

**GSR INSTITUTE OF
CRANIOFACIAL AND
FACIAL PLASTIC
SURGERY

OPERATIVE MANUAL**

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PRIMARY CHEILOPLASTY

Unilateral Complete Cleft Lip

After the preoperative work up, the patient is shifted to the operation theatre. Intravenous line is established and maintained with RL/ DNS solution. Preanesthetic medications are administered intravenously. After induction of general anesthesia, orotracheal intubation is done using 'South Pole RAE tube' and is secured with 2 strips of dynaplast [**first strip should be in an inverted V shape fashion encircling the tube and the second strip is in horizontal direction across the endotracheal tube**]. The dynaplast strips should be firmly adherent to the facial skin on either side. General anesthesia is maintained with inhalational anesthetics.

Preoperative Lip Measurements- Following oral intubation, the preoperative lip measurements are made with a divider compass. The measurements to be made are as follows:

- Alveolar width
- Non-cleft side- Columellar Height: columellar base to nostril
- Cleft side- Columellar Height: columellar base to nostril
- Columellar width
- Nasal width
- Vertical height lip: alar base to Cupid's bow, non-cleft side
- Vertical height Lip: alar base to Cupid's bow, cleft side
- Horizontal lip length: commisure to Cupid's bow, non- cleft side
- Horizontal lip length: commisure to Cupid's bow, left side
- Width of Cupid's bow
- Width of lip: commisure to commisure

- Cupid's bow vermilion width, non-cleft side
- Cupid's bow vermilion width, cleft side
- Nostril width, non- cleft side
- Nostril width, cleft side

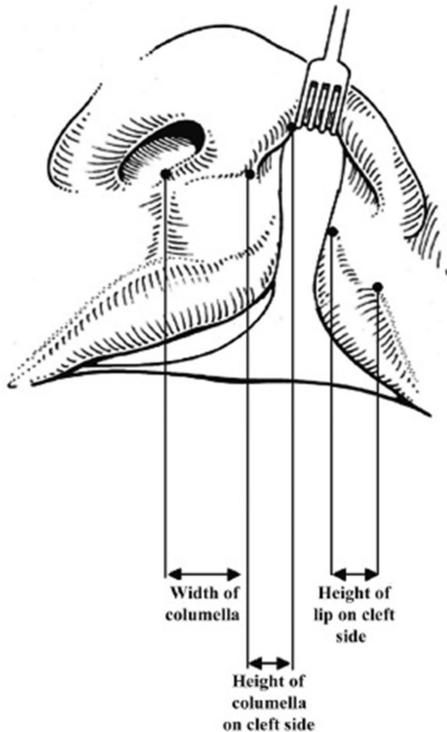


Fig. 3. First set of preoperative measurements.

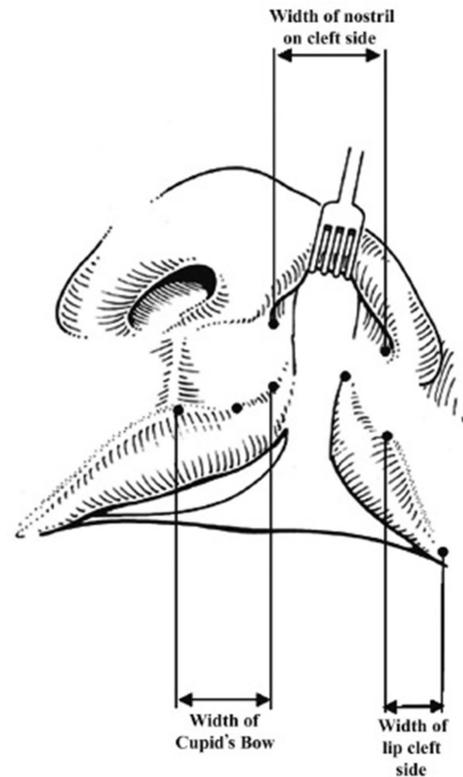


Fig. 4. Second set of preoperative measurements.

Steps to be Followed After Lip Measurements:

- ❖ Make sure that the armamentarium is arranged as per the order.
- ❖ Preparation of the surgical area thoroughly with betadine solution [at least 6 inches proximal to the operative site].
- ❖ Place the head drape covering both the ears & eyes of the patient.
- ❖ Extend the body towel & secure the head drape as well as the body towel along with the head ring using towel clips on either sides making sure that the towel clips are not injuring the ears.

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- ❖ Spread the fine tipped bipolar cautery cable & the suction tube & ensure that they are connected to the source.
- ❖ Connect the suction tip & the cautery tip & ensure their function.
- ❖ Cover the cables with the body towel & secure a towel clip [taking care that the towel clip is not engaging the cable wires/ suction pipe].
- ❖ Clean the hands with a sterilium wash.

Armamentarium Required

1. BP Handles [Short]- 2
2. Dissecting Scissor- 1
3. Skin Hooks- 2
4. Adson's Toothed Tissue Holding Forceps- 2
5. Adson's Non-toothed Tissue Holding Forcep- 1
6. Alar Hook- 1
7. Mitchell's Trimmer [GUM]- 1
8. Small Mucoperiosteal Elevator- 1
9. Needle Holders [4-0, 5-0 & 6-0]- 1 Each
10. Mosquito Forceps- 2
11. Towel Clips- 3
12. Bowls- 2
13. Stainless Steel Dish- 1
14. Sponge Holder- 1
15. Ink Bowl- 1
16. Suture Cutting Scissor- 1

SURGICAL STEPS

1. Incision Marking- Afroze Incision

Incision marking is done according to Afroze incision for cheiloseptoplasty.

Following Points are Marked:

- Tip of the nose
- Base of columella
- Lateral points of columella
- Highest point of white roll on the non-cleft side [**POINT A**]
- Deepest point of white roll on the non-cleft side [**POINT B**]
- **Point C** is 2mm more than the distance between point A & point B
- **Point D** is on the highest point of the white roll fading on the cleft side.

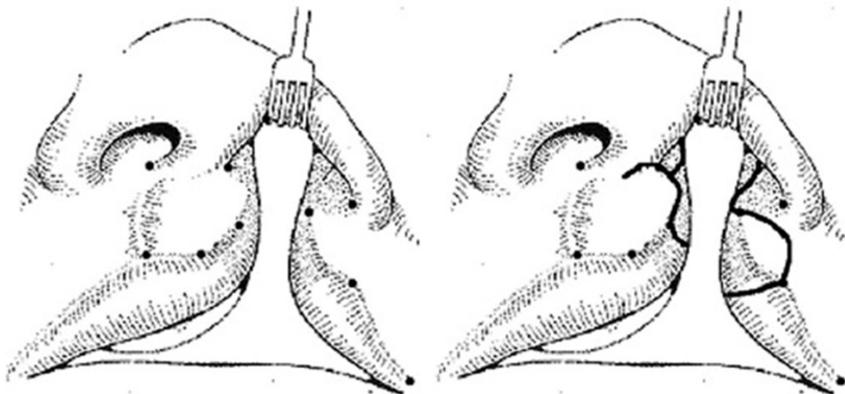


FIGURE 1. Afroze incision marking.

Afroze incision is a combination of Millard incision (on non cleft side) and Pfiefer wavy incision (on cleft side). The Millard incision on the non cleft side is extended from point C along the junction of the skin & vermilion mucosa & further up along the junction of the skin & the nasal mucosa & then turned down lateral to the base of columella to finish in front of the columella without cutting across its base. The incision can be extended further during the surgery using a back cut if more rotation is required.

On the cleft side, the Pfiefer wavy incision starts from point D to go laterally & then curve back to the junction of the skin & vermilion mucosa. From here, it continues along the junction of skin & nasal mucosa to then turn upwards perpendicularly along the junction of the hair bearing & non hair bearing nasal

mucosa stopping at a distance that is approximately one third of the distance of the inner part of the ala.

On both sides the incision is extended anteriorly on to the vermilion at right angles to the incision & continued medially to meet the first part of the incision over the alveolus. On the cleft side, an incision is also made from the distal wave down on the lateral part of the mucosa along the alveolus. Both the above lateral incisions expose the alveolus & piriform area.

2. Surgical Incision- Local infiltration is done using 2% lignocaine with 1:80000 adrenaline under the supervision of an anesthetist. The amount of LA solution to be used is calculated according to body weight of the patient. The maximum dose of lignocaine with adrenaline which can be used is 7.0 mg/ Kg body weight of the patient, not to exceed 500 mg. After waiting for 5 minutes incision is placed using a 15 no. surgical blade.

The incision is placed as described above & the abnormal mucosa covering the area medial to the 2 incisions (**sterile zone**) is removed.

3. Muscle Dissection- On the cleft side, extensive dissection is carried out to relieve all **the abnormal muscle attachments from the piriform rim, ala, lateral aspect of the nose, infra orbital & malar regions.** On the non cleft side, a minimal dissection is done to relieve the abnormal muscle attachments from anterior nasal spine & the columella.

4. Perialveoloplasty & Septoplasty [Septum is the Key]- After the muscle dissection is done, the alveolar flaps are reflected from the cleft margins subperiosteally. Correction of the deviated septum provides stability and exact positioning of the previously lifted alar crus of the cleft side and nasal tip, and the nose can grow in a balanced way with equal muscular force being exerted on both sides. The correct placement of the septum can be achieved only through

very tightly adherent perichondrium. Perichondrium is completely freed from the cartilage on both sides. The septum is then carefully isolated through the same incision by splitting and raising the perichondrium on both sides. The septum is detached from its attachment to the anterior nasal spine and maxillary crest and straightened. The 2 lateral flaps in the alveolus are sutured to complete the perioplasty [using 4-0 vicryl suture]. The perichondrium around the detached septum is sutured together [using three 4-0 vicryl stitches i.e., one at the superior aspect, second in the middle and the third at the inferior aspect of the nasal septum] in such a way that the septum is now in its central position.

5. Suturing- Two stay sutures using 4-0 prolene suture are placed, through the ala nasalis of either sides along with the nasal septum. The nasal sill is sutured next by joining the hair-bearing nasal skin on both sides [using 6-0 prolene]. A saline soaked nasal pack is positioned in the cleft nostril & nasalis sutures are now tightened. After nasalis repositioning is completed, the orbicularis oris muscle is sutured to its counterpart first at the vermillion below the white roll then going higher up till the alar region [using 4-0 vicryl suture].

The skin suturing is done by first securing the white roll with one suture just above and second suture just below the white roll [using 6-0 prolene]. This is done by joining point C on the Cupid's bow to point D on the cleft-side white roll. The C flap is essentially horizontally positioned, resulting in a horizontal scar. The rotation downward of the C flap causes a V-shaped defect in front of the columella, which is filled with the distal V flap of the Pfeiffer wave. Skin closure is further continued using simple interrupted sutures through the skin & vertical mattress sutures through the vermilion to get a good eversion.

6. Postoperative photographs are taken. Nasal pack and pressure dressing are applied. Soframycin based pressure dressing is placed on the upper lip.

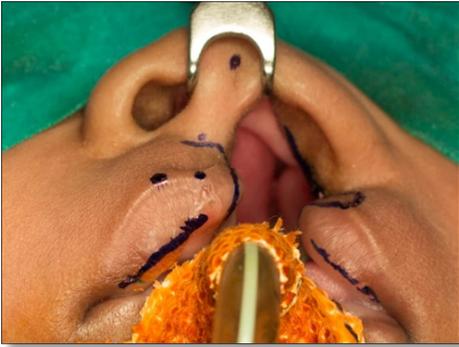


Figure1: Incision marking



Figure2: Muscle dissection on cleft side



Figure3: Muscle dissection on non-cleft side and septal cartilage repositioning

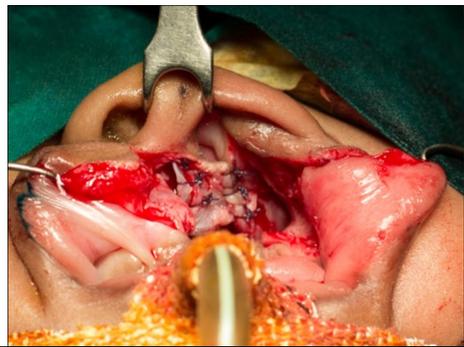


Figure4: Septoplasty, perialveoloplasty and nasal floor reconstruction



Figure5: Mucosal layer suturing



Figure6: Orbicularis oris suturing



Figure7: Skin suturing

7. After the reversal of anesthesia & recovery, the patient is shifted to the ICU & is put in a recovery position. 100% oxygen is given initially at 3 L/minute & is gradually tapered as per the anesthetist's advice. Vital signs are monitored periodically & a close watch is kept to check on post operative bleeding. Patient's attendants are counseled appropriately & the post operative medications are advised.

Incomplete Cleft Lip

After the preoperative work up, the patient is shifted to the operation theatre. Intravenous line is established and maintained with RL/ DNS solution. Preanesthetic medications are administered intravenously. After induction of general anesthesia, orotracheal intubation is done using 'South Pole RAE tube' and is secured with 2 strips of dynaplast **[first strip should be in an inverted V shape fashion encircling the tube and the second strip is in horizontal direction across the endotracheal tube]**. The dynaplast strips should be firmly adherent to the facial skin on either side. General anesthesia is maintained with inhalational anesthetics.

Armamentarium Required

1. BP Handles [Short]- 2
2. Dissecting Scissor-1
3. Skin Hooks- 2
4. Adson's Toothed Tissue Holding Forceps- 2
5. Adson's Non-toothed Tissue Holding Forcep- 1
6. Alar Hook- 1
7. Mitchell's Trimmer [GUM]- 1
8. Small Mucoperiosteal Elevator- 1
9. Needle Holders [4-0, 5-0 & 6-0]- 1 Each
10. Mosquito Forceps- 2
11. Towel Clips- 3
12. Bowls- 2
13. Stainless Steel Dish- 1
14. Sponge Holder- 1
15. Ink Bowl- 1
16. Suture Cutting Scissor- 1

Steps to be Followed After Orotracheal Intubation:

- ❖ Make sure that the armamentarium is arranged as per the order.
- ❖ Preparation of the surgical area thoroughly with betadine solution [at least 6 inches proximal to the operative site].
- ❖ Place the head drape covering both the ears & eyes of the patient.
- ❖ Extend the body towel & secure the head drape as well as the body towel along with the head ring using towel clips on either sides making sure that the towel clips are not injuring the ears.
- ❖ Spread the fine tipped bipolar cautery cable & the suction tube & ensure that they are connected to the source.
- ❖ Connect the suction tip & the cautery tip & ensure their function.
- ❖ Cover the cables with the body towel & secure a towel clip [taking care that the towel clip is not engaging the cable wires/ suction pipe].
- ❖ Clean the hands with a sterilium wash.

1. Incision Marking- Pfeifer Wavy Incision

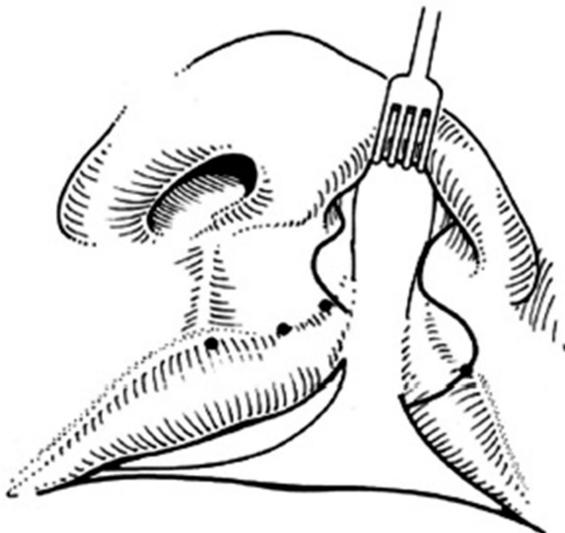


Fig. 2. Marking for the Pfeifer incision.

Marking to be done is according to the Pfiefer Wavy Incision on both cleft & non-cleft sides. On both sides the point is marked on white roll from where it starts fading. The Pfiefer wavy incision starts from these points go laterally & then curve back to the junction of the skin & vermilion mucosa. From here, it continues along the junction of skin & nasal mucosa to then turn upwards perpendicularly along the junction of the hair bearing & non hair bearing nasal mucosa stopping at a distance that is approximately one third of the distance of the inner part of the ala. On both sides the incision is extended anteriorly on to the vermilion at right angles to the incision & continued medially to meet the first part of the incision near the alveolus.

2. Surgical Incision- Local infiltration is done using 2% lignocaine with 1:80000 adrenaline under the supervision of an anesthetist. The amount of LA solution to be used is calculated according to body weight of the patient. The maximum dose of lignocaine with adrenaline which can be used is 7.0 mg/ Kg body weight of the patient, not to exceed 500 mg. After waiting for 5 minutes incision is placed using a 15 no. surgical blade. The incision is placed as described above & the abnormal mucosa covering the area medial to the 2 incisions (**sterile zone**) is removed.

3. Muscle Dissection & Approximation- A sharp dissection is done to dissect the orbicularis oris muscle from either sides of the cleft & a stay suture is placed through the muscle fibres of both sides at the vermilion region. Muscle approximation is carried out using the 5-0 vicryl suture.

4. Suturing- The skin suturing is done by first securing the white roll with one suture just above and second suture just below the white roll [using 6-0 prolene]. Skin closure is further continued using simple interrupted sutures through the skin & vertical mattress sutures through the vermilion to get a good eversion.

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5. Postoperative photographs are taken. Nasal pack and pressure dressing are applied. Soframycin based pressure dressing is placed on the upper lip.

6. After the reversal of anesthesia & recovery, the patient is shifted to the ICU & is put in a recovery position. 100% oxygen is given & is gradually tapered as per the anesthetist's advice. Vital signs are monitored periodically & a close watch is kept to check on post operative bleeding. Patient's attendants are counseled appropriately & the post operative medications are advised.

Bilateral Complete Cleft Lip

After the preoperative work up, the patient is shifted to the operation theatre. Intravenous line is established and maintained with RL/ DNS solution. Preanesthetic medications are administered intravenously. After induction of general anesthesia, orotracheal intubation is done using 'South Pole RAE tube' and is secured with 2 strips of dynaplast **[first strip should be in an inverted V shape fashion encircling the tube and the second strip is in horizontal direction across the endotracheal tube]**. The dynaplast strips should be firmly adherent to the facial skin on either side. General anesthesia is maintained with inhalational anesthetics.

