An Analysis of Deformities in Revision Surgeries for Secondary Unilateral Cleft Lip

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ABSTRACT
Objective: To analyze the secondary cleft lip deformities and the possible causes in a cohort of cases.
Study Design: A case series.
Place and Duration of Study: Services Institute of Medical Sciences and WAPDA Teaching Hospital Complex, Lahore, from September 2008 to March 2012.
Methodology: Consecutive cases of secondary unilateral cleft lip deformities were selected for the study. These cases were interviewed and deformities recorded. Pre and postoperative photographs were taken for comparison. Per operative photographs were taken, after marking of the incisions, to keep a record of the intervention needed to correct the deformities. These cases were then further analyzed to know the deformities and interventions needed for correction of these deformities.
Results: Study subjects comprised 114 males and 75 females. Secondary correction was the most common in second decade of life with 82 cases in this group. The most common deformity was unfavorable scar in 150 cases followed by notch at the vermilion border in 124 cases. Short lip was found in 119 cases. Complete revision of the repair was required in 158 cases and 25 cases required partial redo of the initial repair. In other 6 cases, only scar revision was carried out.
Conclusion: Unfavorable scar followed by vermilion notch and short lip were the most common secondary cleft lip deformities. Better technique helps favorable scar. Vermilion notch and short lip can be overcome by switching from rotation advancement repair to the triangular flap repair of Noordhoff.


INTRODUCTION
Cleft lip is a common congenital anomaly and a source of psychological trauma to both the patient and the parents. Repair is meant to regain the symmetry and alignment of anatomical landmarks and restore the smile of the kid. A successful repair thus brings a relief for whole of the family. In spite of better understanding of the anatomy of the area,¹ great improvements in the surgical procedures²,³ and evolution of modifications in the existing surgical procedures,⁴ secondary deformities in the treated cleft lips do occur, often necessitating the revision surgeries.

Awareness of the common secondary deformities leads to further probe into the possible causes of these deformities and helps evaluate the various techniques of repair and constitutes a necessary step in the evolution of the different techniques of repair. This whole process also helps to reduce the number of surgeries for this congenital anomaly which is very common in some parts of the world.⁵,⁶ It further reduces the fear of repeated surgical trauma of the patient, psychological trauma of deformity on the family as a whole and economic burden on the society.

Present study was carried out with a basic aim to find out the common deformities seen in a series of secondary unilateral cleft lips, their possible causes and thus formulate recommendations to avoid these common deformities.

METHODOLOGY
Study subjects included consecutive secondary unilateral cleft lip cases dealt from September 2008 to March 2012 at the Services Institute of Medical Sciences and WAPDA Teaching Hospital Complex, Lahore. Secondary bilateral cases were excluded from this study. Cleft nose deformity was not addressed as a variable in this particular study. All the surgeries were performed by the first author. Cases were registered and their complete biodata, contact information and consent for the surgical intervention were recorded on special proforma. A photographic record of all these cases was also maintained. As a protocol, the revision surgery was not performed before a lapse of 6 months after the initial surgery. Patients were assessed on the basis of history, presenting complaints and examination of the deformity. Photographic assessment and record keeping was mandatory for all of the cases. Data also included photo-
graphic record of the per-operative marking for revision surgery.

Cases were reviewed retrospectively with the help of pre-operative record, individual operative markings of all the cases obtained for this purpose at the start of surgery, details of the procedures performed and standard photographic records consisting of frontal and worm eye views, both pre-operative and postoperatively. Cases were analyzed separately for lip and nasal deformities. At times, both the pre-operative as well as postoperative photographic records were utilized to precisely confirm the deformities.

Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) version 20 for windows. Variables studied included soft tissue deformities like, vermilion notching, short lip, long lip, tight lip, unfavorable scar, and a fistula. Frequency and percentages were calculated for qualitative variables.

