

RESEARCH

Open Access



Prophylactic third molar removal: are oral surgeons and orthodontists aligned in preventive approaches?

Ipek Necla Guldiken^{1*}, Serap Gulsever², Yagmur Malkoc², Zeynep Cukurova Yilmaz² and Mutlu Ozcan³

Abstract

Background There is a general consensus among dental professionals regarding the extraction of impacted third molars in the presence of clinical symptoms. However, there is less agreement on the management of asymptomatic third molars. The objective of this study is to compare the perspectives of oral surgeons and orthodontists regarding the indications for the extraction of asymptomatic third molars. It is possible that healthcare professionals from different specialties may approach the extraction of these teeth in different ways.

Methods In this cross-sectional study, a web-based questionnaire has been employed to collect data by inquiring about the reasons why participants prefer the extraction of asymptomatic third molars. Descriptive statistics were employed to evaluate the data obtained. The level of significance was set at $P < 0.05$.

Results Prophylactic extraction of partially impacted molars was more favored among the participants ($P < 0.05$). The orthodontists preferred prophylactic extraction due to the risk of late anterior dental crowding (LADC); however, the oral surgeons preferred pre-pregnancy extractions ($P < 0.05$). The extraction decision for partial impaction was higher in females when the risk of distal caries was considered. For fully impacted ones, it was higher in males when the risk of caries and pericoronitis were considered ($P < 0.05$).

Conclusions Orthodontists preferred extraction because of the risk of LADC and caries, while oral surgeons focused on preventing pericoronitis, pathology, focal infection, and symptoms during pregnancy. This divergence between the participants may inform the guidelines for prophylactic management of third molars. These findings may be pertinent in gender medicine.

Clinical relevance This study has been enlightening for departments to consult each other before the extraction of a patient's asymptomatic third molar.

Keywords Impacted teeth, Prophylactic extraction, Guidelines, Asymptomatic third molar

*Correspondence:

Ipek Necla Guldiken
ipek.guldiken@istinye.edu.tr

¹Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Istinye University, Vadi Campus, Ayazaga Mah. Azerbaijan Cad. (Vadistanbul 4A Blok), Sariyer, Istanbul 34396, Turkey

²Department of Oral and Maxillofacial Surgery, School of Dentistry, Istanbul Medipol University, Istanbul, Turkey

³Department of Operative Dentistry, School of Dentistry, University of Zurich, Zurich, Switzerland



© The Author(s) 2024. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

Introduction

Wisdom teeth are permanent third molars in the posterior jaw and usually erupt between 17 and 25 years of age. Third molars most frequently become impacted due to inadequate distance between the second molar tooth and the ascending ramus for the tooth to erupt and the abnormal developmental position of these teeth; an impacted wisdom tooth can sometimes partially emerge (defined as partially impacted), sometimes it cannot break through the bone and gums at all (defined as fully impacted) [1].

One of the significant contributing factors to impacted third molars is macrodontia, a condition characterized by teeth that are larger than normal. In this instance, the third molars are unable to erupt due to a lack of available space within the jaw [2, 3]. Another common cause is late maturation of the third molars. In such instances, other teeth assume the position previously occupied by the third molars, and there is insufficient space for them to erupt [4]. Furthermore, genetic factors are also a significant contributing factor. Genetic predisposition can influence the size of the teeth, the structure of the jaw, and the timing of tooth eruption [5]. In addition, structural anomalies of the jaw bones and excessive tooth crowding can also result in impacted third molars [6, 7].

One of the most contentious issues surrounding the extraction of third molars is the question of whether these teeth are linked to lateral alveolar bone defects (LADC). In the existing literature, there are studies that suggest a potential association between third molars and LADC. For instance, some studies have indicated that the extraction of third molars may increase the risk of LADC [8]. Nevertheless, this association has not been definitively established, and numerous studies indicate that this association is controversial. Some studies have argued that extraction of third molars does not increase the risk of LADC, and that this link is weak or insignificant [9–11]. Consequently, further research is required in this area. [12]

A consensus favors extracting impacted third molars in the presence of clinical symptoms, but no consensus exists on their management when asymptomatic [13]. In addition, healthcare professionals from different fields of expertise may approach the extraction of these teeth differently. The American Association of Orthodontists (AAO) and the American Association of Oral and Maxillofacial Surgeons (AAOMS) have disparate methodologies for the extraction of third molars. In certain instances, the AAO categorizes the removal of third molars as a form of “medically necessary orthodontic treatment.” The AAO recommends the extraction of third molars in cases of space constraints or horizontal tooth growth to prevent damage to other teeth and to prevent periodontal disease [14, 15]. The AAO guidelines stipulate that the condition of third molars should be

monitored on a regular basis throughout and following orthodontic treatment. The AAOMS recommends the extraction of impacted third molars, even when asymptomatic, to prevent long-term health complications. The AAOMS guidelines underscore that the extraction of third molars can result in significant complications in later life, necessitating more invasive medical interventions [16]. In particular, prophylactic extractions are of great importance in young patients, as they serve to minimise the potential for complications. Furthermore, it has been demonstrated that the extraction of third molars can prevent complications such as tooth root resorption [17]. Orthodontists who adhere to the recommendations of the AAO argue that third molar extractions should only be performed when there are significant symptoms or serious abnormalities. In contrast, oral surgeons who adhere to the recommendations of the AAOMS emphasise the necessity of prophylactic extractions to minimise potential risks and prevent long-term health problems. A number of studies in the literature document the advantages and potential risks of both approaches [18, 19]. Understanding the different approaches of the AAO and AAOMS to the extraction of third molars can assist clinical practitioners in determining the most appropriate treatment plan for their patients. The recommendations of both associations serve the purpose of protecting patient health. It is therefore essential to carefully evaluate these guidelines in order to make the most appropriate treatment decisions for individual patient situations. [20–22].

