

CORRECTION OF ALVEOLAR ARCH MALALIGNMENT AFTER TOTAL CORRECTION IN UNILATERAL AND BILATERAL GR III CLEFTS

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ABSTRACT: AIMS AND OBJECTIVES: Aim of this study is to document and analyse the pre-operative and postoperative alveolar arch impressions. **MATERIALS AND METHODS:** 20 cases of both unilateral and bilateral GR III clefts selected for this study. These patients were operated at the age of not less than 9 months, preferably below the age of 18 months. Below the age of 9 months general condition of these children may not cope up the duration of general anesthesia and amount of surgical trauma. After intubating the patient preoperatively, with the help of custom made metal arch plates, at first, Medical grade Alginate material with optimal hydration used to get negative impression, from these, positive impressions were obtained by the use of optimally hydrated medical grade stone powder routinely used by dental surgeons. These positive impressions along with negative impressions and metal plates allowed to settle down for 10 hours undisturbed, after that positive impressions retrieved carefully without breaking and stored for analysis. Similarly postoperative impressions were taken after a gap of 2 years in the same manner like that of pre-operative ones under general anesthesia. Both impressions were compared and analysis was done regarding alveolar arch malalignment, asymmetry and arch collapse correction. **RESULTS & CONCLUSION:** The status of the alveolar arch after single stage operation for cleft lip and palate in the unilateral cleft was much improved and there was considerable correction of the arch collapse as well; in the bilateral cleft the correction of the premaxillary protrusion was better appreciated than the degree of correction of the alveolar gap.

KEYWORDS: Premaxilla protrusion, Alveolar arch collapse, Palatal halves asymmetry, Gr III clefts, Single stage, Total repair of lip and palate.

INTRODUCTION: An important long term goal in the treatment of children with cleft lip and palate is a young adult with acceptable speech, appearance, and psychological development (Endrigia and Kapp-Simon 1999).⁽¹⁾The primary surgical procedures can have dramatic improvement in the facial appearance of the operated child.

The surgical procedures may have long term negative effects on facial growth and dental occlusion (Ross and Jhonston 1972).⁽²⁾ There is evidence in the literature that cleft repair in children with complete unilateral cleft lip and palate interferes with growth of maxilla in the long run.

Presurgical and post-surgical orthodontics and orthopaedics (As the case maybe) have been used to possibly prevent this tendency to have maxillary hypoplasia following surgery; passive molding appliances have been used after lip repair to get the alveolar arches into alignment. The repair of the lip and scarring in the vicinity of the primary palate have been incriminated as the reason for maxillary deficiency in both anteroposterior and vertical dimensions.

Either of the two above procedures are laborious and time intensive and it is difficult to apply to poor patients in developing countries.

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In our institute we have been repairing the cleft of lip and palate in a single stage for logistic reasons and with minimal complications for the past 5 years. These results have also been showed by other authors in the literature.

This study seeked to determine the state of the alveolar arches with respect to their alignment 1 year following single stage repair of the cleft lip and palate in children less than 1 year of age.

REVIEW OF LITERATURE: There are three anatomical structures to be repaired in a cleft lip and palate operation: primary palate (Lip, alveolus), secondary palate (Hard palate) and soft palate. The repair of cleft lip is done between 3 and 6 months of age and the palate was repaired at 18 months of age by majority of surgeons.

There are important findings in a recent report supporting the concept that principal factor that causes maxillary retrusion in cases with unilateral cleft is lip repair (Specifically the orbicularis oris muscle) rather than palate repair. Comparative studies of different methods of lip repair in cleft patients with unilateral clefts have no differences in maxillary growth.

Manchester⁽³⁾ reported that he avoided the muscle repair stage involved in lip repair to avoid undue tension. Conversely, some authors have stated that orbicularis oris muscle repair increases maxillary development. Nadeem Savaci, Mubin Hosnuter, Zekeriya Tosun⁽⁴⁾ repaired orbicularis oris muscle in both study groups and opined that muscle repair must be performed to obtain the best functional, aesthetic results.

