

# EVALUATION OF SECONDARY ALVEOLAR BONE GRAFTING PROCEDURES

<sup>1</sup>AZHAR SHEIKH, MSc, FDS RCS

<sup>2</sup>ULFAT BASHIR, FCPS

<sup>3</sup>OWAIS KHALID DURRANI

<sup>4</sup>RAFIA ANEEQALAHOTI

<sup>5</sup>MOHSIN FAZAL

## ABSTRACT

*The most common procedure followed globally for the bony repair of a cleft palate is by grafting the iliac crest in the defect. The objective of this study was to evaluate the success of the alveolar bone grafting procedures carried out at our institute by using the Berglands Index. A total of 12 patients were evaluated by taking periapical radiographs of the grafted site 6 months post surgery. It was found that 77% of the patients had a bone level of more than 3/4. It was also deduced that the success rate of the grafted bone was 100% when the bone was grafted before the eruption of the canine while success rate dropped to 40% in patients in which the procedure was performed after the eruption of the canine.*

## INTRODUCTION

A cleft palate is the embryological failure of the hard palate to fuse together while the child is in utero. A cleft lip is caused by failure of the tissue surrounding the lip to fuse together during the same period. Most children who have this condition at birth can be helped by surgery. The most common protocol for cleft lip and palate repair is before three months of age the lip is repaired and at 6 months the soft tissue defect in the palate is approximated. The alveolar bone grafting (ABG) done to fill the bony defect is most commonly done at 8-15 years.<sup>1</sup>

The main objectives of the alveolar bone grafting are to<sup>2</sup> fill the residual osseous cleft of alveolus and anterior palate, enhance maxillary stability, obtain functional bony tissue at the donor site where teeth can erupt, give support to the alar bases and to improve dental and facial esthetics.

In autograft materials the Iliac crest is the most popular site as the cancellous bone is abundant over here which rapidly transforms into alveolar bone. Other contemporary materials are not in common use and are not as successful as iliac bone grafts.<sup>3,4</sup>

## METHODOLOGY

The purpose of this study was to evaluate the success of alveolar bone grafts with iliac crest being the donor site performed at Islamic International Dental Hospital, using the Bergland's Index.<sup>5</sup> All surgical procedures were carried out by the same surgeon with the same team at the same hospital setting

A total of 15 patients have undergone secondary alveolar bone grafting at this center in the past two years. All the patients who had undergone surgery at least 6 months prior to this study were recalled for the

<sup>1</sup> Head of Department of Oral and Maxillofacial Surgery, Islamic International Dental Hospital, Islamabad

<sup>2</sup> Head of Department of Orthodontics

<sup>3</sup> Assistant Professor, Department of Orthodontics

<sup>4</sup> House Officer, Department of Orthodontics

<sup>5</sup> Senior Registrar, Department of Oral and Maxillofacial Surgery

**Correspondence:** <sup>1</sup>Department of Oral & Maxillofacial Surgery, Islamic International Dental Hospital, G7/4, Islamabad. Email: drowiz@yahoo.com, Cell: 0333-9114500

radiographic evaluation. Seven females and five males (12 patients in total) were willing to come for the non-mandatory evaluation. Out of these 10 patients had unilateral clefts and two had bilateral cleft. The mean age at the time of operation of these patients was 13.4 with a range of 9-24 years.

The periapical radiographs taken at the same angulation using a film holder were used to measure the bone status at the cleft site.

An acetate sheet was then mounted on the periapical films to evaluate the success of the bone grafting according to the Bergland index<sup>6</sup> (Figures 1 and 2)

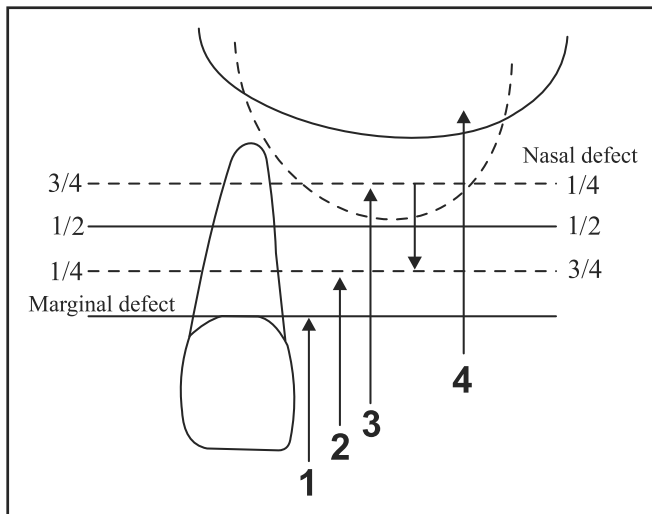


Fig 1: Diagram showing the Bergland Index used for assessing the quality of secondary alveolar bone grafting in UCLP. 1, 'perfect' bone graft; 2, marginal defect up to 1/4 of root length; 3, marginal defect more than 1/4 of root length; 4, failure.<sup>5</sup>

