



Early secondary bone grafting in children with alveolar cleft does not modify the risk of maxillary permanent canine impaction at the age of 10 years



Flavie Kleinpoort ^a, Hugo Ferchichi ^b, Anissa Belkhou ^c, Paul Tramini ^{d, e}, Michèle Bigorre ^c, Guillaume Captier ^{c, e, *}

^a Faculté d'odontologie, Département de chirurgie orale, Université Paul Sabatier, Toulouse, France

^b Faculté d'odontologie, Département d'orthodontie, Université Montpellier 1, Montpellier, France

^c Département de chirurgie orthopédique et plastique pédiatrique (Head: G. Captier MD, PhD), Hôpital Lapeyronie, CHRU, Montpellier, France

^d Faculté d'odontologie, Département de santé publique, Université Montpellier 1, Montpellier, France

^e Laboratoire d'épidémiologie et de recherche clinique EA2415 de Montpellier, Université Montpellier 1, Montpellier, France

ARTICLE INFO

Article history:

Paper received 18 April 2016

Accepted 24 January 2017

Available online 31 January 2017

Keywords:

Alveolar cleft
Early secondary bone grafting
Maxillary canine
Dental impaction

ABSTRACT

Objective: The risk of maxillary permanent canine retention is elevated in children with cleft lip and palate (CLP). This study compared this risk in 10 ± 1 year-old patients with unilateral CLP (UCLP) who underwent or not early maxillary bone grafting at the age of 6 ± 1 years.

Methods: Retrospective, controlled monocentric and observational study with the following inclusion criteria: patients with UCLP, isolated cleft, pre-surgery orthodontic maxillary expansion, same surgical protocol, same surgical team. The risk of maxillary canine retention was evaluated using a dental panoramic radiograph, on the basis of the canine root development stage and of the angle ($>$ or $<45^\circ$) between the main axis of the maxillary canine and a virtual reference axis parallel to the medial sagittal axis.

Results: The impaction risk at the age of 10 was of 14.29% (4/28) for the group who underwent early bone grafting and 21.88% (7/32) for the group without early grafting ($p = 0.45$). Permanent lateral incisor agenesis and the patient's sex did not change this risk.

Conclusions: Early alveolar bone grafting does not significantly change the risk of permanent maxillary canine retention at 10. Long-term followup of a larger population is needed to confirm this result.

© 2017 European Association for Cranio-Maxillo-Facial Surgery. Published by Elsevier Ltd. All rights reserved.

1. Introduction

Alveolar cleft management has remarkably improved in the last few years. Today, it is multidisciplinary with functional, esthetic and psychological objectives. Maxillary bone grafting with gingivoperiosteal flaps associated with orthodontic preparation is an integral part of alveolar cleft management (Abyholm et al., 1981; Bergland et al., 1986; Eppley and Sadove, 2000; Theologie-Lygidakis et al., 2014). However, if maxillary bone grafting is performed before the age of 2 years, it might compromise midfacial growth (Robertson and Jolleys, 1968; Fudalej et al., 2011). On the

other hand, when bone grafting is performed after all permanent tooth eruption, the risk of failure is more elevated with fewer benefits (Hall and Posnick, 1983; Enemark et al., 1988). Since Boyne and Sands (1972), the preferred age for this intervention is before the eruption of the permanent maxillary canine. Indeed, the risk of maxillary permanent canine retention in children with alveolar clefts is very high compared with the general population (Russell and McLeod, 2008; Tortora et al., 2008; Westerlund et al., 2014). Maxillary bone grafting might allow guiding the maxillary permanent canine eruption by favoring its migration and increasing the periodontal support (Troxell et al., 1982, Da Silva Filho et al., 2000). For this, the best time to carry out the alveolar bone graft is at $\frac{1}{4}$ to $\frac{1}{2}$ of canine root development (El Deeb et al., 1982).

Maxillary bone grafting is possible at the time of the permanent central incisor eruption (Precious 2009, Miller et al., 2010);

* Corresponding author. Unité de Chirurgie Plastique Pédiatrique, Hôpital Lapeyronie, 371 Avenue du Doyen Gaston Giraud, 34000 Montpellier, France.
E-mail address: g-captier@chu-montpellier.fr (G. Captier).

however, its effect on the risk of maxillary permanent canine impaction has never been evaluated. The objective of this study was to assess the retention risk at the age of 10 years after early secondary maxillary bone grafting at the age of 5–7 years. The null hypothesis was that early secondary maxillary bone grafting does not modify the risk of canine impaction. Our hypothesis was that early establishment of alveolar bone contour and promoting periodontal health with keratinized gingiva decreases this risk.

2. Materials and methods

This monocentric, retrospective, controlled and observational study on patients born between 1986 and 2005 was carried out at the Pediatric Surgery Service of the University Hospital Center of Montpellier (France).

The risk of maxillary permanent canine impaction on the alveolar cleft side was compared in two groups of 10 ± 1 year-old children with unilateral cleft lip and palate (UCLP): i) group G6 who received an early alveolar bone graft at the age of 6 ± 1 years and ii) group G10 without graft (children who underwent secondary bone grafting between the age of 9 and 11 years).

Inclusion criteria for the group G6 were: 1) patients with complete, unilateral UCLP, 2) same protocol of primary surgery (Montoya et al., 2002), 3) early secondary alveolar bone grafting performed at 6 ± 1 years of age by the same surgeon (GC) with autogenous cancellous bone graft from the iliac crest and 4) post-surgery follow-up up to the age of 10 ± 1 years. Early secondary alveolar bone grafting was performed when the permanent maxillary incisor teeth were in the passive pre-eruption phase.

