

Prevalence and Characteristics of Supernumerary Teeth in Israeli Orthodontic Patients

Tamar Finkelstein*/ Yehoshua Shapira**/ Aikaterini Maria Pavlidi ***/ Shirley Schonberger ****/ Sigalit Blumer *****/ Ofer Sarne *****/ Nir Shpack*****

Background: Supernumerary teeth are one of the most common anomalies in the human dentition, found most frequently in the maxillary anterior region causing impaction or displacement of the adjacent permanent teeth. *Aim:* The purpose of this retrospective study was to determine the prevalence and characteristics of supernumerary teeth in orthodontically treated patients. *Study design:* Pre-treatment facial and intraoral photographs, study models, panoramic and periapical radiographs of 3,000 consecutively treated orthodontic patients (mean age 12.2 years) from the Department of Orthodontics Tel Aviv University, were examined to detect supernumerary teeth in both arches. They were recorded according to gender, age, number, location, position and morphology. *Results:* Thirty-six patients, 22 (61%) males and 14 (39%) females with 50 supernumerary teeth, of which 42 (84%) were found in the maxillary anterior region, and 8 (16%) in the mandible, presenting a prevalence of 1.2%. *Conclusions:* A prevalence of 1.2% was found in our study. The most common supernumerary tooth is mesiodens located at the maxillary anterior region. The characteristics of supernumeraries were based on their morphology, location and position. The most frequent complications caused were rotations, displacement and arrested eruption of maxillary incisors.

Keywords: Supernumerary teeth, prevalence, characteristics, orthodontic patients.

From the The Maurice and Gabriela Goldschleger School of Dental Medicine, Tel Aviv University, Tel Aviv, Israel.

*Tamar Finkelstein, DMD, Instructor, Department of Orthodontics .

**Yehoshua Shapira, DMD, Clinical Associate Professor, Department of Orthodontics.

*** Aikaterini Maria Pavlidi, MDD, Postgraduate Orthodontic Student.

**** Shirley Schonberger, DMD, Instructor, Department of Orthodontics.

*****Sigalit Blumer, DMD, Instructor and Acting Head, Department of Pediatric Dentistry.

*****Ofer Sarne, DMD, Clinical Director, Department of Orthodontics.

*****Nir Shpack, DMD, MSc, Senior Lecturer and Chairman, Department of Orthodontics.

Send all correspondence to:

Yehoshua Shapira

Department of Orthodontics,

The Maurice and Gabriela Goldschleger School of Dental Medicine

Tel Aviv University, Tel Aviv 69978 Israel

Phone: +972-2-5335531

E-mail: yehoshua.shapira@gmail.com

INTRODUCTION

Supernumerary teeth are defined as those formed in excess of the normal dental formula of twenty deciduous and thirty-two permanent teeth. They can be found in any region of the dental arches, occurring more frequently in the permanent dentition, but are most common in the maxillary anterior region causing impaction or displacement of the permanent incisors¹. The reported prevalence is 0.3%–0.8% in the deciduous dentition and 1.5%–3.5% in the permanent dentition². A higher prevalence reported among Asian populations (2.7% in Japanese³, and 3.4% in Hong Kong Chinese school children⁴).

The most common type of supernumerary tooth is a mesiodens detected in the maxillary midline as a conical peg-shaped tooth⁵. Supernumerary teeth are classified according to their morphology (conical, tuberculate, supplemental and odontomas), their location (mesiodens, paramolar, distomolar and parapremolar), their position (buccal, palatal and transverse), and their orientation in the jaws (vertical, inverted, transverse or horizontal) 6-9.

Supernumerary teeth may appear during the natal period as well as post partum, typically during the late mixed dentition. Late developing supernumeraries are most commonly located in the premolar region. One or two supernumeraries are most often detected in the maxillary anterior region, while multiple supernumeraries tend to appear more in the mandibular premolar region¹⁰. In general,

supernumerary teeth can be single or multiple, unilateral or bilateral, in one or in both jaws, erupted or impacted, appear inverted, horizontal or in an abnormal ectopic position¹. Presence of supernumerary teeth are associated with several complications such as delay or prevention in eruption of adjacent teeth, rotations of the central incisors, crowding or midline diastema, malalignment and displacement of the incisors, root resorption, migration into the nasal cavity or maxillary sinus and may compromise facial esthetics 11-14.