**RESULTS**

A total of 1907 cases of cleft lip and palate were operated in a period of three and half years which consisted of 258 secondary cleft lip surgeries. The secondary lip surgeries included 189 cases of unilateral cleft lips and 69 bilateral cleft lips.

Out of 189 cases of unilateral cleft cases, 114 were males and 75 females. Secondary correction was the most common in second decade of life with 82 cases (Table I).

The most common deformity included unfavorable scar in 150 cases. It was followed by notch at the vermilion border in 124 cases. Short lip was found in 119 cases while long lip and tight deformity were noted in 5 cases each. Another group of 13 cases had oro-nasal fistula as well (Table II).

Complete revision of the repair was required in 158 of these cases, 25 cases required partial redo of the initial repair. In other 6 cases only scar revision was carried out.

**Table I:** Age groups involved in correction of secondary cleft lip deformities.

<table>
<thead>
<tr>
<th>Age group (years)</th>
<th>Cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10</td>
<td>61</td>
<td>32</td>
</tr>
<tr>
<td>11-20</td>
<td>82</td>
<td>43</td>
</tr>
<tr>
<td>21-30</td>
<td>32</td>
<td>17</td>
</tr>
<tr>
<td>31-40</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td>41-50</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>189</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table II:** Various secondary deformities.

<table>
<thead>
<tr>
<th>Deformity</th>
<th>Cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unfavorable scar</td>
<td>150</td>
<td>79</td>
</tr>
<tr>
<td>Vermilion notch</td>
<td>124</td>
<td>66</td>
</tr>
<tr>
<td>Short lip</td>
<td>119</td>
<td>63</td>
</tr>
<tr>
<td>Long lip</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Tight lip</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Oro-Nasal fistula</td>
<td>13</td>
<td>7</td>
</tr>
</tbody>
</table>

**DISCUSSION**

The primary goal in the cleft lip repair remains that cleft be undetectable by a peer at conversable distance by school age. Knowledge of normal anatomy, finding the normal landmarks on cleft lip and returning them to normal positions all go long way in getting optimal results. The requirements for lip repair have long been known which include accurate skin, muscle and mucosa union. Others are complete rotation of the lateral segment with advancement of the medial segment, symmetry at the nasal floor and nasal tip, a smooth vermilion border with symmetrical cupid bow with a slight pouting of the central lip, a minimum scar placed in such a manner that its contraction would not interfere with the stated results. Any deviation from these requirements would lead to secondary lip deformities.

Variation in the severity of anomaly, from microform to complete unilateral cleft lip and utilization of different repair techniques speak of possibility of different outcomes in different cases. This may result in a number of secondary cleft lip deformities as well. Critically, the secondary cleft lip deformities are mainly asymmetries and disproportions. Vermilion - cutaneous junction is the usual site of these deformities and often these are seen as a vertical height discrepancy at repair site. However, secondary deformities may also result from faulty muscle repair as well. Hence, list of deformities may include deficient tubercle, vermilion deficiencies and irregularities (notch, whistle deformity), short lip, long lip, tight lip and unfavorable scar.

This study found unfavorable scar the most common deformity in this series of the patients. Minimum upper lip skin scarring is one of the most important requirements in cleft lip repair. Whereas, the reason for unfavorable scar may be a faulty repair, the most common contributing factor, in the setup, has been the illiteracy of the parents and improper wound care. It has been observed very frequently that in spite of the written and verbal postoperative instructions, parents would not be able to keep the suture line clean. As a result, on visit for stitches removal, there is a layer of dried scab covering the suture line. At many a times, the nasal secretions have not been cleaned properly and allowed to dry on the sutures and suture line. Any collection underneath, which is most probable in these circumstances, would jeopardize the results and would lead to a bad scar. Another factor, especially found in cases approaching from far off places, may also be delayed sutures removal which leads to noticeable scars. Yet another factor may be dark colored skin which heals with tendency towards hypertrophic scar as compared to fair colored skin patients.