Inclusion criteria for the group G10 were: 1) patients with complete, unilateral UCLP, 2) same protocol of primary surgery, 3) secondary alveolar bone grafting before the eruption of the maxillary permanent canine at 10 ± 1 years, 4) The pre-graft dental panoramic radiograph was used as control to assess the risk of maxillary permanent canine retention in the group G10.

Independently of the age of alveolar bone grafting, this intervention was always preceded by orthodontic maxillary expansion, if required, and the surgical technique was the same for all patients (Captier et al., 2003). The post-surgery radiographic control was done after six months.

Patients with bilateral cleft lip and palate, associated or syndromic forms, unilateral alveolar-labial cleft or operated in another center were excluded from the study.

The risk of maxillary permanent canine retention was assessed in both groups using the dental panoramic radiograph carried out at 10 ± 1 years of age. This exam is considered reproducible and predictive of maxillary canine impaction (Lindauer et al., 1992, Alessandri Bonetti et al., 2009). The evaluation criteria were: i) the angle formed between the main axis of the maxillary canine and a virtual vertical axis of reference that was parallel to the median sagittal axis. When this angle is higher than 45° , the risk of impaction is present (Russell and McLeod, 2008); and ii) the stage of root development of the canine tooth (Sajani and King, 2012). According to El Deeb et al. (1982), the root development stage of the canine on the cleft side is positively correlated with spontaneous canine eruption. In other words, in the presence of delayed root development, the risk of canine impaction is higher.

The secondary objectives were to determine whether the risk of maxillary permanent canine retention was higher in the presence of agenesis of the permanent lateral incisor and whether the risk was different between sexes.

The consent for the use of the clinical data was obtained from the parents of all included children.

Data were analyzed using the chi-squared test. To control all variables, a multiple logistic regression analysis was performed

with estimation of the adjusted odds-ratios. The dependent variable was the presence of an impacted canine. Differences were considered significant when $p \leq 0.05$. All statistical analyses were carried out using STATA v14.1 Figs. 1–3.

3. Results

Among the 177 children who received a secondary alveolar graft, 28 (10 girls and 18 boys) met the criteria for inclusion in the group G6 and 32 (7 girls and 25 boys) for inclusion in the control group G10. A boy from the group G6 was lost to follow-up. The sex ratio ($p = 0.23$), cleft unilateral feature ($p = 0.24$) and cleft side ($p = 0.55$) as well as agenesis of the permanent lateral incisor on the cleft side ($p = 0.33$) were comparable between groups.

No significant difference was found concerning the risk of maxillary permanent canine impaction between groups (Table 1). Four children with risk of maxillary permanent canine retention were identified in the group G6 (14.29%) and seven in the group G10 (21.88%).

No significant difference ($p = 0.41$) was found between the presence or absence of permanent lateral incisor agenesis and the risk of maxillary permanent canine retention on the cleft side. In the group G6, eight patients with agenesis of the permanent lateral incisor on the cleft side were detected (8/28, 28.5%) among whom three were also at risk of maxillary permanent canine retention (Table 2). In the group G10, there were 13 patients with agenesis of the permanent lateral incisor on the cleft side (13/32, 40%) and two were also at risk of maxillary permanent canine retention (Table 3).

No significant sex-related difference ($p = 0.41$) was found for the risk of maxillary permanent canine retention (Tables 2 and 3). The multiple regression analysis confirmed these results, after adjustment for all the variables (Table 4).

4. Discussion

Our study shows that early secondary alveolar bone grafting (before the eruption of the permanent incisor teeth) does not modify the risk of permanent maxillary canine retention compared with grafting just before the eruption of the permanent maxillary canine (14.29% versus 21.88%; no significant difference), independently of the presence or not of permanent lateral incisor agenesis. Overall, the mean retention risk was 18.08%, which is equivalent to the retention risk (18.9%) reported by Matsui et al. (2005) for a series of 150 patients with UCLP. We did not find any significant difference between boys and girls.

The risk of permanent maxillary canine retention in patients with alveolar cleft is very elevated, about 10–20 times higher than in the general population, where it is of 1–2% (Russell and McLeod, 2008; Tortora et al., 2008). The rate of spontaneous maxillary canine eruption after alveolar bone grafting ranges between 27% and 97% (82% in our study) (Westerlund et al., 2014).

In the general population, palatal displacement of the permanent maxillary canine and the risk of retention could have a genetic origin (Peck et al., 1994, 2002). According to these authors, this hypothesis is strengthened by the following clinical findings: 1) the presence of other dental anomalies, 2) the occurrence of bilateral palatal displacement of the canine teeth, 3) sex differences in canine palatal displacement, 4) familial forms, and 5) differences between populations (predominantly European trait). In patients with cleft lip and palate, the risk of permanent maxillary canine retention can be increased by the presence of dental anomalies (Celikoglu et al., 2015). Baccetti (1998) found that there is a link between four tooth anomalies: aplasia of the second premolar tooth, small size of the permanent lateral maxillary incisor tooth, infraocclusion of the first molar teeth and palatal displacement of

Download English Version:

<https://daneshyari.com/en/article/5640190>

Download Persian Version:

<https://daneshyari.com/article/5640190>

[Daneshyari.com](https://daneshyari.com)