Supernumerary teeth are usually detected during routine clinical dental examination revealing delay in eruption or displacement of the maxillary permanent incisors. They can be detected through routine radiographic examination (panoramic or periapical) for pediatric dentistry or orthodontic diagnosis and treatment planning. Patients with single or multiple supernumerary teeth are often asymptomatic.

Correctly locating a supernumerary tooth, e.g., labial or palatal, is critical especially when surgical intervention is required. More precise identification can be achieved with cone-beam computed tomography (CBCT) 15. Early detection of supernumerary teeth and timely intervention is imperative to prevent development of severe malocclusion and further complications which might require extensive therapy.

The purpose of this retrospective study was to determine the prevalence and describe the characteristics of supernumerary teeth in orthodontically treated Israeli patients.

SUBJECTS AND METHOD

The present study was carried out using pre-treatment facial and intraoral photographs, study models, panoramic and periapical radiographs of 3,000 consecutively treated orthodontic patients from the Department of Orthodontics, Tel Aviv University School of Dental Medicine. The subjects consisted of 1,220 (40.7%) males and 1,780 (59.3%) females (mean age 12.2 years) (Table 1). Their records were examined for the presence of supernumerary teeth both in the maxillary and mandibular arches. Inclusion criteria were patient records with good photographs and radiographs. Exclusion criteria were history of previous orthodontic or surgical treatment in the dental arches, and congenital craniofacial malformations and syndromes.

This study was approved by the Ethics Committee of Tel Aviv University. In addition, informed consent was obtained from the parents/guardian of each patient prior to inclusion in the study.

RESULTS

Thirty-six patients, 22 (61%) males and 14 (39%) females, with 50 supernumerary teeth were included in our sample (Table 1). Forty-two teeth (84%) were found in the maxillary (41 in the anterior segment and 1 in the premolar region). Eight teeth (16%) were detected in the mandible (7 in the premolar region and 1 in the anterior segment) (Table 2), corresponding to a prevalence of 1.2%.

One male patient presented with 3 supernumerary teeth in the mandibular premolar region. Twelve patients (10 males, 2 females) had 2 supernumerary teeth each (24 teeth), of which 10 were in the maxillary anterior segment (20 teeth) and 2 presented them in the mandibular premolar region (4 teeth). The other 23 patients (12 males and 11 females) had 1 supernumerary tooth each (23 teeth), out of which 22 were detected in the maxillary anterior region (22 teeth) and 1 in the mandibular anterior region (Table 2).

The distribution of supernumerary teeth according to their morphology and eruption status is presented in Table 3. The distribution of supernumerary teeth according to their position in the jaw is presented in Table 4.

Four types of supernumerary teeth are described and classified as conical, tuberculate, supplemental and odontoma.

A conical supernumerary is a small peg-shape tooth, commonly referred to as a mesiodens, (from the Latin, middle tooth) detected in the maxillary midline between the permanent central incisors (Fig. 1- A, B). A mesiodens may be oriented vertical, appear in an inverted direction or assume a labio-lingual position (Fig. 2- A-C). 50% of the supernumeraries in our sample were conical and peg-shaped, of which 80% were impacted and 20% erupted (Table 3). Conical supernumerary teeth in a horizontal position (Fig. 3-A) or in the maxillary premolar region were found to be rare (Fig. 3-B).

Tuberculate (Invaginate) supernumerary teeth have more than one cusp or tubercle and are frequently described as barrel-shaped (Fig. 4- A- C). They are often located on the palatal aspect of the maxillary incisors and often appear in pairs. Their root formation is typically delayed compared with that of the permanent incisors, and may be associated with delayed eruption of the maxillary permanent incisors. Tuberculate shaped teeth comprised 14% (n= 7) of the supernumeraries, most of them 71% (n=5) were impacted and 29% (n=2) have erupted (Table 3).