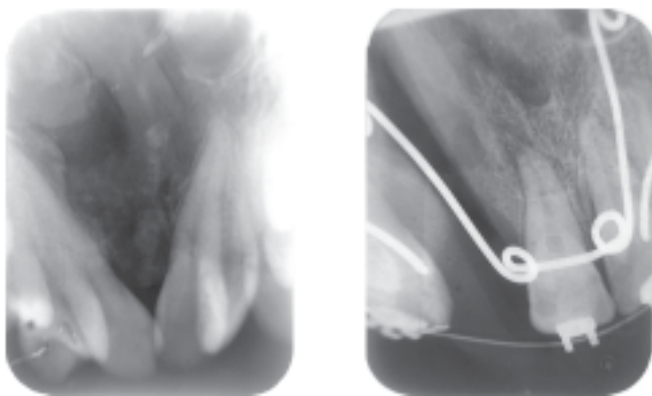


Fig 2: Periapicals showing a Bergland Index score of 1 and 4.

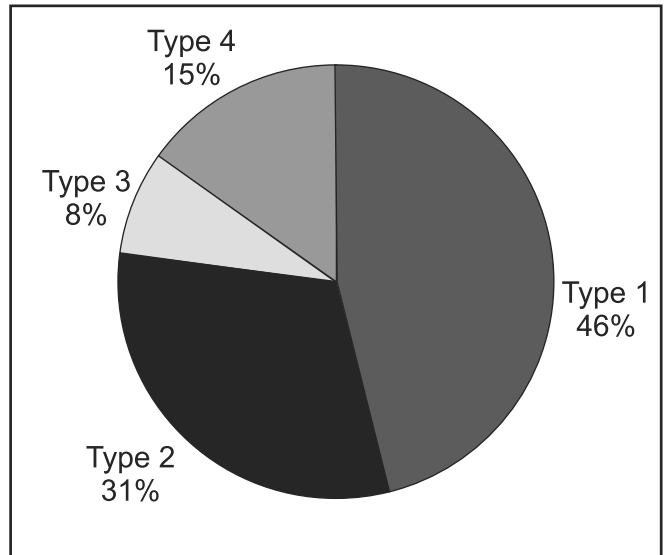


Fig 3: Frequency distribution of the crestal alveolar bone height

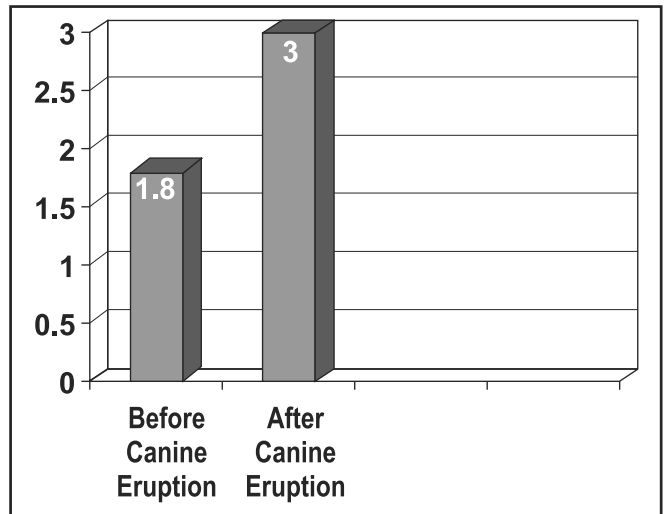


Fig 4: The Mean score for the patients in which the ABG was performed before and after canine eruption

## RESULTS

Frequency distribution of the scores of the alveolar bone height are summarized in figure 3 while the mean scores of patients in which ABG was performed before and after canine eruption are summarized in figure 4. The incidence of successful bone grafting before and after the eruption of the canine is summarized in figure 5.

## DISCUSSION

Bergland, Semb and Abyholm in 1986 proposed a method of evaluating the success of alveolar bone

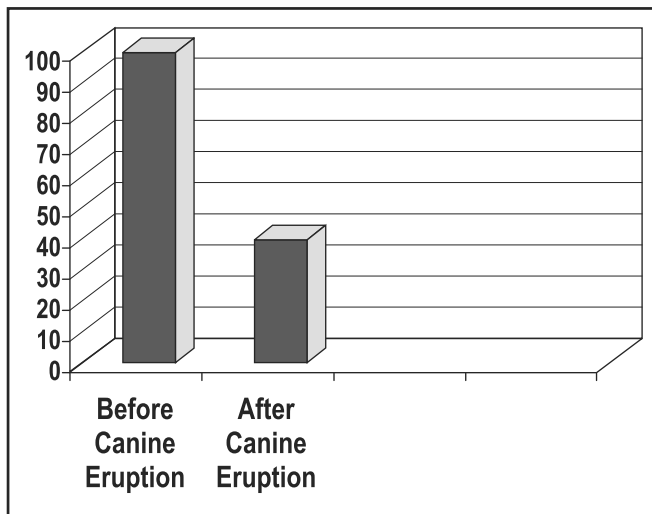


Fig 5: The Incidence of successful bone grafting before and after the eruption of canine

