ORIGINAL ARTICLE

LIP ADHESION– A VIABLE ALTERNATIVE TO PRE-SURGICAL ORTHODONTICS FOR THE MANAGEMENT OF WIDE CLEFT LIPS IN THIRD WORLD COUNTRIES

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Background: Cleft lip and palate is a relatively common condition presenting a considerable technical challenge, especially the wide cleft (>8 mm), for the surgeons. Pre-surgical orthodontics, which reduces the cleft width and facilitates definitive repair, is expensive and not universally available, especially in the third world. Lip adhesion could be a cheaper alternative to pre-surgical orthodontics. **Methods:** This six-year prospective observational study, from 2010 to 2016, was conducted at the paediatric surgical units of PNS Shifa Hospital, Karachi and Military Hospital Rawalpindi. All children with wide (8 mm or more gap in the alveolus) complete ULCP (unilateral cleft lip and palate) were included in the study. Lip adhesion with concomitant vomer flap palatal repair was followed by definitive lip repair once the desired moulding, i.e., alveolar gap <5 mm or adequate narrowing as per surgeon's subjective assessment during the 3 and 6 monthly follow up, had been achieved. **Results:** A total of 53 children with the mean age 4.5±1.5 months were subjected to surgery, 32 (60.4 %) were males and 21 (39.6%) were females. The mean gap in the cleft alveolus was 11.1±1.7 mm, which was reduced to a mean of 3.2±1.3 mm, after a follow up of 4.3±1.1 months. The outcome of the lip repair, based on parental satisfaction, was excellent in 41 (77.3%), good in 10 (18.9%) and poor in 2 (3.8%) cases. **Conclusion:** Lip adhesion is a safe and effective substitute for pre-surgical orthodontics in wide ULCP.

Keywords: Cleft Lip and Palate; Lip Adhesion; Wide cleft

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INTRODUCTION

Cleft lip and palate is a fairly common condition affecting one in 500–550 live births worldwide.[1] The prevalence varies by ethnicity, country, and socioeconomic status. Figures from Pakistan suggest an incidence of 1.91 per 1000 births (one per 523 births).[2] Wide complete clefts present a considerable challenge at the time of repair. Primary definitive lip repair in wide clefts is likely to result in tight lips, with inadequate lip elements, thin vermillion and a whistle deformity. Various methods of decreasing a wide unilateral cleft or reshaping and positioning the protruding premaxillary segment have been described.[3] These include extra oral traction devices such as head caps and elastic bands and orthodontic devices such as in pre-surgical naso-alveolar moulding (PNAM).[4] These methods are complicated and expensive in that each has to be custom-made. They often require services of an expert neonatal orthodontist and the considerable cooperation of the child's parents, especially the mother. PNAM also involves several visits to the hospital whilst the device is being used. Lip adhesion converts a complete wide cleft lip in to a relatively narrow incomplete cleft thus facilitating the definitive closure and reducing the lip/nasal deformity by molding the maxillary segments; much like the way in which the Simonart's band acts as a retainer in utero.[5,6] In our set up, typical of a developing country, it would seem to substitute for PNAM at a significantly lesser cost and fewer number of hospital visits. The purpose of this study was to see the benefits of performing a lip adhesion for wide complete UCLP (unilateral cleft lip and palate) that would be almost impossible to repair satisfactorily without extensive soft tissue mobilization and compromised repairs, requiring major remedial surgeries later on and possibly deleterious effects on maxillary growth.

MATERIAL AND METHODS

This six-year prospective observational study, from 2010 to 2016, was conducted at the paediatric surgical units of PNS Shifa Hospital, Karachi and Military Hospital Rawalpindi. All children with wide (8 mm or more gap in the alveolus) complete ULCP were included in the study. Children undergoing primary definitive lip repair, generally those with a narrow cleft of less than 8 mm, syndromic clefts, incomplete cleft lip and those with bilateral clefts were excluded. All patients were subjected to routine pre-anaesthesia assessment and echocardiography to exclude congenital heart disease.

Antibiotics, co-amoxiclav 90mg/kg and mitronidazole 7.5 mg/kg, were administered at the time of induction of anaesthesia. Patients were aseptically draped in 15 degrees Trendelenberg, supine position with small sand bag under the shoulders to keep the neck extended. The children undergoing lip adhesion also underwent concomitant hard palate and nasal floor closure using the vomer flap technique as described by

Somerlad[7]. After the surgery children were kept in the postoperative ward for 24 hrs. Feeding was allowed on 1st postoperative day and patients were discharged the next day with oral antibiotics and analgesics. Parents were instructed to avoid using bottle feed for two weeks and an initial follow-up visit at that time. Further follow up visits were at three to six months intervals.

Definitive lip repair was planned when adequate moulding of the displaced maxillary segments had occurred, in response to the lip adhesion, to allow a good, tension free repair. This generally occurred over a period 3 to 6 month. The alveolar cleft gap was measured before the lip adhesion procedure was carried out and again at the time of the definitive lip repair (Figure-1). A subjective assessment was also done at the time of the definitive lip repair to see the degree of scarring due to the prior lip adhesion and whether it was easy or difficult to perform the definitive lip repair (Figures-2 and 3). The postoperative care and advice was similar to that described above. Outcome of the lip repair was again assessed after three months and was considered to be excellent, good or poor based subjectively on the opinion of the parents.

