

ORIGINAL RESEARCH



Eruption of Impacted Teeth after Alveolar Bone Graft in Cleft Lip and Palate Region

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ABSTRACT

Aim: This study aimed to assess the eruption of impacted teeth in cleft lip and/or palate (CLP) after alveolar bone graft.

Materials and methods: Research was carried out through a cross-sectional study at the Craniofacial Rehabilitation Center of the University General Hospital of the University of Cuiabá, Mato Grosso, Brazil. Variables related to cleft, cleft side, gender, age, laterality of cleft, impacted teeth, and orthodontic traction were analyzed.

Results: Forty-two patients treated at the institution from 2004 to 2011 were recruited. There were 54.76% males and 45.24% females. The age group between 9 and 11 years was most affected in 59.53% of cases. The unilateral cleft was the most prevalent (85.71%). A total of 57 impacted teeth were observed. Maxillary canine was the most prevalent impacted teeth (97.61%) and more frequent in transforamen incisor cleft (TIC) (76.3%). The orthodontic traction was needed in both maxillary canines and lateral incisor impacted teeth, 64.3 and 35.7% respectively. The orthodontic traction was needed only in TIC ($p = 0.0101$).

Conclusion: The canine teeth were the most prevalent, mainly related to the TIC and all impacted teeth erupted spontaneously in the preforamen incisor cleft (PIC) after placement of the bone graft.

Clinical significance: There was spontaneous eruption of impacted teeth after secondary alveolar bone graft in CLP.

Keywords: Alveolar bone graft, Cleft lip and/or palate, Tooth eruption.

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INTRODUCTION

Cleft lip and/or palate is a congenital malformation that compromises the integrity of the lip and/or palate. The etiology remains not completely understood. Most of the times, its occurrence is attributed to the multifactorial theory, which can be summarized as the interaction of genetic and environmental factors that act alone or in association with infectious diseases, drugs with teratogenic potential, illicit drug, medications, chemicals, and nutritional deficiency during pregnancy.¹⁻³

The prevalence of CLP varies according to geographical location and ethnic groups, being more frequent in Asian descendants, and it affects between one and two individuals per 1,000 births, representing in Brazil an average occurrence of 1 for every 700 live births. Among the existing craniofacial anomalies, CLP is the most frequent.^{1,4-9}

The occurrence of these anomalies is one of the primary causes of tooth impactions.¹⁰⁻¹² When located in the alveolar ridge, the presence of adjacent impacted teeth to cleft very often requires the presence of bone in the region for the eruption of these teeth through bone grafts.¹³⁻¹⁵

Bone grafts are surgical procedures involving the removal of a small amount of bone from the patient's own (autologous bone) and transplanted into the area of bone defects.^{16,17} These grafts are performed based on the stage of eruption of the permanent upper canine with 1/2 to 2/3 of the root formed.¹² When this procedure is

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Fig. 1: The cleft area, after secondary alveolar bone grafting

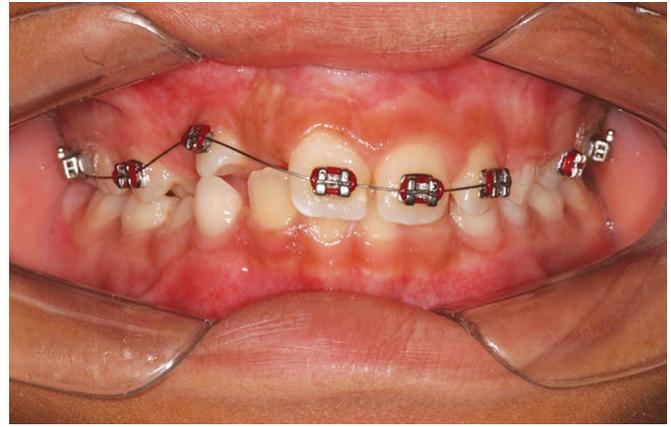


Fig. 2: Eruption of the canine tooth

performed before the eruption of the maxillary canine, it is considered premature, and when performed at any time after full eruption of canines, it is considered as late.¹⁸ Accordingly, the secondary alveolar bone graft is so named because they are made at the end of the process of the mixed dentition and are used in an attempt to promote the spontaneous eruption of teeth, in the adjacent areas of the cleft.¹²

Thus, the aim of this study was to assess eruption of impacted teeth after secondary alveolar bone graft in CLP.