Supplemental supernumerary teeth refers to near duplicates of normal teeth. These were found second in prevalence with 34% (n=17) following the 50% (n=25) conical type (Table 3). The most common supplemental tooth was found to be the maxillary permanent lateral incisor (Fig. 5- A), including 18% of which 78% (n=7) have erupted and 22% (n=2) were impacted. Supplemental mandibular premolars (Fig. 5- B) included 16% of which 88% (n=7) were impacted and 12% (n=1) have erupted. Supplemental mandibular permanent lateral incisors were also found in our sample (Fig. 5- C) (Table 3).

Odontoma refers to any lesion of odontogenic origin was detected in one patient (Fig.6). In addition, 8 patients were found with maxillary central incisors fused to supernumerary teeth (Fig. 7).

Table 1 – Distribution of supernumerary teeth according to gender.

Gender	Patients		Patients with Supernumerary teeth		Number of Supernumerary teeth	
	No.	%	No.	%	No.	%
Male	1220	40.7	22	61	35	70
Female	1780	59.3	14	39	15	30
Total	3000	100	36	100	50	100

Table 2 – Distribution of supernumerary teeth according to their number and jaw location.

Number of teeth/ patient	Number of patients	Supernumerary teeth		Number of teeth in			
				Maxilla		Mandible	
		No.	%	No.	%	No.	%
Single	23 (M-12, F-11)	23	46	22	44	1	2
Double	12 (M-10, F-2)	24	48	20	40	4	8
Triple	1 (M-1)	3	6	-	-	3	6
Total	36	50	100	42	84	8	16

M- Male

F- Female

Table 3 – Distribution of supernumerary teeth according to their morphology and eruption status.

Morphology		Number of teeth		Eruption Status			
				Impacted		Erupted	
		No.	%	%	%	%	%
Conical		25	50	20	80	5	20
Tuberculate		7	14	5	71	2	29
Supplemental	Incisor	9	18	2	22	7	78
	Premolar	8	16	7	88	1	12
Odontoma		1	2	1	100	-	-
Total		50	100	35		15	

Table 4 – Distribution of supernumerary teeth according to their position.

Tooth position	Number of patients	%
Vertical	31	86
Inverted	2	6
Horizontal	3	8
Total	36	100

DISCUSSION

The most frequently detected supernumerary teeth are mesiodens identified in the maxillary midline area as one or two cone-shaped teeth (Fig. 1- A, B). They may be oriented vertically or develop in the path of eruption, inverted and erupt into the nasal cavity or maxillary sinus, or assume a labiolingual position (Fig. 2- A- C). They can be erupted or impacted on the labial or on the palatal sides.

Cone-shaped supernumerary teeth are rarely found in a horizontal position (Fig. 3- A) or in the premolar region (Fig. 3- B). Supernumerary teeth especially in the maxillary anterior region may cause delay or arrested eruption, rotation and displacement of the adjacent permanent incisors. In the premolar region they may be recurring and develop in the mandible late at the age of ten years 16-18.

Supernumerary teeth have been reported more frequently in males than in females with a 2:1 ratio^{1,9,19-21}, and 5.5:1 and 6.5:1 in Japanese and Hong Kong Chinese children, respectively²². The present study showing males affected almost twice with supernumerary teeth than females (22 and 14, respectively) is in agreement with the majority of previous reports. However, other investigations report a preponderance of supernumeraries in females²³⁻²⁵. The conflicting reports on the frequency of supernumerary teeth between genders may be due to different sample size used, as well as in different ethnic and racial populations under investigation in different countries and in various geographic regions. In addition, some reported on supernumerary teeth in the maxillary anterior region only²¹ while others reported on supernumerary teeth in both the maxillary and mandibular arches⁸.

The etiology of supernumerary teeth is still unclear although various theories have been suggested. These include genetic factors, dichotomy (splitting) of the tooth bud, hyperactivity of the dental lamina and atavism^{26,27}, or merely retained from the Anthropoids who had more teeth than Homosapiens^{4,5}. They may also be associated with specific developmental malformations and syndromes, such as cleft lip and palate²⁸, cleidocranial dysplasia, chorhinophalangeal syndrome and Gardner’s syndrome²⁹.