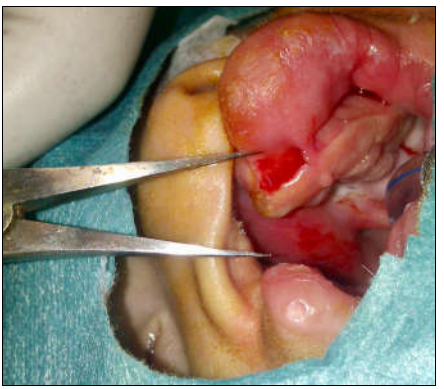

Figure-1: Measurement of the cleft alveolus gap prior to the lip adhesion procedure.

Figure-2: Lip adhesion with minimal scarring as seen at the time of definitive lip repair (A). The same child at the time of repair of the soft palate (B)

Figure-3: Lip adhesion with considerable scarring as seen at the time of definitive lip repair. The essential landmarks such as the highest points of the Cupid's bow are, however, well preserved.

Technique of lip adhesion

All procedures were performed under general anaesthesia with oral intubation using the RAE tube. The cleft edge incisions for the adhesion were marked so that the landmarks for the subsequent definitive lip repair were not disturbed (Figure-4).

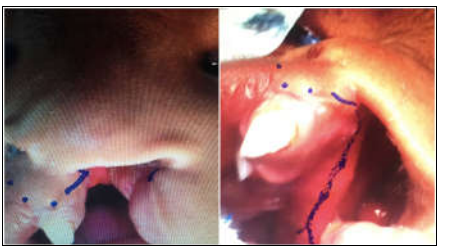

Figure-4: Markings for lip adhesion and vomer flap repair of the hard palate in a child with a wide cleft (12 mm) with considerable antero-posterior step discrepancy in the alveolar cleft. The essential landmarks for the definitive lip repair are avoided while performing the lip adhesion. Marking of the incision for the vomer flap is also shown.

Local infiltration with 1% lignocaine with adrenaline was done using an insulin syringe and the rectangular mucosal and skin flaps were lifted on either side of the cleft. Laterally these extended forms the alar base down to a point just short of the proposed highest point on the Cupid's bow. Medially the flap extended form a similar point on the Cupid's bow up to the base of the nasal

septum. The lateral lip segment was mobilized sub-periosteally to achieve tension free adhesion. These flaps were continuous with the flaps, of the septum/vomer medially and the oral mucoperiosteal flap of the hard palate laterally, being used for the single layered closure of the hard palate as described by Somerlad[7]. The closure of the hard palate was achieved by approximating the vomer flap with the oral mucoperiosteal flap of the palate in a double-breasted fashion using 5–0 or 4–0 polyglactin 910 suture. The closure continued anteriorly by approximating the medial (septal) flap with the lateral mucoperiosteal flap forming the nasal sill. The rectangular mucosal flaps were approximated with 5–0 polyglactin 910 suture. Skin flaps were approximated with subcuticular 5–0 polyglactin 910, further reinforced with Steristrips®. One or two absorbable stitches were used to approximate the orbicularis muscle in the region of the lip adhesion; the mobilisation of the muscle was however kept to a minimum.

Technique of Definitive Lip Repair

We consistently followed the technique of lip repair as described by Somerlad[7]; one that is actually a modified surgical technique based on the work of many, most notably Millard. A detailed description is beyond the scope of this paper.

RESULTS

A total 53 children, 32 (60.4 %) males and 21 (39.6%) females, underwent lip adhesion and vomerine flap closure of the hard palate for wide complete unilateral cleft lip and palate (UCLP). The mean age at the time of lip adhesion and vomerine flap closure was 4.5±1.5 months (range 3–8 months) and the mean gap in the cleft alveolus was 11.1±1.7 mm (range 8 to 16 mm). The mean time to definitive lip repair was 4.3±1.1 months (range 3–6 months) and the mean age was 8.9±1.9 months (range 7–14 months). The gaps in the alveolus had narrowed by the time of the definitive lip repair ranging from 1 to 5 mm; with a mean of 3.2±1.3 mm, which reflects an average decrease in the cleft width by 8.0±2.0 mm or an average 71% reduction. Problematic scarring from the prior lip adhesion was seen in 4 (7.5%) cases. The definitive lip repair was considered to be easy in 51 (96.2%) and moderately difficult in 2 (3.8%) cases. The outcome of the lip repair at three-month follow up was considered to be acceptable in 51 (96.2%) cases; being excellent in 41 (77.3%) and good in 10 (18.9%). Poor, unacceptable cosmetic outcome was seen in only 2 (3.8%) cases. There was only one dehiscence of the lip adhesion and it was managed successfully at a second attempt. There were 2 cases of partial, and one of complete, dehiscence of the vomerine flap palate repair. There were no cases of wound infection. The results are summarized in tables 1, 2 and 3.

