

CLEFT ALVEOLUS; A STUDY ON 49 CASES AT KHYBER COLLEGE OF DENTISTRY PESHAWAR

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ABSTRACT

Objective: The aim of this study is to present pattern of cleft alveolus, treatment with alveolar bone grafting and complications encountered during and following alveolar bone grafting.

Materials and Methods: This study was carried out in Department of Oral and Maxillofacial Surgery, Khyber College of Dentistry Peshawar over a period of 5 years from June 2009 to April 2014. Ethical approval for the purpose of this study was taken from the hospital's ethical review committee. An informed consent was taken from the patient/guardian after explaining purpose and methodology of the research. Thorough history was taken from patient or guardians followed by detailed clinical examination of the patients. Site, size, oronasal communication, presence or absence of teeth, additional or supernumerary teeth, morphology and alignment of erupted teeth were noted. Plain radiographs including Orthopantomogram and upper occlusal view were advised to all patients. Location of the cleft, size and presence or absences of teeth in cleft and unerupted teeth were assessed in the radiograph.

Results: A total of 49 patients having cleft alveolus were included in this study. Thirty three (67%) were male while 16 (33%) were female. Mean age was found to be 12.51 years \pm 3.92 SD. Unilateral cleft alveolus was present among 31 (63%) patients, while in 18 (37%) patients the defect was bilateral. Supernumerary teeth were found in 9 (19%) patients. Oronasal communication was present among 27 (55%) patients. Iliac graft reconstruction of cleft alveolus was done in 32 patients (67%). Failure occurred in 3 patients.

Conclusions: Unilateral alveolar clefts are common and bone grafting in mixed dentition stage using anterior iliac crest is successful.

Key words: Cleft alveolus, Iliac crest bone graft.

INTRODUCTION

Orofacial clefts including cleft lip, cleft palate either alone or in combination affect many important functions like swallowing, speech, hearing and appearance. Cleft alveolus occur as an integral component of cleft lip and palate which refers to the space between the maxillary segment anterior to incisive foramen and present as discontinuity in the dental arch. Children having cleft lip, palate and alveolus require multidisciplinary approach and Oral & maxillofacial surgeon along with orthodontist forms an integral part of cleft lip and palate team¹.

While the repair of cleft lip and palate is done with excellent results in first two years of child life, bony deficiency in the alveolus is not addressed during this time period². For the repair of cleft alveolus, bone grafting has become a common procedure. The only difference is the timing of the bone graft at various centers. According to the timing of bone graft, it is considered as primary, secondary or tertiary³. Witzenberg in 1985 defined grafts as primary or early, early secondary, secondary and late secondary or tertiary bone grafting⁴. Bone grafting that is performed at the time of primary repair surgeries (0-2.5 years) is termed as primary bone graft⁵. Early Secondary bone graft is performed later at the time of mixed dentition stage (2-5 years), secondary (6-12 years)⁶, while late secondary or tertiary bone graft is performed in permanent dentition after completion of orthodontic treatment⁷. Out of all 3 types of grafting, secondary bone grafting remains the most useful and advantageous approach

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of treating cleft alveolus⁸. The main objective of secondary alveolar bone graft (ABG) is to fill the residual osseous cleft alveolus and anterior palate, to give support to alar base, to eliminate residual Oro-nasal fistula and mucosal recesses, to enhance maxillary stability especially in bilateral clefts with mobile premaxilla, to facilitate eruption of teeth and support adjacent dentition, to provide bone for subsequent placement of osseointegrated implants and to improve dental and facial aesthetics⁹.

A number of different materials have been proposed in literature for grafting of cleft alveolus including autogenous, allogenic, xenogenic materials and more recently growth factors such as bone morphogenic proteins (BMP's). Cancellous autogenous bone graft from various body sites remains the ideal source for grafting. The choice of ideal autogenous graft is affected by many factors including surgeon's preference and experience, the volume of bone required and the morbidity associated with harvest¹⁰.

The aim of this study is to present pattern of Cleft alveolus, treatment with ABG and complications encountered during and following ABG in patients reporting to the Department of Oral & maxillofacial surgery Khyber College of Dentistry Peshawar.

METHODS AND MATERIALS

This study was carried out in Department of Oral and Maxillofacial Surgery, Khyber college of Dentistry Peshawar over a period of 5 years from June 2009 to April 2014. Ethical approval for the purpose of this study was taken from the hospital's ethical review committee. An informed consent was taken from the patient/guardian after explaining purpose and methodology of the research. All the patients having cleft alveolus were included in the study. Patients previously operated for alveolar bone grafting and in need of second surgery were excluded.