MATERIALS AND METHODS

The study was approved by the Ethics in Research Committee of the University of Cuiabá, Brazil, protocol number 2011/157.

This is a study of transverse cutting, involving the patients received at the University General Hospital of the University of Cuiabá (HGU-UNIC) Craniofacial Rehabilitation Center in the period between November 1, 2004 and December 31, 2011.

The archives, files, and panoramic radiographs of all the patients received at the CLP Rehabilitation Center in the HGU-UNIC were analyzed, according to the following variables: gender, age, cleft type, cleft side, laterality of cleft, impacted teeth, and orthodontic traction.

Following established criteria for inclusion and exclusion of 646 patients, 42 were selected for this study. The inclusion criteria were: medical records of patients with CLP with impairment of alveolar ridge and at least one permanent tooth included in the margins of the cleft at the time of secondary bone grafting; patient with mixed dentition independent of chronological age (Figs 1 and 2). The exclusion criteria were: patients with incomplete data; no initial panoramic radiograph or control; with damaged radiographs; records of patients with diagnosis of associated systemic diseases or syndromes and patients

who underwent extraction of impacted tooth at the time of bone graft.

After collecting the data, descriptive statistical analysis was performed to establish the relative and average frequencies. Possible associations between the variables were evaluated using the chi-square test. A p-value <0.05 was considered statistically significant.

RESULTS

In the total of 42 patients, the CLP was most prevalent in males, 54.76% (n = 23). It was more frequently observed between 9 and 11 years in 59.53% (n = 25). The data about the frequency of variables cleft type, cleft side, cleft laterality, impacted teeth, and orthodontic traction are shown in Table 1.

Table 1: Distribution of patients with CLP according to the variables: gender, age, cleft type, cleft side, and laterality

Variable	n	Percent
<i>Gender</i>		
Female	19	45.24
Male	23	54.76
<i>Age group (years)</i>		
9–11	25	59.53
12–14	12	28.57
15–16	05	11.90
<i>Cleft type</i>		
PIC	09	21.43
TIC	33	78.57
<i>Cleft side</i>		
Right	20	47.61
Left	27	64.28
<i>Laterality of cleft</i>		
Unilateral	36	85.71
Bilateral	06	14.29
<i>Impacted teeth (n = 57)</i>		
Maxillary canines	41	97.61
Lateral incisor	16	38.01
<i>Orthodontic traction (n = 54)</i>		
Yes	14	33.33
No	40	95.23

Table 2: Distribution of cleft type and cleft side according to the gender of patients with CLP

Gender	Cleft type (n = 54)			Cleft side (n = 60)		
	PIC (%)	TIC (%)	p-value	Right (%)	Left (%)	p-value
Female	11 (78.6)	14 (35.0)	0.0048	9 (36.0)	17 (48.6)	0.3326
Male	3 (21.4)	26 (65.0)		16 (64.0)	18 (51.4)	
Total	14 (100)	40 (100.0)		25 (100.0)	35 (100.0)	

Pearson chi-square

Table 3: Distribution of impacted teeth according to the variables: gender, cleft type, and cleft side of patients with CLP

Gender	Maxillary canines (%)	Lateral incisors (%)	p-value
Male	21 (51.2)	10 (62.5)	
Cleft type			
PIC	9 (23.7)	5 (31.2)	0.5623
TIC	29 (76.3)	11 (68.7)	
Cleft side			
Right	18 (43.9)	7 (43.7)	0.9916
Left	23 (56.1)	9 (56.3)	

Pearson chi-square

Table 4: Distribution of orthodontic traction according to the variables: gender, cleft type, and cleft side of patients with CLP

Gender	Orthodontic traction		
	Yes (%)	No (%)	p-value
Female	6 (42.9)	19 (47.5)	0.7642
Male	8 (57.1)	21 (52.5)	
Cleft type			
PIC	0 (0.0)	14 (35)	0.0101
TIC	14 (100)	26 (65)	
Cleft laterality			
Right	4 (28.6)	21 (52.5)	0.1222
Left	10 (71.4)	19 (47.5)	
Impacted teeth			
Maxillary canines	9 (64.3)	29 (72.5)	0.5523
Lateral incisors	5 (35.7)	11 (27.5)	

Pearson chi-square

Table 2 shows the distribution of cleft type and cleft side according to the gender and cleft type, and it was significant (p = 0.0048), while cleft side was not significant (p = 0.3326).

