STANFORD
SCHOOL OF MEDICINE

ISCFS XI
11TH INTERNATIONAL CONGRESS
QUEENSLAND AUSTRALIA

Lucile Packard
Children's Hospital
AT STANFORD

MAXILLARY DISTRACTION WITH A NEW INTERNAL DEVICE

Lucile Packard Children's Hospital AT STANFORD

Stanford Plastic Surgery

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SCHOOL OF MEDICINE

DIV. OF PLASTIC & RECONSTRUCTIVE SURGERY

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Distraction Of The Maxilla At The Le Fort I level

- Indications
  - Advancement greater than 6-8 mm
  - Increased risk of relapse
  - Soft tissue scar limiting amount of advancement
  - Deterioration of VP mechanism?

Distraction Of The Maxilla At The Le Fort I level

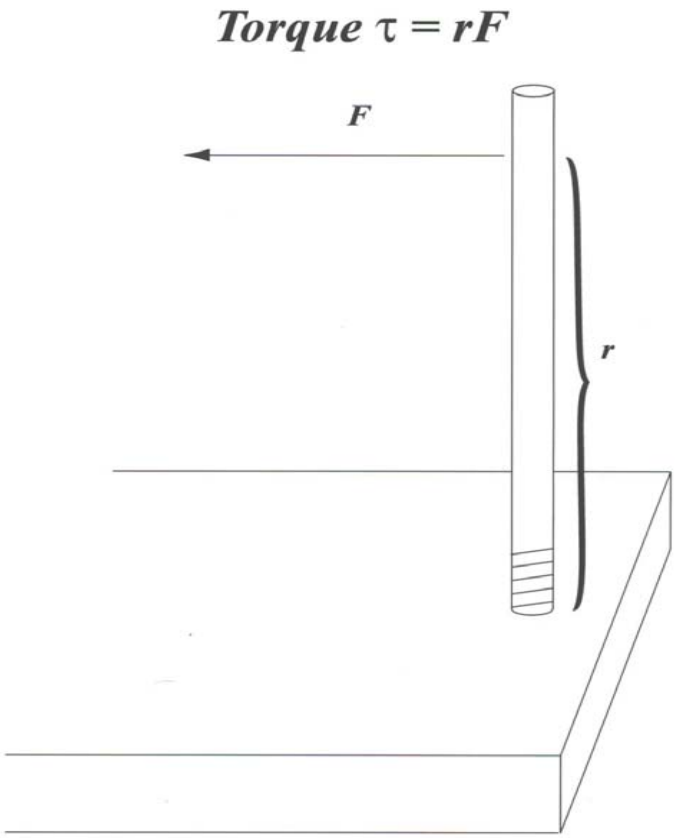
- Advantages
  - No need for bone grafting
  - Stretching, expansion & formation of new soft tissue matrix
  - No compromised aesthetic results due to set back of the mandible
  - Increased stability
- Disadvantage
  - 2 step procedure
  - Technical error
  - Patient compliance
  - Cost
  - Imperfect occlusion

Physics of Distraction Device

- F = VECTOR FORCE OF DISTRACTION
- r= DISTANCE OF DEVICE FROM BONE
- TORQUE τ = r x F

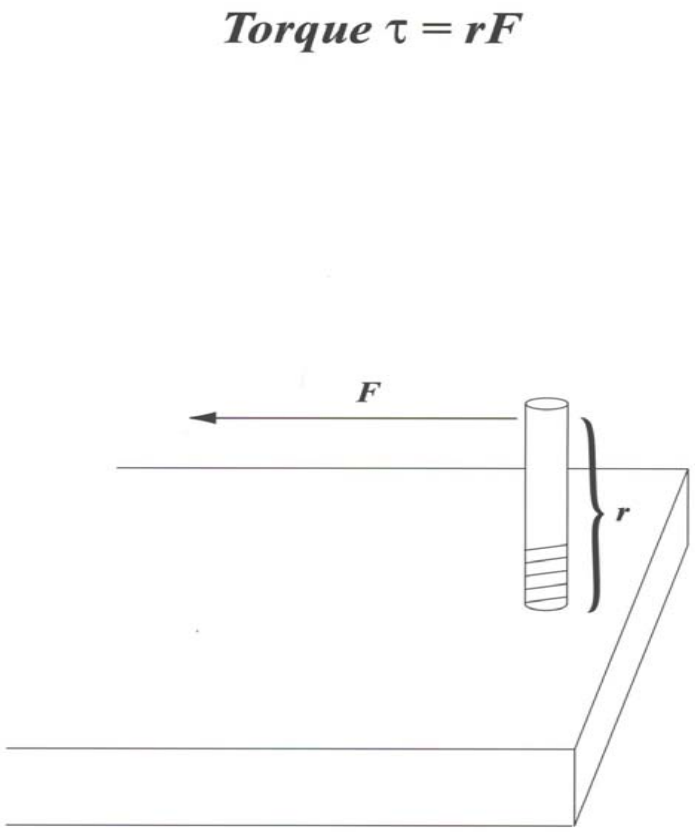
External Distractors

- Higher torque results in the translation of a component or the distraction force into a rotational force
- This results in a smaller force vector along the growth plane of the bone



