Case Report

Modified Wire Stent for Presurgical Nasoalveolar Moulding of Unilateral Cleft Lip and Palate

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ABSTRACT

The idea behind this innovation was to modify the existing self-retentive nasoalveolar moulding plate with acrylic stent. This case reports on a 3 days old neonate born with unilateral cleft lip and palate of the left side, and treated with the modified stent plate with adjunctive adhesive steri tape. This modification comprises of an orthopaedic plate for alveolar moulding and wire stent for nasal moulding of the depressed lower lateral cartilage on affected side. The device was activated on weekly basis till three months of age. Photocopy analysis determined a significant reduction of 6 mm in the anterior cleft region. Alar tip and nasal alar dome were elevated to near normal shape. The device approximated major alveolar segment more efficiently, improved nasal tip and symmetry before cheiloplasty. Lip scar is minimised with pleasant facial appearance.

Key words: Nasoalveolar moulding, wire nasal stent, cheiloplasty.

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IDEAS AND INNOVATION

INTRODUCTION

The advantages of nasoalveolar presurgical infant orthopaedics may be considered from a soft tissue perspective as well as from the usual osseous one. The presurgical reduction in soft tissue and cartilaginous deformity facilitates achievement of surgical soft tissue repair under minimal tension and optimal conditions for scar formation. There is also a reduction in the number and complexity of minor soft revision surgeries required to maintain acceptable nasolabial aesthetics with nasal growth[1]. Presurgical nasoalveolar moulding was shown to significantly increase symmetry of the nose. This increase in symmetry was maintained into early childhood. Gingivoperiosteoplasty has been shown to eliminate the need for secondary alveolar bone grafting in 60% of cases treated with presurgical orthopaedics[2]. The combined benefits of presurgical nasoalveolar moulding and gingivoperiosteoplasty have been shown to reduce the overall cost of therapy from birth to adolescence[3].

The purpose of this article is to introduce modified moulding plate with wire nasal stent containing terminal acrylic bulb. With this device, we experienced much encouraging results, especially when compared to the device presently used (also designed by the senior author).

The objectives of this technique are to actively mould and reposition the deformed nasal cartilages and alveolar process and to lengthen the deficient columella in the neonatal period, prior to primary lip and nasal surgery[4].

These are achieved through the use of acrylic plates and nasal stents to mould the alveolar processes and nasal alar cartilages into normal form and position by taking advantages of the malleability of immature cartilage and its ability to maintain a permanent correction of its form[5].

MATERIALS & METHOD

The current modification was applied on a 3 days old female neonate presenting with complete unilateral cleft of the lip and palate of the left side (Figure1-3). This self retentive orthopaedic plate differed from the existing custom made acrylic stent device by the incorporation of a stainless steel wire stent fabricated from 0.5 mm SS wire in the form of loose loop

(Figure 4-5). The distal ends of this loop get embedded in acrylic plate and the mesial end of the loop is mounted with hard acrylic bulb that is positioned underneath the alar tip. Activation of the plate was done on weekly basis till three months of age. For approximation of the major alveolar segment or cleft gap closure, soft acrylic was removed along the mesial surface along with a little of hard acrylic on the palatal surface from that area. Activation of the palatal plate involved addition of hard acrylic on to palatal surface along the peripheral margins followed by seating the plate intraorally with the head postured forwards. The same amount of acrylic was removed along the buccal surface to maintain uniform thickness. Idea behind palatal addition of the plate was to maintain proper fit as well as to follow growth of the maxillary arch. Activation of the wire nasal stent containing terminal acrylic bulb comprised of gradual addition of acrylic to the bulb along with bending of the wire loop so that the bulb gets positioned under the tip of the nose. Purpose of stent activation was to elevate nasal dome and to direct the cartilage towards nasal tip (Figure 6). After activation, the plate was inserted and 3 m adhesive tape was applied to facilitate approximation of the lip segments (Figure 7). Main difference in retentive means of this device was minimal addition of the soft acrylic in the defect part. Soft acrylic along the major alveolar segment was removed in a bulk and only a small amount was filled in the defect along the lesser alveolar segment as a retentive component. Activation of the wire stent by bending the wire loop and addition of terminal acrylic bulb further aided the retention of this device. On completion of nasoalveolar molding, postmolding, records were attained and patient was referred for cheiloplasty and rhinoplasty (Fig 8-11).

