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Prevalence of Unerupted Maxillary Canines in Orthodontic Patients

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ABSTRACT

Background: The main goal of this study is to analyze the prevalence of unerupted canines in the maxilla among orthodontic patients over a five-year period. Additional objectives include determining prevalence by gender, presence of unilateral or bilateral retention, and, in cases of unilateral retention, the frequency in the left versus right quadrant.

Methods: By reviewing the database of orthopantomogram radiographs taken at Policlinic Musa over five years (2018–2023), 523 orthopantomograms of orthodontic patients with unerupted maxillary canines were selected. The chosen patients were divided based on gender, presence of unilateral or bilateral retention, and the localization of unilateral retention in the right or left quadrant.

Main findings: The study found that the prevalence of unerupted maxillary canines in orthodontic patients was 4.59%. The sample consisted of a higher proportion of females (75%) compared to males (25%). Of all cases of retention, 75% were unilateral and 25% bilateral. Among unilateral cases, 55.56% were in the left quadrant and 44.44% in the right, but this difference was not statistically significant. No significant difference was observed in the type of retention between genders; however, unilateral retention was always on the right side in males (100%) and more frequently on the left in females (83.3%), with these differences being statistically significant.

Principal conclusion: The study confirmed the hypothesis that the prevalence of canine retention in the maxilla is less than 5% and occurs more often unilaterally.

Key words: retention, impaction, canine, orthodontics, prevalence

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INTRODUCTION

Teeth whose eruption is impeded—those fully formed within the bone but not erupted into the dental arch or outside it—are classified as impacted or retained (1). Impacted teeth do not erupt due to mechanical obstacles, most commonly due to adjacent teeth, the ascending ramus of the mandible, or lack of space because of size discrepancy between the tooth and the dental arch. Retained teeth do not erupt due to non-mechanical reasons (1). Local causes include abnormal direction of the tooth germ's long axis, deep position of the germ, lack of eruption impulse, improper positioning within the bone, and pathological processes damaging the germ. Systemic causes include endocrine dysfunctions, nutritional disorders, hereditary factors, and genetic abnormalities (cleft palate, achondroplasia, prognathism, etc.) (2). According to previous research, tooth impaction is the second most common dental anomaly after tooth agenesis (3).

Canines have a distinctive morphology and function in the oral cavity, occupying a specific position between the anterior and posterior segments of the dental arch, playing an important role in facial aesthetics (4). Additionally, due to favorable crown-to-root ratio, large buccolingual width, and dense surrounding bone, they are significant in planning ideal occlusion for fixed prosthetic work (5). According to Butler-Dahlberg's developmental field theory, canines are genetically stable teeth, not prone to caries or hypodontia (6). However, they exhibit a tendency toward impaction or retention. Maxillary canines are the second most frequently impacted teeth after third molars (wisdom teeth), while mandibular canine retention occurs in fewer cases (7). The prevalence of impacted maxillary canines varies depending on population and research methods (8). Some studies suggest that impaction is more common in patients with developmental anomalies of the lateral incisor, which promotes palatal positioning of the canine, leading to impaction (9). Different studies report varying prevalence rates across populations, often attributed to ethnic differences (10).

Impactions and retentions can occur unilaterally or bilaterally within the alveolar ridge. Previous research results on the prevalence of unerupted maxillary canines in orthodontic patients vary by gender; some suggest higher incidence in females (10), while others find no gender difference (11). Due to higher motivation for improved dental aesthetics among women, they more frequently seek orthodontic treatment, which influences the diagnosis of impacted canines (11).

This study aims to determine the five-year prevalence of unerupted maxillary canines in orthodontic patients, including gender differences, unilateral vs. bilateral cases, and left–right distribution in unilateral impactions.

PARTICIPANTS AND METHODS

Participants

A sample of 523 orthodontic patients with orthopantomogram (OPG) radiographs was selected from the archive of Poliklinika Musa, with written consent, over a five-year period (2018–2023). All radiographs were taken using Orthophos SL (Dentsply Sirona) and analyzed using Sydexis software (Dentsply Sirona). The data were entered into Excel tables and statistically processed..

Methods

The prevalence of unerupted maxillary canines was analyzed in relation to the total number of orthodontic patients with adequate OPGs, which was 523. Additionally, data on gender distribution, retention type, and localization of unilateral retentions were determined..

Statistical analysis

Statistical analysis was performed using SPSS for Windows (17.0, SPSS Inc., Chicago, Illinois, USA). The Chi-square ($\chi 2$) test was used to evaluate the data, with a significance level of 0.05.

RESULTS

The prevalence of unerupted maxillary canines in orthodontic patients over five years (2018–2023) was 4.59% (Figure 1).