With respect to alveolar repair, there are two mainly used procedures: bone grafting, and periosteoplasty. It has been showed that each of these procedures has both positive and negative effects to a variable degree on maxillofacial growth. Sameshima et al.^(5,6) Revealed in their study that primary periosteoplasty has additional advantage over bone grafting regarding better vertical relations of the maxilla.

Ross,⁽⁷⁾ in 1995, compared two groups of unilateral cleft patients with different protocols. One of this was conventional approach that is the cleft lip was repaired at 3 months, and the palate was repaired at 18 months of age. The patients in the other group were treated according to the Malek⁽⁸⁾ protocol by repairing the soft palate at 3 months of age, and consequently repairing the lip and hard palate at 6 months of age. The study showed that there was no difference between two study groups regarding cephalometric assessment of maxillo-mandibular relationships.

⁽⁹⁾Silva Filho, O. G., Calvano, F., Assuncao, A. G., and Cavassan., in 2001, compared their own protocol (lip repair at a mean age of 9 months and palate repair 19 months of age on an average) with the modified Malek protocol (lip and palate repair at 20 months of age) .They found that results of maxillofacial evaluation were comparable in both complete unilateral cleft lip and palate groups in the age range of 4 to 7 years. Silva Filho, O. G., Calvano, F., Assuncao, A. G., and Cavassan), also revealed that cleft patients had aesthetically acceptable facies despite their maxillary retrognathism

Swennen⁽¹⁰⁾ et al., in 2002, published a study that compared the craniofacial morphology of two unilateral cleft lip and palate groups treated by different surgical protocols, One of the protocols belonged to the Hannover group (Closure of the lip, hard palate, and soft palate was performed at a mean age of 8, 29, and 32 months, respectively) .and other belonged to the Brussels group (Malek protocol) repairing the soft palate at 3 months of age, and consequently repairing the lip and hard palate at 6 months of age); assessment of maxillary growth was done between 8.8 to 11.1 years in both groups. Despite the great differences between the timing of both protocols, interestingly, there

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was no significant difference in the results regarding anteroposterior midfacial measurements. The only difference was in the Brussels group, in which the maxillary palatal plane was more open because of less posterior vertical maxillary height.

AIMS AND OBJECTIVES: To document pre-operative and post-operative gaps in the maxillary alveolar arch

To determine the role of pre-surgical orthodontic and early post-operative orthodontic interventions in light of the above finding.

PATIENTS AND METHODS: This is a prospective study done during the period from August 2005 to January 2008.

Patients with Group III clefts below 1 year of age of either sex-15 cases of bilateral Group III and 25 cases of unilateral Group III clefts selected for the study.

All cases operated under general anaesthesia.

Preoperative arch impressions were taken after induction.

1year after the operation patients were called for follow-up; 15 patients from each group were available for follow up.

Procedure of taking Impressions: After intubation with RAE tube positioning of the patient checked with the neck in extension by keeping custom made mattress available in our OT, with head stabilized in a head ring.

With the help of custom made stainless steel metal plate which is small enough to enter into Childs mouth, Algitec material (Nonirritant to mucosa, skin) was used to get negative impression of maxillary arch of cleft child. This material will be available in powder form, it has to be hydrated to make it thick jelly like before placing this material on the metal plate. As soon as material prepared into jelly like, it has to be transferred over to custom made metal plate and the impression must be taken by pressing against to cleft maxilla. This entire procedure must be finished within 5-7 minutes (As once hydrated this material will set in 4-5 minutes time). The impression we get is a negative impression, exactly mimicking the cleft dimensions.

Onto the negative impression we must add dental stone powder to get the positive impression. Stone powder is hydrated to make it as solution and poured into the negative impression to evenly spread into the crevices of negative impression as an initial layer and subsequently with thick layers of stone powder solutions, so as to get the positive impression.