RESULTS

Out of 6 variables (5 linear and one angular, tables 1, 2 and 3), Intermolar width prior to moulding therapy was 36.0 mm and on completion stage was recorded the same 36.0 mm, Inter canine width in the pre treatment stage measured 29 mm whereas the post moulding measurement attained was 27 mm. Anterior cleft gap which was initially measured as 10 mm, showed a marked reduction of 6 mm in the post molding stage (post molding, 4mm). Two anthropometric measurements included columellar length and prolabium length. Columellar length before treatment was measured 3.0 mm on the affected side and on completion of moulding therapy increased to 5 mm. Prolabium length recorded before treatment was 8mm and after moulding therapy was recorded 11 mm.

DISCUSSION

Unilateral cleft lip deformity if not treated in time may result in severe growth disturbance of the maxilla, functional defect of teeth and severe facial mutilation[6]. The purpose of moulding therapy is to align the intraoral alveolar segments & correct the nasal tip, alar base, the philtrum and the columella.

Grayson[5, 7] incorporated acrylic stent on to the vestibular shield of an oral moulding plate to attain treatment objectives. Orthopaedic appliances mentioned in the literature[2-8] mostly depend on extraoral attachments for their retention, whereas our devices being self retentive, by virtue of soft acrylic addition, are independent of extraoral attachments and adhesive tape[9, 10] as primary means of retention. However, a 3 millimetre length of Steristrip is used in conjunction with moulding plate to derotate and approximate the deviated major alveolar segment. In our previous studies with acrylic nasal stent[9, 10], anterior cleft gap reduction achieved was about 1mm & 2.2mm respectively. A further reduction of about 4mm was recorded in children after palatoplasy. In Comparison, anterior cleft gap closure attained with the recent modification was significantly greater being 6mm, whereas other measurement like Intercanine width, Intermolar width remained more or less the same.

Correction of the deviated major alveolar Segment achieved previously[10] was 7.35° whereas derotation attained with wire stent was 15°, as evident from the cast photocopy analysis (Fig 12-13). This shows a marked improvement of the deviated segment.

Among anthropometric measurements, columellar length increase on the affected left side was 2.0 mm (pre 3 mm, post 5 mm) and prolabium elongation was recorded 3.0 mm (pre 8 mm, post 11mm) on completion of nasoalveolar moulding with wire stent. If we compare the current results with our previous study[10], columellar increase attained was nearly the same (2.15 mm), whereas prolabium length gain was found 2.25 mm after moulding therapy.

CONCLUSIONS

The current modification with wire stent further adds to the efficacy of this device in terms of anterior cleft gap closure, approximation of the distorted major alveolar segment and significant improvement in alar symmetry.