Preoperative Lip Measurements- Following oral intubation, the preoperative lip measurements are made with a divider compass. The measurements to be made are as follows:

- Alveolar width
- Columellar height (Bilateral)- Base of columella to nostril
- Columellar width
- Nasal width- Bilaterally
- Vertical height of lip (Bilateral)- Alar base to Cupid's bow
- Horizontal lip length (Bilateral)- Oral commissure to Cupid's bow
- Width of Cupid's bow
- Width of lip- Commisure to commisure
- Cupid's bow vermilion width (Bilateral)
- Nostril width (Bilateral)

Armamentarium Required

1. BP Handles [Short]- 2

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2. Dissecting Scissor-1
3. Skin Hooks- 2
4. Adson's Toothed Tissue Holding Forceps- 2
5. Adson's Non-toothed Tissue Holding Forcep- 1
6. Alar Hook- 1
7. Mitchell's Trimmer [GUM]- 1
8. Small Mucoperiosteal Elevator- 1
9. Needle Holders [4-0, 5-0 & 6-0]- 1 Each
10. Mosquito Forceps- 2
11. Towel Clips- 3
12. Bowls- 2
13. Stainless Steel Dish- 1
14. Sponge Holder- 1
15. Ink Bowl- 1
16. Suture Cutting Scissor- 1

Steps to be Followed After Lip Measurements:

- ❖ Make sure that the armamentarium is arranged as per the order.
- ❖ Preparation of the surgical area thoroughly with betadine solution [at least 6 inches proximal to the operative site].
- ❖ Place the head drape covering both the ears & eyes of the patient.
- ❖ Extend the body towel & secure the head drape as well as the body towel along with the head ring using towel clips on either sides making sure that the towel clips are not injuring the ears.
- ❖ Spread the fine tipped bipolar cautery cable & the suction tube & ensure that they are connected to the source.
- ❖ Connect the suction tip & the cautery tip & ensure their function.
- ❖ Cover the cables with the body towel & secure a towel clip [taking care that the towel clip is not engaging the cable wires/ suction pipe].

- ❖ Clean the hands with a sterilium wash.

SURGICAL STEPS

1. Incision Marking- Afroze Incision

- Tip of nose.
- Base of columella.
- Deepest point of the cupid bow on the prolabium.
- Highest point of the white rolls on the prolabium corresponds to future cupid bow.
- Midpoint of the tubercle of the vermillion on the prolabium at the junction of the dry & wet mucosa.
- Highest point on the white rolls from where it starts fading on both sides.
- Deepest point on the white rolls from where it completely disappears on both sides.

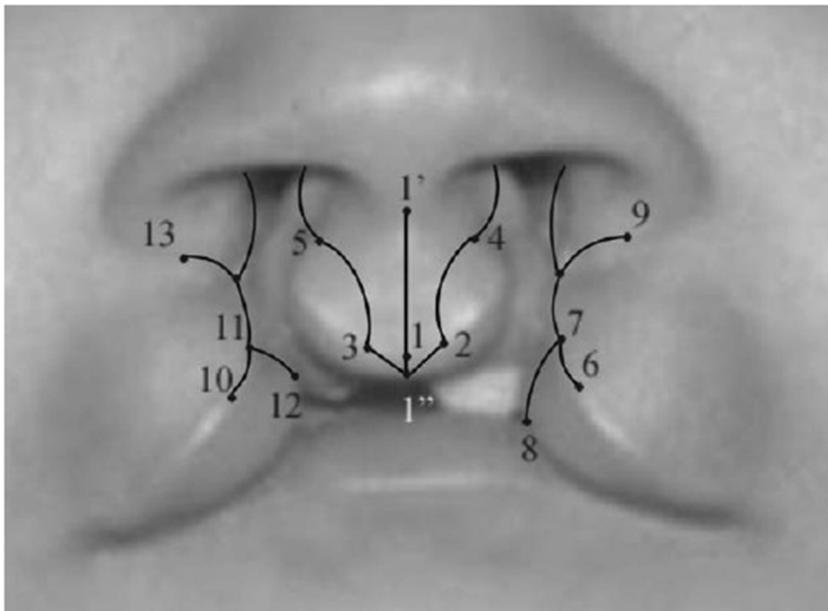


Fig. 1. Marking for the Afroze technique.



Highest points of the white roll on the prolabium of either side are joined with the point in the midline of the prolabium at the junction of the dry & wet vermilion. A reverse “S” incision extends on either side of the prolabium from the highest points of the cupid’s bow to end at the point of the junction of the pre-maxilla with the vomerine mucosa. From the highest point of the white roll fading away over the lateral segments, a “C” shaped incision is marked to end half way up the alar groove. Medial extensions of the incision are from the “C” flap till the junction of the premaxilla with the vomerine mucosa on either side. The sterile zones are marked as in the unilateral cleft lip deformity.

2. Surgical Incision & Muscle Dissection- Surgical Incision is placed using a no.15 surgical blade on the prolabium to separate the philtral flap from the mucosa & a sub-periosteal dissection is done to expose the underlying pre maxilla. The dissection is further extended cranially to expose the anterior nasal spine. The prolabial flap is secured using a 4-0 prolene stay suture. The sterile zones on both the lateral segments are excised & the orbicularis muscle dissection is completed. The flaps for peri-alveoloplasty are created on either

side of the premaxilla as well as the lateral cleft alveolar segments. The dissection of the ala-nasalis muscle group is completed with fine dissecting scissors.

3. Suturing- The prolabial mucosal flap is sutured high on premaxilla upto the anterior nasal spine to form the posterior wall of the labial sulcus using a 4-0 vicryl suture. **Bilateral peri-alveoloplasty is completed [4-0 vicryl suture] in such a way that the periosteal surface of the flap faces the nasal; side while the mucosal surface faces the oral side.** Two stay sutures are secured through the ala nasalis muscle, nasal septum to the ala nasalis muscle of opposite side using 4-0 prolene suture. The nasal sill is completed with 6-0 prolene sutures & bilateral saline soaked bullet shaped nasal packs are placed. The ala nasalis sutures are now completed & the sutures are cut close to the knot. The nasal packs are removed at this stage. The lateral labial flaps are advanced medially & are sutured together with 4-0 vicryl suture to form the mucosal aspects of the upper lip as well the labial vestibule. The orbicularis oris muscle fibres from either side below the white roll in the vermilion region are approximated & a 4-0 vicryl stay suture is secured. The rest of the orbicularis is now reconstructed till the upper most part close to the anterior nasal spine. The philtral flap is repositioned & the first suture using a 6-0 prolene is secured to form the median tubercle of the cupid's bow. The white roll on either side is secured with first suture above the white roll & the second below it on either side. The vermilion mucosa is sutured through vertical mattress using 6-0 prolene to get a vertical eversion. The skin closure is completed using simple interrupted sutures.



4. Postoperative photographs are taken. Nasal pack and pressure dressing are applied. Soframycin based pressure dressing is placed on the upper lip.

5. After the reversal of anesthesia & recovery, the patient is shifted to the ICU & is put in a recovery position. 100% oxygen is given & is gradually tapered as per the anesthetist's advice. Vital signs are monitored periodically & a close watch is kept to check on post operative bleeding. Patient's attendants are counseled appropriately & the post operative medications are advised.

HARD PALATOPLASTY- [HARD PALATE REPAIR]

Bardach Palatoplasty- Two Flap Palatoplasty Technique

After the preoperative work up, the patient is shifted to the operation theatre. Intravenous line is established and maintained with RL/ DNS solution. Preanesthetic medications are administered intravenously. After induction of general anesthesia, orotracheal intubation is done using 'South Pole RAE tube' and is secured with 2 strips of dynaplast **[first strip should be in an inverted V shape fashion encircling the tube and the second strip is in horizontal direction across the endotracheal tube]**. The dynaplast strips should be firmly adherent to the facial skin on either side. General anesthesia is maintained with inhalational anesthetics.

Steps to be Followed After Endotracheal Intubation:

- ❖ Make sure that the armamentarium is arranged as per the order.
- ❖ Preparation of the surgical area thoroughly with betadine solution [at least 6 inches proximal to the operative site].
- ❖ Place the head drape covering both the ears & eyes of the patient.
- ❖ Extend the body towel & secure the head drape as well as the body towel along with the head ring using towel clips on either sides making sure that the towel clips are not injuring the ears.
- ❖ Spread the fine tipped bipolar cautery cable & the suction tube & ensure that they are connected to the source.
- ❖ Clamp the basket to the body towel using a towel clip.
- ❖ Connect the suction tip & the cautery tip & ensure their function.
- ❖ Cover the cables with the body towel & secure a towel clip [taking care that the towel clip is not engaging the cable wires/ suction pipe].
- ❖ Apply Dingman's retractor only in presence of anesthesiologist & it is ensured that the airway resistance is within the normal limits.

- ❖ Intraoral saline wash is done & the preoperative pictures are taken.
- ❖ Clean the hands with a sterilium wash

Armamentarium Required

1. Local Anesthetic Syringe [2ml]- 1
2. B.P. Handle [Long]- 1
3. B.P. Blade No. 15- 1
4. Dissecting Scissors- 3
5. Skin Hooks- 2
6. Adson's Toothed Tissue Holding Forceps [Long]- 2
7. Adson's Non-toothed Tissue Holding Forcep [Long]- 1
8. Mitchell's Trimmer [GUM]- 1
9. Small Periosteal Elevator- 1
10. Needle Holders [4-0, 5-0 & 6-0]- 1 Each
11. Mosquito Foceps- 2
12. Towel Clips- 3
13. Bowls- 2
14. Stainless Steel Dish- 1
15. Sponge Holder- 1
16. Ink Bowl- 1
17. Suture Cutting Scissor- 1
18. Dingman's Mouth Gag with Set of Three Tongue Blades- 1
19. Freer's Periosteal Elevator- 1

SURGICAL STEPS

1. Incision Marking- Bardach Palatoplasty- Two Flap Palatoplasty Technique- Incision marking is done bilaterally along the cleft margins & continued laterally close to palato-gingival margins of maxillary teeth & anteriorly as far as the limit of the defect in such a way as to include the palatine rugae in

the flap. Posteriorly, the marking is done from the cleft margins across the base of bifid uvula to extend across the palatopharyngeal arches up to 10 mm bilaterally.

2. Surgical Incisions & Mucoperiosteal Flap Reflection- Local infiltration is done using 2% lignocaine with 1:80000 adrenaline under the supervision of an anesthetist. The amount of LA solution to be used is calculated according to body weight of the patient. The maximum dose of lignocaine with adrenaline which can be used is 7.0 mg/ Kg body weight of the patient, not to exceed 500 mg. After waiting for 5 minutes incision is placed using a 15 no. surgical blade according the incision markings starting from palatopharyngeal arches across the base of bifid uvula, along the cleft margins followed by lateral releasing incisions.

Mucoperiosteal flaps are reflected on either sides to expose the posterior nasal spine (**PNS**) medially & the pterygoid hamulus (**PH**) on the lateral aspect. This will create two posteriorly based palatal pedicle flaps with the greater palatine neurovascular bundle in the center.

3. Muscle Dissection & Nasal Layer Separation- After the PNS is exposed medially and pterygoid hamulus laterally the muscle aponeurosis attached to the hamulus is freed to allow for muscle mobilization medially. The abnormal insertion of the levator palatine muscle is identified medially and following the same plane the soft palate mucosa is carefully dissected from the levator muscle bundle. The levator muscle is carefully separated from the nasal layer. Nasal layer is undermined on either side using a Mitchell's trimmer. **To ensure a tension free closure of the oral mucoperiosteum, the periosteal fibres over the pterygoid hamulus could be incised with a no. 15 BP blade.**

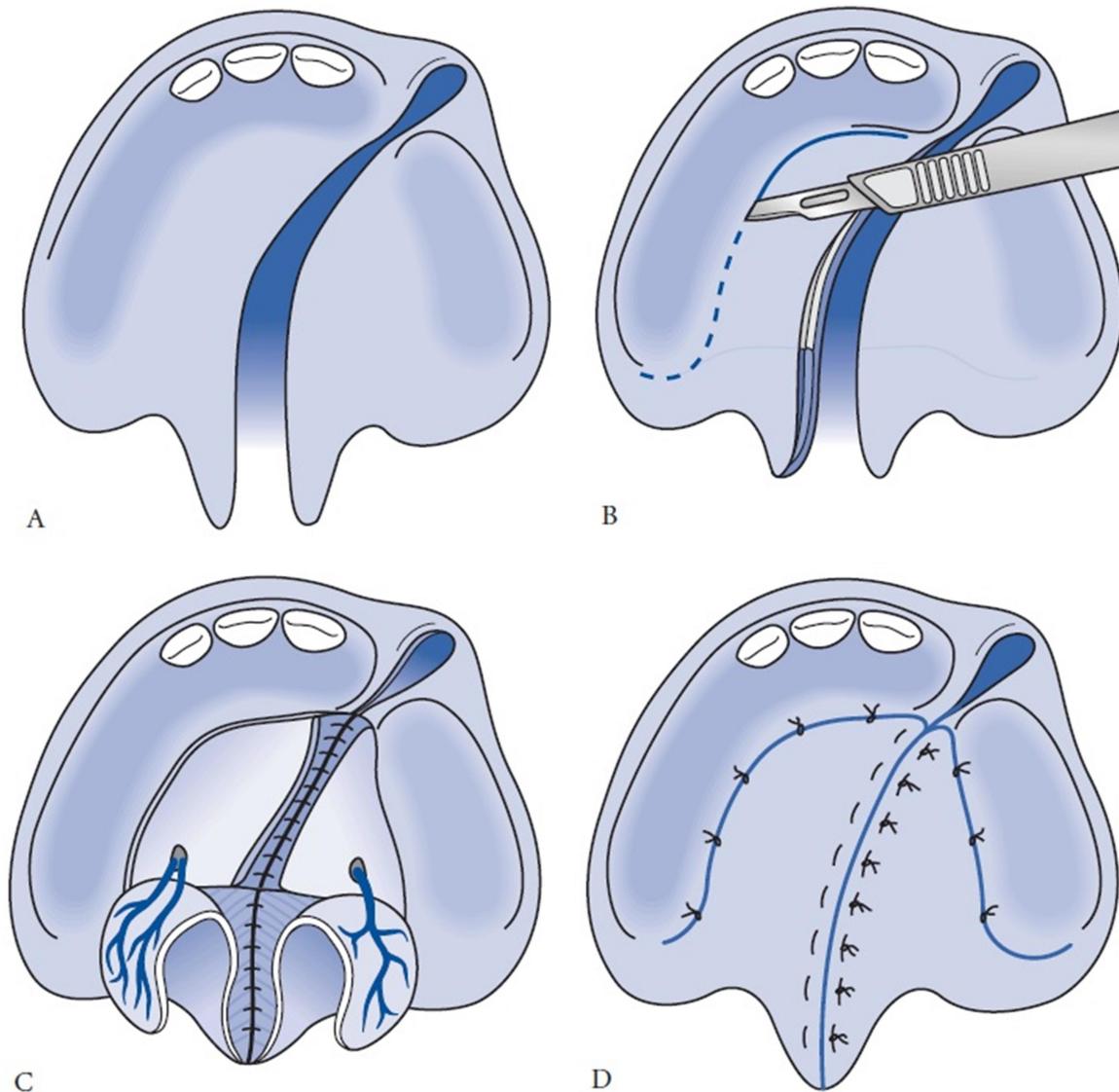


Figure- Bardach Palatoplasty- Two Flap Palatoplasty Technique

4. Suturing- The nasal layer of either side is approximated using a 4-0 vicryl suture & a vomer flap could be used for the same purpose, if required in case of wide clefts. Following nasal layer closure, the approximation of the levator muscle bundle is done with 4-0 PDS II suture or 4-0 prolene suture by repositioning the bundle transversely and posteriorly. The uvula is reconstructed using 4-0 vicryl sutures. Soft palate mucosa is anchored to levator muscle bundle

by 3-0 black silk suture using vertical mattress technique (sling suture). In this technique, the suture first passes from soft palate mucosa of one side passes through the levator muscle bundle of both sides to exit through the soft palate mucosa on other side. It then pass back to first side by passing through only mucosa of both sides without incorporating underlying muscle and is tied together.

After closure of soft palatal mucosa oral mucoperiosteal flaps on both sides should be mobilized medially to cover the nasal layer and is sutured. Adequate medial mobilization of the oral layer is ensured by dissecting around the greater palatine vascular pedicle. The oral mucoperiosteum is sutured with 4-0 vicryl suture using simple interrupted & a vertical mattress sutures alternatively in such a way that all the vertical mattress sutures pass through the oral mucoperiosteum only, while all the simple interrupted sutures pass through the oral layer as well as the nasal layer. The lateral release incisions of the oral layer are sutured with the palate-gingival margins or labial mucoperiosteum using 3-0 black silk sutures.

5. Operative site is gently cleaned with normal saline, & hemostasis is ensured. A soframycin based oral pack is secured over the hard palate with 3-0 black silk sutures. Vaseline is applied over the soft palate mucosa and sutures. Postoperative photographs are taken.

6. After the reversal of anesthesia & recovery, the patient is shifted to the ICU & is put in a recovery position. 100% oxygen is given & is gradually tapered as per the anesthetist's advice. Vital signs are monitored periodically & a close watch is kept to check on post operative bleeding. Patient's attendants are counseled appropriately & the post operative medications are advised.

SOFT PALATOPLASTY- [SOFT PALATE REPAIR]

Von- Langenbeck Technique

After the preoperative work up, the patient is shifted to the operation theatre. Intravenous line is established and maintained with RL/ DNS solution. Preanesthetic medications are administered intravenously. After induction of general anesthesia, orotracheal intubation is done using 'South Pole RAE tube' and is secured with 2 strips of dynaplast [**first strip should be in an inverted V shape fashion encircling the tube and the second strip is in horizontal direction across the endotracheal tube**]. The dynaplast strips should be firmly adherent to the facial skin on either side. General anesthesia is maintained with inhalational anesthetics.

Steps to be Followed After Endotracheal Intubation:

- ❖ Make sure that the armamentarium is arranged as per the order.
- ❖ Preparation of the surgical area thoroughly with betadine solution [at least 6 inches proximal to the operative site].
- ❖ Place the head drape covering both the ears & eyes of the patient.
- ❖ Extend the body towel & secure the head drape as well as the body towel along with the head ring using towel clips on either sides making sure that the towel clips are not injuring the ears.
- ❖ Spread the fine tipped bipolar cautery cable & the suction tube & ensure that they are connected to the source.
- ❖ Clamp the basket to the body towel using a towel clip.
- ❖ Connect the suction tip & the cautery tip & ensure their function.
- ❖ Cover the cables with the body towel & secure a towel clip [taking care that the towel clip is not engaging the cable wires/ suction pipe].
- ❖ Apply Dingman's retractor only in presence of anesthesiologist & it is ensured that the airway resistance is within the normal limits.