These positive impressions will be separated from negative impressions; while separating great care must be executed otherwise fine contours and dimensions of the cleft palate will be damaged; once positive impression retrieved it is stored in a safe place. Similarly post-operative follow up impressions were taken at 1 year after surgery and a comparative study was done.

Cleft Gap: The gap between two anterior ends of palatal shelves (At the level of the alveolar arch), at mid palatal region, and posteriorly at the end of the bony palate.

The results have been computed using the first of the above measurements.

Asymmetry: usually there is an asymmetry in the alignment of palatal shelves, the cleft side palatal half is collapsed and positioned at a lower level than non-cleft side.

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Premaxilla: Usually the premaxilla in Bilateral Group III clefts is much protruded and positioned in relation to the lateral palatal shelves.

RESULTS:

1. Total of 40 patients of Group III clefts of both unilateral and bilateral clefts (25 cases of unilateral Group III, 15 cases of bilateral clefts) were included in the study in the above stipulated period.
2. Only 9 patients in bilateral study group and 20 patients in unilateral study group came for follow up. Post-operative impressions were taken for comparison and analysis.

UNILATERAL GROUP III CLEFTS: With the total correction one year following surgery

1. The average gap between the palatal halves of the cleft palate from 10.95mm came down to 4.30 mm with an average gain (Correction) of 6.65 mm.
2. The average arch collapse of 10.1mm came down to 4.85 mm with an average gain (correction) of 5.25mm, after gap of one year postoperatively.
3. The highest alveolar gap corrected was 12mm (12mm to 0mm).
4. The highest correction alveolar collapse noticed was 13mm (13mm to 0mm).

BILATERAL GROUP III CLEFTS: With the total correction after gap of one year following surgery

1. The average alveolar gap of 12.44mm came down to 10.44 with an average gain of 2mm.
2. The average premaxillary protrusion came down from 11.22mm to 5.66mm on right side with an average gain of 5.56 mm and on left side from 10.33mm to 5.77mm with an average gain of 4.56mm.
3. The highest alveolar gap corrected was 5mm (From 13mm to 8mm)
4. The highest correction of premaxillary protrusion noticed was 10mm (From 10mm to 0 mm)

DISCUSSION: Total correction in unilateral and bilateral Group III clefts under the age of 1 year in this study has given some promising results on maxillary alveolar arch alignment and correction of alveolar arch collapse.

In Unilateral Group III clefts in 9 out of 20 cases arch collapse corrected to normal (Arch collapse value of zero), and alveolar gap alignment came to normal (Both anterior ends in opposition) in 9 out of 20 cases. More than 5 mm correction of the alveolar gap noticed in 13 cases out of 20 operated cases.

In bilateral Group III clefts there is not much improvement in alveolar gap alignment; the best gap correction noticed was 4mm (Pre op 13mm to 8mm post operatively) but on an average there is 1 to 2 mm decrease in the alveolar gap noticed in all most all the cases. On right side the best correction of arch collapse in relation to premaxilla noticed was 8 mm, but on an average 4 mm to 5mm correction was noticed. On left side the best correction of arch collapse in relation to premaxilla noticed was 9mm, but on an average there is 4.56mm correction was noticed.

The status of the alveolar arch after single stage operation for cleft lip and palate in the unilateral cleft was much improved and there was considerable correction of the arch collapse as well; in the bilateral cleft the correction of the premaxillary protrusion was better appreciated than the degree of correction of the alveolar gap.

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CONCLUSION: The dissection of an unscarred operating area in contrast to the delayed and secondary hard palate closure is a significant advantage of the one staged procedure; and there is a lower anterior fistula rate, In addition excessive scar tissue resulting from staged and successive surgical interventions in the early childhood for treatment of cleft lip and palate might have detrimental effects on maxillary growth.

This study has in addition shown that there is a molding action of the single stage operation on the alveolar arches that probably does decrease the role of orthodontics. There is no direct intervention on the alveolus in our total correction procedure; the theoretical advantage would be the availability of unscarred gingival tissue for secondary alveolar bone grafting at the time of eruption of the canine tooth.