Table-1: Mean ages at the time of lip adhesion and definitive lip repair

	At lip adhesion	At definitive lip repair	Mean time gap form lip adhesion to definitive repair
Mean Age (months)	4.6±1.5	8.9±1.9	4.3±1.1 months

Table-2: Mean alveolar cleft widths at the time of lip adhesion and the definitive lip repair.

	At Lip Adhesion	At definitive Lip Repair	Mean Reduction in Alveolar Cleft Width
Mean Alveolar Cleft Width (mm)	11.1±1.7	3.2±1.3	8.1±2.0 (71% cleft width reduction)

Table-3: Outcomes of the lip adhesion procedure

Outcomes	Number of patients	
Problematic Scarring after Lip Adhesion	4 (7.5%)	
Acceptable scarring after Lip Adhesion	49 (92.5%)	
Easy Tension-free Definitive Lip Repair	51 (96.2%)	
Moderately Difficult Definitive Repair	2 (3.8%)	
Good to Excellent Cosmetic Outcome of the Definitive Lip Repair	51 (96.2%)	Excellent in 41 (77.3%) Good in 10 (18.9 %)
Poor Cosmetic Outcome of the Definitive Lip Repair	2 (3.8%)	
Dehiscence of Lip Adhesion	1 (1.9%)	
Vomer Flap Dehiscence	3 (5.7%)	1 complete 2 partial

DISCUSSION

Formal lip repair achieves a much more satisfying result in incomplete clefts as compared to complete ones. Extensive mobilization and approximation of cleft lip elements under tension are likely to result in poor cosmetic outcome and may also adversely affect maxillary growth. Millard regarded the pre-surgical orthodontics and the lip adhesion as two important procedures before primary cheiloplasty in the cleft treatment protocol. After the pre-surgical orthodontics and the lip adhesion, the local soft and skeletal tissues could be moved to a more normal position thus providing supportive bony platform for primary cheiloplasty and rhinoplasty. It could even benefit later functional palatal reconstruction and reduce the occurrence of fistula. However, in his opinion, there was no need for patients with a lip cleft of less than 8 mm to have any pre-surgical orthodontic treatments.[8] NAM is available in only a very few private centres in Pakistan and is relatively expensive (costs ranging from Rs 80,000–120,000). It also requires services of an expert neonatal orthodontist and a lot of effort has to be put in by the mothers, not to mention the frequent follow-up visits. Lip adhesion, by comparison, is cheaper (averaging Rs 30,000) and requires only one or two follow-up visits at the most. By carefully selecting cases suitable for primary formal cleft lip repair, i.e., those with cleft less than 8 mm width, and subjecting the rest to a preliminary adhesion has shown to favourably affect the overall results. In our study, there were

minimal complications of the lip adhesion procedure (only one dehiscence and post-operative scarring in only 4 (7.5%) of cases. The scarring was generally not severe and it only made the definitive repair moderately difficult. In this way, we were still able to achieve good to excellent results after the definitive lip repair in 96.2 % of cases (Figure-5).

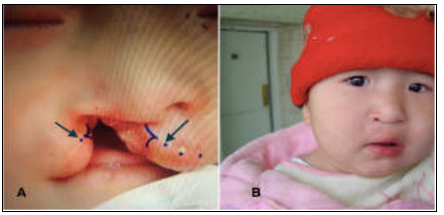

Figure-5: A 3-month old girl with a wide cleft, considered unsuitable for a definitive lip repair. Lip adhesion resulted in good realignment and narrowing of the alveolar cleft making the definitive lip repair relatively easy and a pleasant outcome as seen at the time of soft palate repair.

Some authors question the usefulness of lip adhesion because it may contribute to unnecessary additional scarring and abnormal tethering of the lip or nasal elements.[9] We, on the contrary, feel that if the procedure is carried out meticulously, and with care not to involve the essential landmarks of the future lip repair, scarring should not jeopardize the formal repair (Figure-4). We have not seen the scarring after the lip adhesion to be the cause of any significant difficulty or less than desirable cosmetic results. Many experienced cleft surgeons continue to use the lip adhesion with the purpose of treating the abnormal skeletal base and making the subsequent definitive repair much easier.[10] Others have reported benefits in using nonsurgical lip adhesion with tape but we have not found it to be very effective and unsupervised taping may have potential harmful effects such as retroclination.[11] The involvement of orthodontics does, however, have a greater role to play at a later stage such as the early adolescence when alveolar bone grafting and other dental procedures are required and are considered an essential part of the overall management.[12]

CONCLUSION

Lip adhesion is a safe and effective way of achieving pre-surgical improvement in the morbid anatomy of the wide unilateral complete cleft lip. The moulding of the maxillary segments allows the surgeon to perform a much easier formal lip repair under minimal tension and one that is supported better skeletal base; all in all, resulting in a very satisfactory cosmetic outcome. It is much cheaper than NAM and, because of the relative non-availability of the latter, is a very suitable option in third world countries.

AUTHORS' CONTRIBUTION

SHZ: Conception of the study, data analysis and interpretation. JUR: Study design, photographic data collection. HUR: Data collection. NA: Data collection and proof reading

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