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Research paper

Prevalence of dental anomalies in French orthodontic patients: A retrospective study

C. Baron^a, M. Houchmand-Cuny^b, B. Enkel^c, S. Lopez-Cazaux^{a,d,*}

^a Département of Pediatric Dentistry, Faculté de Chirurgie Dentaire, Université de Nantes, Centre Hospitalo-Universitaire de Nantes, 1, place Alexis-Ricordeau, BP, 44042, Nantes cedex 1, France

^b Département of Orthodontics, Faculté de Chirurgie Dentaire, Université de Nantes, Centre Hospitalo-Universitaire de Nantes, 1, place Alexis-Ricordeau, BP, 44042, Nantes cedex 1, France

^c Département of Conservative Dentistry and Endodonty, Faculté de Chirurgie Dentaire, Université de Nantes, Centre Hospitalo-Universitaire de Nantes, 1, place Alexis-Ricordeau, BP, 44042, Nantes cedex 1, France

^d Unité d'investigation Clinique 11 Odontologie, Centre Hospitalo-Universitaire de Nantes, 1, place Alexis-Ricordeau, BP, 44042, Nantes cedex 1, France

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ABSTRACT

Objectives: To investigate the prevalence and gender distributions of dental anomalies in French orthodontic patients.

Material and methods: A retrospective review of the dental files of orthodontic patients was conducted to investigate the frequencies of dental anomalies. Pretreatment intraoral photographs and panoramic radiographs were analyzed. The occurrence rates of various dental anomalies (as determined by the numbers, shapes, structures, exfoliations, and eruptions of teeth) were calculated as percentages and differences in gender distribution using Chi² and Fisher tests.

Results: Five hundred fifty-one patients receiving orthodontic treatment between 2003 and 2013 at a French hospital were included in the study: 45.74% of the patients ($n = 252$) presented at least one dental anomaly. Taurodontism was the most common (15.06%), followed by ectopic eruption (11.43%). Odontoma, macrodontia, fusion, gemination, talon cusp, dentinogenesis imperfecta, regional odontodysplasia, premature tooth eruption, and premature exfoliation were not found. No statistically significant correlations were found between gender and the occurrence of dental anomalies.

Conclusion: French orthodontic patients exhibit a high rate of dental anomalies, indicating that dental anomalies should be carefully considered in the orodental management of French patients.

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1. Introduction

Dental anomalies consist of a wide range of disorders, the symptoms of which include changes in the numbers, shapes, structures, exfoliations, and eruptions of teeth. Dental anomalies result from disturbances during the morphodifferentiation stage of development and the exfoliation and eruption patterns of developing teeth.

Dental anomalies are frequently observed in orthodontic patients and should be considered because they could complicate the dental and orthodontic treatments [1].

Several studies have addressed the prevalence of dental anomalies in particular populations. The results of these studies are inconsistent between and within populations, such that the prevalence of dental anomalies has been found to vary between 5.46 and 74.70% [1–6]. These differences reflect variations in race, sampling methods, and diagnostic criteria. Most of these studies report results regarding only a few types or subtypes of dental anomalies. To the best of our knowledge, a study investigating European or French populations has yet to be conducted; most available data pertain to the prevalence of agenesis (5.50–7%) and molar incisor hypomineralization (MIH) (7.30–21.80%) [7,8] in Europe. Therefore, the present study was conducted to assess the prevalence of all types (as determined by dental numbers, shapes,

* Corresponding author. Département of Pediatric Dentistry, Faculté de Chirurgie Dentaire, Université de Nantes, Centre Hospitalo-Universitaire de Nantes, 1, place Alexis-Ricordeau, BP, 44042, Nantes cedex 1, France.

E-mail address: [S.Lopez-Cazaux^{ad}](mailto:S.Lopez-Cazaux@serena.lopez-cazaux@univ-nantes.fr); serena.lopez-cazaux@univ-nantes.fr (S. Lopez-Cazaux).

structures, eruptions, and exfoliations) in a population of French orthodontic patients.

2. Materials and Methods

2.1. Study population

The present study was based on a retrospective examination of the dental files of orthodontic patients at Nantes Hospital (France) using the following inclusion criteria:

- orthodontic files archived at this hospital between 2003 and 2013;
- 18 years old or younger;
- complete dental file including x-ray (panoramic radiography) and photographs (front, lateral, maxillary, and mandibular views).

The exclusion criteria were:

- adult patients (> 18 years old);
- incomplete dental file (x-ray and/or photographs missing);
- poor quality of the documents (lack of luminosity or black and white photographs, blooming distortion of the x-ray, etc.).