Internal Distractors

- Device placed directly on the bone
- Negligible radius
- Torque τ = rF approaches 0
- Insignificant amount of torque increases effective force vector along the growth plane of the bone



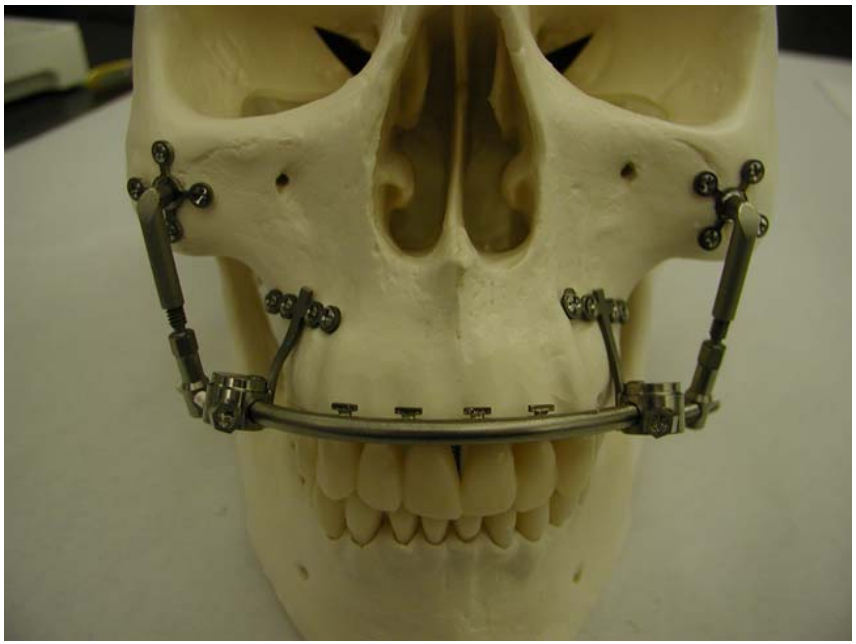
Spectrum ™ Lefort I Internal Distractor Device

- Internal Device
- Intra-oral activation
- Bi-directional
- 25 mm of distraction
- Attachment to teeth or bone

- OsteoMed, Addison Texas

Spectrum Lefort I Distractor Components

- Distractor bow & ligation posts
- Malar post & plates
- Vertical adjustment legs
- Maxillary rigid fixation plates.
- Horizontal distraction arms.
- Distractor activators



Clinical Experience

- Patient demographics
  - 10 patients with Maxillary hypoplasia
    - 8 male
    - 2 female
  - Non-syndromic Cleft lip & palate
    - 7 w BCLP
    - 3 w UCLP
  - Age at distraction of maxilla, ranged from 14- 47 yrs old (18)
  - 4 patients w h/o VPI, s/p pharyngeal flap

Clinical Experience

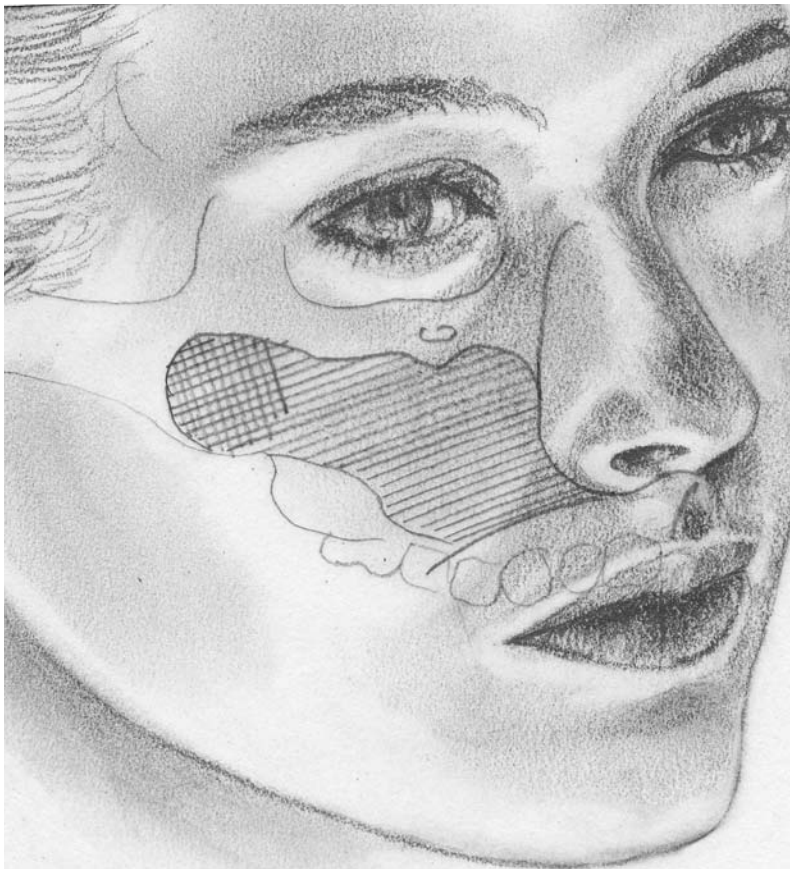
- Pre-Operative work-up
  - Orthodontics
  - Dental Models
  - Panorex, Lat. Cephalogram, AP as needed
  - Ceph. Analysis
  - Visual treatment Objective
  - Surgical Treatment Objective as needed