It is also important to note that the practices and outcomes for the extraction of third molars may also vary according to regional and cultural differences. A number of variables, including different dietary habits, genetic factors, and access to healthcare, can influence the outcomes of these procedures. For instance, certain studies conducted in Asia have indicated that strict dietary habits and genetic factors may result in a reduced frequency of third molar extractions [10, 11, 23].

In Western countries, the extraction of third molars is a more common practice. This is attributed to factors such as dietary differences and the importance attached to oral hygiene, as well as easier access to healthcare services [8, 9]. In studies conducted in Europe and North America, the extraction of third molars is more frequently recommended for the prevention of periodontal diseases and to maintain oral health [14, 18].

In contrast, in Africa and the Middle East, the practice of extracting third molars is conducted in a different manner. In these regions, access to healthcare services may be limited, which may influence decisions about third molar extraction. Moreover, studies conducted in these regions indicate that awareness of third molar

extraction is low, which may contribute to increased complications [10].

In light of these discrepancies, it is of paramount importance to conduct multicultural studies. A more comprehensive perspective on clinical practice can be gained by understanding how the practices and outcomes of third molar extraction vary in different geographical regions. Future studies of this kind may contribute to the development of more universal and evidence-based approaches to wisdom teeth extraction.

The principal objective of this study was to conduct a comprehensive comparison of the perspectives of oral surgeons and orthodontists regarding the prophylactic extraction of third molars. In particular, this study intended to gain insight into the varying indications for third molar extraction in the absence of symptoms, but with varying degrees of impaction. Furthermore, we examined how these perspectives differ based on the gender of the practitioners and their level of experience, differentiating between trainees and senior practitioners. By addressing these factors, this research aimed to contribute to a more nuanced understanding of clinical decision-making processes and enhance patient care strategies.

Materials and methods

Ethics approval

The Institutional Ethics Committee of Istanbul Medipol University approved this cross-sectional study (file number: E-10840098-604.01.01-5450). It has been conducted in accordance with the World Medical Association Declaration of Helsinki of 1975 as revised in 2000.

Design and sample

The design and methodology of this survey study were informed by the Checklist for Reporting Internet E-Survey Results (CHERRIES) recommendations. Adherence to the CHERRIES guidelines ensures comprehensive and transparent reporting of internet-based survey results, thereby enhancing the validity and reliability of the findings. The CHERRIES checklist encompasses a number of crucial criteria, including the development and pre-testing of the questionnaire, the recruitment process of respondents and identification of the sample, the administration of the questionnaire, and the statistical methods employed in data analysis. This web-based questionnaire was prepared according to the CHERRIES recommendations. Adherence to these recommendations is crucial for the standardization and comparability of online survey research. [24, 25]

The researchers shared the study questionnaires with 250 orthodontists, oral surgeons and trainees from Turkey in full consideration of the possible loss of participants. A short letter requesting voluntary

participation explained the survey's aim. It introduced the questionnaire, generated via the internet-based survey tool Google Forms, and sent to participants via email and *WhatsApp*. At the beginning of the electronic survey, the introductory section included informed consent for the participants whether they would attend the survey on a voluntary basis. The survey was initiated following the participants' consent on the online platform. The questionnaire required approximately five minutes to complete. Participants were selected to ensure a range of clinical experiences, which may influence their opinions on the topics surveyed. This diversity in clinical experience is considered a strength of the study, as it provides a comprehensive view of the different perspectives within the field.

The first part of the survey collected demographic data from the participants (sex, age, academic degree, and profession). The second part presented participants with two different asymptomatic case scenarios for third molars regarding the extent of impaction (partially or fully impacted) and indications for removal (Fig. 1). The five common indications were selected from the guidelines of AAOMS and NICE and regarding the authors' experience. Short descriptive sentences identified the reasons (indications) for the decision. All data was kept confidential by the research team.

Data analysis

An independent t-test was used to detect the sample size for the two independent groups. The sample size was calculated as 120 (60 for each group) based on a G-power analysis with an effect size of 0,60, α -an error probability of 0.05, and a power of 0.95. The NCSS program (Number Cruncher Statistical System) 2007 (Kaysville, Utah, USA) performed the statistical analysis. Descriptive statistical methods (mean, standard deviation, median, frequency, percentage, minimum, maximum) were used to evaluate the study data. The Shapiro-Wilk test and graphical examinations were used to test the conformity of the quantitative data to the normal distribution. Dependent groups t-test was used for intra-group comparisons of normally distributed qualitative variables. The Pearson chi-square, Fisher's exact, and Fisher-Freeman-Halton exact tests were used to compare qualitative data. Statistical significance was accepted as $P < 0.05$.

Results

Participants

The study was conducted with 127 participants, 51.2% ($n=65$) female and 48.8% ($n=62$) male, using the internet-based survey tool Google Forms. 49.6% of the participants were oral surgeons, while 50.4% were orthodontists. On the other hand, 49.6% and 50/4% were

Dear Colleague,

The survey research we are conducting is carried out by the Department of Oral, Dental, and Maxillofacial Surgery at Istanbul Medipol University. The aim of this study is to determine under what circumstances the prophylactic extraction of asymptomatic impacted third molar teeth in young adult patients (aged 18-35), which are periodontally healthy, caries-free, painless, and unrelated to a pathological lesion, is indicated by the Departments of Oral and Maxillofacial Surgery and Orthodontics. Additionally, it seeks to compare the consensus or differences between the departments.

Please **mark** your demographic information below if you agree to participate.