Table 3 shows the distribution of impacted teeth according to the variables gender, cleft type, and cleft side. It was not significant (p < 0.05).

Table 4 shows the distribution of orthodontic traction according to the variables gender, cleft type, cleft side, and impacted teeth. The orthodontic traction was more common in males, 57.1% (n = 8); TIC 100% (n = 14); cleft side 71.4% (n = 10); and maxillary canines 64.3% (n = 9). However, only the variable "cleft type" was considered significant (p = 0.0101).

DISCUSSION

Cleft lip and palate is a developmental abnormality that affects individuals of both sexes. In this study, males showed a higher proportion, as they represent 54.76% of the sample, in agreement with published studies.^{7,8,12}

In this study, only patients with clefts involving the lip and alveolus, or lip, alveolus and palate concomitantly were considered. Therefore, only PIC and TIC were examined. Of the selected patients, 21.43 and 78.57% had PIC and TIC respectively. Some studies have presented results ranging from 65.8 to 80.7% for these types of clefts.^{12,14}

The TIC extends from the nose to the palate, leaving no bone in the region where corresponding teeth must erupt; 75.5% of not erupted teeth were included in this type of crack when compared with the preforamen clefts and preforamen clefts, while the canines correspond to

69.8% of the same. The results obtained in this study are similar to published works.^{11,12,14}

In the areas corresponding to cleft, there was no bone, but with an open cavity, and most do not have soft tissue in the median region of the facial lower thirds, especially reaching the nose, lip, and alveolus. This facial appearance becomes a stigma to the sufferer. Without the supporting bone, the dental eruption in the region will be difficult, and may even impact the teeth near the cleft or in some cases absent.^{14,16} In the present study, maxillary canines and lateral incisor impacted were observed.

The lack of dental eruption in the bone graft area after 12 months of surgery requires careful evaluation of imaging tests to establish the orthodontic traction of impacted teeth.^{10,12,16-19} In this study, during this same period, we noted this need in 33.33% of cases evaluated.²⁰

By relating the orthodontic traction with the cleft type, all patients had their teeth erupted naturally when it was PIC, while there was orthodontic traction in all cases of TIC. This is probably due to the fact that in these clefts, the region devoid of bone tissue is greater as well as the time required for this type of cleft bone graft. Similar results have been noted in the literature.²¹ It was considered significant (p = 0.0101), indicating the need for traction in most cases with TIC.

According to the literature, for cases in which there is involvement of alveolar ridges, the secondary bone graft surgery is to be performed after 7 years of age in the

presence of incisors impacted. Other authors indicated the same procedure from 8 or 9 years of age, on condition that the maxillary canine had formed two-thirds of the root. This is in contrast with the studies whose authors pointed out that the number of root formed would not affect the results of dental eruption.^{17,21-23} Early secondary bone grafting should be performed between the ages of 5 and 7 years to promote the eruption of the lateral incisor.²⁴ In this research, the average age for bone graft surgery was 11.5 years. The time for the secondary bone graft is very important for proper alignment of the teeth adjacent to the cleft, and depending on the plan, it is important to include the lateral incisors for esthetic and functional restoration of the patient. It is believed that the bone graft needs to be anticipated, considering the root of the lateral incisor and not the canine root, in order that the lateral incisor eruption maintains the bone graft in place, allowing further eruption of canine.^{13,14,16,22}

In the present study, the presence of secondary bone grafting contributed to the spontaneous eruption of most retained lateral incisors in the area of cleft. Thus, the authors state that this clinical procedure should be performed early, considering the formation of the root of the incisor and not the root of the canine.^{10,17,24}

CONCLUSION

Based on the methodology, it was possible to conclude that (i) the TIC was the most frequent between the patients with cleft lip and/or the male gender was most affected; (ii) the canine teeth were the most prevalent and mainly related to the TIC; (iii) all impacted teeth erupted spontaneously in the PIC after placement of the bone graft.

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