

# Premaxillary Setback by Posterior Vomerine Osteotomy in Cases of Protruded Premaxilla in Bilateral Cleft Lip Patients: Experience at the Children's Hospital, Lahore

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## ABSTRACT

**Background:** Protruded premaxilla is the most common problem in cases of bilateral cleft causes difficulty in achieving repair in most of the cases as lateral lip elements are not so developed to reach the height of premaxilla leading to significant issues in facial appearance and functions in early childhood. Such premaxilla usually attains an unsightly position after cleft repair. As malpositioned premaxilla is difficult to deal with orthodontic treatment in later childhood, surgical repositioning of premaxilla concomitant to lip repair is much needed in such cases for better aesthetic and functional outcome from early childhood.

**Patients and methods:** This prospective study was conducted at the Children's Hospital Lahore from January 2017 to December 2022. A total of 30 patients were enrolled and were dealt with posterior vomerine osteotomy for premaxillary set back. Premaxillary protrusion of more than 10mm was the inclusion criteria. All syndromic patients were excluded from this study. Frequency and percentages were calculated using SPSS 23.0.

**Results:** Out of 30 patients, 16 (54%) were male and 14 (46%) were female. Age range was from 3 month to 9 months (mean age  $4.6 \pm 1.6$  months), Follow up was from 1 - 5 years (mean  $2.2 \pm 1.07$  years). Set back ranged from 8 mm to 20 mm (mean  $12.86 \pm 1.89$  mm). All patients had good aesthetic and functional outcomes assessed by visual analogue scale and scoring system respectively.

**Conclusion:** Premaxillary setback by posterior vomerine osteotomy is safe option at the time of lip repair for the protruded premaxilla and produces best aesthetic and functional outcome.

### Keywords:

Premaxillary setback, posterior vomerine osteotomy, premaxillary protrusion

## INTRODUCTION

Premaxillary protrusion affect more than 70% of bilateral cleft lip patients and has remained a great challenge before the advent of nasoalveolar molding.<sup>1</sup> The condition has always resulted in misaligned and tilted position after cleft lip repair without appropriate surgical manipulation. This deformity manifests as lingually-tilted premaxillary protrusion, elongation, rotation or both, leading to considerable cosmetic disfigurement and oral functions, which can result in lower self-esteem of child and parent's anxiety.<sup>2</sup> Secondary correction of the premaxilla is required for these problems, and the osteotomy is typically used for this correction. Premaxillary secondary osteotomy is a widely used procedure, but surgeons do not agree on the ideal age for the procedure's use.<sup>3</sup>

Majority of surgeons favor performing an alveolar bone graft and a "late" osteotomy on patients between the ages of 9 and 12. Proponents of late osteotomies contend that osteotomies performed before the age of 8 years interfere with the development of the midface; however, many young children present with compromised oral and facial functions, making it unreasonable to wait until they are nine or twelve years old to correct them.<sup>4</sup> primary objective of our study is to ascertain the better aesthetic and functional outcome with setback technique at the time of lip repair in order to improve the child's quality of life from the start and to establish its safety in early age group due to its minimal complication.

## PATIENTS AND METHODS

This prospective observational study was conducted in The Children's Hospital Lahore from January 2017 to December 2022. A total of 30 patients with bilateral cleft lip and palate who underwent primary setback by posterior vomerine osteotomy were enrolled by

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consecutive sampling technique. Inclusion criteria was premaxillary protrusion more than 10mm. All syndromic patients were excluded from the study. A written informed consent was taken and study perspectives were clearly explained to all patients. Approval from hospital ethical committee taken before this study.

When there are no other options, protrusion of premaxilla more than 1 cm is used as the threshold for when a setback is necessary. The rest of the clinical examination especially the relationship between the premaxillary anatomy and the palate, is also essential to the planning process. The amount of the osteotomy is determined by the extent of the protrusion for the setback to restore continuity of the maxillary arch. Under general anesthesia, the single-stage procedure is carried out while the patient is supine with slight neck extension and head stabilization. Lip is marked as per **Mulliken's marking**.<sup>5</sup> Freshly prepared local anaesthetic using 90 ml normal saline, 1 ml of 1:1000 adrenaline and 10 ml 0.5% bupivacaine is mixed and injected as 1ml per Kg of child weight to achieve haemostasis by vasoconstriction and to control post-operative pain. Local anaesthetic solution is injected using 30 Gauge needle into prolabium, lateral lip elements, nose and inferior turbinate. Mouth gag is inserted and vomer is