1st Part:	
GENDER	M / F
AGE	< 30 / 30-50 / > 50
SPECIALIZATION	Orthodontics / Oral and Maxillofacial Surgery
ACADEMIC TITLE	Research Assist. Dentist (trainee) / Spec. Dentist (professor)

In the survey form below, two different scenarios are provided in order. At the beginning of the tables related to the scenarios, it is indicated which eruption position of the third molar tooth (Partially impacted: one part of the crown is exposed and Fully impacted: no exposed tooth seen in the mouth) will be inquired about your opinions on prophylactic extraction. Please mark one or more possible reasons by encircling YES or NO that you consider an indication for prophylactic extraction.

Thank you for participating in the survey.

2nd Part:	
A) PROPHYLACTIC EXTRACTION OF THE <u>PARTIALLY IMPACTED</u> THIRD MOLAR TOOTH YES	
1-Risk of causing anterior crowding in the long term after orthodontic treatment (YES / NO)	
2-Risk of being a focal infection site (YES / NO)	
3-Risk of periodontal disease (pericoronitis) (YES / NO)	
4-Risk of becoming symptomatic during pregnancy (if planned) (YES / NO)	
5-Risk of causing decay in the neighbouring 2nd molar tooth (YES / NO)	
6-Presence of pathology (e.g. cyst) around the related tooth (YES / NO)	
B) PROPHYLACTIC EXTRACTION OF THE <u>FULLY IMPACTED</u> THIRD MOLAR TOOTH YES	
1-Risk of causing anterior crowding in the long term after orthodontic treatment (YES / NO)	
2-Risk of being a focal infection site (YES / NO)	
3-Risk of periodontal disease (pericoronitis) (YES / NO)	
4-Risk of becoming symptomatic during pregnancy (if planned) (YES / NO)	
5-Risk of causing decay in the neighbouring 2nd molar tooth (YES / NO)	
6-Presence of pathology (e.g. cyst) around the related tooth (YES / NO)	

Fig. 1 The survey

trainees and specialists, as determined by their academic degrees.

Analyzing the possible risk factors by extent of impaction, 84.3% and 74.0% of participants considered partially impacted third molars a risk factor for caries of an adjacent second molar tooth and development of symptoms during pregnancy. These were relatively higher than the other risk factors (Fig. 2).

Gender and age effect

In both genders, prophylactic extraction of partially impacted third molars was more supported than fully impacted third molars. In every age group, prophylactic extraction of partially impacted third molars was more supported than fully impacted ones ($P < 0.05$).

Women evaluated caries in the adjacent second molar tooth as a significant indication for prophylactic

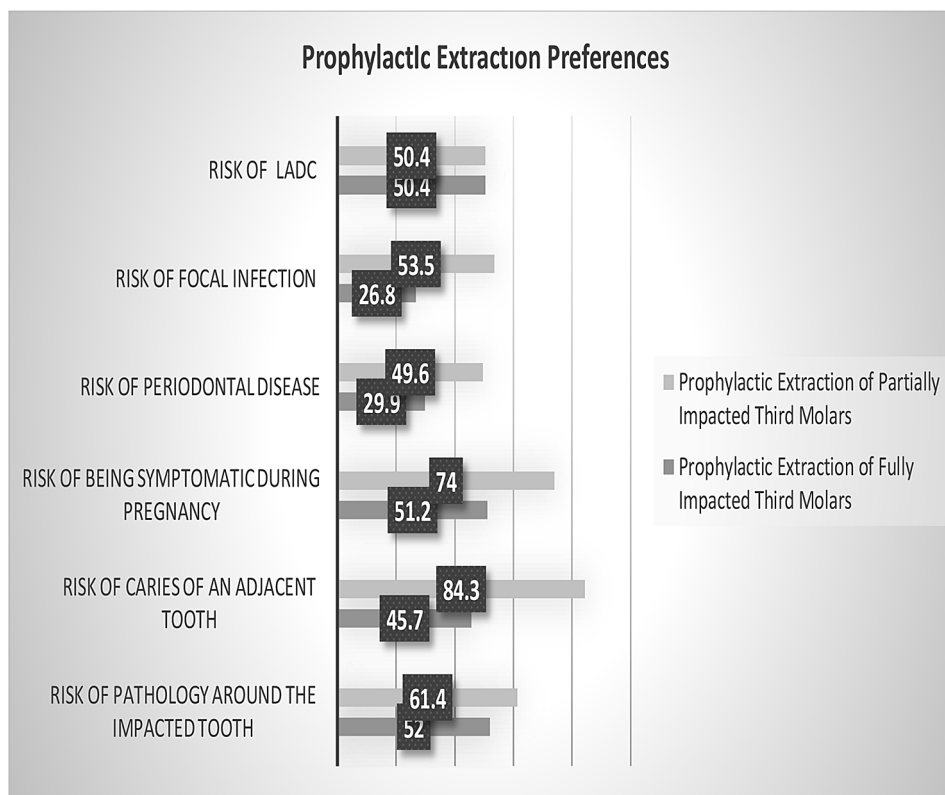


Fig. 2 Distribution (%) of prophylactic extraction preferences regarding the indications

extraction of a partially impacted tooth more frequently than men. For the prophylactic extraction of the partially impacted third molar tooth, the risk of LADC after orthodontic treatment, the risk of focal infection, the risk of periodontal disease (pericoronitis), the risk of developing symptoms during pregnancy, and the risk of pathology around the impacted tooth (cyst, etc.) did not show a statistically significant difference according to the participants' gender. The rate of evaluating the risk of periodontal disease (pericoronitis) and caries in the adjacent second molar tooth for the men participants as a prophylactic extraction indication of a fully impacted tooth was found to be statistically significantly higher than in the women ($P < 0.05$) (Table 1).