- ❖ Intraoral saline wash is done & the preoperative pictures are taken.
- ❖ Clean the hands with a sterilium wash

Armamentarium Required

1. Local Anesthetic Syringe [2ml]- 1
2. B.P. Handle [Long]- 1
3. B.P. Blade No. 15- 1
4. Dissecting Scissors- 3
5. Skin Hooks- 2
6. Adson's Toothed Tissue Holding Forceps [Long]- 2
7. Adson's Non-toothed Tissue Holding Forcep [Long]- 1
8. Mitchell's Trimmer [GUM]- 1
9. Small Periosteal Elevator- 1
10. Needle Holders [4-0, 5-0 & 6-0]- 1 Each
11. Mosquito Forceps- 2
12. Towel Clips- 3
13. Bowls- 2
14. Stainless Steel Dish- 1
15. Sponge Holder- 1
16. Ink Bowl- 1
17. Suture Cutting Scissor- 1
18. Dingman's Mouth Gag with Set of Three Tongue Blades- 1

SURGICAL STEPS

1. Incision Marking- Von-Langenbeck Technique

Incision marking is done bilaterally along the cleft margins & continued posteriorly, from the cleft margins across the base of bifid uvula to extend across the palatopharyngeal arches up to 10 mm bilaterally. Laterally, the releasing incisions are marked on the hard palate close to palato-gingival margins of

maxillary teeth bilaterally. Medially, a single midline releasing incision is marked from the anterior margin of the cleft.

2. Surgical Incisions & Muscle Dissection- Local infiltration is done using 2% lignocaine with 1:80000 adrenaline under the supervision of an anesthetist. The amount of LA solution to be used is calculated according to body weight of the patient. The maximum dose of lignocaine with adrenaline which can be used is 7.0 mg/ Kg body weight of the patient, not to exceed 500 mg. After waiting for 5 minutes incision is placed using a 15 no. surgical blade according to planned incision markings starting from palatopharyngeal arches across the base of bifid uvula, along the cleft margins and anterior midline releasing incisions. This is followed by bilateral releasing incisions.

Mucoperiosteal flaps are reflected on either sides to expose the posterior nasal spine (**PNS**) medially & the pterygoid hamulus (**PH**) on the lateral aspect. This will create two bipedicled flaps on either side. The two bipedicled flaps are attached on its anterior as well as posterior aspects. Care should be taken to avoid damage to greater palatine neurovascular bundle as the access is difficult because of anterior and posterior attachments.

3. Muscle Dissection & Nasal Layer Separation- After the PNS is exposed medially and pterygoid hamulus laterally the nasal layer is undermined on either side using a Mitchell's trimmer. The abnormal insertion of the levator palatine muscle is identified medially and following the same plane the soft palate mucosa is carefully dissected from the levator muscle bundle. The levator muscle is carefully separated from the nasal layer. **To ensure a tension free closure of the oral mucoperiosteum, the periosteal fibres over the pterygoid hamulus could be incised with a no. 15 BP blade.**

4. Suturing- The nasal layer of either side is approximated using a 4-0 vicryl suture. Following nasal layer closure, the approximation of the levator muscle bundle is done with 4-0 PDS II suture or 4-0 prolene suture by repositioning the bundle transversely and posteriorly. The uvula is reconstructed using 4-0 vicryl sutures. Soft palate mucosa is anchored to levator muscle bundle by 3-0 vicryl sutures using vertical mattress technique (sling suture). In this technique, the suture first passes from soft palate mucosa of one side passes through the levator muscle bundle of both sides to exit through the soft palate mucosa on other side. It then pass back to first side by passing through only mucosa of both sides without incorporating underlying muscle and is tied together.

Adequate medial mobilization of the oral mucosa is ensured by dissecting around the greater palatine vascular pedicle. The lateral release incisions of the oral layer are sutured with the palato-gingival margins or labial mucoperiosteum using 3-0 vicryl sutures.

5. Operative site is gently cleaned with normal saline, & hemostatsis is ensured. A soframycin based oral pack is secured over the hard palate with 3-0 black silk sutures. Vaseline is applied over the soft palate mucosa and sutures. Postoperative photographs are taken.

6. After the reversal of anesthesia & recovery, the patient is shifted to the ICU & is put in a recovery position. 100% oxygen is given & is gradually tapered as per the anesthetist's advice. Vital signs are monitored periodically & a close watch is kept to check on post operative bleeding. Patient's attendants are counseled appropriately & the post operative medications are advised.

REDO PALATOPLASTY

Modified Furlow's Z- Plasty Technique

After the preoperative work up, the patient is shifted to the operation theatre. Intravenous line is established and maintained with RL/ DNS solution. Preanesthetic medications are administered intravenously. After induction of general anesthesia, orotracheal intubation is done using 'South Pole RAE tube' and is secured with 2 strips of dynaplast [**first strip should be in an inverted V shape fashion encircling the tube and the second strip is in horizontal direction across the endotracheal tube**]. The dynaplast strips should be firmly adherent to the facial skin on either side. General anesthesia is maintained with inhalational anesthetics.

Steps to be Followed After Endotracheal Intubation:

- ❖ Make sure that the armamentarium is arranged as per the order.
- ❖ Preparation of the surgical area thoroughly with betadine solution [at least 6 inches proximal to the operative site].
- ❖ Place the head drape covering both the ears & eyes of the patient.
- ❖ Extend the body towel & secure the head drape as well as the body towel along with the head ring using towel clips on either sides making sure that the towel clips are not injuring the ears.
- ❖ Spread the fine tipped bipolar cautery cable & the suction tube & ensure that they are connected to the source.
- ❖ Clamp the basket to the body towel using a towel clip.
- ❖ Connect the suction tip & the cautery tip & ensure their function.
- ❖ Cover the cables with the body towel & secure a towel clip [taking care that the towel clip is not engaging the cable wires/ suction pipe].
- ❖ Apply dingman's retractor only in presence of anesthesiologist & it is ensured that the airway resistance is within the normal limits.

- ❖ Intraoral saline wash is done & the preoperative pictures are taken.
- ❖ Clean the hands with a sterilium wash

Armamentarium Required

1. Local Anesthetic Syringe [2ml]- 1
2. B.P. Handle [Long]- 1
3. B.P. Blade No. 15- 1
4. Dissecting Scissors- 3
5. Skin Hooks- 2
6. Adson's Toothed Tissue Holding Forceps [Long]- 2
7. Adson's Non-toothed Tissue Holding Forcep [Long]- 1
8. Mitchell's Trimmer [GUM]- 1
9. Small Periosteal Elevator- 1
10. Needle Holders [4-0, 5-0 & 6-0]- 1 Each
11. Mosquito Forceps- 2
12. Towel Clips- 3
13. Bowls- 2
14. Stainless Steel Dish- 1
15. Sponge Holder- 1
16. Ink Bowl- 1
17. Suture Cutting Scissor- 1
18. Dingman's Mouth Gag With Set of Three Tongue Blades- 1
19. Freer's Periosteal Elevator- 1

SURGICAL STEPS

1. Incision Marking- Modified Furlow's Z- Plasty Technique

Following points & lines are marked with gentian violet ink:

- **Point A-** Point on the midline of the soft palate corresponding to the posterior border of the hard palate.

- **Point B-** The next point marked at the middle of the base of the reconstructed uvula, or the middle of the posterior border of the soft palate in cases where the uvula had not previously been reconstructed.
- **Line AB-** Line was drawn to connect point A with point B.
- **Point C & Point D-** The line AB extends up to a distance of 10 mm on both the palato-pharyngeal arches (points C and D).
- **Anterior Limb & Point E-** The incision design of the oral layer is based on the original Furlow Z-plasty, with an anterior limb on the left side and a posterior limb on the right side. The marking for the anterior limb started from point A and followed a path parallel to the posterior border of the hard palate at a distance of 5 mm. It then extends up to the retromolar area of the left side of the maxilla (point E).
- **Posterior Limb & Point F-** The posterior limb extended from point B to the right side of the soft palate at a right angle to line AB (point F).
- Care should be taken to ensure that the lines AB, AE, and BF are of equal length. These incision markings allow two flaps to be raised, whereby the one on the left can be rotated posteriorly and the flap on the right side can be rotated anteriorly.

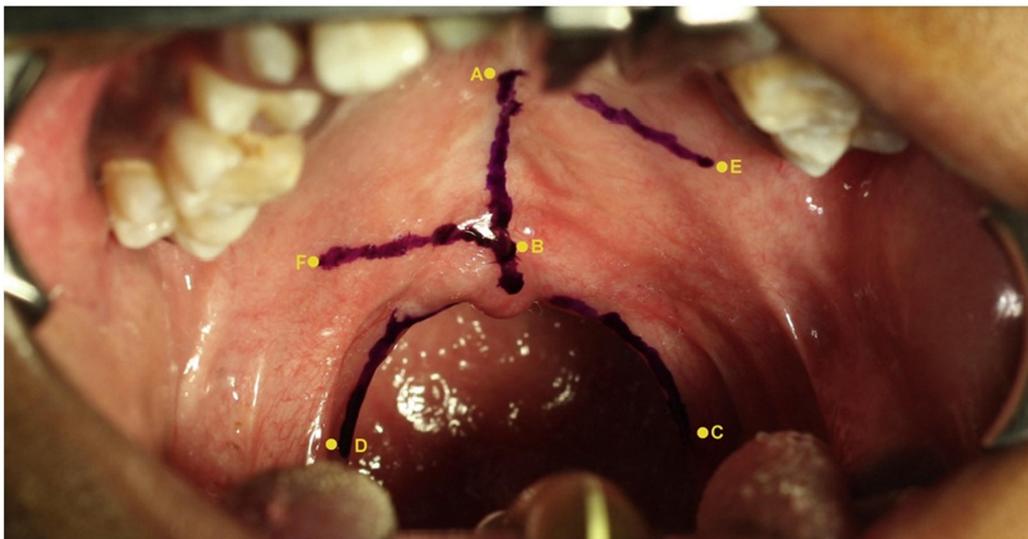


Figure- Modified Furlow's Z-Plasty Incision Marking

2. Surgical Incisions & Muscle Dissection- Local infiltration is done using 2% lignocaine with 1:80000 adrenaline under the supervision of an anesthetist. The amount of LA solution to be used is calculated according to body weight of the patient. The maximum dose of lignocaine with adrenaline which can be used is 7.0 mg/ Kg body weight of the patient, not to exceed 500 mg. After waiting for 5 minutes incision is placed using a 15 no. surgical blade.

The incision starts on the oral layer from point B to A. The incision then continues from point B to points C and D. After the incisions ABC and ABD are completed, the incision AE is given. A myo-mucosal flap is raised from the nasal layer with the levator muscle bundle initially attached to the oral flap, but will be dissected away from the oral mucosa after raising the flap. Next, incision BF is given. In this second flap, the oral mucosa is raised, leaving the levator muscle bundle attached to the nasal layer. The levator muscle bundle is raised from the nasal layer in a second stage. The previously closed nasal layer is left intact and not dissected as in a traditional Furlow Z-plasty.

3. Suturing- The closure of the nasal layer starts posteriorly by approximating the points C and D and moving anteriorly up to the intact part of the nasal layer. This closure of the nasal layer is done with 4-0 Vicryl suture. The approximation of the levator muscle bundle is done with 4-0 PDS II suture or 4-0 prolene suture by repositioning the bundle transversely and posteriorly. Closure of the oral layer is done with a Z-plasty by transposing flap BF anteriorly and AE posteriorly with 4-0 Vicryl sutures.

If either on the left or the right side, the wound closure is incomplete with gaping, a buccal myomucosal flap can be harvested to achieve the same. Donor site is primarily closed using 5-0 vicryl suture.

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4. Operative site is gently cleaned with normal saline, & hemostatsis is ensured. Vaseline is applied over the soft palate mucosa and sutures. Postoperative photographs are taken.

5. After the reversal of anesthesia & recovery, the patient is shifted to the ICU & is put in a recovery position. 100% oxygen is given & is gradually tapered as per the anesthetist's advice. Vital signs are monitored periodically & a close watch is kept to check on post operative bleeding. Patient's attendants are counseled appropriately & the post operative medications are advised.

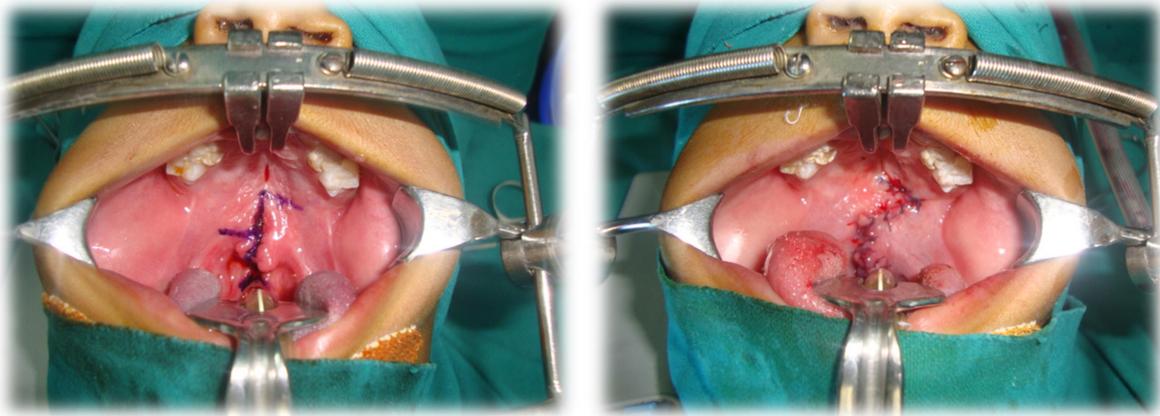


Figure- Modified Furlow's Z-Plasty

HARVESTING BUCCAL MYOMUCOSAL FLAP

SURGICAL STEPS- An inverted U shaped flap is marked on the buccal mucosa corresponding to the side of the defect & a monopolar cautery is used to incise the mucosa, submucosa & a part of the buccinator muscle to create a buccal myomucosal flap of adequate length & width. The flap is positioned over the defect & is sutured using 5-0 vicryl suture. Donor site is primarily closed using 5-0 vicryl suture. Operative site is gently cleaned with normal saline, & hemostasis is ensured. Post operative photographs are taken prior to extubation.



Figure- Buccal-Myomucosal Flap

FISTULA REPAIR

Fistula at the Junction of the Hard & Soft Palate

Armamentarium Required

1. Local Anesthetic Syringe [2ml]- 1
2. B.P. Handle [Long]- 1
3. B.P. Blade No. 15- 1
4. Dissecting Scissors- 3
5. Skin Hooks- 2
6. Adson's Toothed Tissue Holding Forceps [Long]- 2
7. Adson's Non-toothed Tissue Holding Forcep [Long]- 1
8. Mitchell's Trimmer [GUM]- 1
9. Small Periosteal Elevator- 1
10. Freer's Periosteal Elevaror -1
11. Needle Holders [4-0, 5-0 & 6-0]- 1 Each
12. Mosquito Forceps- 2
13. Towel Clips- 3
14. Bowls- 2
15. Stainless Steel Dish- 1
16. Sponge Holder- 1
17. Ink Bowl- 1
18. Suture Cutting Scissor- 1
19. Dingman's Mouth Gag with Set of Three Tongue Blades- 1

SURGICAL STEPS- After the preoperative preparation similar to palatoplasty, an incision is placed along the margins of the fistula using a no.15 BP blade. Sharp dissection is done & the oral layer is separated from the nasal layer. The nasal layer from either side is undermined & approximated with 5-0 vicryl suture. A lateral release incision is placed if required to aid in mobilization of the oral

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mucoperiosteum & oral layer is approximated using 5-0 vicryl suture. Hemostasis is ensured & intraoral wash is done using normal saline & postoperative photographs are taken prior to extubation. A soframycin based oral pack is secured over the hard palate, with 3-0 black silk suture.

After the reversal of anesthesia & recovery, the patient is shifted to the ICU & is put in a recovery position. 100% oxygen is given initially at 3 L/minute & is gradually tapered as per the anesthetist's advice. Vital signs are monitored periodically & a close watch is kept to check on post operative bleeding. Patient's attendants are counseled appropriately & the post operative medications are advised.

FISTULA REPAIR

**Fistula at the Anterior Part of the Hard Palate (Fistula < 5mm in size)-
[Modified Von Langenbeck Technique]**

SURGICAL STEPS- After the preoperative preparation similar to palatoplasty, incision is placed using a no.15 BP blade along the margins of the palatal fistula only to separate nasal layer from oral mucoperiosteum. Laterally, releasing incisions are given bilaterally close to palato-gingival margins of the maxillary teeth. These lateral releasing incisions will not unite with the incisions around the cleft/ fistula margins. With the help of Freer's periosteal elevator bilateral mucoperiosteal flaps are carefully reflected. This will create two bipediced flaps on either side. The two bipediced flaps are attached on its anterior as well as posterior aspects. Care should be taken to avoid damage to greater palatine neurovascular bundle as the access is difficult because of anterior and posterior attachments. Using a Mitchel trimmer, nasal layer is separated from oral layer and is undermined to facilitate closure. The nasal layer of either side is approximated using a 4-0 vicryl suture. After closure of nasal layer, the oral mucoperiosteum is mobilized medially to cover the nasal layer and is sutured with 4-0 vicryl suture using simple interrupted or vertical mattress technique. The lateral release incisions of the oral layer are sutured with the palato-gingival margins using 4-0 vicryl sutures.

After the reversal of anesthesia & recovery, the patient is shifted to the ICU & is put in a recovery position. 100% oxygen is given initially at 3 L/minute & is gradually tapered as per the anesthetist's advice. Vital signs are monitored periodically & a close watch is kept to check on post operative bleeding. Patient's attendants are counseled appropriately & the post operative medications are advised.

