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ORIGINAL ARTICLE

The prevalence of specific dental anomalies in a group of Saudi cleft lip and palate patients

Ghada H. Al-Kharboush [a], Khalid M. Al-Balkhi [b], Khalid Al-Moammar [b,*]

[a] *Riyadh Military Hospital, Saudi Arabia*
[b] *College of Dentistry, King Saud University, Riyadh, Saudi Arabia*

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KEYWORDS

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Abstract *Objective:* The aims of this study were to investigate the prevalence and distribution of dental anomalies in a group of Saudi subjects with cleft lip and palate (CLP), to examine potential sex-based associations of these anomalies, and to compare dental anomalies in Saudi subjects with CLP with published data from other population groups.

Design: This retrospective study involved the examination of pre-treatment records obtained from three CLP centers in Riyadh, Saudi Arabia, in February and March 2010. The pre-treatment records of 184 subjects with cleft lip and palate were identified and included in this study. Pre-treatment maxillary occlusal radiographs of the cleft region, panoramic radiographs, and orthodontic study models of subjects with CLP were analyzed for dental anomalies.

Results: Orthopantomographs and occlusal radiographs may not be reliable for the accurate evaluation of root malformation anomalies. A total of 265 dental anomalies were observed in the 184 study subjects. Hypodontia was observed most commonly (66.8%), followed by microdontia (45.6%), intra-oral ectopic eruption (12.5%), supernumerary teeth (12.5%), intra-nasal ectopic eruption (3.2), and macrodontia (3.2%). No gender difference in the prevalence of these anomalies was observed.

Conclusions: Dental anomalies were common in Saudi subjects with CLP type. This will complicate the health care required for the CL/P subjects. This study was conducted to epidemiologically explore the prevalence of dental anomalies among Saudi Arabian subjects with CLP.

1. Introduction

Clefts of the lip and palate (CL/P) are currently the most common craniofacial birth defects. Most studies have suggested that 70% of CL/P cases are non-syndromic, and that the remaining 30% are associated with structural abnormalities outside the cleft region (Schutte and Murray, 1999; Cobourne, 2004; Lidral et al., 2008). Non-syndromic clefts affect one in every 700 live births, with ethnic and geographic

* Corresponding author.
E-mail addresses: drghada.h.k@gmail.com (G.H. Al-Kharboush), kalbalkhi@ksu.edu.sa (K.M. Al-Balkhi), kalmoammar@ksu.edu.sa (K. Al-Moammar).

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variation (Dixon et al., 2011). Individuals with non-syndromic cleft lip and palate CL/P commonly exhibit various dental anomalies involving tooth shape, size, and position (Ranta, 1983; Kim and Baek, 2006; Da Silva et al., 2008). The extent of these dental anomalies varies according to sex, ethnicity, and cleft type (Aizenbud et al., 2005; Al Jamal et al., 2010; Pegelow et al., 2012; Matern et al., 2012; Paranaiba et al., 2013; Mikulewicz et al., 2014). For example, hypodontia was the most prevalent dental anomaly in a Brazilian CL/P population, followed by impacted teeth, supernumerary teeth, and microdontia (Paranaiba et al., 2013). Likewise, hypodontia was the predominant dental anomaly among individuals with CL/P in Sweden and Jordan; other dental anomalies present in these populations included impacted teeth, supernumerary teeth, microdontia, macrodontia, taurodontism, and dilaceration (Pegelow et al., 2012; Al Jamal et al., 2010).

These anomalies have deleterious effects on the dentition leading to esthetic problems, impairment of mastication, and improper phonation (Hardin-Jones and Jones, 2005). Knowledge of the presence of such anomalies in individuals with CL/P will aid orthodontists' anticipation of malocclusion and other challenges when dealing with such cases in the clinic. Orofacial clefts and associated malocclusion contribute substantially to long-term disability in children, as well as tremendous emotional and financial stresses for affected individuals and families.