The rate of evaluation of the risk of caries in the adjacent second molars as a prophylactic indication for extraction of the partially impacted tooth in the 30–50 age group was higher than those under the age of 30 and over the age of 50 ($P < 0.05$). A significant difference was found according to age, considering the risk of pathology formation around the preserved impacted tooth as an indication for prophylactic extraction of a fully impacted tooth ($P < 0.05$). In addition, as a prophylactic extraction indication for a fully impacted, the risk of pathology formation around the tooth was ranked higher in those under 30 years of age than those 30–50 and over 50 years of age (Table 1).

Proficiency and academic title effect

The prophylactic removal decision differed significantly according to expertise and academic title; orthodontists and oral surgeons in both academic degrees decided to extract asymptomatic partially impacted third molars more frequently than fully impacted ones ($P < 0.05$).

Orthodontists and oral surgeons differed significantly in their attitudes toward prophylactic extraction of partially impacted third molars relative to the risk of periodontal disease (pericoronitis) and LADC after orthodontic treatment; developing symptoms during pregnancy, caries at the adjacent second molar tooth, and pathology around the impacted tooth (cyst, etc.) ($P < 0.05$). However, the two groups had no statistically significant difference regarding the focal infection risk. Orthodontists more than oral surgeons favor extracting the fully impacted third molar, considering LADC after orthodontic treatment to be significantly high risk ($P < 0.05$). Oral surgeons more than orthodontists favor extracting the fully impacted third molar, considering the risk of symptoms developing during pregnancy or focal infection to be statistically significantly high ($P < 0.05$). Participants showed no statistically significant difference by specialization in favoring extracting the fully impacted third molar, considering the risk of periodontal disease (pericoronitis), caries in the adjacent second molar, and pathology around the third molar (Table 2).

Table 1 Effects of gender and age on prophylactic extraction of partially and fully impacted third molars

Gender	Female n (%)	Male n (%)	P-value	
Partially Impacted Third Molars				
Risk of LADC after orthodontic treatment	31 (47.7)	32 (51.6)	^a 0.659	
Risk of focal infection	47 (72.3)	46 (74.2)	^a 0.810	
Risk of periodontal disease (pericoronitis)	46 (70.8)	43 (69.4)	^a 0.862	
Risk of being symptomatic during pregnancy	31 (47.7)	31 (50.0)	^a 0.795	
Risk of caries at the adjacent second molar tooth	43 (66.2)	26 (41.9)	^a0.006**	
Risk of pathology around the impacted tooth	30 (46.2)	31 (50.0)	^a 0.665	
Fully Impacted Third Molars				
Risk of LADC after orthodontic treatment	31 (47.7)	32 (51.6)	^a 0.659	
Risk of focal infection	26 (40.0)	33 (53.2)	^a 0.135	
Risk of periodontal disease (pericoronitis)	27 (41.5)	37 (59.7)	^a0.041*	
Risk of being symptomatic during pregnancy	15 (23.1)	18 (29.0)	^a 0.444	
Risk of caries at the adjacent second molar tooth	6 (9.2)	14 (22.6)	^a0.039*	
Risk of pathology around the impacted tooth	24 (36.9)	25 (40.3)	^a 0.694	
Age	< 30 years >50 30–50		P-value	
	n (%)	n (%)	n (%)	
Partially Impacted Third Molars				
Risk of LADC after orthodontic treatment	27 (42.9)	26 (55.3)	10 (58.8)	^b 0.310
Risk of focal infection	41 (65.1)	39 (83.0)	13 (76.5)	^b 0.105
Risk of periodontal disease (pericoronitis)	44 (69.8)	34 (72.3)	11 (64.7)	^b 0.839
Risk of being symptomatic during pregnancy	30 (47.6)	21 (44.7)	11 (64.7)	^b 0.354
Risk of caries at the adjacent second molar tooth	31 (49.2)	33 (70.2)	5 (29.4)	^b0.008**
Risk of pathology around the impacted tooth (cyst etc.)	27 (42.9)	25 (53.2)	9 (52.9)	^b 0.511
Fully Impacted Third Molars				
Risk of LADC after orthodontic treatment	29 (46.0)	27 (57.4)	7 (41.2)	^b 0.375
Risk of focal infection	27 (42.9)	23 (48.9)	9 (52.9)	^b 0.694
Risk of periodontal disease (pericoronitis)	33 (52.4)	24 (51.1)	7 (41.2)	^b 0.710
Risk of being symptomatic during pregnancy	18 (28.6)	10 (21.3)	5 (29.4)	^b 0.649
Risk of caries at the adjacent second molar tooth	10 (15.9)	7 (14.9)	3 (17.6)	^b 0.964
Risk of pathology around the impacted tooth (cyst etc.)	33 (52.4)	12 (25.5)	4 (23.5)	^b0.007**

Pearson ^a Chi-Square Test, ^bFisher Freeman Halton Test

* $P < 0.05$ ** $P < 0.05$

Table 2 Effects of profession degree on prophylactic extraction of partially and fully impacted third molars

	Orthodontist n (%)	Surgeon n (%)	P-value
Partially Impacted Third Molars			
Risk of LADC after orthodontic treatment	42 (66.7)	21 (32.8)	^a0.001**
Risk of focal infection	45 (71.4)	48 (75.0)	^a 0.649
Risk of periodontal disease (pericoronitis)	39 (61.9)	50 (78.1)	^a0.046*
Risk of being symptomatic during pregnancy	17 (27.0)	45 (70.3)	^a0.001**
Risk of caries at the adjacent second molar tooth	46 (73.0)	23 (35.9)	^a0.001**
Risk of pathology around the impacted tooth (cyst etc.)	20 (31.7)	41 (64.1)	^a0.001**
Fully Impacted Third Molars			
Risk of LADC after orthodontic treatment	43 (68.3)	20 (31.3)	^a0.001**
Risk of focal infection	17 (27.0)	42 (65.6)	^a0.001**
Risk of periodontal disease (pericoronitis)	32 (50.8)	32 (50.0)	^a 0.929
Risk of being symptomatic during pregnancy	11 (17.5)	22 (34.4)	^a0.030*
Risk of caries at the adjacent second molar tooth	7 (11.1)	13 (20.3)	^a 0.155
Risk of pathology around the impacted tooth (cyst etc.)	21 (33.3)	28 (43.8)	^a 0.228