Characteristics of supernumerary teeth have been described and classified as conical, tuberculate, supplemental and odontoma. Our sample included all four types of supernumerary teeth distributed in both jaws. Comparing tooth morphology and eruptive status reveals that the great majority of supernumerary teeth, including 80% of conical, 71% of tuberculate and 88% of supplemental premolar types were impacted. It is interesting to note that the majority of the supplemental incisors (78%) have erupted while 88% of the supplemental premolars were impacted. This is probably due to the late developing supernumerary premolars after the eruption of the normal premolars. The supplemental supernumeraries are located mainly distal to the last tooth of a series. The majority of supernumeraries found in the deciduous dentition belong to the supplemental type.

Odontoma refers to any lesion of odontogenic origin. Two types have been described: a complex composite odontoma is a diffuse mass of disorganized dental tissue, and a compound composite odontoma, detected in our sample, has some superficial anatomical similarity to a normal tooth.

The morphology of the supernumerary tooth appears to influence the retention of the permanent adjacent teeth. It has been reported that more than 90% of incisor-shaped supernumeraries caused retention of the adjacent permanent incisors¹¹. We found a similar phenomenon, where incisor shape supernumeraries prevented the normal eruption of the central incisors. However, other morphological types of supernumerary teeth, such as the conical peg-shaped mesiodens found in the majority of our patients, out of which 80% were impacted, caused eruption interferences and arrest of the permanent incisors. Supernumerary teeth that were vertically positioned caused eruption delay more often than those that were inverted or in horizontal position. Multiple supernumeraries are rare in patients when no other syndromes are associated.

It has been reported that there exists a tendency for supernumerary teeth to resorb and disappear with time by replacement resorption³⁰. The findings of the present study do not corroborate this phenomenon.

Figure 1 – A – Mesiodens erupted in the midline between the two central incisors.

B – Two Mesiodens erupting in the midline palatal to the central incisors.

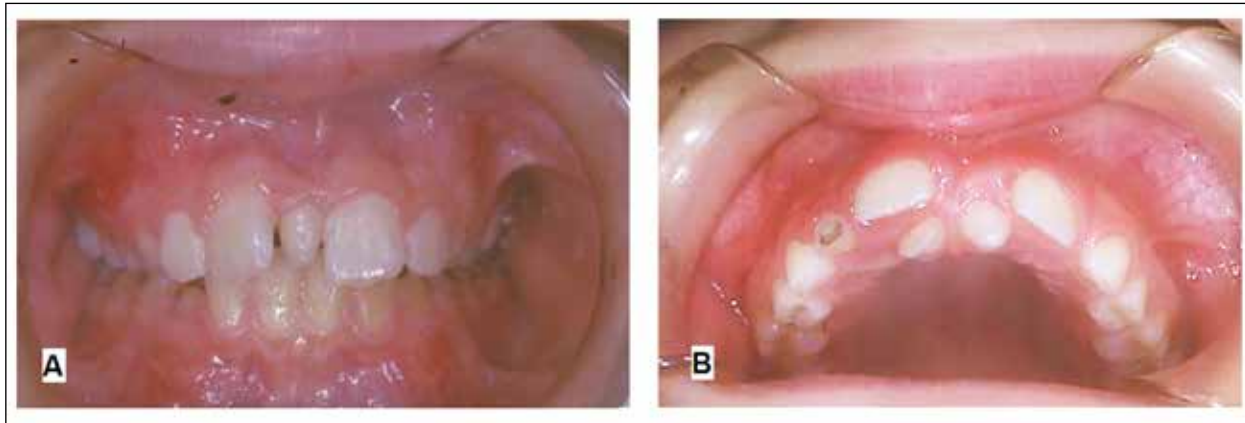


Figure 2 – Orientation of supernumerary Mesiodens teeth.

A – Vertical (erupted). B – Labio-lingual (impacted). C – Inverted (impacted).