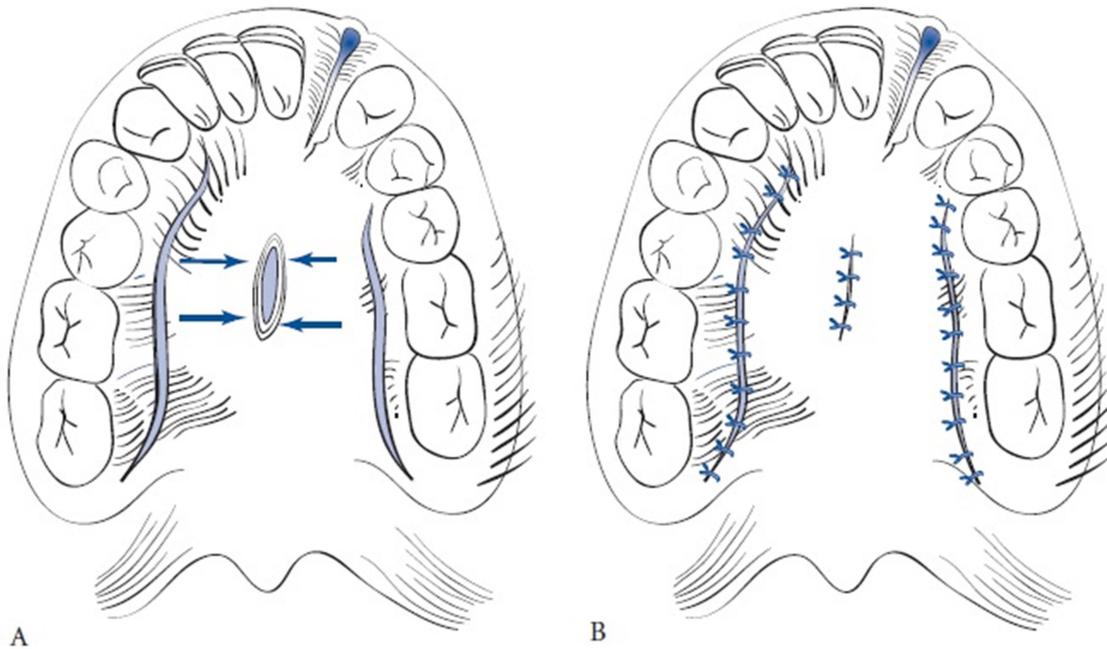


FIGURE 44-3 *Modification of the von Langenbeck technique for closure of a residual palatal fistula. A, Incisions are created at the fistula defect along the junction of oral and nasal mucosa, and laterally in order to develop palatal flaps. Care is taken to maintain anterior soft tissue attachment for improved blood supply. This may make flap mobilization and visualization of the defect difficult. B, The nasal side is closed first, and then oral side closure is accomplished with interrupted sutures.*

Fistula at the Anterior Part of the Hard Palate (Fistula > 5mm but < 1.5 cm in size)- [Modified Bardach Technique]

SURGICAL STEPS- After the preoperative preparation similar to palatoplasty, incision is placed using a no.15 BP blade along the margins of the palatal fistula & is continued laterally close to palato-gingival margins of maxillary teeth & anteriorly as far as the limit of the defect in such a way as to include the palatine rugae in the flap. Mucoperiosteal flaps are reflected on either side using a Freer's periosteal elevator & the nasal layer is undermined on either side using a Mitchel trimmer. The nasal layer of either side is approximated using a 4-0 vicryl suture. After closure of nasal layer, the oral mucoperiosteum is sutured with 4-0 vicryl suture using simple interrupted or vertical mattress technique. The lateral release incisions of the oral layer are sutured with the palato-gingival margins or labial mucoperiosteum using 4-0 vicryl sutures.

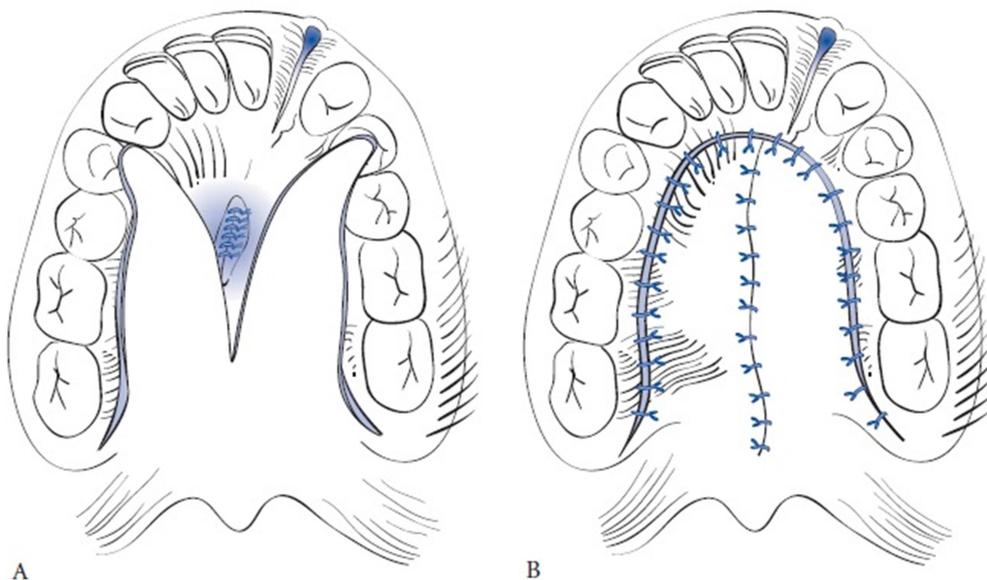


FIGURE 44-2 Modification of the two-flap palatoplasty technique for closure of a residual palatal fistula. A, Two large mucoperiosteal flaps are developed with dissection extended to a point posterior of the fistula defect. The nasal mucosa is repaired as a separate layer. B, Closure of the oral side. The midline is closed first using multiple interrupted sutures, and then the lateral incisions are reapproximated.

**Fistula at the Anterior Part of the Hard Palate (Fistula > 1.5 cm in size)-
[Anteriorly Based Dorsal Tongue Flap Technique]**

SURGICAL STEPS- After the preoperative preparation similar to palatoplasty, incision is placed 3-4 mm away all around the circumference of the fistula margins. First, nasal side closure of the palatal defect is performed using turnover flaps with multiple interrupted sutures. Next, this technique calls for development of an anteriorly based tongue flap that is approximately 5 cm in length, The width of the tongue flap depend upon the size of the defect to be covered and it ranges from one third to two thirds of the total width of the tongue.

The tongue flap is elevated along the underlying musculature and then inset using multiple mattress sutures for closure of the oral side. The recipient bed within the tongue is closed primarily. After the initial surgery, the tongue flap is allowed to heal for approximately 3 weeks. The flap remains pedicled to the donor site & is detached under local anesthesia 3 weeks later. The flap is sectioned and the stump at the donor site is freshened and inset into the tongue.

After the reversal of anesthesia & recovery, the patient is shifted to the ICU & is put in a recovery position. 100% oxygen is given initially at 3 L/minute & is gradually tapered as per the anesthetist's advice. Vital signs are monitored periodically & a close watch is kept to check on post operative bleeding. Patient's attendants are counseled appropriately & the post operative medications are advised.

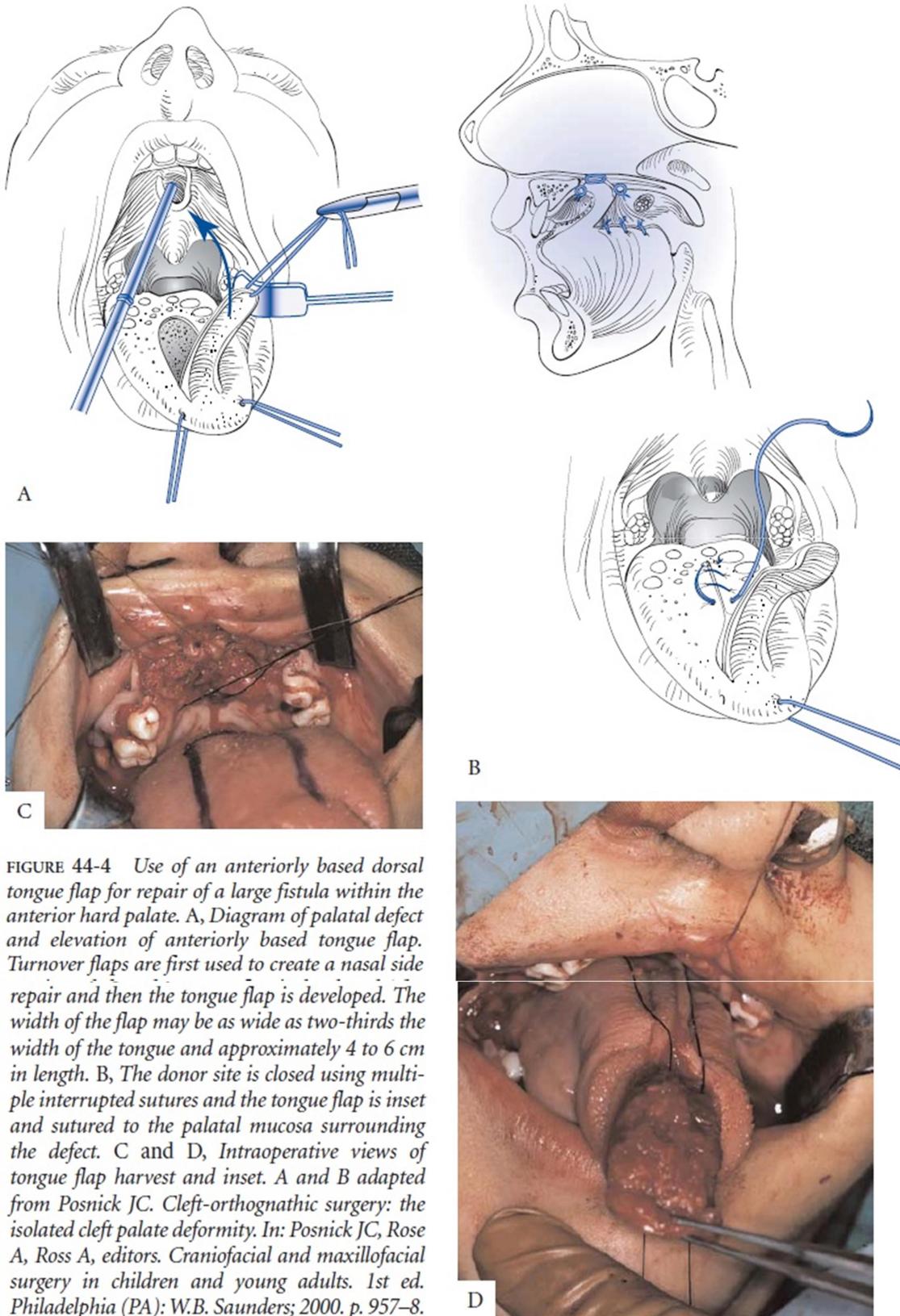


FIGURE 44-4 Use of an anteriorly based dorsal tongue flap for repair of a large fistula within the anterior hard palate. A, Diagram of palatal defect and elevation of anteriorly based tongue flap. Turnover flaps are first used to create a nasal side repair and then the tongue flap is developed. The width of the flap may be as wide as two-thirds the width of the tongue and approximately 4 to 6 cm in length. B, The donor site is closed using multiple interrupted sutures and the tongue flap is inset and sutured to the palatal mucosa surrounding the defect. C and D, Intraoperative views of tongue flap harvest and inset. A and B adapted from Posnick JC. Cleft-orthognathic surgery: the isolated cleft palate deformity. In: Posnick JC, Rose A, Ross A, editors. *Craniofacial and maxillofacial surgery in children and young adults*. 1st ed. Philadelphia (PA): W.B. Saunders; 2000. p. 957–8.

Anterior Iliac Crest Bone Harvesting [Pediatric Group]

After the preoperative work up, the patient is shifted to the operation theatre. Intravenous line is established and maintained with RL/ DNS solution. Preanesthetic medications are administered intravenously. After induction of general anesthesia, orotracheal intubation is done using 'South Pole RAE tube' and is secured with 2 strips of dynaplast [**first strip should be in an inverted V shape fashion encircling the tube and the second strip is in horizontal direction across the endotracheal tube**]. The dynaplast strips should be firmly adherent to the facial skin on either side. General anesthesia is maintained with inhalational anesthetics.

Steps to be Followed After Endotracheal Intubation:

- ❖ Make sure that the armamentarium is arranged as per the order.
- ❖ Place a hip roll over the side to be operated to make the anterior superior iliac spine (**ASIS**) more prominent.
- ❖ Preparation of the surgical area thoroughly with betadine solution [at least 6 inches proximal to the operative site].
- ❖ Place the head drape covering both the ears & eyes of the patient.
- ❖ Place a towel with hole over the iliac region.
- ❖ Place 2 body towels, one over the upper half of the body & the other over the lower half of the body.
- ❖ Extend the body towel & secure the head drape as well as the body towel along with the head ring using towel clips on either sides making sure that the towel clips are not injuring the ears.
- ❖ Spread the fine tipped bipolar cautery cable & the suction tube & ensure that they are connected to the source.
- ❖ Connect the suction tip & the cautery tip & ensure their function.

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- ❖ Cover the cables with the body towel & secure a towel clip [taking care that the towel clip is not engaging the cable wires/ suction pipe].
- ❖ Clean the hands with a steriliium wash.

Armamentarium Required

1. B.P. Handle [Long]- 1
2. B.P. Blade No. 15- 1
3. Howarth's Elevator- 1
4. Suture Cutting Scissor- 1
5. Sponge Holder- 1
6. Ink Bowl & Tooth Pick- 1
7. Langenback Retractors [Small]- 2
8. Cat's Paw Retractor- 1
9. Bone Scoop - 1
10. Bone Gouge- 1
11. Osteotome (6mm)- 1
12. Mallet- 1
13. Needle Holder- 1
14. Steel Bowl- 1
15. Steel Plate- 1

SURGICAL STEPS

1. Incision Marking

- ❖ **Point 1** is at the highest point of the antero-superior iliac spine (**ASIS**).
- ❖ **Point 2** is approximately 1cm superior to the 1st point.
- ❖ **Point 3** is approximately 1cm lateral to the 2nd point.
- ❖ **Incision-** A 2cm long incision is marked in a superior direction form point 3 parallel to the anterior iliac crest.



2. Surgical Incision & Dissection- Local infiltration is done using 2% lignocaine with 1:80000 adrenaline under the supervision of an anesthetist. The amount of LA solution to be used is calculated according to body weight of the patient. The maximum dose of lignocaine with adrenaline which can be used is 7.0 mg/ Kg body weight of the patient, not to exceed 500 mg. Wait for 5 minutes to achieve desired level of vasoconstriction. The skin over the iliac spine is retracted medially & local infiltration is done using lignocaine with epinephrine. A 2 cm. long incision is placed using no. 15 surgical blade in a superior direction from point 3 parallel to the anterior iliac crest. The incision is deepened through the skin, subcutaneous layer, fat layer & the scarpa's fascia. The iliacus muscle is identified & is retracted medially to expose the cartilage.

3. Harvesting Marrow-Cancellous Bone- "H- Shaped" incision is designed over the cartilage & is retracted to expose the ilium. The vertical limbs of H are across the iliac cartilage and the horizontal limb of H is longitudinally in the middle of the iliac cartilage. The anterior vertical limb should be at a distance of 3 cm from the anterior superior iliac spine (ASIS) and the posterior vertical limb can be placed at a variable distance from ASIS depending on the amount of bone to be harvested [maximum permissible distance of 8 cm from ASIS].

The medial & the lateral cortical plates are identified & the cancellous bone is harvested from within the medial & lateral cortical plates without damaging

them using an osteotome & bone gouge. Cortical plate when desired is harvested from the medial side. The bone chunks are placed on a petridish & covered with blood soaked gauze pieces. The bone chunks are crushed into small pieces & platelet rich plasma is simultaneously prepared & incorporated with the cancellous bone chips.

4. Wound Closure & Dressing- The wound is packed with a betadine soaked gauze for 15-20 minutes so as to achieve hemostasis. After establishing hemostasis, wound closure is performed in layers. Firstly, the cartilage, followed by the iliacus muscle approximation, scarpa's fascia, & the subcutaneous layer using absorbable sutures (3-0 catgut or 3-0 vicryl suture). Skin closure is achieved using 3-0 prolene or ethilon suture. Following the wound closure, 2ml of bupivacaine is infiltrated for postoperative pain relief. Soframycin based dressing is done followed by dynaplast pressure bandage.

Anterior Iliac Crest Bone Harvesting [Adults]

1. Surgical Incision & Dissection- The procedure of iliac harvesting in the adults is essentially similar to that of the pediatric group till the point of soft tissue dissection. After exposure of the anterior iliac crest incision is given over the perosteum and subperiosteal dissection is done to expose the antero superior iliac crest and spine.

2. Harvesting Marrow-Cancellous Bone- Cancellous bone can be harvested by any one of the following techniques:

A. Trap Door Technique

B. Medial Subcrestal Technique

A. Trap Door Technique- In this technique the osteotomy cut is made over the iliac crest starting from a point 3 cm posterior to ASIS and can be extended to a distance 8 cm posterior to the ASIS. The osteotomy cut is deepened to hinge the medial cortex with its muscle and fascial attachment medially so as to expose the marrow-cancellous bone. Cancellous bone can be harvested by trephines or bone gouge.

B. Medial Subcrestal Technique- In this technique after exposure of the iliac crest, iliacus muscle is retracted medially to expose the medial cortical plate. A subcrestal triangular osteotomy is performed on the medial cortex with the base toward as well as parallel to the iliac crest and the base facing caudally. The medial cortex is removed to expose the underlying marrow cancellous bone. Cancellous bone is harvested using bone gouge.

3. Wound Closure & Dressing- The wound is packed with a betadine soaked gauze for 15-20 minutes so as to achieve hemostasis. After establishing hemostasis, wound closure is performed in layers. Firstly, the cartilage, followed by the iliacus muscle approximation, scarpa's fascia, & the subcutaneous layer

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using absorbable sutures (3-0 catgut or 3-0 vicryl suture). Skin closure is achieved using 3-0 prolene or ethilon suture. Following the wound closure, 2ml of bupivacaine is infiltrated for postoperative pain relief. Soframycin based dressing is done followed by dynaplast pressure bandage.

SECONDARY ALVEOLAR BONE GRAFTING

Armamentarium Required

1. B.P. Handles [Short]- 1
2. Dissecting Scissor [Small]- 1
3. Skin Hooks- 2
4. Adson's Toothed Tissue Holding Forceps- 2
5. Adson's Non-toothed Tissue Holding Forcep- 1
6. Small Cheek Retractors [Or the Dingman's Mouth Gag]- 2
7. Small Periosteal Elevator- 1
8. Needle Holders [4-0, 5-0 & 6-0]- 1 Each
9. Mosquito Forceps- 2
10. Towel Clips- 3
11. Bowls- 2
12. Stainless Steel Dish- 1
13. Sponge Holder- 1
14. Suture Cutting Scissor- 1

SECONDARY ALVEOLAR BONE GRAFTING WITHOUT PALATAL FISTULA

SURGICAL STEPS

1. Surgical Incision & Flap Designing- Local infiltration is done using 2% lignocaine with 1:80000 adrenaline under the supervision of an anesthetist. The amount of LA solution to be used is calculated according to body weight of the patient. The maximum dose of lignocaine with adrenaline which can be used is 7.0 mg/ Kg body weight of the patient, not to exceed 500 mg. Wait for 5 minutes to achieve desired level of vasoconstriction. With a no.15 surgical blade a crevicular incision is placed extending from the mesial interdental papilla of 1st molar on the cleft side upto two teeth beyond the defect margin on the non cleft side. The incision is continued along the margins of the cleft alveolus & with

sharp dissection, the oral layer is separated from the nasal layer. Perforations if any in the nasal layer are sutured using 4-0 vicryl suture & the nasal layer is used to form a bed to receive the bone graft.