injected to raise vomerine flap in subperiosteal plane.<sup>6</sup> Five minutes are given for local anesthetic to settle followed by marking of vomer followed by incisions made vertically over the vomer posterior to vomer-premaxillary suture. (Figure 1A-C) Vomerine flaps are retracted and sutured with lateral palatal shelves with 5/0 polygalactin sutures. (Figure 1D) Vomer bone that need resection is marked as wedge and using fine bone nibbler vomer is resected in small chunks. (Figure 1E) After removal of wedge of bone mouth gag is removed and mobility of premaxilla is checked. Using periosteal elevator mucosa is mobilized from upper segment of vomer and from septal cartilage. Part of septal attachment from vomer is detached using periosteal elevator till whole bony complex of premaxilla –vomer is free and gently pushed towards base of skull avoiding fracture at premaxilla- vomerine suture. Removed bone is crushed and used as bone graft at the fracture site. (Figure 1F-G) Stay sutures are removed and incision is closed in continuous locking fashion using 5/0 polygalactin suture. (Figure 1H) After complete lip dissection, premaxilla is stitched with polygalactin 4/0 stitches to lateral maxillary shelves, two simple stitches are placed on each side followed by lip closure and primary rhinoplasty using Tajima nasal incisions.<sup>7</sup> (Figure 1 I-J).

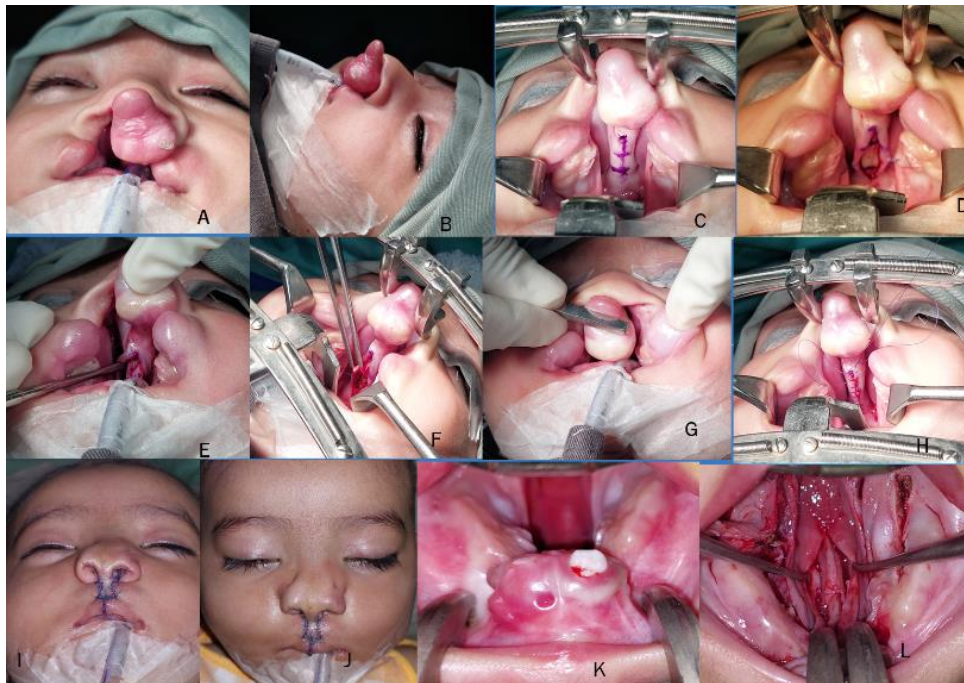


Figure 1: **A.** A 5 month old child with bilateral cleft lip and palate with premaxillary protrusion **B.** Lateral view **C.** Incision marking over vomer **D.** Vomerine flaps retracted and wedge of bone removed **E.** Subperichondrial and subperiosteal dissection of vomerine-septal mucosal flap for premaxillary mobilization **F.** Placement of removed bone as bone graft **G.** Gentle push down of premaxillary segment **H.** Incision closure in continuous fashion **I,J.** Post-operative view **K.** Position of premaxilla at the time of palate repair at 12 month of age **L.** Completely healed bone at the time of palate repair.