The current study was conducted in view of these considerations, and to address the paucity of reported epidemiological studies of craniofacial anomalies in Saudi Arabia (Kumar et al., 1991; Tahir, 1998; Al-Balkhi, 2008). The prevalence and distribution of dental anomalies (abnormalities in tooth number, size, shape, and location) were investigated in a group of Saudi subjects with CLP type, and the possible existence of gender-based associations with these anomalies was examined. Furthermore, the study aimed to compare dental anomalies in Saudi subjects with CLP with published data from other population groups.

2. Materials and methods

The records of 184 subjects with CLP were collected in this retrospective study; 138 subjects were from an orthodontic clinic at a university hospital and 62 subjects were from orthodontic clinics at two other hospitals, in Riyadh, Saudi Arabia. The study was conducted in February and March 2010, and included medical records from the period of November 1993 to October 2009 were collected and examined. Pre-treatment maxillary occlusal radiographs of the cleft region, panoramic radiographs, and orthodontic study models of subjects with CLP were analyzed. This is to investigate the presence of dental anomalies, and to evaluate the differences between gender, and between unilateral and bilateral CLP. The ethics committee of the College of Dentistry Research Center, King Saud University, approved this study in January 2010 (NF 2156).

The inclusion criteria were: (1) non-syndromic CLP; age 6–30 years to ensure complete calcification of all permanent tooth crowns, which occurs at around 6–7 years of age. (2) Availability of good-quality pre-treatment records.

Data were obtained by visual evaluation of occlusal and panoramic radiographs. The presence of dental anomalies was confirmed by evaluating subjects' orthodontic casts. Patients' treatment records were also studied to eliminate the possibility of premature tooth loss or extraction. The number, size, and shape of permanent dentition affected by hypodontia, microdontia, macrodontia, and ectopic eruption, as well as supernumerary teeth, were determined using panoramic and occlusal radiographs and recorded using the World Dental Federation index of tooth numbering and regional location (Nilsson and Ash, 2010). The investigated dental anomalies were defined as follows.

2.1. Abnormalities of tooth number

Diagnoses of hypodontia and supernumerary teeth in the cleft area were established according to the criteria reported by Damante (1972): hypodontia was defined as the absence of the lateral incisor and a supernumerary tooth was defined as any additional tooth mesial or distal to the cleft area in the presence of the lateral incisor. Outside of the cleft area, these anomalies were diagnosed according to the criteria of Gravey et al. (1999): hypodontia or tooth agenesis was diagnosed when the tooth or tooth bud was absent on radiographs, resulting in a deficient dental developmental series, and a supernumerary tooth was diagnosed based on the identification of an additional tooth germ or calcification (beyond the normal dental developmental series) on radiographs in any region of the dental arch.

2.2. Abnormalities of crown morphology

Macrodontia and microdontia refer to teeth that are substantially larger and smaller, respectively, than the average normal size, or larger and smaller, respectively, than the contralateral homolog or a tooth in the sample group from the opposing arch (D'Souza et al., 2006). Microdontia also refers to a tooth that does not fill its space in the dental arch, or appears small because of the absence of expected shape (D'Souza et al., 2006).

2.3. Root malformation

Dilaceration was defined as a bend in a root at any level along its length, as observed on panoramic and occlusal radiographs. A short root was identified by comparison with the root of the contralateral tooth on radiographs, based on the normal crown to root ratio (D'Souza et al., 2006).

2.4. Ectopic eruption

Intra-oral ectopic eruption was diagnosed when a tooth had not erupted in its normal position/site in the oral cavity. Intra-nasal ectopic eruption was diagnosed when a tooth had erupted through the floor of the nasal cavity.

2.5. Statistical analysis

Data were analyzed and are presented in two main parts: evaluation of methodological error and calculation of descriptive and analytical statistics. Analyses were conducted using the Statistical Package for the Social Sciences (version 16.0; SPSS Inc., Chicago, IL, USA).