Thorough history was taken from patients or guardians followed by detailed clinical examination of the patients. Complaints of the patient were noted. On clinical examination the site, size, oronasal communication, presence or absence of teeth, additional or supernumerary teeth and morphology & alignment of erupted teeth were noted. Plain radiographs including Orthopantomogram (OPG) and upper occlusal view were advised to all patients. Location of the cleft, size and presence or absences of teeth in cleft and unerupted teeth were noted in the radiograph. Patients were evaluated systemically regarding their fitness

for surgical procedure under general anesthesia. All the patients underwent orthodontic consultation for assessment of pre surgical orthopedics/orthodontics. Patients were treated by grafting with anterior iliac crest bone graft. Standard surgical procedure was followed. Oro-nasal communication if any was closed first followed by bone grafting and oral flaps closure. Patients having infection of dental origin in cleft region were treated first either by extraction or endodontic treatment of teeth if required, while bone grafting of cleft site was delayed until infection subsided. In some patients who had soft tissue deficiency and large Oro nasal communication were first treated by repair of soft tissues and bone grafting was carried out later in separate procedure. All the surgeries were carried out under General Anesthesia. Nasogastric tube was used for feeding purpose, antibiotics and analgesics were advised.

Those patients who underwent ABG were followed for post op complications immediately, after 1 week and then monthly for up to 1 year. Patients were examined clinically for complication if any and radiographs were taken to assess grafted bone. Bergland's radiographic criteria were used to assess the height of grafted bone. All the data collected was compiled and analyzed using SPSS 17. A descriptive analysis was used to determine the central tendency and dispersion measures of the variables. Frequency tables were used to determine patient age, gender distribution, cleft location and presence of teeth in cleft margin, and per/post op complications encountered during ABG.

RESULTS

A total of 49 patients having cleft alveolus were included in this study. Thirty three (67%) were male while 16(33%) were female. Mean age was found to be 12.51 SD \pm 3.92. Unilateral cleft alveolus was present among 31(63%) patients, while in 18 (37%) patients the defect was bilateral. It was found that 33(67%) patients had permanent teeth present in cleft margin. Supernumerary teeth were found in 9(19%) patients. Oronasal communication was present among 27 (55%) patients. The details are given in Table-1. All the patients underwent General anesthesia. Iliac graft reconstruction of cleft alveolus was done in 32 patients (67%). Extraction of teeth having infection from cleft margin was done in 12(25%) patients, 4(8%) patients underwent repair of Oro nasal fistula having soft tissue deficiency for bone grafting. One patient treatment was postponed for orthodontics purpose.

Total duration of Hospital stay was 5 days. All patients had pain in donor site that resolved in 1 week time duration. Soft tissue dehiscence at cleft site was

Table-1: Distribution of type of cleft, gender, presence of teeth, supernumerary teeth and Oro-nasal communication

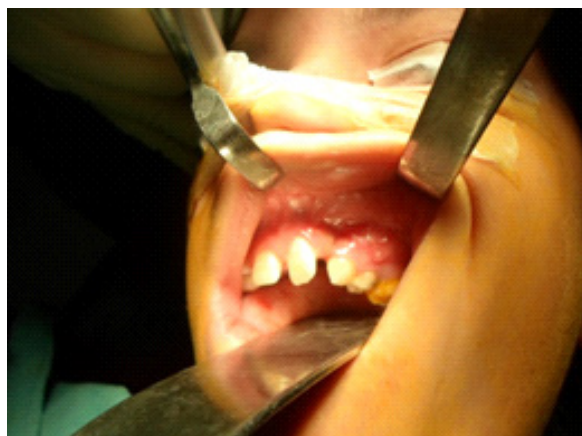
Gender			Type of cleft			Permanent teeth at cleft margin			Supernumerary teeth			Oronasal communication		
	n	%		n	%		n	%		n	%		n	%
Male	33	67	Unilateral	31	63	Present	33	67	Present	9	19	Present	27	55
Female	16	33	Bilaterall	18	37	Not present	16	33	Not present	40	81	Not present	22	45
Total=49 (100%)														

Table-2: Bergland's success criteria for height of ABG (n=32)

Type I bone		Type II bone		Type III bone		Type IV bone		Total	
n	%	n	%	n	%	n	%	n	%
19	59.37	10	31.26	0	0	3	9.37	32	100

found in 3 patients and gait disturbance was seen in 1 patient.

Bergland's radiographic criteria were used to assess height of the grafted bone. Type I bone was found in 19 (59%), Type II bone in 10(31%) where as type IV bone was encountered in 3(10%) cases and three cases required second surgery. The details are given in Table-2.



DISCUSSION

Bone grafting of the cleft alveolus in patients born with cleft and palate is an established practice. It is an important step in the overall management of cleft lip and palate (CLP) patients. Successful grafting allows eruption of teeth into the cleft and the achievement of orthodontic movement of teeth adjacent to the cleft site to obtain non-prosthetic rehabilitation⁸. In this study the mean age of the children who were referred for treatment was 12.51 SD \pm 3.92. The timing of grafting has been the topic of debate for many years, however consensus remains that the success of bone grafting is greatly enhanced if it is performed before eruption of canine in mixed dentition period that is

between 5 and 12 years of age¹¹. In a study reported by Jia LY¹², at the time of bone grafting mean age of the patients was 12.3 years which is in accordance with our study. Moreover the success rate was higher in this age. Similarly the consideration of deleterious effects of surgery on maxillary growth is minimal at this stage¹³.