2. Bone Grafting- The cortical plate is positioned over the defect in such a way that the cortical side is in contact with the nasal layer. Crushed cancellous bone incorporated with PRP is grafted to the cleft site. Take photographs with the graft in place.

3. Wound Closure & Dressing- The oral layer is sutured with 3-0 vicryl so as to get a water tight closure. After suturing photographs are taken. The wound is covered with a thin layer of zinc oxide eugenol paste & an extraoral pressure dressing is placed on the upper lip.

4. After the reversal of anesthesia & recovery, the patient is shifted to the ICU & is put in a recovery position. 100% oxygen is given & is gradually tapered as per the anesthetist's advice. Vital signs are monitored periodically & a close watch is kept to check on post operative bleeding. Patient's attendants are counseled appropriately & the post operative medications are advised.

SECONDARY ALVEOLAR BONE GRAFTING WITH PALATAL FISTULA

SURGICAL STEPS

- 1. Surgical Incision & Flap Designing-** Local infiltration is done using 2% lignocaine with 1:80000 adrenaline under the supervision of an anesthetist. The amount of LA solution to be used is calculated according to body weight of the patient. The maximum dose of lignocaine with adrenaline which can be used is 7.0 mg/ Kg body weight of the patient, not to exceed 500 mg. Wait for 5 minutes to achieve desired level of vasoconstriction.

With a no.15 surgical blade a crevicular incision is placed extending from the mesial interdental papilla of 1st molar on the cleft side upto two teeth beyond the defect margin on the non cleft side. The incision is continued along the margins of the cleft alveolus & with sharp dissection, the oral layer is separated from the nasal layer. Palatal flaps are then developed, incorporating whatever residual palatal defect may be present to allow for closure of the residual palatal fistula. It can be more easily accomplished by starting reflection of the palatal flaps from a sulcular incision that is placed on the palatal side of the dentition followed by reflection of full-thickness palatal flaps toward the palatal defect. The palatal flaps can then be separated from the nasal tissue along the cleft margin by sharp dissection with scissors from the anterior extending posteriorly as the flaps are elevated. In this manner, the maximum palatal soft tissue is preserved for closure, while assuring adequate nasal mucosa to obtain a watertight nasal closure. Once the buccal and palatal flaps have been developed, access is readily obtained to the nasal mucosa, which is then reflected and sutured, burying the knots to obtain a watertight nasal closure. Once the nasal mucosa is closed, the palatal defect is closed by first closing the palatal flaps, converting the cleft palate into a single flap.

2. Bone Grafting- The cortical plate is positioned over the defect in such a way that the cortical side is in contact with the nasal layer. Crushed cancellous bone incorporated with PRP is grafted & after the photograph being taken, the oral layer is sutured with 3-0 vicryl so as to get a water tight closure.

3. Wound Closure & Dressing- Finally, the labial flaps can be advanced, and they are sutured to each other and then to the palatal flap producing the classic four corner closure over the crest of the ridge. In most cases, the sliding flaps will be advanced one papilla on either side of the cleft, or, in some cases, only single papilla advancement from the posterior segment is necessary. It may be necessary to perform a small back cut or to release or score the periosteum to obtain a tension-free closure. Suturing is done with 3-0 vicryl suture to get water tight closure. After suturing photographs are taken. The wound is covered with a thin layer of zinc oxide eugenol paste & an extraoral pressure dressing is placed on the upper lip.

4. After the reversal of anesthesia & recovery, the patient is shifted to the ICU & is put in a recovery position. 100% oxygen is given & is gradually tapered as per the anesthetist's advice. Vital signs are monitored periodically & a close watch is kept to check on post operative bleeding. Patient's attendants are counseled appropriately & the post operative medications are advised.

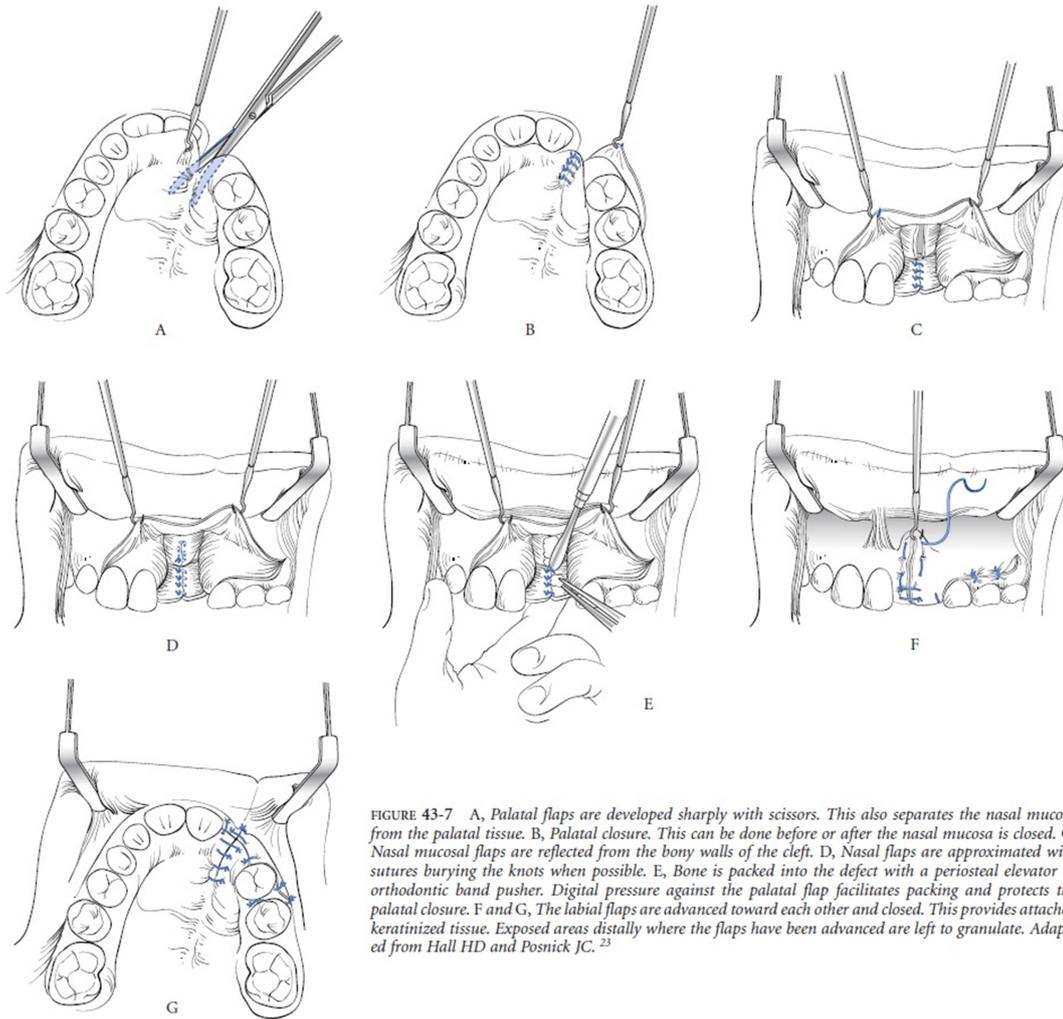


FIGURE 43-7 A, Palatal flaps are developed sharply with scissors. This also separates the nasal mucosa from the palatal tissue. B, Palatal closure. This can be done before or after the nasal mucosa is closed. C, Nasal mucosal flaps are reflected from the bony walls of the cleft. D, Nasal flaps are approximated with sutures burying the knots when possible. E, Bone is packed into the defect with a periosteal elevator or orthodontic band pusher. Digital pressure against the palatal flap facilitates packing and protects the palatal closure. F and G, The labial flaps are advanced toward each other and closed. This provides attached keratinized tissue. Exposed areas distally where the flaps have been advanced are left to granulate. Adapted from Hall HD and Posnick JC.²³

CLEFT RHINOPLASTY

Unilateral Cleft Deformity

After the preoperative work up, the patient is shifted to the operation theatre. Intravenous line is established and maintained with RL/ DNS solution. Preanesthetic medications are administered intravenously. After induction of general anesthesia, orotracheal intubation is done using 'South Pole RAE tube' and is secured with 2 strips of dynaplast [**first strip should be in an inverted V shape fashion encircling the tube and the second strip is in horizontal direction across the endotracheal tube**]. The dynaplast strips should be firmly adherent to the facial skin on either side. General anesthesia is maintained with inhalational anesthetics.

Steps to be Followed After Endotracheal Intubation:

- ❖ Make sure that the armamentarium is arranged as per the order.
- ❖ Preparation of the surgical area thoroughly with betadine solution [at least 6 inches proximal to the operative site].
- ❖ Place the head drape covering both the ears & eyes of the patient.
- ❖ Extend the body towel & secure the head drape as well as the body towel along with the head ring using towel clips on either sides making sure that the towel clips are not injuring the ears.
- ❖ Spread the fine tipped bipolar cautery cable & the suction tube & ensure that they are connected to the source.
- ❖ Connect the suction tip & the cautery tip & ensure their function.
- ❖ Cover the cables with the body towel & secure a towel clip [taking care that the towel clip is not engaging the cable wires/ suction pipe].
- ❖ Clean both the nostrils with moist gauze & trim the vibrissae.
- ❖ Clean the hands with a sterilium wash.

EXTERNAL APPROACH [TRASNSFIXATION INCISION]

SURGICAL STEPS

1. Local Anesthetic Administration- 10 mL of 2% lignocaine with 1:80000 adrenaline [**subject to patient's body weight & anesthetist's approval**] is injected as under:

- 5 mL subdermally all along the nasal dorsum from the radix to the nasal tip region.
- 2 mL at the piriform aperture bilaterally.
- 1 mL at the junction of columella and upper lip.

2. Surgical Incision & Dissection- Bilateral incisions starting just anterior to the medial crura and extending from the dome to the mid columellar region with an inverted V incision [**vertical limb of the V should be longer on the cleft side**] across the columella connecting the incisions of both sides. Small sharp scissor is used to dissect across the columella between the skin and anterior edge of the medial crura. Dissection is continued to undermine the columella flap. A double hook is used to retract the columellar flap while the scissor is inserted over the lateral crura. One blade of the scissor is placed in the pocket over the lateral crus and the other in the vestibule along the lower rim of the alar cartilage & the dissection is continued to complete the marginal incision. The columellar flap is retracted with a double skin hook. Dissection is extended to the septal angle and along the nasal dorsum upto the caudal end of the nasal bones. Elevator is used to lift the periosteum off the nasal bones. Dividing the attachment of the upper lateral cartilages to the septum assists in elevation of the mucoperichondrial flap and exposure of the septum. Septoplasty or septal repositioning can be performed at this stage if needed. Alar cartilages are exposed using hydrodissection. Cephalic trimming of the alar cartilages is done on either sides & they are hitched together to strengthen the cartilages. Spreader grafts are positioned between the nasal septum & the upper lateral cartilages opposite the side of the nasal septal deviation & secured using 5-0 prolene suture. Small

scissors are used to create a pocket between the medial crura. Columellar sturt graft is positioned to support the nasal tip. Auricular cartilage or nasal septal cartilage graft can be used for this purpose. Submucosal resection allows a significant portion of nasal septal cartilage to be harvested for grafting. At least 1 cm should be maintained superiorly and anteriorly in an L shaped configuration to provide support for the nose. In order to resect the cartilage a Cottle elevator is used to cut the cartilage. Fomon scissors may be used to make the superior and inferior cuts through the bony septum.

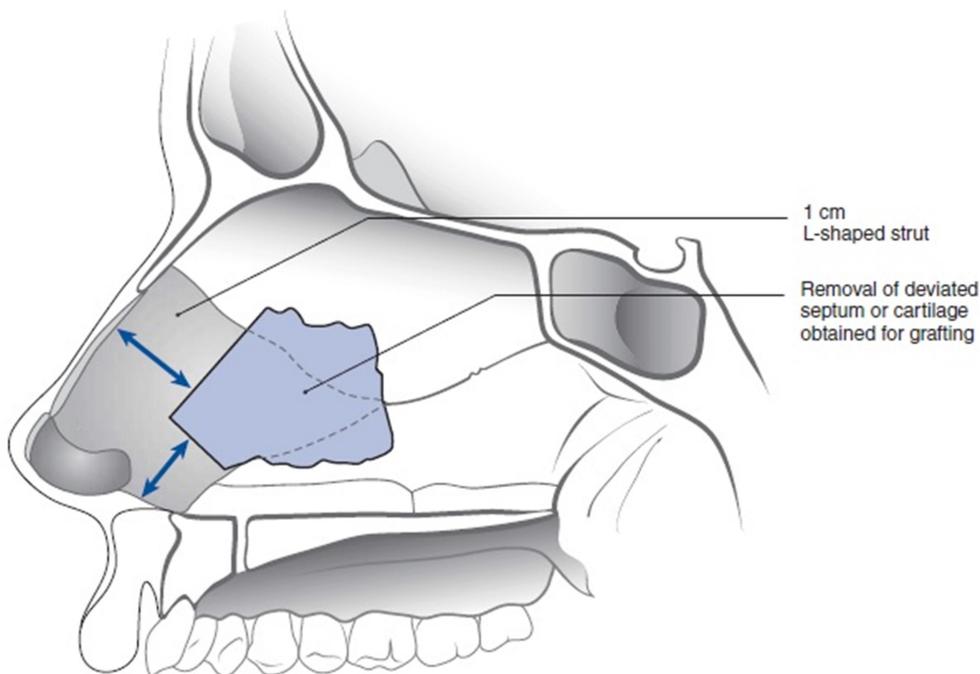


FIGURE 65-26 Resection of cartilage/bone from the nasal septum. This may be done to harvest cartilage for grafting procedures or for removal of grossly deviated septum. It is important to maintain 1 cm dorsally and caudally for nasal support.

3. Suturing- Pass 2 straight needles through the columella sturt complex & secure with 5-0 prolene suture. To strengthen the ala, either a double tailing of the ala on the cleft side or alar onlay graft could be done. For a supra tip support, a minced cartilage graft is used which is prepared by crushing the small pieces of the auricular cartilage in a cartilage crusher. The minced cartilage is filled into the space above the hitced alar cartilages over the nasal dorsum & closure is

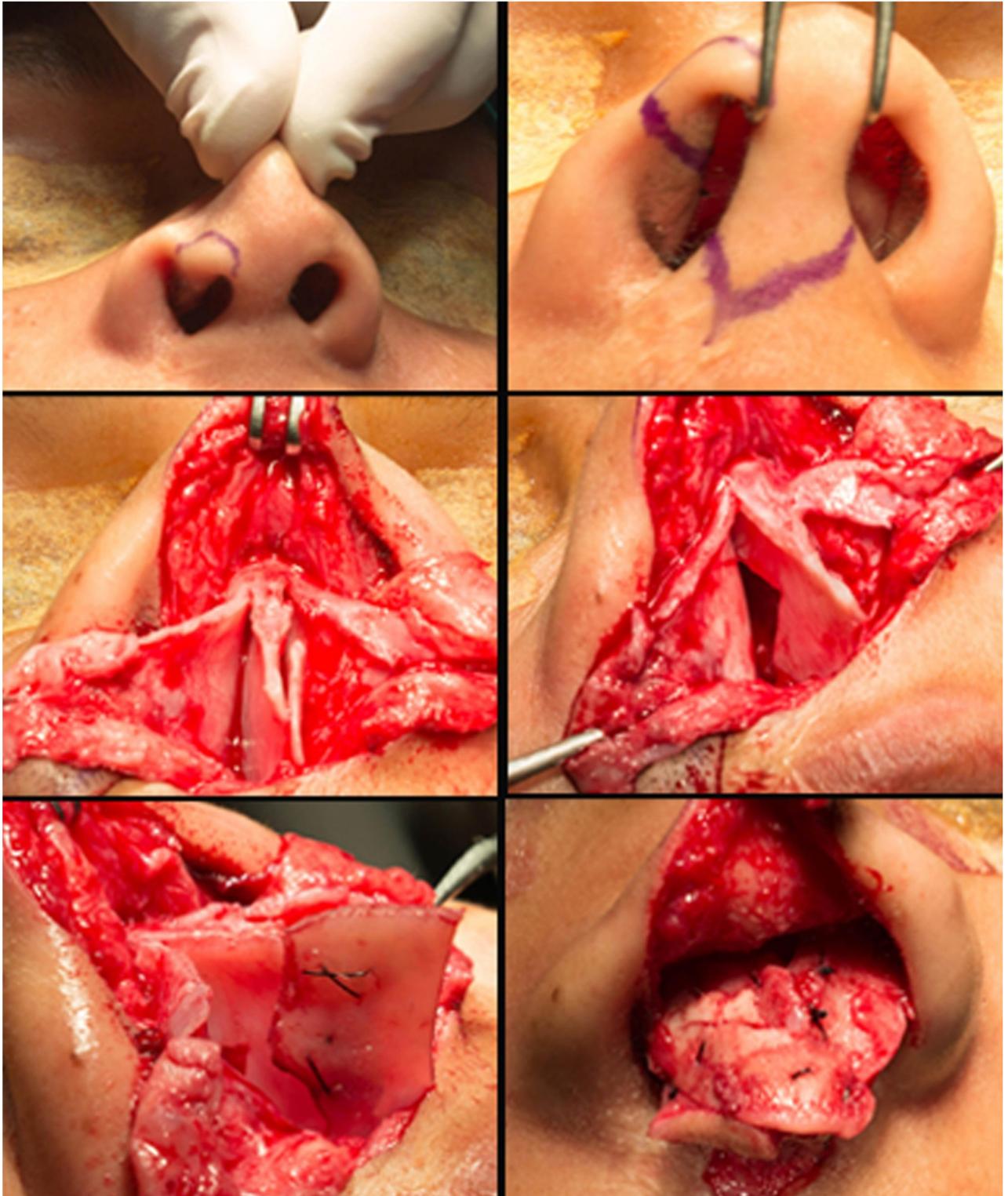
achieved with 5-0 prolene suture. Septal quilt suturing is done using 3-0 vicryl suture [if septoplasty was done]. Postoperative photographs are taken.