Pearson Chi-Square Test

. * $P < 0.05$ ** $P < 0.05$

The rate of preference by professors considering the risk that partially impacted third molars may cause LADC after orthodontic treatment was significantly higher than those of trainees; a total of 25 trainees (38.7%) considered the risk of LADC, while 38 (59.4%) of the professors stated that they considered this risk ($P < 0.05$). According to their academic titles, the risk of the focal infection, periodontal disease (pericoronitis), being symptomatic during pregnancy, caries in the adjacent second molar tooth, and the formation of pathology around the related tooth did not show a statistically significant difference (Table 2).

Considering the risk of pathology around the fully impacted third molars, the trainees' preference rate was significantly higher than the professors' for fully impacted third molars ($P < 0.05$). The risk of LADC after orthodontic treatment, focal infection, periodontal disease (pericoronitis), development of symptoms during pregnancy and caries in the adjacent second molar did not show a significant difference by academic title (Table 2).

When the subgroups of academic titles according to professions have been evaluated for partially impacted third molars, different results have been obtained. Regarding the risk of LADC, the attitude of professor orthodontists was significantly different from that of trainee orthodontists ($P < 0.05$). On the other hand, the attitudes of trainees and professors towards the risk of being symptomatic during pregnancy differed according to their professions ($P < 0.05$). Regarding risk of caries at the adjacent second molar tooth, professors' attitudes differed according to their professions, while trainees' attitudes differed according to their professions regarding risk of pathology around the impacted tooth ($P < 0.05$) (Table 3).

In the evaluation for fully impacted third molars, it is seen that the attitudes of professor orthodontists are significantly different from those of trainee orthodontists regarding the risk of LADC ($P < 0.05$). In addition, it was found that there were significant differences in the considerations of the trainees regarding risk of focal infection, risk of being symptomatic during pregnancy, risk of caries at the adjacent second molar tooth and risk of pathology around the impacted tooth ($P < 0.05$) (Table 3).

Discussion

The extraction of an impacted third molar is a standard procedure in the field of dentistry. An impacted third molar that does not elicit any symptoms is classified as "asymptomatic." The extraction of these teeth is generally recommended to prevent potential complications, including infection, caries, periodontal disease, and pathologies such as cysts or tumors [26].

This study represents the first attempt to determine the rationale behind prophylactic extraction of partially and

completely impacted asymptomatic third molars and to assess the perspectives of oral surgeons and orthodontists, taking into account their academic backgrounds. Moreover, this study will contribute to the evaluation of dentists' opinions regarding the prophylactic removal of asymptomatic impacted third molars, given the risk of developing symptoms during pregnancy.

In general, specialists consider the prophylactic removal of third molars according to their expertise. The majority of participants expressed a preference for the prophylactic removal of partially impacted third molars, citing the potential for the development of symptoms during pregnancy and the formation of distal caries in the second molars as the rationale for this approach. In contrast to orthodontists, oral surgeons were more likely to cite pregnancy-related risks as a rationale for extracting partially and fully impacted third molars. In the presented study, nearly half of the participants from both areas of expertise indicated that impacted third molars should be removed as a precautionary measure. However, orthodontists were more inclined to believe that prophylactic removal of impacted third molars was necessary to prevent LADC.

The findings of this study indicate that the majority of participants, regardless of gender, academic title, or expertise, supported the indications for the retention of partially impacted molars over those for fully impacted ones. However, there was a divergence of opinion among the participants with regard to the retention of third molars. While professors indicated that retaining these teeth increased the risk for LADC, trainees believed that keeping fully impacted teeth increased the risk of pathology. Although some authors reported that less experienced oral surgeons recommend extraction for asymptomatic impacted third molars more often than their more experienced counterparts, Almendros Marques et al. asserted that the practitioner's experience does not influence treatment decisions [27, 28].

The therapeutic decisions of oral surgeons and orthodontists regarding asymptomatic third molars have been evaluated. Gavazzi et al. stated that orthodontists and oral surgeons concur that third molars do not generate a force responsible for anterior crowding in the upper and lower jaws and do not consider prophylactic third molar extraction to be a valuable method for preventing LADC [12]. However, a discrepancy regarding that theory exists in the scientific literature. Laskin reported that both orthodontists and oral surgeons believed that eruption force generates a thrust that causes LADC, recommending the removal of third molars prophylactically [29]. Another study points out that orthodontists are less likely than oral surgeons to recommend prophylactic removal of these teeth; oral surgeons, more than orthodontists, think that asymptomatic third molars cause

Table 3 Effects of academic degree on prophylactic extraction of partially and fully impacted third molars