2.2. Data collection

The study utilized pretreatment documents consisting of intraoral photographs and panoramic radiographs. Complementary data were provided by other documents in each patient's dental file (dental history, periapical radiographs, etc.). One operator examined the documents.

A total of 26 dental anomalies were assessed:

- number anomalies: hypodontia (fewer than six teeth missing; permanent third molars were excluded), oligodontia (six or more teeth missing), anodontia (absence of all the teeth), and hyperdontia (supernumerary teeth, in addition to the regular number of teeth);
- shape anomalies: macrodontia (disproportionately large tooth), microdontia (disproportionately small tooth), fusion, gemination, taurodontism (the tooth trunk is elongated and the floor of the pulp chamber is displaced apically with proportionately shortened roots); the Shifman Index was used to assess the presence of taurodontism, dilaceration, dens evaginatus (extra cusp or tubercle protrudes from the surface of a tooth) and dens invaginatus (dens in dente: developmental malformation resulting from invagination of enamel in the crown or root surface before calcification);
- structural anomalies: amelogenesis imperfecta, dental fluorosis, MIH, enamel hypoplasia, dentinogenesis imperfecta, dentin dysplasia, and regional odontodysplasia;
- eruption and exfoliation anomalies: premature and retarded tooth eruption (based on normal eruption of the teeth), impaction, ectopic tooth eruption, transposition, premature exfoliation (based on normal exfoliation of the teeth) and included primary tooth.

2.3. Statistical analysis

All data collected were analyzed with regard to frequency, gender, and tooth type. The prevalence and distribution of dental anomalies were also assessed. The Chi² test and Fisher exact test were used to determine differences between anomalies and between genders. Biostatgv statistical software (Institut Pierre

Louis d'Epidémiologie et de Santé Publique UMR S 1136, Inserm et Université de la Sorbonne, Jussieu, France) was used for statistical analysis.

3. Results

A total of 551 patients (329 females) with a mean age of 15.23 years were included in this study; 389 are excluded.

Two hundred fifty-two patients (45.74% of the study population) presented at least one anomaly. No statistically significant correlation was found between the occurrence of dental anomalies and gender (Chi² test; $P = 0.54$). Among these patients, 31.58% presented one dental anomaly and 14.16% presented more than one dental anomaly. The numbers of dental anomalies did not depend on sex (Chi² test; $P = 0.40$) (Table 1).

The distributions of dental anomalies determined herein are presented in Table 2. Taurodontism, affecting 15.06% of the patients, was the most common dental anomaly observed, followed by ectopic eruption (11.43%).

3.1. Number anomalies

Thirty-nine patients (7.07%) presented anomalies in number. The gender distribution was not found to be statistically significant ($P = 0.14$; (Chi² test) (Table 2).

The most common number anomaly observed was hypodontia. The prevalence of dental agenesis was 5.81%. Among the 32 patients who presented agenesis, 40.63% presented only one dental agenesis, and three (0.54%) exhibited oligodontia. No case of anodontia was observed. Excluding third molars (37.04%), the greatest incidence of missing teeth occurred in second mandibular premolars, followed by second maxillary premolars (16.05%) and the maxillary lateral incisors (14.81%). On the other hand, no cases of agenesis of maxillary central incisors, mandibular canines, first maxillaries, or mandibular molars were observed.

Only seven patients (1.27%), presented supernumerary teeth. Every patient had between one and three supernumerary teeth. Only one patient presented mesiodens.

3.2. Shape anomalies

One hundred one patients (18.33%) exhibited shape anomalies. The distribution by sex was not statistically significant ($P = 0.38$; (Chi² test) (Table 2).

The most common shape anomaly was taurodontism. The distribution of taurodontism was similar between arches. Furthermore, our analysis found that molars were significantly more taurodontic than premolars ($P = 0.03$, (Chi² test). Taurodontism occurred most frequently in second mandibular molars.

Fourteen patients (2.55%) exhibited microdontia. This anomaly was observed in 79% of cases involving maxillary incisors.

One female patient (0.18% of the study population) presented dilaceration of the maxillary central incisor, which was impacted. Dens in dente occurred in one case involving maxillary lateral incisors. No cases of macrodontia, fusion, gemination, or talon cusp was found.

Table 1

Prevalence of dental anomalies by sex in the sample.

Variables	Males (n=222) n (%)	Females (n=329) n (%)	Total (n=551) n (%)
No dental anomaly	124 (22.50)	175 (31.76)	299 (54.26)
One dental anomaly	72 (13.07)	102 (18.51)	174 (31.58)
≥ Two dental anomalies	26 (4.72)	52 (9.44)	78 (14.16)
Total	222 (40.29)	329 (59.71)	551 (100)

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