grafting by measuring the alveolar crest height in relation to the adjacent teeth.<sup>6, 7</sup> According to them a graft was considered successful if the root coverage was at or more than 2/3 of the adjacent teeth six months after grafting, i.e. the a Bergland index score of 1 and 2.<sup>6, 7</sup> In the present study the overall success rate of alveolar bone grafting was 77% of the total cases operated upon, this is better than the radiographs evaluated by Williams et al<sup>5</sup> from the CSAG study in UK where the success rate was determined to be 59% with serious deficiency (Grade F) in 29% of the cases as compared to 15% in cases performed at our center. It should also be appreciated that after the implementation of the recommendations put forth after the CSAG study Revington and McNamara in a recent multicenter study in the UK have determined the success rate to be 86% in 2006 radiographs.<sup>8</sup>

The studies carried out by Meazzini et al<sup>9</sup>, Bergland et al<sup>6, 7</sup> and Bayerlein et al<sup>10</sup> suggest better formation of bone at the cleft site when the ABG was performed before the eruption of the canine in the alveolar segment. This study tends to agree with the aforementioned authors, as the mean Bergland's index score achieved in the patients in which the ABG was performed before the canine eruption was 1.8 with a 100% successful bone formation. This was not as good as in the patients in which the ABG was performed after the eruption of the canine, the index score being at 3 and with 40% of patients in which the bone formation was successful.

## CONCLUSION

1. Alveolar bone grafting with bone from the iliac crest is a viable procedure for the repair of the alveolar defect.
2. This procedure should ideally be performed before the eruption of the adjacent tooth (canine or lateral incisor) in the grafted bone for optimal bone formation in the site.
3. A multi center study with a larger patient pool should be performed to validate the results obtained in this study

## REFERENCES

- 1 Olasoji HO, Hassan A, Adeyemo WL. Survey of management of children with cleft lip and palate in teaching and specialist hospitals in Nigeria. *Cleft Palate Craniofac J.* 2011 Mar; 48(2):150-55.
- 2 Wu Y, Wang G, Yang Y, Zhang Y. Influence of alveolar-bone grafting on the nasal profile: unilateral cleft lips, alveoli, and palates. *J Craniofac Surg.* 2010 Nov;21(6):1904-07.
- 3 van Hout WM, Mink van der Molen AB, Breugem CC, Koole R, Van Cann EM. Reconstruction of the alveolar cleft: can growth factor-aided tissue engineering replace autologous bone grafting? A literature review and systematic review of results obtained with bone morphogenetic protein-2. *Clin Oral Investig.* 2011 Jun;15(3):297-303.
- 4 Lazarou SA, Contodimos GB, Gkegkes ID. Correction of alveolar cleft with calcium-based bone substitutes. *J Craniofac Surg.* 2011 May;22(3):854-57.
- 5 Williams A, Semb G, Bearn D, Shaw W, Sandy J. Prediction of outcomes of secondary alveolar bone grafting in children born with unilateral cleft lip and palate. *Eur J Orthod.* 2003 Apr;25(2):205-11.
- 6 Bergland O, Semb G, Abyholm F, Borchgrevink H, Eskeland G. Secondary bone grafting and orthodontic treatment in patients with bilateral complete clefts of the lip and palate. *Ann Plast Surg.* 1986 Dec;17(6):460-74.
- 7 Bergland O, Semb G, Abyholm FE. Elimination of the residual alveolar cleft by secondary bone grafting and subsequent orthodontic treatment. *Cleft Palate J.* 1986 Jul;23(3): 175-205.
- 8 Revington PJ, McNamara C, Mukarram S, Perera E, Shah HV, Deacon SA. Alveolar bone grafting: results of a national outcome study. *Ann R Coll Surg Engl.* 2010 Nov; 92(8):643-46.
- 9 Meazzini MC, Tortora C, Morabito A, Garattini G, Brusati R. Alveolar bone formation in patients with unilateral and bilateral cleft lip and palate after early secondary gingiv-alveoloplasty: long-term results. *Plast Reconstr Surg.* 2007 Apr 15;119(5):1527-37.
- 10 Bayerlein T, Proff P, Heinrich A, Kaduk W, Hosten N, Gedrange T. Evaluation of bone availability in the cleft area following secondary osteoplasty. *J Craniomaxillofac Surg.* 2006 Sep;34 Suppl 2:57-61.