Second most common secondary cleft lip deformity seen in this study was that of vermilion notch and number of studies found it as one of the most common deformities.
encountered in the secondary cleft lip cases.\textsuperscript{3,13,14} Vermilion notching may result from a number of factors. One of the reasons for this notching may be placement of a linear scar at vermilion cutaneous junction which is an inherent problem of the most of repair incisions. Turning in of the sutured edges may also result in notching.\textsuperscript{15} It may also result from inadequate alignment of the orbicularis oris muscle at the junction of medial and lateral segments. Studies have also related this problem to insufficiently lengthened oral lining of the medial lip segment as compared to the cutaneous surface of the same segment.\textsuperscript{13} Another common reason for the deformity may be an inadequate rotation of the medial segment of the cleft which results in a short vertical height of the lip as well as a notch at the vermilion.

It is apparent that notch resulting from inadequate rotation of medial lip segment would also have the accompanying short lip, as seen in this study. While notching was found in 124 cases, accompanying short lip was also found in 119 cases. Whereas lot of stress has been laid on whistle deformity,\textsuperscript{16-18} only few of the studies mentioned the accompanying short lip deformity which in itself is a separate entity.\textsuperscript{19} This study, however, found it almost as common in these cases as notch itself.

As Millard rotation advancement repair is most commonly used technique in our setup,\textsuperscript{2} it might be assumed that in most of these cases it was this inadequate rotation of the medial segment which resulted in these two deformities. It was further confirmed by the other two findings in the study. The deformity of long lip, with rotation advancement repair technique, results from overdoing of the rotation element of the repair. As technically it is difficult to overdo with the rotation advancement, the deformity of long lip is seen in a quite small number of the cases. This deformity was seen in 5 cases in this series. However, this deformity is more commonly seen in lip repaired with techniques utilizing triangular and rectangular repair.\textsuperscript{20}

Tight upper lip is another complication of the unilateral cleft lip repair and is usually seen after triangular repair.\textsuperscript{7,21} This deformity was also seen in 5 cases. Again, it was uncommon in this series as the triangular repair is used quite rarely as compared to rotation advancement technique of repair. Oronasal fistula occurs when the repair does not involve all the three layers of the lip. This deformity was seen in 13 cases.

Study also found that while addressing these secondary deformities, 158 cases required a complete redo of the procedure and only 25 cases settled with a partial redo of the repair process. Only 6 cases required minor scar revisions. This finding reflects that an initial faulty repair would require a complete redo in majority of the cases and, therefore, one must go very carefully through the criteria laid down for a successful repair.

As the most common complication was an unfavorable scar, it can be safely recommended that every attempt must be made by the surgeon to get a good scar. However, as pointed out earlier, it also needs proper input by the parents as well. They must be reminded about the outcomes frequently and advised to keep the area clean and free of any nasal secretions. Also, as hypertrophic scarring is a common problem with the black skin, they must be advised for regular post-operative massage of the suture line as a first measure to get a smooth scar.

Vermilion notch and short lip almost had the same frequency as both resulted from a common cause. Deformity may be overcome by switching from straight line closure to triangular flap repair of Noordhoff. It breaks the straight line of closure and brings in quite useful vermilion tissue from the lateral to medial segment thus removing major factors responsible for notch at vermilion and also that of short lip deformity. Some studies also suggest the achievement of the same outcome by simply adding a variable Z-plasty at vermilion.\textsuperscript{2} As pointed out earlier, avoiding an overdo of rotation advancement may help to overcome the long lip deformity.

CONCLUSION

The most common secondary deformity of unilateral cleft lip repair in our setup, remains the unfavorable scar followed by vermilion notch and short lip. Whereas favorable scar outcome needs input both from the surgeon and the parents, deformities like vermilion notch and short lip can be overcome by switching from rotation advancement repair to the triangular flap repair of Noordhoff.

REFERENCES


Deformities in revision surgeries for secondary unilateral cleft lip