	Groups P-value			
	Trainee n (%)	Subgroup P-value	Specialist n (%)	Subgroup P-value
Partially Impacted Third Molars				
Risk of LADC after orthodontic treatment	25 (39.7)		38 (59.4)	^a 0.026*
Orthodontist	12	^a 0.896	30	^a 0.001**
OMFS	13		8	
Risk of focal infection	46 (73.0)		47 (73.4)	^a 0.857
Orthodontist	18	^a 0.792	27	^a 0.213
OMFS	20		20	
Risk of periodontal disease	45 (71.4)		44 (68.8)	^a 0.742
Orthodontist	17	^a 0.099	22	^a 0.952
OMFS	28		22	
Risk of being symptomatic during pregnancy	35 (55.6)		27 (42.2)	^a 0.132
Orthodontist	8	^a 0.001**	9	^a 0.002**
OMFS	27		18	
Risk of caries at the adjacent second molar tooth	31 (49.2)		38 (59.4)	^a 0.250
Orthodontist	17	^a 0.733	29	^a 0.001**
OMFS	14		9	
Risk of pathology around the impacted tooth	31 (49.2)		30 (46.9)	^a 0.793
Orthodontist	8	^a 0.002**	12	^a 0.051
OMFS	23		18	
Fully Impacted Third Molars				
Risk of LADC after orthodontic treatment	30 (47.6)		33 (51.6)	^a 0.657
Orthodontist	18	^a 0.067	25	^a 0.048**
OMFS	12		18	
Risk of focal infection	34 (54.0)		25 (39.1)	^a 0.092
Orthodontist	6	^a 0.001**	11	^a 0.211
OMFS	28		14	
Risk of periodontal disease	30 (47.6)		34 (53.1)	^a 0.535
Orthodontist	12	^a 0.066	20	^a 0.148
OMFS	18		14	
Risk of being symptomatic during pregnancy	17 (27.0)		16 (25.0)	^a 0.799
Orthodontist	4	^a 0.042**	7	^a 0.813
OMFS	13		9	
Risk of caries at the adjacent second molar tooth	11 (17.5)		9 (14.1)	^a 0.599
Orthodontist	3	^a 0.006**	4	^a 0.982
OMFS	8		5	
Risk of pathology around the impacted tooth	33 (52.4)		16 (25.0)	^a 0.002**
Orthodontist	12	^a 0.012**	9	^a 0.814
OMFS	21		7	

Pearson Chi-Square Test

*P<0.05 **P<0.005

LADC [30]. Some researchers argue that impacted third molars with insufficient mesiodistal distance for eruption in the dental arch can cause crowding in the anterior teeth by applying force to other teeth; some advocate that these teeth do not have enough power to move other teeth and cannot cause crowding [31–33]. There is an ongoing discussion as to whether prophylactic extraction of these teeth is necessary before or during orthodontic treatment to prevent orthodontic recurrence [12, 30].

The practitioner’s field of experience has been shown to influence the treatment method decision for

asymptomatic impacted third molars. Gavazzi et al. state that orthodontists and oral surgeons agree that third molars cannot generate a force responsible for anterior crowding [12]. Laskin reported that orthodontists and oral surgeons recommend prophylactic removal of third molars to prevent LADC [29]. Conversely, Lindauer said orthodontists less often than oral surgeons recommend prophylactic removal of these teeth [30]. Our study found that orthodontists, more often than oral surgeons, advocated the removal of both partially and fully impacted asymptomatic third molars to prevent LADC.

In this study, a greater proportion of oral surgeons and orthodontists preferred the removal of partially impacted third molars in order to prevent distal cervical caries than any other group of dental professionals. Some authors have argued that periodontal pathogens present in the vicinity of impacted teeth can act as a reservoir for the development of periodontal disease, and that these teeth should therefore be extracted in order to eliminate periodontal pathogens around second molars. Others have reported that gingival infections around partially impacted teeth can be prevented with good oral hygiene, and have suggested that impacted teeth should be retained as long as they are asymptomatic [34–37]. Many authors have reported a relatively high rate of cystic changes around impacted wisdom teeth [38, 39]. Almendros-Marques et al. pointed out that asymptomatic third molars may lead to the development of some form of pathology [40]. Other authors reported that the incidence of cysts and tumors associated with impacted third molars is low, and removal of these teeth is contraindicated [41, 42]. In our study, oral surgeons considered removing partially erupted asymptomatic third molars as an appropriate intervention to prevent future pathological changes.

Pre-pregnancy extraction is discussed in reference to the risks surgery poses for mother and fetus [43]. Compared to orthodontists, oral surgeons preferred the extraction of partially or fully erupted third molars before pregnancy. This difference may be due to the typical presentation of pregnant patients to surgical departments for symptoms related to impacted third molars; hormonal changes and immune system deficiency related to pregnancy increase the tendency for inflammation in the oral cavity, though there is no evidence of a significant increase in the risk of complications associated with an impacted third molar during pregnancy. Therefore, prophylactic removal of impacted molars during pregnancy is an issue that should be carefully examined on a case-by-case basis, considering the individual's medical history and weighing the potential risks or benefits of the procedure. It has been recommended that any dental treatment should be delayed until the second trimester to avoid potential threats to the developing fetus [43].

The main limitation of this study was that it included only orthodontics and oral and maxillofacial surgery rather than other specialities. The study focused solely on the viewpoints of dentists within a single country. International studies with a larger participant pool can remedy this limitation in the future.

A comprehensive and meticulous evaluation by dental professionals is critical to determine an appropriate treatment plan. Further research must be conducted to gain a deeper understanding and make an informed judgment regarding the proper treatment approach.

Conclusions

From this study, the following could be concluded:

1. A notable divergence was observed between the perspectives of orthodontists and oral surgeons with regard to the indications for prophylactic third molar extraction. Orthodontists favored prophylactic extraction of asymptomatic impacted third molars to prevent LADC and caries, whereas oral surgeons favored extraction to prevent pericoronitis, pathology, focal infection, or symptom development during pregnancy.
2. When genders are compared, the extraction preference of partially impacted third molars was significantly higher in females compared to males, regarding the risk of caries on second molars. This may hold relevance in the field of gender medicine.
3. The degree of clinical experience also influenced the opinions expressed. Trainee dentists were more likely to favor prophylactic extraction to prevent long-term complications, while experienced specialists tended to base their decisions on immediate clinical symptoms and risks.