In the present study, majority of children presented with unilateral cleft alveolus. The epidemiology of CLP shows that bilateral clefts are rare as compared to unilateral clefts. In a study by Brydon¹⁴ the overall ratio of unilateral versus bilateral clefts was 2.49:1. It is important to consider the type of cleft before bone grafting, as some studies indicate that morbidity of ABG is greater in bilateral CLP patients as compared to unilateral cases¹⁵.

The presence of erupted permanent teeth 67% as well as supernumerary teeth 19% was found among children in this study. It is known fact that children born with clefts have a higher incidence of abnormal crown morphology, hypodontia, supernumerary teeth and taurodontosim¹⁶. Similar results were reported in a meta-analysis by Tannure PN¹⁷ where positive association was found between supernumerary teeth and cleft alveolus. The reason may be that development of orofacial cleft is closely associated with tooth germ development and genes responsible for producing clefts also causes problem with teeth development¹⁸. Moreover some reports have suggested that these abnormalities can be correlated with severity of cleft defect and isolated CLP can even be phenotyped on the basis of dental anomalies¹⁹.

One of the goals of cleft surgeries is achieving air tight seal between the oral and nasal cavities. The oro nasal fistula may persist even after primary surgical repair in cleft patients. This is one of the most important factors indicating success of treatment. In current study 55% patients had residual oro nasal fistula. On the basis of location, fistula can either be prealveolar, alveolar or post alveolar²⁰. In a study by Eberlinc A²¹, rate of residual fistula after primary repair was 3.9% which is very low as compared to this study. Moreover these were more common in bilateral CLP as compared to unilateral cases. They also noticed that Oro-nasal fistulas appear in the regions where a two-layer closure is difficult to achieve as in case of alveolar ridge, in places where suturing is difficult often at the junction of the hard and soft palate and at the junction of two different surgical procedures. Development of residual Oro-nasal fistulas is dependent upon extent and

diameter of the cleft, tensionless suturing, two layer closure, surgical technique and infection after repair.

Thirty two patients in current study were treated by bone grafting of the cleft alveolus. Graft was taken from anterior iliac crest using the lateral approach. Both the anterior and posterior iliac bone harvesting approaches have been well explained in literature. The main advantages during anterior iliac bone harvesting approach are less operative time and allowance of two teams to work simultaneously. However more bone procurement, minimal pain, scar and availability of thick skin are the advantages of posterior approach to iliac crest. But in posterior iliac spine bone harvesting the patient's position needs to be changed which can displace the endotracheal tube²².

All patients in this study were followed regularly to see the results of bone grafting. Anterior iliac crest bone graft has a high success rate 91% in this study. Type I Bergland's scale was seen in 59.37% of patients and type II in 31 % patients who undergone ABG. The success of cleft alveolus reconstruction with iliac graft has been well studied in literature. Collins M¹⁵ in his review of 115 patients treated with iliac grafting used Bergland's criteria to judge success of grafts. In his study 86% grafts were successful, while 2.18 percent of the cases had failed (type IV). Trinidad IK²³ by using Bergland criteria found that 71% of patients had type I bone following ABG. In this study 3 patients had lost the grafted bone and required second bone graft surgery.

Main complications found in current study were mild to moderate pain, resorption of bone, tissue dehiscence and temporary gait disturbances. In all patients the pain subsided within one week time. Those patients who had wound dehiscence and bone resorption required second bone graft surgery. Swan MC²⁴ performed a study on morbidity following iliac crest grafting in cleft alveolus. He found the median stay in hospital to be 3 days; the median time till the child could walk properly was 7 days. Postop limp was found in 57% patients 3% had donor site infection. Similarly Tanneru PN²⁵ published study of 10 CLP patients treated with alveolar bone grafting. Iliac crest was used in 9 patients while sympheseal bone in 1 patient. He reported favourable outcome in terms of postop recovery and graft uptake. In another study by Dunphy L²⁶ post-operative complications encountered were temporary neuropraxia of the lateral cutaneous nerve of the thigh and an abnormal gait. Recipient site complications included wound dehiscence and

infection. Similar results of post-operative dehiscence and infections were reported by Murthy AS²⁷. Laurie et al²⁸ reported a high incidence of increased blood loss via the drain, delayed wound healing and moderate postoperative pain (average of six weeks) of the donor site. This rate of complication is high as compared to this study in which anterior iliac bone was harvested.

CONCLUSIONS

Majority of the patients presenting to Department of Oral and Maxillofacial surgery KCD Peshawar were male and unilateral cleft was common. Supernumerary teeth were found in 19% cases. Bone graft harvested from anterior iliac crest has a good success rate with minimal complications. Bone grafting carried out in mixed dentition stage between age of 8 years to 12 years has good success rate. Majority of the patients who undergone ABG with iliac crest bone do not require second surgery.

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