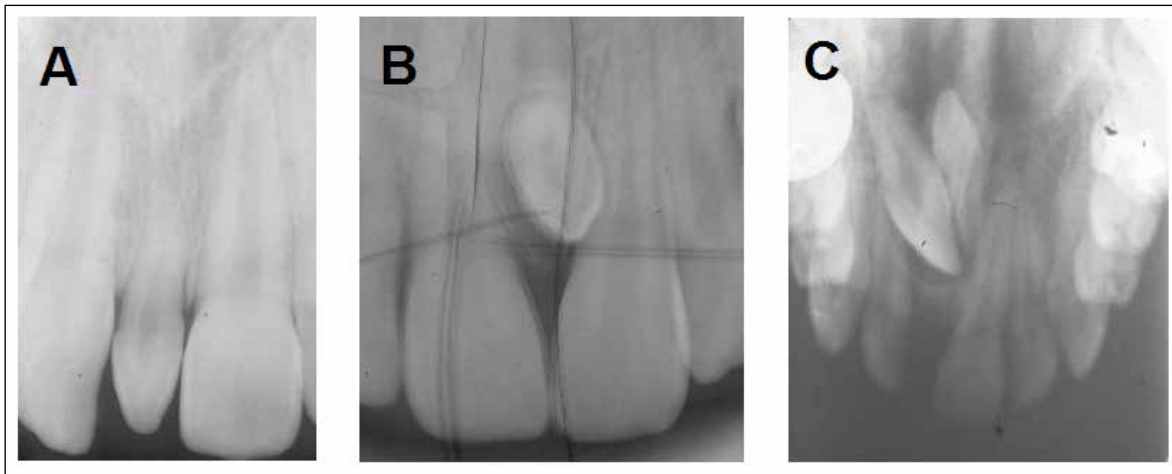


Figure 3 – A – Panoramic radiograph showing an impacted cone-shaped supernumerary tooth in horizontal position.

B – Panoramic radiograph showing bilateral paired cone-shaped supernumerary teeth in the maxillary premolar region (arrows), and an additional supernumerary tooth distal to the maxillary left third molar.

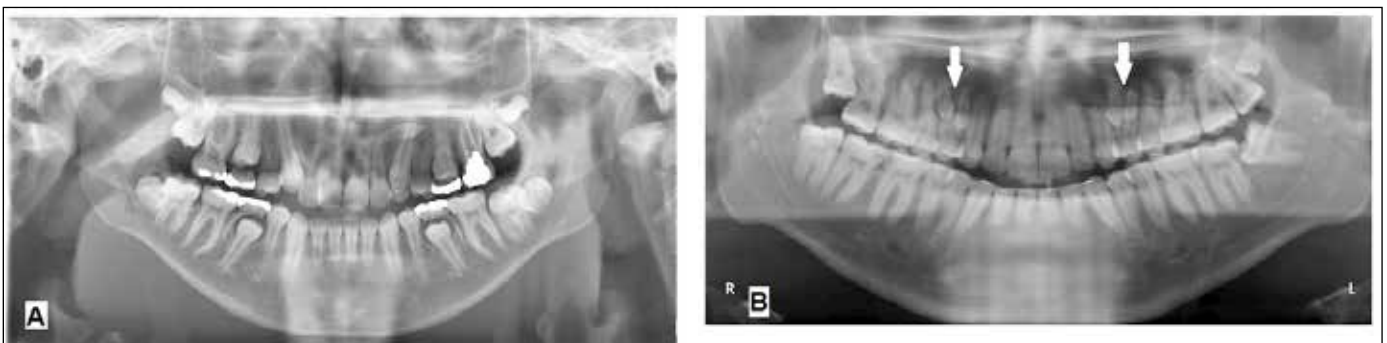


Figure 4—Tuberculate type of supernumerary teeth.

A – Panoramic radiograph showing two impacted tuberculate supernumerary teeth apical to the retained deciduous central incisors, arresting eruption of the permanent central incisors (arrows).

B – Panoramic radiograph showing an erupted tuberculate supernumerary and an additional impacted supernumerary tooth arresting eruption of the right permanent central incisor (arrows).

C—Intraoral photographs of the patient in B.