The anatomical reference points are unaffected by the premaxillary setback, despite the fact that it is anticipated to alter the prolabium's location and the cleft lip's configuration. The osteotomies are performed, as far as possible, away from growth centers. The vascular supply of the philtrum and premaxilla is carefully preserved. Digital pushback is used for premaxillary retropositioning. Patients are put on liquid to semisolid diet after surgery for three weeks, after which they can resume their regular diet without any limitations. Regardless of the patient's age, the postoperative instructions are the same. After surgery, patients are given cefipime course lasting three days. Premaxillary vascularity is assessed 24 hours following the procedure the premaxilla's color was evaluated clinically in order to make this determination.

Premaxilla's mobility is checked in a week time. Suture line stability was assessed clinically by moving premaxilla at the time of palate repair at 1-year age. Age, weight, height, sex, haemoglobin level, premaxillary protrusion from maxillary arch, position of premaxilla, length of setback, peroperative blood loss, postoperative airway difficulty, vascularity of premaxilla, mobility of premaxilla, aesthetic outcome, teeth alignment, midface retrusion, nasal regurgitation, speech was observed on predesigned questionnaire. Continuous data were expressed as mean  $\pm$  standard deviation. Categorical data were expressed as percentages and frequencies. Serial photograph in frontal, lateral and worm eye view were obtained on regular follow up period. Statistical package for social sciences (SPSS-23) was used to analyze data.

## RESULTS

Out of 30 patients, 16 (54%) were male and 14 (46 %) were female. Age range was from 3 month to 9 months (mean age  $4.6 \pm 1.6$  months), Follow up was from 1 - 5 years (mean  $2.2 \pm 1.07$  years). Set back ranged from 8 mm to 20 mm (mean  $12.86 \pm 1.89$  mm). None of the patients had any complication of excessive blood loss, airway compromise preoperatively. None of the patients had any vascular compromise of premaxilla / prolabium or lip dehiscence. All patient had stable premaxilla in follow up period at the time of palate repair. Good aesthetic outcome was observed in >90% patients (Figure 2-4). Nasal regurgitation of food content was observed in <10% of patients after palatoplasty. Dental alignment was good in 70%, average in 20% and poor in 10% patients. Early midface retrusion on lateral profile picture was observed



Figure 2: **A.** 3-month-old child with bilateral cleft lip and palate with premaxillary protrusion **B.** Postoperative picture at 1 year of age

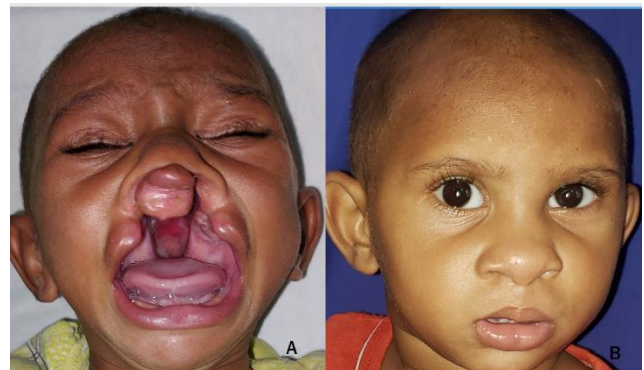


Figure 3: **A.** 6-month-old child with bilateral cleft lip and palate with premaxillary protrusion **B.** Postoperative picture at 16 month of age



Figure 4: **A.** 3-month-old child with bilateral cleft lip and palate with premaxillary protrusion **B.** Postoperative picture at 11 month of age

in 10% patients.

## DISCUSSION

A delicate balance must be maintained between the soft tissue and bony anatomy of face to better facial aesthetics and normal and proportionate growth. These relationships are disrupted in patients with bilateral cleft lip and a protruding premaxilla, resulting in the premaxilla projecting unrestrainedly and collapse of lateral maxillary shelves.<sup>6</sup> Position of premaxilla, which

usually remains protruding, long in vertical direction, malrotated in lingual plane, and overriding the collapsed lateral maxillary shelves, is not corrected by the bilateral cleft lip repair over a protruded premaxilla.<sup>8</sup> Frequently, nasal regurgitation of liquids and food particles, as well as nasal emission of air, are caused by lateral or dorsal oronasal fistulas to the premaxilla.<sup>9</sup> Speech issues, poor dental hygiene, and facial differences can all contribute to serious psychosocial issues and social stigma in children. Premaxilla correction is necessary as these issues affect children during their preschool and early school years.