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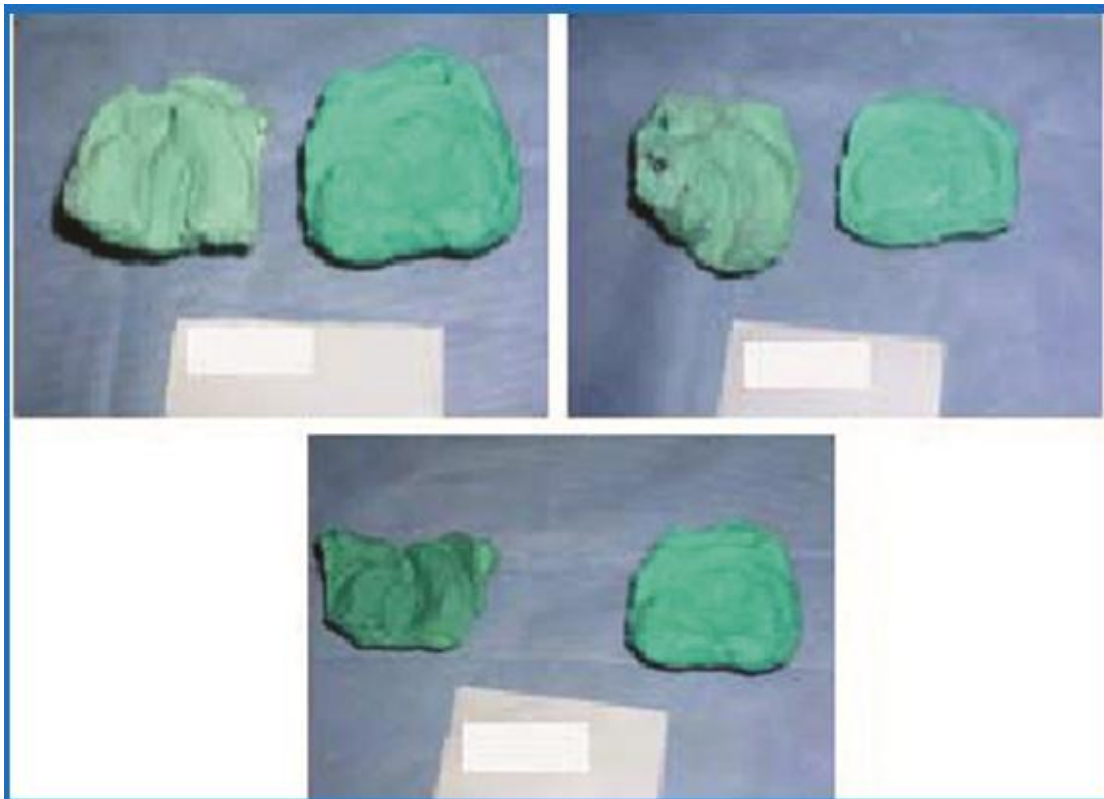
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ANALYSIS:

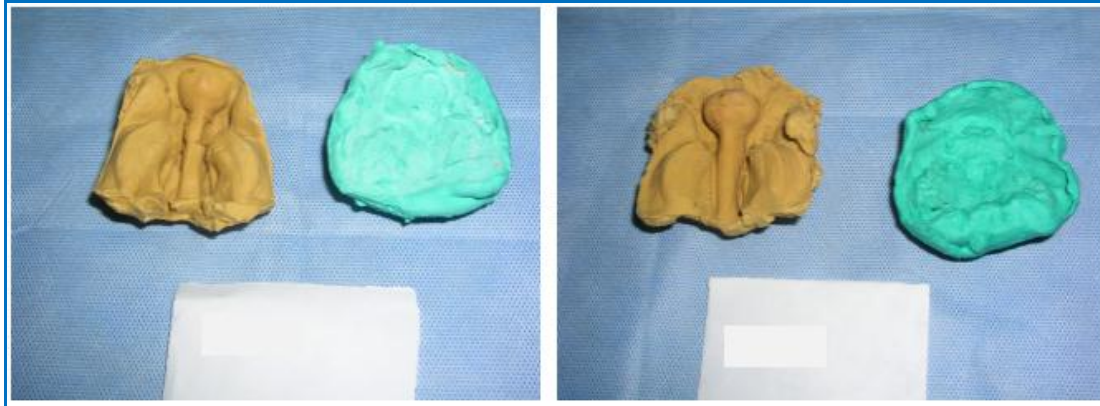


UNILATERAL GR III CLEFTS:



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BILATERAL GROUP III CLEFT:



No.	Age/Sex	Ip No.	Diag	D.O surgery	Pre-op		Post-op	
					alv- gap,	arch collapse	alv- gap,	arch collapse
1	9/12,F	521202	RT	13/9/05	13mm	14mm	12mm	8mm
2	9/12,M	522258	LT	26/9/05	15mm	12mm	8mm	8mm
3	12/12,F	523989	LT	17/10/05	12mm	14mm	9mm	9mm
4	10/12,F	524826	LT	26/10/05	14mm	13mm	3mm	10mm
5	10/12,F	526523	RT	15/11/05	12mm	13mm	8mm	8mm
6	9/12,F	527350	LT	24/11/05	12mm	12mm	0mm	0mm
7	10/12,M	527899	LT	12/11/2005	15mm	8mm	8mm	8mm
8	10/12,M	528471	RT	12/08/2005	11mm	12mm	6mm	6mm
9	10/12,M	602246	LT	30/1/06	12mm	8mm	0mm	0mm
10	11/12,F	611646	LT	16/5/06	14mm	13mm	10mm	10mm
11	9/12,M	671227	RT	20/6/06	12mm	11mm	0mm	0mm
12	10/12,M	673001	LT	07/04/2006	9mm	8mm	0mm	0mm
13	12/12,M	627086	RT	12/12/2006	8mm	8mm	0mm	0mm
14	12/12,F	609716	LT	25/4/06	8mm	6mm	6mm	6mm
15	9/12,M	616025	RT	08/04/2006	0mm	6mm	0mm	0mm
16	12/12,M	616137	LT	08/04/2006	13mm	6mm	0mm	0mm
17	10/12,M	620761	LT	26/9/06	10mm	11mm	8mm	8mm
18	8/12,M	622604	RT	17/10/06	11mm	13mm	0mm	0mm
19	10/12,F	627628	RT	14/12/06	12mm	8mm	8mm	6mm
20	12/12,F	703234	RT	14/2/07	6mm	6mm	0mm	0mm
					219	202	86	97
					10.95mm	10.1mm	4.3mm	4.85mm

Table 1: Data of Unilateral Group III Clefts-20 Patients

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Sl. No.	IP No.	Diagnosis	D.O Surgery	PRE-OP		POST-OP	
				Alv gap	Averg Premax protrusion (rt+lt)	Alv gap	Averg Premax protrusion (rt+lt)
1	522148	BIL	23/9/05	10mm	10mm	10mm	6mm
2	522385	BIL	27/9/05	12mm	12mm	8mm	5mm
3	528241	BIL	6/12/2005	13mm	9mm	11mm	6.5mm
4	M-426	BIL	14/6/06	13mm	9.5mm	11mm	5mm
5	671751	BIL	23/6/06	13mm	12.5mm	8mm	4.5mm
6	614136	BIL	15/7/06	14mm	11mm	12mm	6mm
7	626182	BIL	28/11/06	12mm	10.5mm	11mm	9.5mm
8	701306	BIL	18/1/07	13mm	12mm	11mm	6mm
9	672140	BIL	28/6/06	12mm	10.5mm	12mm	6mm
AVERAGE				12.44mm	10.77mm	10.44 mm	5.71mm

Table 2: Data of Bil GRIII Clefts

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