Fig.1: Pre-Treatment front view

Fig.2: Intra-oral view

Fig.3 :Profile

Fig.4: Modified PSIOP with wire stent. Dorsal View

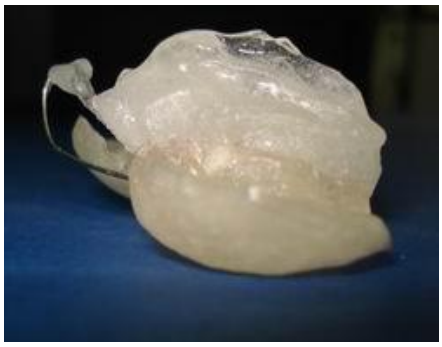


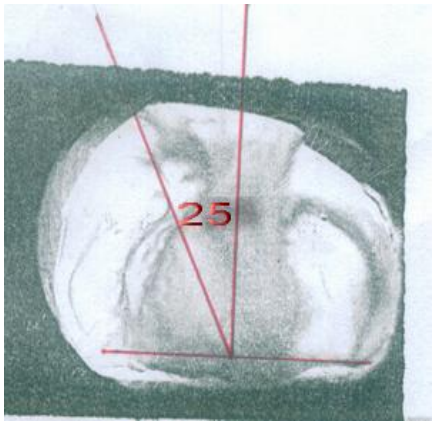
Fig. 5: Wire Stent Plate. Lateral view

Fig. 6: Appliance in situ

Fig. 7: Approximation of cleft lip segments with steri strip

Fig. 8, 9: Post moulding

Fig.10: Appliance in situ



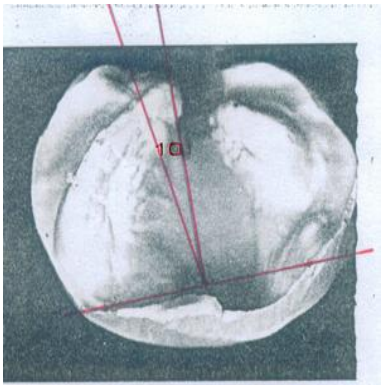


Fig. 11: Post moulding close up **Fig. 12: Pre moulding cast photocopy analysis** **Fig.13: Post moulding cast photocopy analysis**

Table 1: Linear Measurements From The Cast Photocopies

I.M.W			I.C.W			Anterior cleft gap.		
Pre treat	Post molding	Diff	Pre treat	Post molding	Diff	Pre treat	Post molding	diff
36	36	0	29	27	2	10	04	06

Table 2: Angular Measurements From The Cast Photocopies

Pre treat rotation	Post molding rotation	Difference
25°	10°	15°

Table 3: Anthropometric Measurements

Columellar Length			Prolabium Length		
Pre trt	Post molding	Diff	Pre trt	Post molding	Diff
3.0	5.0	2.0	8.0	11.0	3.0

REFERENCES

1. Lee C, Grayson BH, Lin WY, Cutting CB. Long term study of midface growth in unilateral cleft lip and palate patients following gingivoperioplasty. Presented at the American cleft palate craniofacial association April 1996.b Scottsdale, AZ
2. Santiago PE, Grayson BH, Gianoutsos MP, Kwon SM, Brecht LE, Cutting CB. Reduced need for alveolar bone grafting by pre-surgical orthopaedics and primary gingivoperioplasty. Cleft Palate Craniofac J. 1998; 35:77-80
3. Pfeifer T, Grayson BH, Cutting CB. Gingivoperioplasty versus alveolar bone graft: An outcome analysis of costs in the treatment of unilateral cleft alveolus. Presented at the 55th Annual Meeting of the American Cleft palate Craniofacial Association; April 1998; Baltimore, MD
4. Suri S, Tompson BD. Modified muscle activating maxillary orthopaedic appliance for presurgical nasoalveolar molding in infants with unilateral cleft lip and palate Cleft palate craniofacial J. 2004; 41:225-229.
5. Grayson BH, Cutting CB. Presurgical Nasoalveolar Orthopaedic molding in primary correction of nose, lip and alveolus of infants born with unilateral and bilateral clefts. Cleft palate craniofacial J.2001; 38: 193-198.
6. Yang JY, Chao AY, Cheon JS. Correction of the unilateral cleft lip using Surgeon made Naso alveolar molding device. J Korean society of plast Reconstr Surg 2004; 31(1):1-8.
7. Grayson BH, Santiago PE, Brecht LE Cutting CB. Presurgical Nasoalveolar molding in infants with cleft lip and palate. Cleft palate craniofacial J. 1999; 36:486-98
8. Doruk C, Bence K. Extra Oral nasal molding in a new born with unilateral cleft lip and palate, a case report. Cleft palate craniofacial J. 2005; 42:699-702
9. Ijaz A, Zahid S. Nasoalveolar molding with modified orthopaedic plate at the cleft centre of Children's Hospital & institute of child health, Lahore. Pakistan Oral & Dental J. 2005; 25(2):187-192
10. Ijaz A. Nasoalveolar molding of the unilateral cleft of the lip and palate infants with modified stent plate. Pakistan Oral & Dental J. 2008; 28(1):63-70