Abbreviations

LADC	Late Anterior Dental Crowding
AAOMS	American Association of Oral and Maxillofacial Surgeons
NHS	National Health Service (UK)
NICE	National Institute of Clinical Excellence
NCSS	Number Cruncher Statistical System
CHERRIES	Checklist for Reporting Internet E-Survey Results

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12903-024-04819-0>.

Supplementary Material 1

Acknowledgements

not applicable.

The study was presented as an oral presentation at the 11th International OMFS Congress of ACBID in 2018.

Author contributions

I.G. designed the study, wrote the main manuscript, and edited it multiple times. S.G. designed the study, helped with statistical analyses, and contributed to the writing. Y.M. organized data collection and made statistical analyses. Z.C.Y. designed the study, checked and edited the references, and contributed to the writing. M.O. led the design of the study, edited the main text and made contribution to the writing. All authors reviewed the manuscript.

Funding

Not applicable.

Data availability

If there is any request regarding the data, the corresponding author (Ipek Necla Guldiken) will be the provider, whose the contact address is given below: ipek.guldiken@istinye.edu.tr.

Declarations

Ethical approval

The Institutional Ethics Committee of Istanbul Medipol University approved this cross-sectional study (file number: E-10840098-604.01.01-5450).

Consent to participate

Informed consent was obtained online at the start of the survey, with agreement indicated by continuing with the survey.

Consent for publication

not applicable.

Competing interests

The authors declare no competing interests.