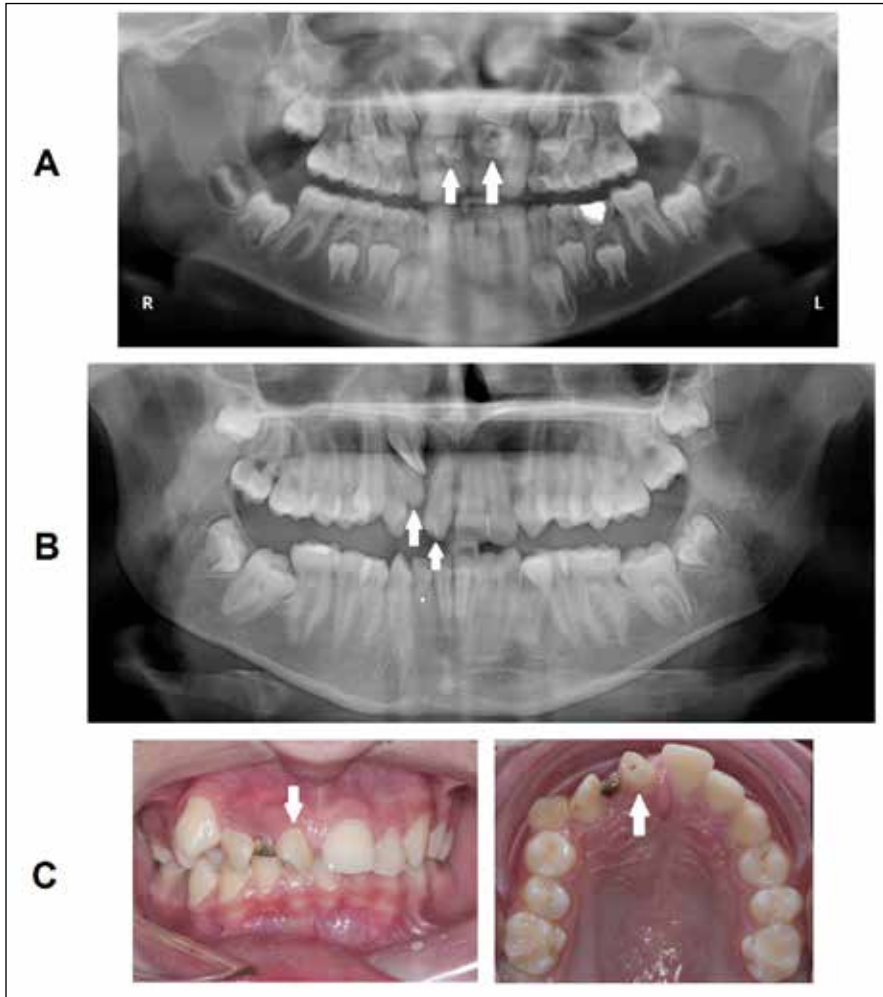


Figure 5 – Supplemental supernumerary incisors and premolars.

A – Intraoral frontal and occlusal photographs showing bilateral supplemental maxillary lateral incisors (arrows).



Figure 5 – Supplemental supernumerary incisors and premolars. (continued)

B – Periapical radiographs showing bilateral supernumerary mandibular premolars.

C – Intraoral occlusal photo showing bilateral supernumerary mandibular permanent lateral incisors and a unilateral supernumerary premolar (arrows).