In this study of 30 patients, the technique of premaxillary setback with posterior vomerine osteotomy along with primary rhinoplasty is a new technique for the early management of protruded premaxilla and have produced excellent aesthetic results. This technique demonstrates that this procedure can be carried out without need of much sophisticated postoperative care and our results are consistent with the study conducted by Usama et al.<sup>9</sup>

The possibility of endangering premaxillary perfusion is a significant factor influencing the surgical approach.<sup>10</sup> Premaxillary osteotomy has been the subject of numerous debates in the past. A childhood injury to the nasal septum, which is thought to be the pacemaker for midfacial growth, can result in developmental abnormalities of this region. In order to avoid potential interference with maxillary growth, previous authors recommended to perform a premaxillary osteotomy after the patient turned 6 years old. However, one study reported that 8 years old was the minimum age for a premaxillary osteotomy.<sup>11</sup>

Even there are few published reports on this procedure but experience in present study demonstrated the technique had no complication of premaxillary vascular compromise in the hand of senior plastic surgeon as there is minimal chance of vascular compromise of premaxillary segment due to location of osteotomy in posterior segment of vomer.<sup>12</sup> Added benefit is the primary rhinoplasty, which is easily carried out for better aesthetic outcome.

It was thought to change the angle of osteotomy/osteotomy according to the age of patients but we have seen that during early months of life osteotomy design is symmetrical and osteotomy should not damage the septum in the area of basal zone which extend between sphenoid bone to anterior nasal spine which is thought to be the growth center for the septal cartilage to prevent future growth of premaxilla and the maxilla.<sup>13</sup>

Studies have shown that bilateral cleft lip patients who have not undergone surgery have slight projection of premaxilla and premaxillary teeth, slight projection of upper jaw and mild mandibular hypoplasia as compare to patients who had undergone repair for bilateral cleft lip and palate.<sup>14</sup> In one report, the authors reported that most of patients reported retraction of maxilla after premaxillary setback.<sup>15</sup> It is not necessary to wait until the age of 10 to 12 years old to properly position the premaxilla because one previous study reported that no long term detrimental effect on midfacial growth occurred due to premaxillary setback in children of different age groups. However, because osteotomy and premaxilla repositioning can result in segment necrosis and teeth abnormalities due to vascular insult, therefore their recommendation was to perform this procedure in utmost need.<sup>16</sup>

Incidence of midface hypoplasia is much prevalent in cases of bilateral cleft lip patients. That is why many surgeons recommend achieving better aesthetic outcome irrespective of the technique that may affect the midface growth in future. There are several potential causes of the reduced midfacial growth, including cleft palate repair techniques, surgical induced scar, scarring due to lip repair, and intrinsic factors. While preoperative NAM and other presurgical orthopedics have generally produced positive results, some believe that they can also cause hypoplasia similar to what could be due to premaxillary setback.<sup>17</sup>

This study has limitations because of limited number of cases and single center. Due to the unique presentation of each case of protruding premaxilla, it is challenging to control for many patient variables. Our study has limitation to ascertain the long-term effect on facial growth due to its short follow-up therefore we recommend that long term follow up is required to ascertain the definitive effects of this technique on facial profile and to have a better understanding of how different technical issues affect the facial growth. To better understand the impact of various technical factors on facial growth, a multicenter trial may be conducted till the age of adolescence or adult life after premaxillary bone resection for setback for the treatment of these bilateral cleft children. The authors opted this technique as waiting to adjust premaxilla always cause severe anxiety to parents and it has been seen to be safe by many authors. Due to the potential for premaxillary vascular impairment, we did not perform simultaneous gingivoperiosteoplasty in any of the patients.

## CONCLUSION

Protruded premaxilla in cases of bilateral cleft lip and palate patients had always remained a stigma for the child and the family for child better psychosocial development. Premaxillary setback by posterior vomerine osteotomy would be the first line management in future to its excellent aesthetic and functional outcome. It is important to balance the risks/benefits of these procedures well in advance of the operation.

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