MORPHO-FUNCTIONAL REPAIR OF CLEFT PALATE - EVIDENCE BASED

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GSR Institute of Facial Plastic Surgery

- Non-profit hospital established in 1996
- Dedicated Cleft & Craniofacial Centre of Excellence
- Presently **1,600** cleft and craniofacial surgeries are done every year
- 4 surgeons and 4 fellows with full support team
- More than **30,000** documented cleft & craniofacial surgeries have been performed since **1996**
- **600** primary new born cleft children are registered every year
Cleft palate variations
Cleft of hard and soft palate associated with cleft lip

Unilateral complete cleft palate with palatal shelves at the same level anteriorly

Unilateral complete cleft palate with palatal shelves at the different levels anteriorly

Bilateral complete cleft palate with palatal shelves at the same level of the premaxilla anteriorly

Bilateral complete cleft with palatal shelves at different levels of the premaxilla anteriorly
Cleft palate variations

Isolated Cleft Palate

Cleft of hard and soft palate

Submucous cleft palate

Cleft of soft palate

Bifid uvula
Protocols Primary Cleft Palate Repair

• 0-6 months:
  a. Lip & Soft palate
  b. Lip with Hard palate using Vomer flap

• 6 months-2 years:
  • Primary palate repair
  • One stage
    - Complete palate (9-14 months)
  • Two stage
    - Soft palate (6-12 months)
    - Hard Palate (13-24 months)

• Technique:
  - Bardach two flap technique
  - Von Langenback
  - Furlow
  - Delaires
  - Sommerlads
  - Morphofunctional
How do you decide which is the best way to repair the palate
Cleft Palate Repair: Delaire

- Two stage Palatoplasty – Lip + Soft Palate [6 months]

- Horizontal incision posterior to greater palatine vessels.

- Advantages
  - Encourages normal function of the soft palate and the tongue.
  - Facilitates closure of the hard palate.
  - Prevents arch collapse.
  - Good palatal lengthening, fewer hearing problems.

- Disadvantages
  - Two stage procedure.

The design of this flap is entirely dependent on the **greater palatine neurovascular pedicle** and it provides greater versatility to cover the cleft.

**Advantages:**
- Complete closure of the entire palate in one stage.
- Creation of more physiologic soft palate muscle sling and a layered closure technique.

**Disadvantages:**
Does not provide additional length to the repaired palate to allow normal speech production.

Cleft Palate Repair: Sommerlad

Radical retro positioning of the velar musculature and tensor tenotomy using an operating microscope to allow accurate levator muscle reconstruction.

➢ **Advantages:**
  - Non tension closure even in wider palates.
  - Good speech outcomes.

➢ **Disadvantages:**
  - Recurrent ear infections due to tensor tenotomy.
  - High fistula rates due to radical muscle relieving from the nasal area.
  - Loss of tautness of soft palate.

Cleft Palate Repair: Furlow

- Alternating the reversing Z-plasties of the nasal and oral flaps and repositioning the levator veli palatini muscle within the posteriorly mobilized flaps.

- Effective for primary closure of a submucous cleft palate and secondary correction of marginal velopharyngeal insufficiency.

**Advantages:**
- No need to raise large mucoperiosteal flaps from the hard palate.
- The soft palate can be lengthened.[Good speech outcome]

**Disadvantages:**
- Non anatomical palatal closure
- Ignores musculus uvulae
- Difficult to close wider clefts
- Large raw area - needs to be covered with buccal flap.


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Intervelar Veloplasty

- Dissection of the Levator Palati from the posterior border of the hard palate, nasal and oral mucosa and posterior repositioning.

- Suturing of the muscle with that of the opposite side for the reconstruction of the Levator sling.

- Sommerlad dissects the levator palatini belly separately and sutures independently as the Levator is the dominant muscle for elevation of the soft palate during speech. Also tensor tenotomy is performed.

- Court Cutting transects the Tensor Palati and to keep its function intact, the cut end is transfixed with the hook of the hamulus.
Maxillofacial growth and speech outcome after one-stage or two-stage palatoplasty in unilateral cleft lip and palate. A systematic review

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Aim of this systematic review was to investigate the relationship between the number of surgical procedures performed to repair the cleft palate and maxillofacial growth, speech and fistula formation in non-syndromic patients with unilateral cleft lip and palate.
Conclusion:

This systematic review shows inconclusive evidence for the relative effects of one-stage or two stage palate repair on maxillofacial growth, speech and fistula rates in patients with unilateral cleft lip and palate. Further, well-designed, randomized controlled studies, especially targeting long-term results, are required.
Effect of One-Stage versus Two-Stage Palatoplasty on Hypernasality and Fistula Formation in Children with Complete Unilateral Cleft Lip and Palate: A Randomized Controlled Trial

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Background: Is one-stage or two-stage palatoplasty more effective for preventing fistula formation and hypernasality in patients with complete unilateral cleft lip and palate?

