This is consistent with the findings of Tarazona et al.[8], Benkaddour et al.[15], and Yadav et al.[2], but contrasts with studies by Russell et al.[17], Di Giovanni et al.[18], and Miclotte et al.[19], who did not find a statistically significant improvement in third molar angulation following premolar extractions. Miclotte et al.[19] reported that premolar extraction might positively influence the eruption space and vertical position of third molars, but found no association with their uprighting. In contrast, Hammouda et al.[20] observed a positive effect on the uprighting of third molars regardless of whether the first or second mandibular premolars were extracted.

Yadav et al. reported a mean angulation change of 14.00 ± 12.66° the extraction of mandibular second premolars, which is considerably higher than the results obtained in the present study (6.43 ± 9.45°)[2]. Although lower, the value observed in this study is still clinically significant, given that Russell et al. identified a 5° change as the threshold for clinical relevance in third molar angulation[17].

In interpreting these findings, it is important to note that the reference plane used in this study was the line connecting the lowest points of the sigmoid notches, which is considered relatively stable within the examined age range[8]. However, other studies have used different reference planes on OPG radiographs, which may partly explain discrepancies in results.

Orthodontic extraction of mandibular premolars has a positive effect on the eruption of mandibular third molars, not only by influencing their inclination but also by increasing retromolar space.

The greatest increase in retromolar space occurs between the ages of 10 and 12 years, after which growth slows until approximately 16 years of age[21]. The mean age of patients in both groups in the present study was approximately 17 years, with no statistically significant difference between groups, indicating limited residual growth in the observed region.

Björk et al.[22] in a longitudinal study conducted using the implant method, demonstrated that premolar extraction is associated with significant resorption at the anterior border of the mandibular ramus, which further increases retromolar space and facilitates third molar eruption.

In the present study, no statistically significant differences were found between the left and right sides in either group, which is consistent with the findings of Benkaddour et al.[15], but differs from those of Yadav et al.[2], who reported greater uprighting on the right side in the extraction group.

Our results also showed that uprighting of mandibular third molars occurred in 32.14% of teeth in Group I, compared to 71.43% in Group II, with the extraction of mandibular second premolars, consistent with the findings of Gohilot et al.[21]. This further supports the positive influence of mandibular second

premolar extraction on third molar uprighting and eruption.

Although retromolar growth is nearly complete in the age group included in this study, Richardson noted that pre-eruptive rotational movements of mandibular third molars may still occur[23]. This may explain the positive angulation changes observed in approximately one-third of teeth in Group I.

Nevertheless, the overall mean change in angulation in Group I was slightly negative, consistent with the findings of Saysel et al.[24], but differing from Yadav et al.[2], who reported slight improvement in angulation in cases without extraction of mandibular premolars. In general, both positive and negative changes in third molar angulation in cases without mandibular premolar extractions are minimal—typically only a few degrees—and are unlikely to significantly influence eruption outcomes.

Conclusion

Based on the obtained results, the null hypothesis was rejected.

Extraction of mandibular second premolars in the treatment of Class II, Division 1 malocclusion positively affects the angulation of unerupted mandibular third molars, with no significant difference between the left and right sides. In the group of patients treated without the extraction of mandibular premolars, the mean change in angulation of mandibular third molars was slightly negative.

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Conflict of Interest

The authors declare no conflict of interest.