4. Dressing- Soramycin based nasal pack is placed in the nostrils & the nasal skin is painted with tincture benzoin. Two long steri-strips are secured on the lateral aspect of the nose from the naso frontal region to the alar aspect bilaterally. Two other strips are positioned similarly just below the previously positioned steri strips & the excess is trimmed. Three strips are placed across the nasal dorsum from the radix to the nasal tip such that each plaster overlaps at least one-third width of the previously placed strip & the nasal tip remaining exposed.

5. After the reversal of anesthesia & recovery, the patient is shifted to the ICU & is put in a recovery position. 100% oxygen is given initially at 3 L/minute & is gradually tapered as per the anesthetist's advice. Vital signs are monitored periodically & a close watch is kept to check on post operative bleeding. Patient's attendants are counseled appropriately & the post operative medications are advised.

Tajima's Reverse U Approach:

The incision almost resembles the transcolumellar reverse V & the difference being that on the cleft side, the vertical limb of the V being longer than the noncleft side, is extended superiorly along the nasal vestibule, till the nasal tip to extend along the nasal skin laterally along the ala of the nose about 3mm superior to the alar rim to end at about 2/3rds the distance towards the alar base.



Bilateral Cleft Deformity

EXTERNAL APPROACH- SURGICAL STEPS- The transfixion incision on either side is connected with a U shaped incision over the prolabium in such a way so as to use a part of the tissue from the proabium to lengthen the coumella. With a sharp dissection the flap is reflected & a double skin hook is engaged & the alar cartilages are exposed. One blade of the scissors is placed in the pocket over the lateral crus and the other in the vestibule along the lower rim of the alar cartilage & the dissection is continued to complete the marginal incision. The columellar flap is retracted with a double skin hook. Dissection is extended to the septal angle and along the nasal dorsum upto the caudal end of the nasal bones. Alar cartilages are exposed using hydrodissection. Cephalic trimming of the alar cartilages is done on either sides & they are hitched together using 5-0 prolene suture to strengthen the cartilages. Small scissors are used to create a pocket between the medial crura. Columellar Sturt graft [nasal septal cartilage or auricular cartilage] is positioned to support the nasal tip. Pass 2 straight needles through the columella sturt complex, & secure with 5-0 prolene. Shield grafting could be done to define the nasal tip. For a supra tip support, a minced cartilage graft is used which is prepared by crushing the small pieces of the auricular cartilage in a cartilage crusher. The minced cartilage is filled into the space above the hitched alar cartilages over the nasal dorsum & closure is achieved with 5-0 prolene suture. Postoperative photographs are taken.

Dressing- Soframycin based nasal pack is placed in the nostrils & the nasal skin is painted with tincture benzoin. Two long steri-strips are secured on the lateral aspect of the nose from the naso-frontal region to the alar aspect bilaterally. Two other strips are positioned similarly just below the previously positioned steri-strips & the excess is trimmed. Three strips are placed across the nasal dorsum from the radix to the nasal tip such that each plaster overlaps at least one-third width of the previously placed strip & the nasal tip remaining exposed.

ESTHETIC RHINOPLASTY

EXTERNAL APPROACH- [TRANSFIXATION INCISION]

Bilateral incisions start just anterior to the medial crura and extending from the dome to the mid columellar region with an inverted V across the columella connecting the incisions of both sides. Small sharp scissor is used to dissect across the columella between the skin and anterior edge of the medial crura. Dissection is continued to undermine the columella flap. A double hook is used to retract the columellar flap while the scissors are inserted over the lateral crura. One blade of the scissors is placed in the pocket over the lateral crus and the other in the vestibule along the lower rim of the alar cartilage & the dissection is continued to complete the marginal incision. The columellar flap is retracted with a double skin hook. Dissection is extended to the septal angle and along the nasal dorsum upto the caudal end of the nasal bones. Elevator is used to lift the periosteum off the nasal bones. Dividing the attachment of the upper lateral cartilages to the septum assists in elevation of the mucoperichondrial flap and exposure of the septum. Nasal bone osteotomy to reduce the width at the radix is done through an external approach using an osteotome, so as to create an inward fracture of the nasal bones. Following the osteotomy, external digital pressure is used to reduce the nasal width. Septoplasty or septal repositioning can be performed at this stage if needed. Alar cartilages are exposed using hydrodissection. Cephalic trimming of the alar cartilages is done on either sides & they are hitched together to strengthen the cartilages. Small scissors are used to create a pocket between the medial crura. Columellar sturt graft [nasal septal cartilage or auricular cartilage] is positioned to support the nasal tip. Pass 2 straight needles through the columella sturt complex & secure with 5-0 prolene suture. A medpore implant or autogenous costochondral graft [RIB] is used to augment the nasal bridge if indicated. Tip definition is achieved using a shield grafting. For a supra tip support, a minced cartilage graft is used which is prepared by crushing the small pieces of the auricular cartilage in a cartilage

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crusher. The minced cartilage is filled into the space above the hitched alar cartilages over the nasal dorsum & closure is achieved with 5-0 prolene suture. Postoperative photographs are taken.

Dressing- Soframycin based nasal pack is placed in both the nostrils & the nasal skin is painted with tincture benzoin. If the nasal bone osteotomy is done, only an anterior nasal pack is done to avoid hampering the position of the nasal bones. Two long steri-strips are secured on the lateral aspect of the nose from the naso-frontal region to the alar aspect bilaterally. Two other strips are positioned similarly just below the previously positioned steri-strips & the excess is trimmed. Three strips are placed across the nasal dorsum from the radix to the nasal tip such that each plaster overlaps at least one-third width of the previously placed strip & the nasal tip remaining exposed. A thermoplastic splint is secured over the nasal dorsum to support the nasal bones if an osteotomy is done.

After the reversal of anesthesia & recovery, the patient is shifted to the ICU & is put in a recovery position. 100% oxygen is given initially at 3 L/minute & is gradually tapered as per the anesthetist's advice. Vital signs are monitored periodically & a close watch is kept to check on post operative bleeding. Patient's attendants are counseled appropriately & the post operative medications are advised.

AURICULAR CARTILAGE HARVESTING

Armamentarium Required

1. B.P. Handle [Short]- 1
2. B.P. Blade No. 15- 1
3. Dissecting Scissor- 1
4. Skin Hooks- 2
5. Adson's Toothed Tissue Holding Forceps- 2
6. Adson's Non-toothed Tissue Holding Forceps- 1
7. Mitchell's Trimmer [GUM]- 1
8. Small Periosteal Elevator- 1
9. Needle Holders [4-0, 5-0 & 6-0]- 1 Each
10. Towel Clips- 3
11. Bowls- 2
12. Stainless Steel Dish- 1
13. Sponge Holder- 1
14. Ink Bowl- 1
15. Suture Cutting Scissor- 1

Post Auricular Approach- Surgical procedure- A wavy line incision is placed few millimeters below the helix of the ear on the posterior aspect. Local infiltration is done using 2% lignocaine with 1:80000 adrenaline under the supervision of an anesthetist. Saline infiltration is done on both the anterior as well as the posterior aspects so as to separate the tissue planes & aid in dissection (**Hydrodissection**). Incision is placed using a no. 15 BP blade & is deepened through the subcutaneous layer. A Mitchell trimmer is used to strip the cartilage tissue off the fascia & is continued in an inferior direction as far as possible within the anatomic boundary. A sharp scissor is used & the auricular cartilage is resected out & is placed into betadine solution. Primary closure is done using 3-0 prolene suture & 6 ear bolsters [3 anterior & 3 posterior] are secured followed by ear dressing.

COSTOCHONDRAL CARTILAGE HARVESTING

Armamentarium Required

1. B.P. Handle [Short]- 1
2. B.P. Blade No. 15- 1
3. Howarth's Periosteal Elevator- 1
4. Adson's Toothed Tissue Holding Forceps- 1
5. Needle Holders [4-0, 5-0 & 6-0]- 1 Each
6. Suture Cutting Scissor- 1
7. Wilson Rib Cutter- 2
8. Artery Forceps- 3-4
9. Kocker Forceps- 2
10. Wilson Rib Shear- 2
11. Sponge Holder- 1
12. Steel Bowls- 2
13. Towel Clips- 3
14. Langenback's Retractors- 3-4
15. Ink Bowl & Marking Stick- 1

SURGICAL PROCEDURE- Surgical area is prepped using betadine solution & a standard draping procedure is carried out. The level at which the pectoralis muscle ends is palpated and the incision is marked below this level (approximately 2.5 cm below the nipple). The most commonly harvested rib is either the sixth or seventh rib. Incision is given with a no. 15 surgical blade, and dissection is then continued with electrocautery. The muscles are dissected and the rib is exposed. The periosteum is reflected from lateral toward the medial aspect of the dissection. Care should be taken not to injure the neuro-vascular bundle when reflecting the periosteum on the inferior aspect of the rib. The extent of periosteal reflection is based on whether a cartilage cap is to be harvested or not.

In cases of segmental mandibular resections that do not involve the condyle region, a segment of the rib may be used to graft the continuity defect. In

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instances in which the cartilage is not needed, the harvest is straightforward. The periosteum is reflected superiorly and inferiorly, and the inner aspect is reflected with the aid of a Doyen (pig-tail) retractor. Once the appropriate length is dissected, the medial cut is done followed by the posterior cut with the aid of a guillotine rib cutter.

In instances in which a cartilage cap is needed, the dissection is extended to the costochondral junction, with care taken to leave the overlying periosteum/perichondrium in the area intact. This maneuver aids in the retention of the cartilage cap to the rib. Approximately 2 to 4 mm of cartilage is maintained on the graft, and the medial incision is completed with the use of a blade. The remainder of the harvesting is the same as previously stated.

Once the harvest is completed, the anesthesiologist is asked to give a positive pressure ventilation and the presence of air leaks is checked by pouring saline solution over the operated site. Bubbling of saline indicate pleural puncture requiring definitive management. The incision is closed in layers, taking care to re-approximate the periosteum followed by the muscles. Following the subcutaneous layer, skin closure is done using prolene suture. Dressing is given over the surgical site.

TEMPOROMANDIBULAR JOINT ANKYLOSIS

After the preoperative work up, the patient is shifted to the operation theatre. Intravenous line is established and maintained with RL/ DNS solution. Preanesthetic medications are administered intravenously. Under intravenous sedation, with superior laryngeal nerve block, blind nasotracheal intubation is attempted. A fiberoptic bronchoscope could be used for intubation if the blind nasal intubation fails. The endotracheal tube is secured with 3 strips of dynaplast **[first two strips should be in an inverted V shape fashion encircling the tube & are secured to the nasal dorsum and the third strip is in horizontal direction across the endotracheal tube secured to the forehead skin]**. The dynaplast strips should be firmly adherent to the facial skin on either side. The endotracheal tube is also secured using a septal stitch with 1-0 [round body] mersilk suture. General anesthesia is maintained with inhalational anesthetics.

Steps to be Followed After Endotracheal Intubation:

- ❖ Make sure that the armamentarium is arranged as per the order.
- ❖ Preparation of the surgical area thoroughly with betadine solution [at least 6 inches proximal to the operative site].
- ❖ Preparation and draping should expose the entire ear and lateral canthus of the eye. Shaving the preauricular hair is optional. A sterile plastic drape can be used to keep the hair out of the surgical field. Cotton soaked in mineral oil or antibiotic ointment may be placed into the external auditory canal.
- ❖ Secure the head drape with 3-4 stitches through the drape & the skin of the scalp using 3-0 silk suture.
- ❖ Extend the body towel & secure the head drape as well as the body towel along with the head ring using towel clips on either sides making sure that the towel clips are not injuring the ears.
- ❖ Spread the fine tipped bipolar cautery cable & the suction tube & ensure that they are connected to the source.

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- ❖ Connect the suction tip & the cautery tip & ensure their function.
- ❖ Cover the cables with the body towel & secure a towel clip [taking care that the towel clip is not engaging the cable wires/ suction pipe].
- ❖ Place another body towel covering the cables.
- ❖ Clean the hands with a sterilium wash.

Armamentarium Required

1. Langenback Retractors- 6-7
2. Fork Ramus Retractor- 1
3. Cheek Retractors- 2
4. Tongue Depressor- 1
5. Straight Chisels- 5-6
6. Mallet- 1
7. BP Handles- 2
8. Howarth's Periosteal Elevator- 1
9. Obwegesser's Periosteal Elevator- 1
10. Mosquito Forceps- 6-8
11. Bone Rongeur- 1
12. Condylar Retractor- 1
13. Towel Clips- 4
14. Artery Forcep (Curved)- 1
15. Cocker Forcep- 1
16. Smith Spreader- 1
17. Cat's Paw Retractors- 4
18. Steel Bowls- 2
19. Dissecting Scissors- 2
20. Micromotor Hand Piece- 1
21. Bone Cutting Burs
22. Needle Holders [3-0, 4-0, 5-0]- 1 Each

23. Suture Cutting Scissor- 1

24. Adson's Toothed Tissue Holding Forcep- 1

25. Adson's Non-toothed Tissue Holding Forcep- 1

SURGICAL STEPS

1. Incision Marking- The incision is outlined at the junction of the facial skin with helix of the ear. A natural skin fold along the entire length of the junction of the incision can be used. If none is present, posterior digital pressure on the preauricular skin usually creates a skin fold that can be marked. The incision extends superiorly to the top of the helix, and then it extends over the temporal area in wavy pattern.

2. Infiltration of Vasoconstrictor- The preauricular area is quite vascular. A vasoconstrictor can be injected subcutaneously in the area of the incision to decrease incisional bleeding. If a local anesthetic is also being injected, however, it should not be injected deeply because it may be necessary to use a nerve stimulator on exposed facial nerve branches.

3. Skin Incision- The incision is made through skin and subcutaneous connective tissues (including temporoparietal fascia) to the depth of the temporalis fascia (superficial layer). Any bleeding skin vessels are cauterized before deeper dissection proceeds.

4. Dissection- Blunt dissection with periosteal elevators undermines the superior portion of the incision (that above the zygomatic arch) so that a flap can be retracted anteriorly for approximately 1 to 1.5 cm. This flap is dissected anteriorly at the level of the superficial (outer) layer of temporalis fascia. The superficial temporal vessels and auriculotemporal nerve may be retracted anteriorly in the flap. Failure to develop the flap close to the cartilaginous external auditory canal

increases the risk of damage to these structures. Below the zygomatic arch, dissection proceeds bluntly adjacent to the external auditory cartilage. Scissor dissection proceeds along the external auditory cartilage in an avascular plane between it and the glenoid lobe of the parotid gland. The external auditory cartilage runs anteromedially and the dissection is parallel to the cartilage. The depth of the dissection at this point should be similar to that above the zygomatic arch. Attention again turns to the portion of the incision above the zygomatic arch. With the flap retracted anteriorly, an incision is made at an angulation of 45 degree to the root of zygoma through the superficial (outer) layer of temporalis fascia just in front of the tragus. At the root of the zygoma, the incision can be through both the superficial layer of temporalis fascia and periosteum of the zygomatic arch. The sharp end of a periosteal elevator is inserted in the fascial incision, deep to the superficial layer of temporalis fascia, and swept back and forth to dissect this tissue from the underlying areolar and adipose tissues. The undermining proceeds inferiorly toward the zygomatic arch, where the sharp end of the periosteal elevator cleaves the attachment of the periosteum at the junction of the lateral and superior surfaces of the zygomatic arch, freeing the periosteum from its lateral surface. The periosteal elevator can then be used to continue bluntly dissecting inferiorly with the black-and-forth motion, taking care not to dissect medially into the TMJ capsule. Blunt dissection with scissors can also be used to dissect inferiorly to the zygomatic arch. Once the dissection is approximately 1 cm below the arch, the intervening tissue is sharply released posteriorly along the plane of the initial incision. The entire flap is then retracted anteriorly, to expose the ankylotic mass.

5. Gap Arthroplasty- After exposure of the ankylotic mass, a condylar retractor is placed beneath the posterior border to reach upon the medial aspect of the condylar neck. The osteotomy cut starts from the anterior border proceeding horizontally backwards up to half way followed by a 45° angulation upwards.

Bone cutting bur is used under copious saline irrigation & a minimum gap of approximately 1.5 cm is created.

6. Ipsilateral Coronoidectomy- Ipsilateral coronoid process if intact is removed. The anterior border of the zygomatic arch could be osteotomized to aid in the retrieval of the coronoid process. In case of difficult cases, intraoral access can be used for coronoidectomy. Bony ledges if any are trimmed & the sharp margins are smoothed. A mouth gag is utilized & a mouth opening of at least 35 mm is ensured in adult patients, and lesser in the pediatric age group.

7. Contralateral Coronoidectomy- If the mouth opening is < 35 mm, contralateral coronoidectomy through intraoral incision is required.

8. Temporalis Myofascial Flap Interposition- The temporalis myofascial flap is harvested & is interposed between the lower border of the zygomatic arch & the ramus of mandible & secured in place using 3-0 vicryl suture.

9. Suturing- After irrigation of the surgical site with betadine and normal saline, surgical drain should be inserted in the gap created. Wound closure is done in two layers. Deeper layers are closed with 3-0 vicryl sutures and skin closure is done with 3-0 black silk suture.

10. Postoperative photographs are taken. Soframycin based pressure dressing is applied.

11. After the reversal of anesthesia & recovery, the patient is shifted to the ICU & is put in a recovery position. 100% oxygen is given initially at 3 L/minute & is gradually tapered as per the anesthetist's advice. Vital signs are monitored periodically & a close watch is kept to check on post operative bleeding. Patient's

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attendants are counseled appropriately & the post operative medications are advised.

12. Check for the facial nerve weakness as soon as feasible depending upon the patient's conscious level.

MIDFACE DISTRACTION OSTEOGENESIS

After the preoperative work up, the patient is shifted to the operation theatre. Intravenous line is established and maintained with RL/ DNS solution. Preanesthetic medications are administered intravenously. After induction of general anesthesia, nasotracheal intubation is done preferably on the left side. The nasotracheal tube is secured with 3 strips of dynaplast **[first two strip should be in an inverted V shape fashion encircling the tube & are secured to the nasal dorsum and the third strip is in horizontal direction across the endotracheal tube secured to the forehead skin]**. The dynaplast strips should be firmly adherent to the facial skin on either side. The endotracheal tube is also secured using a septal stitch with 1-0 [round body] mersilk suture. General anesthesia is maintained with inhalational anesthetics.