Methods: This parallel blocked randomized controlled trial included 100 patients with nonsyndromic complete unilateral cleft lip and palate with a repaired cleft lip, divided into two equal groups. Group A had one-stage palatoplasty on cleft palate patients at age 12 to 15 months while group B had two-stage palatoplasty patients with soft palate at age 12 to 15 months and hard palate at age 24 to 25 months. Presence of a fistula was tested clinically at 3 years and speech was tested using nasometry and perceptual analysis at 6 years. Group C consisted of non-cleft controls (n = 20, age 6 years) for speech using nasometry. Fistula rates, hypernasality ratings, and nasalance scores were compared between group A and B. Nasalance recordings of groups A and B were compared with control group C.

Results: There was no difference in fistula rates between groups A and B (p = 0.496, 95 percent CI, 0.305 to 1.15). Mean nasalance scores of group A showed higher nasalance than group B (p = 0.006, 95 percent CI, 1.16 to 0.33). Perceptual analysis showed no difference between groups A and B (p = 0.857 and p = 1.000), group A showed higher mean nasalance than group C (p = 0.357 and p = 1.000), whereas group B showed no difference (p = 0.088, 95 percent CI, -0.14 to 0.06).

Conclusions: There was no difference in fistula rates between groups. Nasalance was slightly higher in patients in the one-stage palatoplasty group than two-stage palatoplasty group, but the difference was not clinically significant. (JPL, November 14, 1:30-3:2001).

CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, IL

Group A
One stage repair
(Complete palate age 12 months)

Group B
Two stage repair
(Soft Palate at age 12 months, Hard Palate at age 24 months)

Group C
Children with unaffected palates (Controlled Group)

Conclusion:

There was no difference in fistula rates between groups.

Although the mean nasalance of the one-stage group was a little higher than the two-stage group and the difference was statistically significant for speech outcome.

The difference may not be clinically relevant as the score was still in the borderline/normal range.

It was concluded that One Stage palatoplasty has better outcome than Two stage palatoplasty on hypernasality and fistula formation.
Morpho-Functional Palatoplasty
Protocols for Morphofunctional Repair of Cleft Palate

- **Age**: 12 months
- **Surgery**: One stage
- **Technique**: Two flap with optimal muscle dissection
- **Speech**:
  - **Pre surgical**:
    - Parent Counselling
  - **Post surgical**:
    - Screening for Language Development & Counselling
    - Demonstration of Language Stimulation
    - Speech Assessment
    - Guidance & Demonstration for Speech Correction
- **VPI**: Modified Furlows ‘Z’ Plasty with Levator Myoplasty
  - Pharyngeal flap
  - Combination of both
Medial and Lateral incisions to expose the soft palate musculature and mobilize the hard palate flaps.

Two flap technique with optimal muscle dissection

Soft Palate Muscle Dissection

- Optimal muscle dissection
- Dissection only of Levator muscle bundle (Levator Myoplasty)
- Tensor tendon is not dissected

Two flap technique with optimal muscle dissection

Postoperative Management

- Postoperative antibiotic dressing for 5 days
- Postoperative feeding: Clean, Clear and Filtered fluids for 1 month.
- Plenty of oral fluids.
- Parent counselling.
Common Sequele

- Formation of Fistula
- Velopharyngeal Insufficiency
Common Sequele

- Formation of Fistula
- Velopharyngeal Insufficiency
The **objective** of this study is to determine whether placement of an antibiotic oral pack on the hard palate **reduces fistula rates** after primary cleft palatoplasty.
• 100 Patients in each group

• Technique Used:

  Bardach two flap with levator myoplasty keeping tensor tendon intact.