LITERATURA/REFERENCES

1. Pinto AC, Francisco H, Marques D, Martins JNR, Caramês J. Worldwide Prevalence and Demographic Predictors of Impacted Third Molars-Systematic Review with Meta-Analysis. J Clin Med. 2024;13(24):7533.
2. Yadav C, Utreja A, Singh S, Jena A. Second premolar extraction improves the angulation of developing third molars better than first premolar extraction among subjects undergoing comprehensive orthodontic treatment. Journal of Dental Specialities. 2016;4(1):46–51.
3. Laskin DM. Evaluation of the third molar problem. J Am Dent Assoc. 1971;82:824–828.
4. Lindauer SJ, Laskin DM, Tüfekçi E, Taylor RS, Cushing BJ, Best AM. Orthodontists' and surgeons' opinions on the role of third molars as a cause of dental crowding. Am J Orthod Dentofacial Orthop. 2007;132(1):43–48.
5. Lyros I, Vasoglou G, Lykogeorgos T, Tsolakis IA, Maroulakos MP, Fora E, et al. The Effect of Third Molars on the Mandibular Anterior Crowding Relapse-A Systematic Review. Dent J (Basel). 2023;11(5):131.
6. Begg PR, Kesling PC. Begg Orthodontic Theory and Technique: Saunders; 1977.
7. Richardson ME. The etiology and prediction of mandibular third molar impaction. Angle Orthod.1977;47:165–172.
8. Tarazona B, Paredes V, Llamas JM, Cibrian R, Gandía JL. Influence of first and second premolar extraction or non-extraction treatments on mandibular third molar angulation and position. A comparative study. Med Oral Patol Oral Cir Bucal. 2010;15(5):e760–e766.
9. Jain S, Valiathan A. Influence of first premolar extraction on mandibular third molar angulation. Angle Orthod. 2009;79(6):1143–1148.
10. Miclotte A, Van Hevele J, Roels A, Elaut J, Willems G, Politis C, et al. Position of lower wisdom teeth and their relation to the alveolar nerve in orthodontic patients treated with and without extraction of premolars: a longitudinal study. Clin Oral Investig. 2014;18(7):1731–1739.
11. Oostenbrink AHA, Bronkhorst EM, Booij JW, Dieters AJA, Ren Y, Kuijpers-Jagtman AM, et al. Second Versus First Molar Extractions in Class II Division 1 Malocclusion Treatment: A Retrospective Longitudinal Outcome Study into Maxillary Canine, Premolar, and Molar Movement. J Clin Med. 2025;14(1):225.
12. Nolla CM. The development of the permanent teeth. Journal of Dentistry for Children. 1960;27:254-66.
13. Dahlberg G. Statistical methods for medical and biological students. London: George Allen & Unwin; 1940.
14. Nance PE, White Jr RP, Offenbacher S, Phillips C, Blakey GH, Haug RH. Change in third molar angulation and position in young adults and follow-up periodontal pathology. Journal of oral and maxillofacial surgery. 2006;64(3):424-8.
15. Asmae B, Khaoula M' R, Loubna B, Fatima Z, Asmae B. The effect of premolar extractions on the change of angulation and eruption space of the mandibular third molars after orthodontic treatment. International Arab Journal of Dentistry (IAJD). 2025;16(1):86-94.
16. Almendros-Marqués N, Berini-Aytés L, Gay-Escoda C. Influence of lower third molar position on the incidence of preoperative complications. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2006;102(6):725-32.
17. Russell B, Skvara M, Draper E, Proffit WR, Philips C, White RP, Jr. The association between orthodontic treatment with removal of premolars and the angulation of developing mandibular third molars over time. Angle Orthod. 2013;83(3):376-80.
18. Di Giovanni T, Vogiatzi T, Koretsi V, Walsh T, Silikas N, Papageorgiou SN. Effect of orthodontic extraction of mandibular premolars on third molar angulation after treatment with fixed appliances : A cross-sectional study. J Orofac Orthop. 2024;85(6):392-403.
19. Miclotte A, Grommen B, Cadenas de Llano-Pérula M, Verdonck A, Jacobs R, Willems G. The effect of first and second premolar extractions on third molars: A retrospective longitudinal study. J Dent. 2017;61:55-66.
20. Dhekra H, Ines D, Moncef O, Samir T, Adel BA, editors. Influence of Premolar Extraction or Non-Extraction Treatment on Third Molar Eruption: A Comparative Study 2021;6:69–75..
21. Gohilot A, Pradhan T, Keluskar KM. Effects of first premolar extraction on maxillary and mandibular third molar angulation after orthodontic therapy. J Oral Biol Craniofac Res. 2012 ;2(2):97-104.
22. Bjork A. Variations in the growth pattern of the human mandible: longitudinal radiographic study by the implant method. J Dent Res. 1963;42:400–411.
23. Richardson M. Pre-eruptive movements of the mandibular third molar. Angle Orthod. 1978;48(3):187-93.
24. Saysel MY, Meral GD, Kocadereli I, Taşar F. The effects of first premolar extractions on third molar angulations. Angle Orthod. 2005;75(5):719-22.