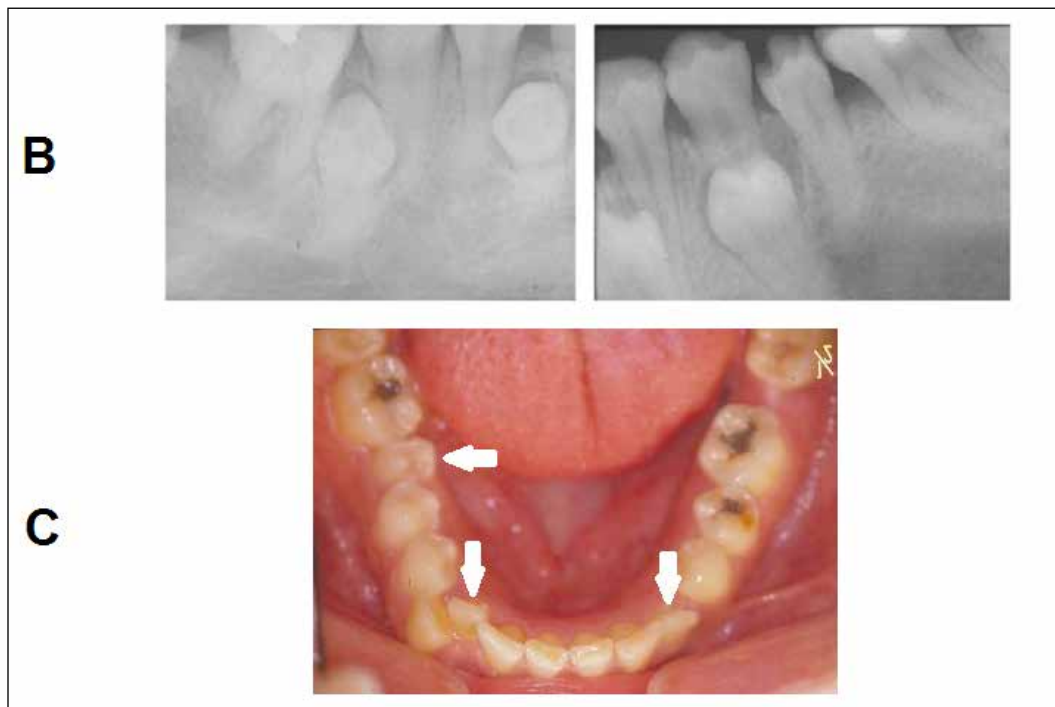


Figure 6 – Compound composite Odontoma.

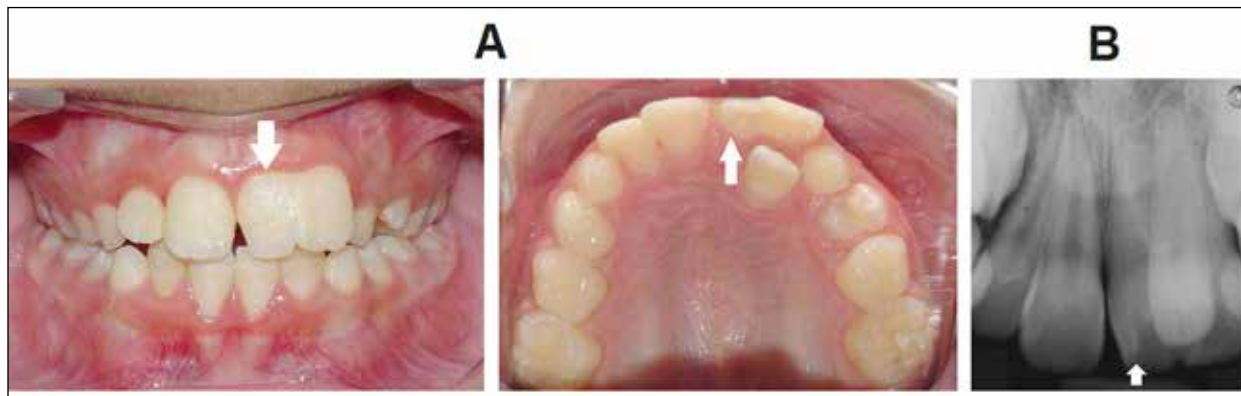
An odontoma above the root apices of the left deciduous central and lateral incisors, arresting the eruption of the left permanent central and lateral incisors.



Figure 7 – Unilateral fusion between the left permanent central incisor and a supernumerary tooth.

A – Intraoral frontal and occlusal views of a fusion between the left permanent central incisor and a supernumerary tooth. The permanent lateral incisor erupted ectopic palatal.

B – Periapical radiograph showing the fused central incisor to a supernumerary tooth (arrow).



Supernumerary teeth may be found fused to the maxillary permanent central incisors, causing crowding, malalignment and un-esthetic appearance of the anterior segment. This condition was discovered in our sample with eight rare cases of fusion between a maxillary permanent central incisor and a supernumerary tooth, both unilaterally and bilaterally. This situation is relatively rare and requires special attention and multidisciplinary treatment approach.

CONCLUSIONS

A prevalence of 1.2% was found in our study of supernumerary teeth in orthodontically treated patients. The most common supernumerary tooth is the mesiodens located at the maxillary anterior region. Other supernumerary teeth are characterized by their shape, position and morphology. The most frequent complication caused by supernumerary teeth was arrested eruption, rotation and displacement of maxillary incisors.

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