• Group A:
  - Oral pack placed on the hard palate for 5 days postop
  - 2% patients had fistula

• Group B:
  - Without Oral Pack
  - 21% patients had fistula

• Follow-up period: 6 months

• Oral pack made of Sterile cotton gauze soaked in framycetin sulfate antibiotic cream (Soframycin Skin Cream, Sanofi India Limited, India) for 5 days postoperatively

Conclusion:

The findings of this study provide evidence that the rate of fistula formation after primary palatoplasty is significantly reduced if a pack soaked with antibiotic cream is placed on the palate postoperatively for 5 days.
Palatal Fistulae: A Comprehensive Classification and Difficulty Index

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(A) Based on type,

- **Longitudinal**

- **Transverse fistulae**
  - small - medium - large
Based on site

1. Hard palate
   (a) Anterior
   (b) Middle
   (c) Posterior

2. Soft palate and Uvula

Factors affecting success:

1. Site of Fistula.
2. Size of Fistula
3. Degree of scarring of palatal tissues (no. of previous procedures on palate
Treatment modalities for surgical management of anterior palatal fistula: Comparison of various techniques, their outcomes, and the factors governing treatment plan: A retrospective study

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(a) Alveolar fistula

(b) Fistula extending to hard palate

(c) Fistula in hard palate

(a) Fistula with secondary mucolized tissue.

(b) Normal anatomical tissue

Unrepaired anterior palatal fistula

Redo with Bardach’s principle

Island flap

Crevicular

Postoperative

Tongue flap

Algorithm for the management of palatal fistula

Tongue Flap

- **Guerrero-Santos and Altamirano**, were the first to report on the use of tongue flaps for palatal defect closure.

- The tongue flap is easy and reproducible with excellent esthetical and functional results.

- **Advantages:** The advantages are the use of adjacent tissue, the excellent blood supply and the low morbidity in donor site.

- **Disadvantage:** Inability in swallowing and speech until depedicling of the flap and in some cases the attachment of the flap can be lost due to traction.
Buccal Myomucosal Flap

- BMMF is a vascular and dependable flap.
- Vascular supply of the flap is consistent and profuse.
- The buccinator myomucosal flap is effective in reducing/eliminating hypernasality in patients with cleft palate and velopharyngeal insufficiency.

**Advantages:**
- Flap congestion is occasional and necrosis is rare.
- It tolerates stretching, folding, and twisting.

**Disadvantages:**
- Fibrosis. Secondary healing.
- Parotid duct orifice injury.
Common Sequelae

- Formation of Fistula
- Velopharyngeal Insufficiency
Surgeries for VPI

- Palatal lengthening
  - V-Y pushback procedure
  - Intravelar veloplasty
  - Double opposing Z-plasty

- Velopharyngeal narrowing procedure
  - Sphincter pharyngoplasty
  - Pharyngeal flap
    - Superiorly based
    - Inferiorly based

VPI correction
We recommend

Modified Furlows ‘Z’ Plasty With Levator Myoplasty
Why ‘Z’ plasty?

- Several studies have supported the selection of double opposing Z-plasty in individuals with small VP gaps of 5 mm or less
  (Chen et al., 1994, 1996; Lindsey and Davis, 1996; D’Antonio, 1997; Seagle et al., 1999, 2002; D’Antonio et al., 2000; Sie et al., 2001).

- With increasing experience with patient selection and modification of the Z-plasty design, however, increases in length up to 10 mm have been reported. (Hudson et al. 1995, Orgun Deren et al, William H. Lindsey and Paul T. Davis)

Why Levator Myoplasty?

- The physiologic orientation of the levator veli palatini muscle is crucial so that the velum is long enough and mobile enough. Either one alone is not enough to ensure velopharyngeal closure.
Use of a modified Furlow Z-plasty as a secondary cleft palate repair procedure to reduce velopharyngeal insufficiency


This Study conducted to determine the effectiveness of a modified secondary Furlow Z-plasty in improving VPI.
Modified Furlows ‘Z’ Plasty with Levator Myoplasty

Incision marking


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Levator Myoplasty
Modified Furlows ‘Z’ Plasty with Levator Myoplasty

Closure


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RESULTS

• Post operative hypernasality reduced significantly.

• Post operative hyponasality did not develop.

• Furlow’s z- plasty with levator myoplasty for secondary repair of VPI seems is a proven technique in reduction of hypernasality during speech.
My Recommendations

- **Primary Palatoplasty:-**
  - Evidenced based Morpho-Functional Palatoplasty
  - One Stage
  - Two Flap Technique with optimal Muscle dissection keeping Tensor Tendon intact

- **Fistula :-**
  Prevent using an antibiotic soaked pack

- **Velopharyngeal Incompetence:-**
  Modified Furlows ‘Z’ plasty with levator myoplasty
Bring the Smile Back

Thank You

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