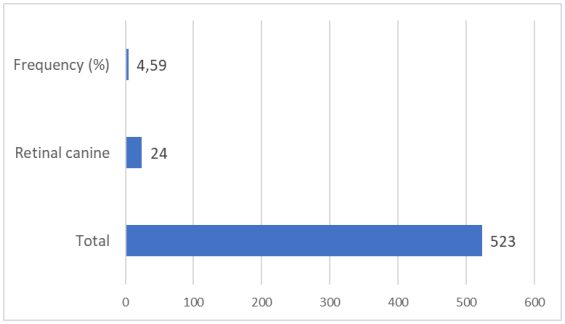

Figure 1. Prevalence of unerupted maxillary canines in orthodontic patients

No statistically significant differences were found in retention type between genders (Figure 2).

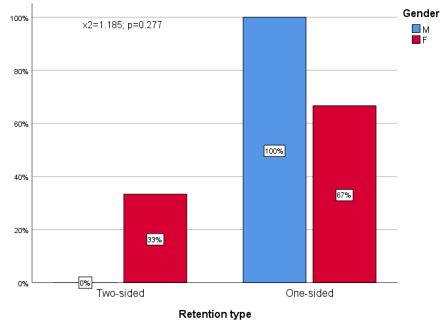

Figure 2. Types of retention based on gender

Localization of unilateral retention was more common on the right side in men and on the left side in women; these differences were statistically significant (Figure 3).

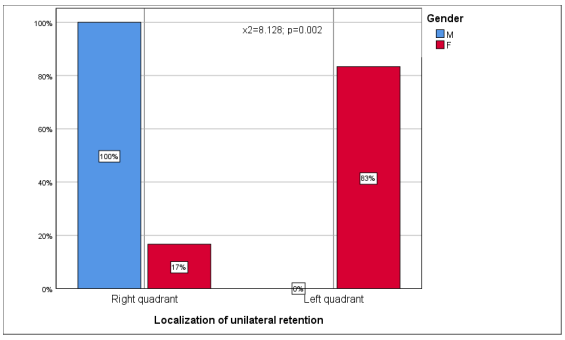

Figure 3. Localization of unilateral retention according to gender

The sample included more females, with a statistically significant difference. Unilateral retentions were more common, with a statistically significant difference. Unilateral retentions were more frequently located in the left quadrant, but this difference was not statistically significant (Table 1).

Table 1. Participants by gender, retention type, and the side of unilateral retention

	n	%	χ^2	p
Gender			6.001	0.014
M	6	25.0		
F	18	75.0		
Retention type			6.001	0.014
Two-sided	6	25.0		
One-sided	18	75.0		
Localization of unilateral retention			0.222	0.637
Right quadrant	8	33.3		
Left quadrant	10	41.7		

DISCUSSION

This study showed that impacted maxillary canines occurred at a relatively low prevalence within the studied orthodontic population. Impactions appeared more frequently unilaterally and were more common in female patients. A tendency toward left-sided impactions was observed overall, together with gender-related differences in side localization.

The findings are consistent with earlier research indicating that impaction is among the most common dental anomalies after agenesis (3). Previous studies have shown that maxillary impactions are significantly more frequent than mandibular ones (7), a pattern also supported by this study.

The predominance of unilateral impaction corresponds with reports noting that unilateral cases occur far more often than bilateral (10, 13).

Regarding gender, the present results support studies reporting a higher prevalence of impaction in females (10), although some authors have found no significant gender differences (11).

The overall prevalence aligns with ranges reported in different populations, where maxillary canine

impaction varies depending on ethnicity and diagnostic methods (8,10,12).The observed tendency for left-sided impactions, particularly in women, also reflects findings occasionally mentioned in the literature, although results across studies remain inconsistent.

Gender-related differences in the side of unilateral impaction were evident. While previous literature rarely emphasizes this detail, such findings may indicate subtle anatomical or developmental differences between sexes. The clinical relevance of this observation remains uncertain.

This study was conducted in a single center and included only orthodontic patients, which may limit generalizability. Its retrospective design and reliance on orthopantomographic imaging, although high in quality, present inherent diagnostic limitations compared with three-dimensional methods.

Future studies should involve larger and more diverse populations, preferably through multicenter collaboration. Using advanced imaging such as CBCT could improve diagnostic accuracy. Additional research into genetic or developmental factors may help clarify observed gender- and side-related tendencies.

CONCLUSION

Impacted maxillary canines represent a relatively uncommon but clinically relevant anomaly, occurring more frequently unilaterally and in female patients. Although certain differences in localization were observed, their clinical implications remain uncertain. These findings contribute valuable regional data and support the need for early detection and timely management of impacted canines.

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CONFLICT OF INTEREST

None to declare.

AUTHORS' CONTRIBUTIONS

JR conceived and designed the study, collected the data; RJ analyzed the data, interpreted the results, and prepared the figures. IMT edited and revised the manuscript; JR, RJ and IMT approved the final version of the manuscript.

ETHICAL BACKGROUND

Institutional review board statement: The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Ethics Committee.

Informed consent statement: Informed consent was obtained from all subjects involved in the study.

Data availability statement: We deny any restrictions on the availability of data, materials and associated protocols. Derived data supporting the findings of this study are available from the corresponding author on request.

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