Received: 22 January 2024 / Accepted: 27 August 2024

Published online: 11 September 2024

References

- Forsberg CM, Huddinge O. Tooth size, spacing, and crowding in relation to eruption or impaction of third molars. *Am J Orthod Dentofac Orthop*. 1988;94:57–62.
- Ahire B, Bhoosreddy A, Bhoosreddy S, Shinde M, Pandharbale A, Kunte V. Radiographic assessment of agenesis, impaction, and paradicular radiolucencies in relation with third molar in Nashik City of Maharashtra. *J Dent Allied Sci*. 2016;5(1):3.
- Saisha J, Kapeshi C, Siame A, Sikhanyiso M, Kafumukache E, Gupta K, et al. Clinical presentation of impacted third molar tooth and its effect on the adjacent tooth, in Lusaka, Zambia. *Anat J Afr*. 2023;12(1):2296–302.
- Sivaramakrishnan SM, Ramani P. Study on the prevalence of eruption status of third molars in South Indian population. *Biology Med*. 2015;7(4).
- Adeyemo WL, James O, Oladega AA, Adamson OO, Adekunle AA, Olorunsola KD, et al. Correlation between height and impacted third molars and Genetics Role in Third Molar Impaction. *J Maxillofac Oral Surg*. 2021;20(1):149–53.
- Gkantidis N, Tacchi M, Oeschger ES, Halazonetis D, Kanavakis G. Third molar agenesis is associated with facial size. *Biology (Basel)*. 2021;10(7).
- Tassoker M, Kok H, Sener S. Is there a possible association between skeletal face types and third molar impaction? A retrospective Radiographic Study. *Med Principles Pract*. 2019;28(1):70–4.
- Shekhar V, Khanna S, Gandhi C, Bhushan R, Shaik I, Sharma S. Does caries in the adjacent tooth justify prophylactic odontectomy of impacted tooth? *J Dent Res Rev*. 2020;7(4):197.
- Ghaeminia H, Perry J, Nienhuijs MEL, Toedtling V, Tummers M, Hoppenreijts TJM, et al. Surgical removal versus retention for the management of asymptomatic disease-free impacted wisdom teeth. *Cochrane Database Syst Reviews*. 2016;2016:8.
- Fawzi Omar BDSL. Prevalence of impacted Wisdom Teeth among Hawler Young people. *Mustansiria Dent J*. 2008;5(1):97–103.
- Soesilawati P, Yuliati A, Fandani F, Prabowo NZS, Tamariska T, Salma RF, et al. Diet as a partial explanation for Wisdom Teeth Problem. *e-GiGi*. 2022;10(1):129.
- Gavazzi M, De Angelis D, Blasi S, Pesce P, Lanteri V. Third molars and dental crowding: different opinions of orthodontists and oral surgeons among Italian practitioners. *Prog Orthod*. 2014;15(1).
- Renton T, Wilson NHF. Problems with erupting wisdom teeth: signs, symptoms, and management. *British Journal of General Practice [Internet]*. 2016 Aug 1 [cited 2023 Nov 6];66(649):e606–8. <https://bjgp.org/content/66/649/e606>
- Consolaro A. Third molars and premolars extraction in conventional orthodontics and in treatments based on maxillary bone remodeling with temporary anchorage: indications and care. *Dent Press J Orthod*. 2017;22(1):23–31.
- Susami T, Fukawa T, Miyazaki H, Sakamoto T, Morishita T, Sato Y, et al. A survey of orthodontic treatment in team care for patients with syndromic craniosynostosis in Japan. *Cleft Palate Craniofac J*. 2018;55(4):479–86.
- Rafetto LK. Managing impacted third molars. *Oral and Maxillofacial Surgery Clinics of North America*. Volume 27. W.B. Saunders; 2015. pp. 363–71.
- Mayrink G, Ballista PR, Kinderly L, Araujo S, Marano R. External Root Resorption associated with impacted third molars: a Case Report. *J Oral Health Craniofac Sci*. 2017;2:43–8.
- Angeles Fuster Torres M, Gargallo Albiol J, Berini Aytés L, Gay Escoda C, Gay-Escoda C. Evaluation of the indication for surgical extraction of third molars according to the oral surgeon and the primary care dentist. Experience in the master of oral surgery and implantology at Barcelona University Dental School. *Med Oral Patol Oral Cir Bucal*. 2008;13(8):499–504.
- Antanas Š, Giedrė T. Effect of the lower third molars on the lower dental arch crowding. *Stomatologija, Baltic Dental and Maxillofacial Journal*. 2006;8(3):80–4.
- Dodson TB, Gonzalez ML. American Association of Oral and maxillofacial surgeons' anesthesia and third molar extraction Benchmark Study: Rationale, methods, and initial findings. *J Oral Maxillofac Surg*. 2016;74(5):903–10.
- Richards D. Management of unerupted and impacted third molar teeth. A National Clinical Guideline. *Evid Based Dent*. 2000;2(2):44–5.
- Adam N, Update JSO. 2018 undefined. NICE Guidance on the Extraction of Wisdom Teeth—Time for a Rethink? *magonlinelibrary.com* N Adam, J Sandler Orthodontic Update, 2018-magonlinelibrary.com [Internet]. 2018 [cited 2023 Nov 6]; <https://www.magonlinelibrary.com/doi/abs/https://doi.org/10.12968/ortu.2018.11.1.33>
- Kuang S, Liu Y, Zhuang W, Li K, Yang W, Tian Y. The effect of root orientation on inferior alveolar nerve injury after extraction of impacted mandibular third molars based on propensity score-matched analysis: a retrospective cohort study. *BMC Oral Health*. 2023;23(1).
- Daikeler J, Bosnjak M, Manfreda KL. Web versus other survey modes: an updated and extended meta-analysis comparing response rates. *J Surv Stat Methodol*. 2020;8(3):513–39.
- Eysenbach G. Improving the Quality of Web Surveys: The Checklist for Reporting Results of Internet E-Surveys (CHERRIES). *J Med Internet Res [Internet]*. 2004;6(3):34. <http://www.jmir.org/2012/1/e8>
- Song F, O'meara S, Wilson P, SGHT. 2000 undefined. The effectiveness and cost-effectiveness of prophylactic removal of wisdom teeth. *europemc.org* Song, S O'meara, P Wilson, S Golder, J Kleijnen Health Technology Assessment (Winchester, England), 2000-europemc.org [Internet]. [cited 2023 Nov 6]; <https://europemc.org/article/med/10932022>
- Almendros-Marqués N, Berini-Aytés L, Gay-Escoda C. Influence of lower third molar position on the incidence of preoperative complications. *Oral surgery, oral medicine, oral Pathology. Oral Radiol Endodontology*. 2006;102(6):725–32.
- Ventä I. How often do asymptomatic, disease-free third molars need to be removed? *Journal of Oral and Maxillofacial Surgery*. 2012;70(9 SUPPL. 1).
- Laskin DM. Evaluation of the third molar problem. *J Am Dent Assoc*. 1971;82(4):824–8.
- 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 Dentofac Orthop*. 2007;132(1):43–8.
- Richardson M, Dentofacial DOAJ, of O. and, 1989 undefined. The role of the third molar in the cause of late lower arch crowding: a review. *Elsevier [Internet]*. [cited 2023 Nov 6]; <https://www.sciencedirect.com/science/article/pii/S088954068990139X>
- Niedzielska I. Third molar influence on dental arch crowding. *Eur J Orthod [Internet]*. 2005 Oct 1 [cited 2023 Nov 6];27(5):518–23. <https://doi.org/10.1093/ejo/cji045>
- Ades AG, Joondeph DR, Little RM, Chapko MK. A long-term study of the relationship of third molars to changes in the mandibular dental arch. *Am J Orthod Dentofac Orthop*. 1990;97(4):323–35.
- Friedman JW. The prophylactic extraction of third molars: a public health hazard. *Am J Public Health*. 2007;97(9):1554–9.
- Kim SJ, Hwang CJ, Park JH, Kim HJ, Yu HS. Surgical removal of asymptomatic impacted third molars: considerations for orthodontists and oral surgeons. *Semin Orthod*. 2016;22(1):75–83.
- Falci SGM, De Castro CR, Santos RC, De Souza Lima LD, Ramos-Jorge ML, Botelho AM, et al. Association between the presence of a partially erupted mandibular third molar and the existence of caries in the distal of the second molars. *Int J Oral Maxillofac Surg*. 2012;41(10):1270–4.
- White RP, Madianos PN, Offenbacher S, Phillips C, Blakey GH, Haug RH, et al. Microbial complexes detected in the second/third molar region in patients with asymptomatic third molars. *J Oral Maxillofac Surg*. 2002;60(11):1234–40.
- Adelsperger J, Campbell JH, Coates DB, Summerlin DJ, Tomich CE. Early soft tissue pathosis associated with impacted third molars without pericoronary radiolucency. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2000;89(4):402–6.

39. Baykul T, Saglam AA, Aydin U, Başak K. Incidence of cystic changes in radiographically normal impacted lower third molar follicles. *Oral Surg Oral Med Oral Pathol Oral Radiol Endodontology*. 2005;99(5):542–5.
40. 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 Endodontology*. 2006;102(6):725–32.
41. Stathopoulos P, Mezitis M, ... CKJ of oral and, 2011 undefined. Cysts and tumors associated with impacted third molars: is prophylactic removal justified? Elsevier [Internet]. 2011 Feb [cited 2023 Nov 7];69(2):405–8. Available from: <https://www.sciencedirect.com/science/article/pii/S0278239110005690>.
42. Adeyemo WL. Do pathologies associated with impacted lower third molars justify prophylactic removal? A critical review of the literature. *Oral surgery, oral medicine, oral Pathology, Oral Radiol Endodontology*. 2006;102(4):448–52.
43. Al Agjili DE, Khalaf ZI. The role of oral and prenatal healthcare providers in the promotion of oral health for pregnant women. *BMC Pregnancy Childbirth*. 2023;23(1).

Publisher's note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.