Steps to be Followed After the Nasotracheal Intubation:

- ❖ Make sure that the armamentarium is arranged as per the order.
- ❖ Preparation of the surgical area thoroughly with betadine solution [at least 6 inches proximal to the operative site].
- ❖ Place the head drape covering both the ears & eyes of the patient.
- ❖ Extend the body towel & secure the head drape as well as the body towel along with the head ring using towel clips on either sides making sure that the towel clips are not injuring the ears.
- ❖ Spread the bipolar cautery cable, the suction tube, cable for the micromotor hand piece, monopolar cautery cable & cable for oscillating saw & ensure that they are connected to the source.
- ❖ Connect the suction tip, cable for the micromotor hand piece & the cautery tips & ensure their function.
- ❖ Cover the cables with the body towel & secure a towel clip [taking care that the towel clip is not engaging the cable wires/suction pipe].
- ❖ Place another body towel covering the cables.
- ❖ Clean the hands with a sterilium wash.

Armamentarium Required

1. Rowe's Maxillary Disimpaction Forceps- 2
2. Maxilla Mobilizers- 2
3. Bone Rongeur- 1
4. Copper Malleable Retractor- 2
5. Pterygoid Chisel- 1
6. Smith Spreaders- 2
7. Mallet- 1
8. Rigid Midface External Distraction Device- 1
9. Artery Forceps (Curved & Straight)- 4 Each
10. Towel Clips- 3
11. Cheek Retractor- 2
12. B.P. Handles- 2
13. B.P Blade No. 15- 2
14. Obwegesser's Periosteal Elevator- 1
15. Howarth's Periosteal Elevators- 4
16. Chin Retractor- 1
17. Langenback Retractors- 6
18. Reverse Langenback Retractor- 2
19. Mosquito Forceps- 4
20. Adson Toothed Tissue Holding Forceps- 2
21. Adson Non-toothed Tissue Holding Forceps- 2
22. Needle Holders [3-0, 4-0]- 1 Each
23. Dissecting Scissor- 1
24. Suture Cutting Scissor -1
24. Sponge Holder- 1
25. Ink Bowl & Tooth Pick- 1
26. Tongue Depressor- 1

- 27. Divider & Scale- 1
- 28. Steel Bowls- 2
- 29. Chisels & Osteotomes (Straight)- 2
- 30. Guarded Septal Chisel- 2
- 31. Septal Osteotome
- 32. Zygoma Hook-1

SURGICAL STEPS

1. Local Infiltration & Splint Fixation- Local infiltration is done using 2% lignocaine with 1:80000 adrenaline under the supervision of an anesthetist. Local infiltration is done as under:

- 2ml in the pterygoid region bilaterally.
- 2ml in the buttress region bilaterally.
- 1 ml each in the piriform region bilaterally.

Preformed surgical acrylic splint with a palatal bar is secured to the maxillary arch using pre stretched 26 gauge soft stainless steel wires.

2. Surgical Incision & Dissection- Vestibular incision is placed with a monopolar cautery extending from 2nd premolar of one side to the other stopping just short of the buccal frenum wherein the incision is curved upwards so as to avoid tearing of the flap during retraction. The incision at the midline in the region of labial frenum is slightly curved in a more or less V shape so as to get a V-Y closure.

The incision is deepened through the mucosa, muscles attached to the lateral wall of the maxilla & the periosteum & the gingivo-mucoperiosteal flap is reflected with a Howarth's periosteal elevator. During the flap reflection, a gauze piece is used in the region of the anterior wall of the maxilla to avoid perforation. By a subperiosteal dissection to the orbital rim, the infraorbital nerve is exposed & is protected. The anterior nasal spine & piriform rim are identified & the

septopremaxillary ligament is detached from the anterior nasal spine using an osteotome. Two Langenbeck retractors are used on either sides placing them at the piriform rim & the zygomaticomaxillary buttress areas taking care not to injure the infraorbital nerves. The nasal mucosa is then dissected from the lateral nasal wall & the nasal floor. Posterior dissection is done inferior & posterior to zygomaticomaxillary buttress up to the pterygoid plate.

3. LeFort I Osteotomy & Maxillary Disimpaction- Osteotomy is initiated at the zygomaticomaxillary buttress region using a reciprocating saw & proceeds anteriorly making sure that a perisoteal elevator is placed between the nasal mucosa & the piriform rim. Posterolateral wall of the maxilla is sectioned under the mucosal tunnels. The posterior osteotomy is directed inferiorly as it proceeds from the zygomaticomaxillary buttress region to the junction of maxilla & the pterygoid plate. Osteotome is used through the anterior wall of maxilla to complete the posterior osteotomy followed by a guarded septal chisel for the lateral wall of the nose.

Pterygoid chisel is used for the pterygoid osteotomy with an assistant placing his/her index finger above & behind the maxillary tuberosity [hamular notch] to palpate the osteotomy. Gauze packs are used in the pterygoid region for hemostasis making sure that a gauze count is kept & the same steps are carried out on the contralateral side. With a finger pressure the anterior aspect of the maxilla is gently depressed. If a significant resistance is encountered, the lateral nasal wall osteotomy could be incomplete & should be redone. A Smith spreader is used to expand the osteotomy. Maxilla is down fractured & mobilized with Rowe's maxillary disimpaction forceps [palatal beak of the disimpaction forceps should be covered with a gauze piece to avoid injuring the palatal tissues]. Following the down fracture, any tear in the nasal mucosa is identified and sutured with 3-0 vicryl.

4. Reconstruction Plating & Distractor Fixation- Reconstruction plate is adapted to the maxillary alveolus followed by fixation with monocortical screws. Two traction wires are threaded over the reconstruction plate at the piriform areas bilaterally. These threaded wires are passed externally from the labial skin with the help of spinal needle. These wires will be fixed to the distraction device.

The rigid external device is secured in position with the screws engaging bilaterally in the temporal areas. The threaded wires are now fixed to the distraction device. The distractor is activated & the maxilla is evaluated for anterior movement following which the distractor is activated in the opposite direction & the wound closure is done using 3-0 vicryl suture. Immediate postoperative photographs are taken prior to extubation.

5. After the reversal of anesthesia, & recovery, patient is shifted to the ICU & is put in a supine position with elevation of the head end. 100% oxygen is given initially at 3l/minute & is gradually tapered as per the anesthetist's advice. Vital signs are monitored periodically & a close watch is kept to check on post operative bleeding. Patient's attendees are counseled appropriately & the post operative medications are advised.

NOTE- For intraoral sutural distraction osteogenesis, the osteotomy cut is neither expanded nor is the maxilla down fractured since the sutural distraction aims at the downward & forward growth of the maxilla at the cost of the growth potential of the zygomaticomaxillary suture. The osteotomy cut is followed by the fixation of the distraction device.

BASIC BIOLOGICAL & BIOMECHANICAL PRINCIPLES/ PROTOCOL OF DISTRACTION OSTEOGENESIS

Distraction Osteogenesis parameters are not rigidly established and considerable variations exist between different recommended treatment groups, however the following general principles or protocol of distraction are recommended.

1. Healing Period or Latency Period or Delay Period- It may be defined as that time interval when the corticotomy / osteotomy is performed until the time when the distraction is initiated for mesenchymal proliferation and callus formation. Generally a delay of 4 - 5 days is acceptable for adults. For children latency period is 2-3 days.

2. Rate of Distraction- It may be defined as the number of millimeters per day at which the bone surfaces are stretched. The rate of 1 mm a day is considered optimal for adults. In children rate of distraction can be faster at a rate of 2 mm/day.

3. Rhythm of Distraction- It may be defined as the number of distractions per day, usually in equally divided increments to total the rate. The rhythm may vary from one cycle per day of 1mm to 0.25 mm four times a day or 0.5 mm twice daily. Clinically 0.5 mm distraction twice a day is considered more acceptable with regard to patient's compliance.

4. Healing Index or Stabilization Period or Consolidation Period- It may be defined as the number of days or months from the operation when the distraction device can be removed and the bone can be exposed to unprotected load bearing forces. This period generally ranges from 8-12 weeks.

Note- Make sure that the wires, the pins, & the distraction frame are intact.

Things to be done if there is unusual lack of resistance during distractor activation:

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- Take new post operative radiographs.
- Evaluate rigidity of the activation arm of the distractor.
- Check for stability of the temporal screws of the rigid external distractor.
- Observe for wound dehiscence & possible plate exposure.

MANDIBULAR DISTRACTION OSTEOGENESIS

SURGICAL STEPS

1. Surgical Incision- Local infiltration is given using 2% lignocaine with 1:80000 adrenaline under the supervision of an anesthetist. After achieving desired level of vasoconstriction, incision is made in the vestibule perpendicular to the proposed site of osteotomy cut and a subperiosteal plane is developed to expose the osteotomy site for the intra oral distraction osteogenesis while Risdon's submandibular incision is preferred for the extra oral distraction.

2. Osteotomy [for Angle, Ramus & Body of Mandible]- Distractor is placed in the predetermined position based on the preoperative workup. A reciprocating saw or a fissure bur can be used to perform the osteotomy, staying clear of the inferior alveolar nerve bundle by 3-5 mm. Lateral, superior and inferior aspects of the mandible are cut, leaving the mid portion of the lingual cortex intact. The osteotomy is then completed using a series of osteotomes on the inferior and superior borders, as well as the lingual aspect. The distraction device is now secured to the mandible with screw fixation. Activation is attempted to ensure movement of the proximal and distal segments

3. Osteotomy [For Symphysis of Mandible]- The osteotomy is started through the body of the mandible with a saw. The device is secured in position. A thin osteotome is then used to complete the bony cut through the alveolar process and between the teeth, attempting to maintain the integrity of the soft tissue

EXTRA-ORAL DEVICE

SURGICAL PROCEDURE- Scrub the surgical area with betadine solution up to 6 inches from the surgical site. Standard draping procedure is carried out. Local Infiltration is done with lignocaine & epinephrine. Submandibular incision is used to approach the lower border of the mandible taking care to preserve marginal

mandibular nerve. Sharply dissect the masseter off the buccal surface of the mandible in the subperiosteal plane.

Selection of pinhole sits for extra oral device require careful attention as this decides the position of the distractor. Avoid drilling unerupted tooth follicles, and also be sure that the pin projects sufficiently above the skin so that device clears skin and ear surface. Place most cephalic holes 1st because they are technically more difficult. Insert 50 mm self drilling half pins. Attach the distractor device.

Completion of osteotomy is done after the device has been applied and tightened or before the application of the distractor. (Prevent injury to inferior alveolar nerve and vessels.) Wound closure is achieved using vicryl for deeper layers & prolene suture for skin closure.

BASIC BIOLOGICAL & BIOMECHANICAL PRINCIPLES/ PROTOCOL OF DISTRACTION OSTEOGENESIS

Distraction Osteogenesis parameters are not rigidly established and considerable variations exists between different recommended treatment groups, however the following general principles or protocol of distraction are recommended.

1. Healing Period or Latency Period or Delay Period- It may be defined as that time interval when the corticotomy / osteotomy is performed until the time when the distraction is initiated for mesenchymal proliferation and callus formation. Generally a delay of 4 - 5 days is acceptable for adults. For children latency period is 2-3 days.

2. Rate of Distraction- It may be defined as the number of millimeters per day at which the bone surfaces are stretched. The rate of 1 mm a day is considered

optimal for adults. In children rate of distraction can be faster at a rate of 2 mm/day.

3. Rhythm of Distraction- It may be defined as the number of distractions per day, usually in equally divided increments to total the rate. The rhythm may vary from one cycle per day of 1mm to 0.25 mm four times a day or 0.5 mm twice daily. Clinically 0.5 mm distraction twice a day is considered more acceptable with regard to patient's compliance.

4. Healing Index or Stabilization Period or Consolidation Period- It may be defined as the number of days or months from the operation when the distraction device can be removed and the bone can be exposed to unprotected load bearing forces. This period generally ranges from 14-16 weeks.

Note- Make sure that the wires, the pins, & the distraction frame are intact.

Things to be done if there is unusual lack of resistance during distractor activation:

- Take new post operative radiographs.
- Evaluate rigidity of the activation arm of the distractor.
- Check for stability of the temporal screws of the rigid external distractor.
- Observe for wound dehiscence & possible plate exposure.

MAXILLARY OSTEOTOMY (LEFORT I OSTEOTOMY)

After the preoperative work up, the patient is shifted to the operation theatre. Intravenous line is established and maintained with RL/ DNS solution. Preanesthetic medications are administered intravenously. After induction of general anesthesia, nasotracheal intubation is done preferably on the left side. The nasotracheal tube is secured with 3 strips of dynaplast **[first two strip should be in an inverted V shape fashion encircling the tube & are secured to the nasal dorsum and the second strip is in horizontal direction across the endotracheal tube secured to the forehead skin]**. The dynaplast strips should be firmly adherent to the facial skin on either side. The endotracheal tube is also secured using a septal stitch with 1-0 [round body] mersilk suture. General anesthesia is maintained with inhalational anesthetics.

Steps to be followed After the Nasotracheal Intubation:

- ❖ Make sure that the armamentarium is arranged as per the order.
- ❖ Preparation of the surgical area thoroughly with betadine solution [at least 6 inches proximal to the operative site].
- ❖ Place the head drape covering both the ears & eyes of the patient.
- ❖ Extend the body towel & secure the head drape as well as the body towel along with the head ring using towel clips on either sides making sure that the towel clips are not injuring the ears.
- ❖ Spread the bipolar cautery cable, the suction tube, cable for the micromotor hand piece, monopolar cautery cable & cable for oscillating saw & ensure that they are connected to the source.
- ❖ Connect the suction tip, cable for the micromotor hand piece & the cautery tips & ensure their function.
- ❖ Cover the cables with the body towel & secure a towel clip [taking care that the towel clip is not engaging the cable wires/suction pipe].
- ❖ Place another body towel covering the cables.
- ❖ Clean the hands with a sterilium wash.

Armamentarium Required

1. Rowe's Maxillary Disimpaction Forceps- 2
2. Maxilla Mobilizers- 2
3. Bone Rongeur- 1
4. Copper Malleable Retractor- 2
5. Pterygoid Chisel- 1
6. Smith Spreaders- 2
7. Mallet- 1
8. Rigid Midface External Distraction Device- 1
9. Artery Forceps (Curved And Straight)- 4 Each
10. Towel Clips- 3
11. Cheek Retractor- 2
12. B.P. Handles- 2
13. B.P Blade No. 15- 2
14. Obwegesser's Periosteal Elevator- 1
15. Howarth's Periosteal Elevators- 4
16. Chin Retractor- 1
17. Langenback Retractors- 6
18. Reverse Langenback Retractor- 2
19. Mosquito Forceps- 4
20. Adson Toothed Tissue Holding Forceps- 2
21. Adson Non-toothed Tissue Holding Forceps- 2
22. Needle Holders [3-0, 4-0]- 1 Each
23. Dissecting Scissor- 1
24. Suture Cutting Scissor -1
25. Sponge Holder- 1
26. Ink Bowl & Tooth Pick- 1
27. Tongue Depressor- 1

- 28. Divider & Scale- 1
- 29. Steel Bowls- 2
- 30. Chisels & Osteotomes (Straight)- 4
- 31. Guarded Septal Chisel- 2
- 32. Septal Osteotome- 1
- 33. Zygoma Hook-1

SURGICAL STEPS

1. Local Infiltration & Splint Fixation- Local infiltration is done using 2% lignocaine with 1:80000 adrenaline under the supervision of an anesthetist. Local infiltration is done as under:

- 2ml in the pterygoid region bilaterally.
- 2ml in the buttress region bilaterally.
- 1 ml each in the piriform region bilaterally.

Preformed surgical acrylic splint with a palatal bar is secured to the maxillary arch using pre stretched 26 gauge soft stainless steel wires.

2. Surgical Incision & Dissection- Vestibular incision is placed with a monopolar cautery extending from 2nd premolar of one side to the other stopping just short of the buccal frenum wherein the incision is curved upwards so as to avoid tearing of the flap during retraction. The incision at the midline in the region of labial frenum is slightly curved in a more or less V shape so as to get a V-Y closure.

The incision is deepened through the mucosa, muscles attached to the lateral wall of the maxilla & the periosteum & the gingivo-mucoperiosteal flap is reflected with a Howarth's periosteal elevator. During the flap reflection, a gauze piece is used in the region of the anterior wall of the maxilla to avoid perforation.

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By a subperiosteal dissection to the orbital rim, the infraorbital nerve is exposed & is protected. The anterior nasal spine & piriform rim are identified & the septopremaxillary ligament is detached from the anterior nasal spine using an osteotome. Two Langenbeck retractors are used on either sides placing them at the piriform rim & the zygomaticomaxillary buttress areas taking care not to injure the infraorbital nerves. The nasal mucosa is then dissected from the lateral nasal wall & the nasal floor. Posterior dissection is done inferior & posterior to zygomaticomaxillary buttress up to the pterygoid plate.

Osteotomy is initiated at the zygomaticomaxillary buttress region using a reciprocating saw & proceeds anteriorly making sure that a perisosteal elevator is placed between the nasal mucosa & the piriform rim. Posterolateral wall of the maxilla is sectioned under the mucosal tunnels. The posterior osteotomy is directed inferiorly as it proceeds from the zygomaticomaxillary buttress region to the junction of maxilla & the pterygoid plate. If the patient needs a greater augmentation of the cheek & infraorbital region, a high level osteotomy is done a few millimeters below the infraorbital foramen. Osteotome is used through the anterior wall of maxilla to complete the posterior osteotomy followed by a guarded septal chisel for the lateral wall of the nose.

Pterygoid chisel is used for the pterygoid osteotomy with an assistant placing his/her index finger above & behind the maxillary tuberosity [hamular notch] to palpate the osteotomy. Gauze packs are used in the pterygoid region for hemostasis making sure that a gauze count is kept & the same steps are carried out on the contralateral side. With a finger pressure the anterior aspect of the maxilla is gently depressed. If a significant resistance is encountered, the lateral nasal wall osteotomy could be incomplete & should be redone. A smith spreader is used to expand the osteotomy. Maxilla is down fractured & mobilized with Rowe's maxillary disimpaction forceps [palatal beak of the disimpaction

forceps should be covered with a gauze piece to avoid injuring the palatal tissues]. Following the down fracture, any tear in the nasal mucosa is identified and sutured with 3-0 vicryl.

3. Intermaxillary Fixation (IMF) & Internal Fixation- The maxilla is placed in a desirable position corresponding to the mandible. Intermaxillary fixation is done using 26 gauge soft stainless steel wires using prefabricated splint as the key. Rigid internal fixation is done using titanium plates and screws at zygomatico-maxillary buttresses & the piriform buttresses bilaterally.

The septopremaxillary ligament is secured to the anterior nasal spine using a 2-0 prolene suture. A two layered V-Y closure is done with 3-0 vicryl suture. Immediate postoperative photographs are taken prior to extubation. IMF is released.

4. After the reversal of anesthesia, & recovery, patient is shifted to the ICU & is put in a supine position with elevation of the head end. 100% oxygen is given initially at 3l/minute & is gradually tapered as per the anesthetist's advice. Vital signs are monitored periodically & a close watch is kept to check on post operative bleeding. Patient's attendees are counseled appropriately & the post operative medications are advised.

MANDIBULAR OSTEOTOMY

BILATERAL SAGITTAL SPLIT RAMUS OSTEOTOMY (BSSO)

After the preoperative work up, the patient is shifted to the operation theatre. Intravenous line is established and maintained with RL/ DNS solution. Preanesthetic medications are administered intravenously. After induction of general anesthesia, nasotracheal intubation is done preferably on the left side. The nasotracheal tube is secured with 3 strips of dynaplast, **[first two strip should be in an inverted V shape fashion encircling the tube & are secured to the nasal dorsum and the third strip is in horizontal direction across the endotracheal tube secured to the forehead skin]**. The dynaplast strips should be firmly adherent to the facial skin on either side. The endotracheal tube is also secured using a septal stitch with 1-0 [round body] mersilk suture. General anesthesia is maintained with inhalational anesthetics.

Steps to be Followed After the Nasotracheal Intubation:

- ❖ Make sure that the armamentarium is arranged as per the order.
- ❖ Preparation of the surgical area thoroughly with betadine solution [at least 6 inches proximal to the operative site].
- ❖ Place the head drape covering both the ears & eyes of the patient.
- ❖ Extend the body towel & secure the head drape as well as the body towel along with the head ring using towel clips on either sides making sure that the towel clips are not injuring the ears.
- ❖ Spread the bipolar cautery cable, the suction tube, cable for the micromotor hand piece, monopolar cautery cable & cable for oscillating saw & ensure that they are connected to the source.
- ❖ Connect the suction tip, cable for the micromotor hand piece & the cautery tips & ensure their function.
- ❖ Cover the cables with the body towel & secure a towel clip [taking care that the towel clip is not engaging the cable wires/suction pipe].
- ❖ Place another body towel covering the cables.

- ❖ Clean the hands with a sterilium wash.

Armamentarium Required

1. Steel Bowls- 2
2. Steel Dish- 1
3. Disposable Syringe 2ml & 5ml- 1 Each
4. BP Handles- 2
5. Surgical Blade No. 15- 2
6. Towel Clips- 4
7. Copper Malleable Retractor- 2
8. Smith Spreaders- 2
9. Mallet- 1
10. Osteotomes & Chisels- 4
11. Artery Forceps (Curved and Straight)- 4
12. Cheek Retractors- 2
13. Howarth's Periosteal Elevators- 2
14. Obwegeser Periosteal Elevator- 1
15. Chin Retractors- 1
16. Langenback Retractors- 4
17. Reverse Langenback Retractors- 2
18. Adson's Toothed Tissue Holding Forceps- 2
19. Adson's Non-toothed Tissue Holding Forceps- 2
20. Needle Holder [3-0, & 4-0]- 1 Each
21. Dissecting Scissor- 1
22. Suture Cutting Scissor- 1
23. Sponge Holder- 1
24. Ink Bowl-1
25. Tooth Pick- 1
26. Tongue Depressor- 1

- 27. Divider & Scale- 1
- 28. Bone Ronger- 1
- 29. Micromotor & Hand Piece- 1
- 30. Oscillating Saw -1
- 31. Plating Kit- 1
- 32. Wire Twisters- 1
- 33. Wire Cutter- 1
- 34. No. 26 Gauge & No. 28 Gauge Soft Stainless Steel Wires- 1

SURGICAL STEPS

1. Local Infiltration & Splint Fixation- Local infiltration is done using 2% lignocaine with 1:80000 adrenaline under the supervision of an anesthetist. Local infiltration is done in the mandibular buccal vestibular region in relation to mandibular molar region bilaterally. Preformed surgical acrylic splint with a palatal bar is secured to the maxillary arch using pre stretched 26 gauge soft stainless steel wires.

2. Surgical Incision & Dissection- A 3 cm long curvilinear incision is placed medial to the buccal fat pad along the external oblique ridge using a monopolar cautery. Full thickness mucoperiosteal flap is reflected & the lateral aspect of angle & ramus of mandible is exposed by stripping the muscle attachments till inferior and posterior border of mandible. Dissection is further extended to the inferior border of the mandible & upto the 2nd molar region. Coronoid retractor is then paced inferiorly on the anterior aspect of the ascending ramus which is then elevated above the mandibular foramen & the ramus is stripped of the temporalis muscle attachment upto the sigmoid notch. Once the medial full thickness flap has been developed & then lingula is identified, and the location of the sigmoid notch may be checked with a suitable instrument.

3. Osteotomy- On the medial side, the horizontal osteotomy is made through the medial cortex with a Lindemann bur or a reciprocating saw about 1.5 cm inferior to the sigmoid notch but superior to the mandibular foramen. Soft tissues are retracted with a channel retractor, while protecting the inferior alveolar neurovascular bundle. The osteotomy is created through the cancellous bone until approximately 50% of the ramus is cut, further continuing along the natural concave boundary between the medial aspect of the ramus & the internal oblique ridge. Vertical cut is continued to the level of the distal aspect of the 2nd molar. A vertical osteotomy is then created perpendicular to the inferior border of the mandible along the buccal aspect of the 2nd molar. This vertical cut connects the inferior border of the mandible with the sagittal ramus osteotomy along the internal oblique ridge. Thin & narrow osteotomes are used initially to complete the osteotomy cuts gradually progressing towards the larger osteotomes until the sagittal splitting is complete. Neurovascular bundle should be retained in the lateral aspect of the distal segment. Mandible is positioned in an appropriate & desired relation with the maxilla.

Note- If the mandible is to advanced- The proximal aspect of the distal segment needs to be stripped off from the medial pterygoid attachments

If the mandible is to be set back- The distal aspect of the proximal segment is trimmed as needed.

4. Intermaxillary Fixation (IMF) & Internal Fixation- Intermaxillary fixation is done using 26 gauge soft stainless steel wires using prefabricated splint as the key. Rigid internal fixation is done using titanium plates and screws on both sides. Following a satisfactory fixation, the IMF is released. Wound closure is done with 3-0 vicryl suture. Extra-oral pressure dressing is placed.

5. After the reversal of anesthesia, & recovery, patient is shifted to the ICU & is put in a supine position with elevation of the head end. 100% oxygen is given initially at 3l/minute & is gradually tapered as per the anesthetist's advice. Vital signs are monitored periodically & a close watch is kept to check on post operative bleeding. Patient's attendees are counseled appropriately & the post operative medications are advised.

GENIOPLASTY

Following the preoperative protocol as mentioned earlier, the procedure is carried out as under:

1. Local Infiltration & Splint Fixation- Local infiltration is done using 2% lignocaine with 1:80000 adrenaline under the supervision of an anesthetist.

2. Surgical Incision & Dissection- Crown's incision, also called Maurice Mommaerts incision is placed on the vermilion of the lower lip extending from corner of the mouth of one side to the other using a monopolar cautery. The incision is deepened through the mucosa, submucosa & the periosteum without hampering the mentalis fibres. Adequate amount of exposure to the bone is ensured using either a Howarth's or an obwegesers periosteal elevator.

3. Osteotomy- Midline is marked on the symphysis using a round bur. Osteotomy cut is marked extending from lower border of the mandible corresponding to the distal aspect of the canine, to the other side. Osteotomy is initially done using the bone cutting burs & is later deepened with a reciprocating saw. The bicortical cut is completed with osteotomes & the segment is adequately freed.

4. Internal Fixation- The osteotomised segment is repositioned as desired, stabilized with a bone holding forcep & is fixed either with long screws that engage both the osteotomised as well as the stable segment or using the miniplates. Wound closure is done with 3-0 vicryl suture. Extra-oral pressure dressing is placed.

DOUBLE SLIDING PROPELLAR GENIOPLASTY

Following the preoperative protocol as mentioned earlier, the procedure is carried out as under:

1. Local Infiltration & Splint Fixation- Local infiltration is done using 2% lignocaine with 1:80000 adrenaline under the supervision of an anesthetist.

2. Surgical Incision & Dissection- Crown's incision, also called Maurice Mommaerts incision is placed on the vermilion of the lower lip extending from corner of the mouth of one side to the other using a monopolar cautery. The incision is deepened through the mucosa, submucosa & the periosteum without hampering the mentalis fibres. Adequate amount of exposure to the bone is ensured using either a Howarth's or an Obwegesers periosteal elevator.

3. Osteotomy- Midline is marked on the symphysis using a round bur. Osteotomy is marked in such a way so as to create a stepped intermediate wafer of bone between the inferior fragment & the mandible which is also advanced to provide bony contact between the upper & lower fragments. Osteotomy is initially done using the bone cutting burs & is later deepened with a reciprocating saw. The bicortical cut is completed with osteotomes & the segment is adequately freed.

4. Internal Fixation- The osteotomised segment is repositioned as desired, stabilized with a bone holding forcep & is fixed either with long screws that engage both the osteotomised as well as the stable segment or using the miniplates. Wound closure is done with 3-0 vicryl suture. Extra-oral pressure dressing is placed.

TRAUMA

After the preoperative work up, the patient is shifted to the operation theatre. Intravenous line is established and maintained with RL/ DNS solution. Preanesthetic medications are administered intravenously. After induction of general anesthesia, nasotracheal intubation is done preferably on the left side. The nasotracheal tube is secured with 3 strips of dynaplast **[first two strip should be in an inverted V shape fashion encircling the tube & are secured to the nasal dorsum and the second strip is in horizontal direction across the endotracheal tube secured to the forehead skin]**. The dynaplast strips should be firmly adherent to the facial skin on either side. The endotracheal tube is also secured using a septal stitch with 1-0 [round body] mersilk suture. General anesthesia is maintained with inhalational anesthetics.

Steps to be Followed After the Nasotracheal Intubation:

- ❖ Make sure that the armamentarium is arranged as per the order.
- ❖ Preparation of the surgical area thoroughly with betadine solution [at least 6 inches proximal to the operative site].
- ❖ Place the head drape covering both the ears & eyes of the patient.
- ❖ Extend the body towel & secure the head drape as well as the body towel along with the head ring using towel clips on either sides making sure that the towel clips are not injuring the ears.
- ❖ Spread the bipolar cautery cable, the suction tube, cable for the micromotor hand piece, monopolar cautery cable & ensure that they are connected to the source.
- ❖ Connect the suction tip, cable for the micromotor hand piece & the cautery tips & ensure their function.
- ❖ Cover the cables with the body towel & secure a towel clip [taking care that the towel clip is not engaging the cable wires/suction pipe].
- ❖ Place another body towel covering the cables.
- ❖ Clean the hands with a sterilium wash.

MANDIBULAR FRACTURES

Armamentarium Required

1. BP Handles [Short]- 2
2. Adson's Toothed Tissue Holding Forceps- 2
3. Adson's Non-toothed Tissue Holding Forcep- 1
4. Mosquito Forceps- 4
5. Towel Clips- 3
6. Steel Bowls- 2
7. Sponge Holder- 1
8. Needle Holders [3-0, 4-0]- 1 Each
9. Suture Cutting Scissor- 1
10. Local Anesthetic Syringe- 1
11. Langenback Retractors- 4
12. Cheek Retractors- 2
13. Tongue Depressor- 1
14. Howarth's Periosteal Elevators- 4
15. Obwegesser's Periosteal Elevator- 1
16. Copper Malleable Retractors- 2
17. Micromotor Hand Piece & Drill Bits
18. Plating Kit
19. Mosquito Forceps- 4
20. Bone Rongeur- 1
21. Bone Holding Forcep- 1
22. Condylar Retractor- 1
23. Cat's Paw Retractors- 2

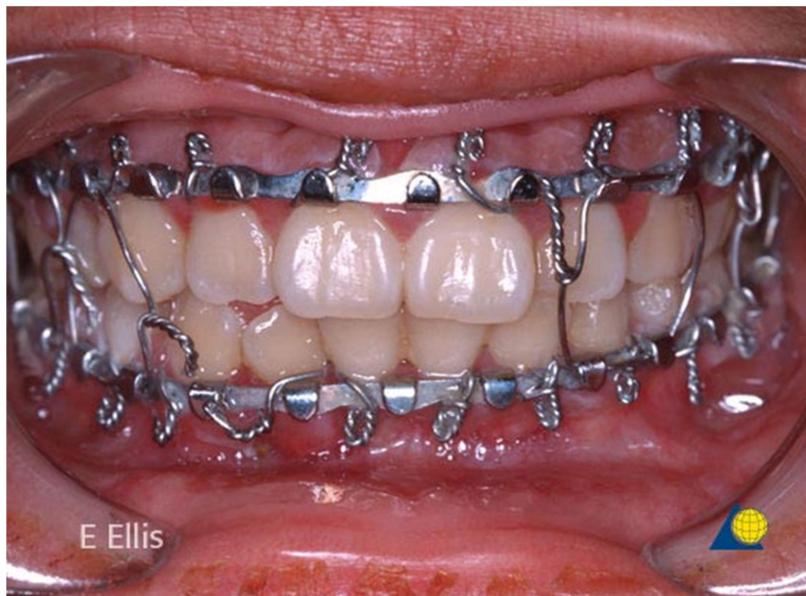
Symphysis, Parasymphysis, Body, Angle, Subcondylar and Ramus Fractures

Surgical Steps for Open Reduction & Internal Fixation (ORIF)

1. Erich Arch Bar Placement- Erich arch bar fixation is done on maxilla and mandible.

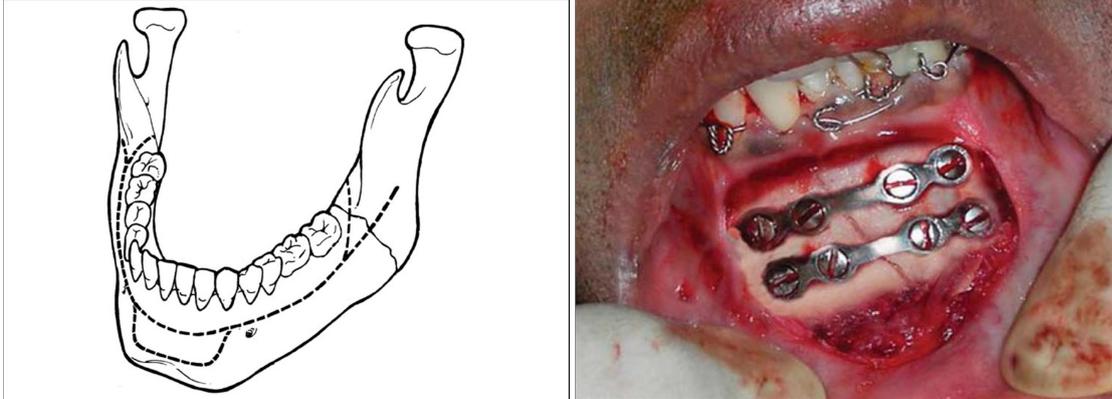
2. Surgical Incision & Exposure of Fracture Line- Local infiltration is done using 2% lignocaine with 1:80000 epinephrine along planned incision. Incision is placed with 15 no: blade/ cautery & is deepened up to the periosteum. Care should be taken not to injure the mental nerve in the region of mental foramen near 2nd premolar root apex. Subperiosteal dissection is done to expose underlying fracture line.

3. Fracture Reduction- The fracture segments are manipulated to check for fibrous tissue / foreign body presence which if present is debrided. Occlusion guided fracture reduction is done. After establishing occlusion, maxillo-mandibular fixation (MMF) is done.



4. Internal Fixation- Functionally stable fixation is done achieved using miniplates and monocortical screws. The site of placement of miniplates is based

on **Champy's Ideal Lines of Osteosynthesis**. MMF is released and occlusion is reevaluated. Post-fixation photographs are taken.



5. Suturing- A two layered closure if possible is done with 3-0 vicryl sutures for deeper layer and 4-0 Black silk suture for mucosa closure.

6. Postoperative photographs are taken. Extraoral pressure dressing is placed.

7. After the reversal of anesthesia & recovery, the patient is shifted to the ICU & is put in a recovery position. 100% oxygen is given initially at 3 L/minute & is gradually tapered as per the anesthetist's advice. Vital signs are monitored periodically & a close watch is kept to check on post operative bleeding. Patient's attendants are counseled appropriately & the post operative medications are advised.

MAXILLARY FRACTURES

Armamentarium Required

1. BP Handles [Short]- 2
2. Adson's Toothed Tissue Holding Forceps- 2
3. Adson's non-toothed tissue holding Forcep- 1
4. Mosquito Forceps- 4
5. Towel Clips- 3
6. Steel Bowls- 2
7. Sponge Holder- 1
8. Needle Holders [3-0, 4-0]- 1 Each
9. Suture Cutting Scissor- 1
10. Local Anesthetic Syringe- 1
11. Langenback Retractors- 4
12. Cheek Retractors- 2
13. Tongue Depressor- 1
14. Howarth's Periosteal Elevators- 4
15. Obwegesser's Periosteal Elevator- 1
16. Copper Malleable Retractors- 2
17. Micromotor Hand Piece & Drill Bits
18. Plating Kit
19. Mosquito Forceps- 4
20. Bone Rongeur- 1
21. Bone Holding Forcep- 1
22. Condylar Retractor- 1
23. Cat's Paw Retractors- 2
24. Smith Spreader- 1
25. Forked Ramus Retractor- 1
26. Channel Retractors- 1
27. Mallet- 1
28. Zygoma Hook- 1

LEFORT FRACTURES

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- 3. Fracture Reduction-** The fracture segments are manipulated to check for fibrous tissue / foreign body presence which if present is debrided. Occlusion guided fracture reduction is done. After establishing occlusion, maxillo-mandibular fixation (MMF) is done.
- 4. Internal Fixation-** Functionally stable fixation is done achieved using miniplates and monocortical screws. MMF is released and occlusion is reevaluated. Post-fixation photographs are taken.
- 5. Suturing-** A two layered closure if possible is done with 3-0 vicryl sutures for deeper layer and 4-0 Black silk suture for mucosa closure.
- 6.** Postoperative photographs are taken. Extraoral pressure dressing is placed.
- 7.** After the reversal of anesthesia & recovery, the patient is shifted to the ICU & is put in a recovery position. 100% oxygen is given initially at 3 L/minute & is gradually tapered as per the anesthetist's advice. Vital signs are monitored periodically & a close watch is kept to check on post operative bleeding. Patient's attendants are counseled appropriately & the post operative medications are advised.