Surgical Technique

- Preoperatively, pre-bend the distractor bow to a set of dental study models

Surgical Technique

- The face of the maxilla is dissected elevating the periosteum as one would do for a Le Fort I osteotomy.
- The only difference is the more extensive elevation of the periosteum over the malar eminence as shown by the cross hatching.
- A complete Lefort I osteotomy is preformed & partially mobilized

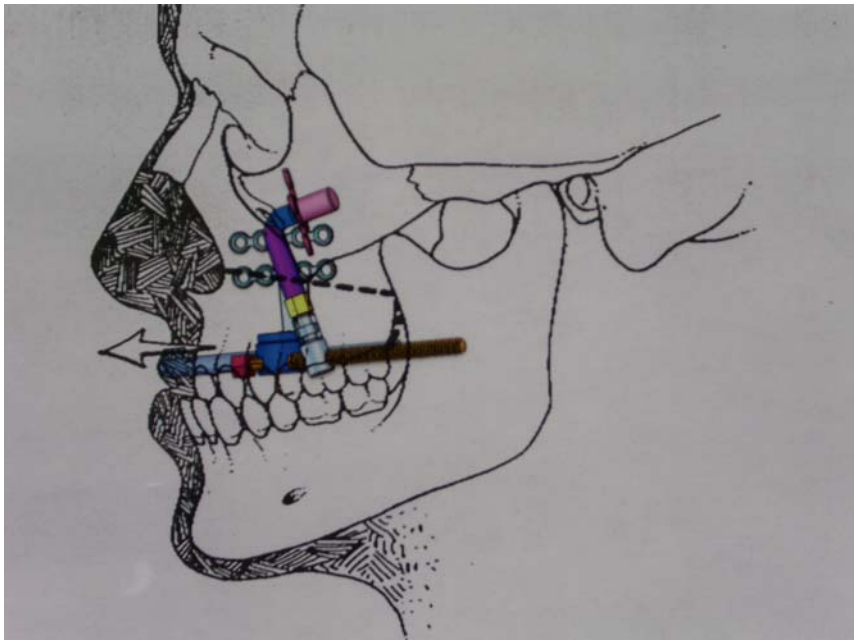


Surgical Technique

- Adjust the position of the horizontal distractor rod

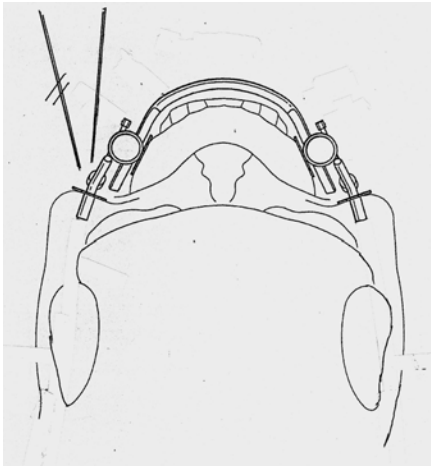
Surgical Technique

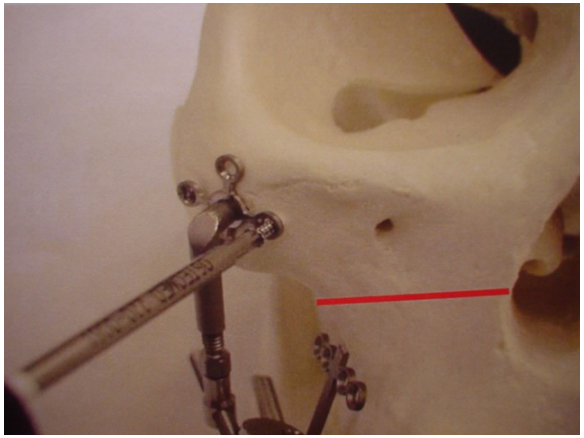
- Place the fully assembled distractor in the mouth & ligate the bow in the midline to the dentition
- Make certain that the distractor bow is horizontal or parallel to the dentition



Surgical Technique

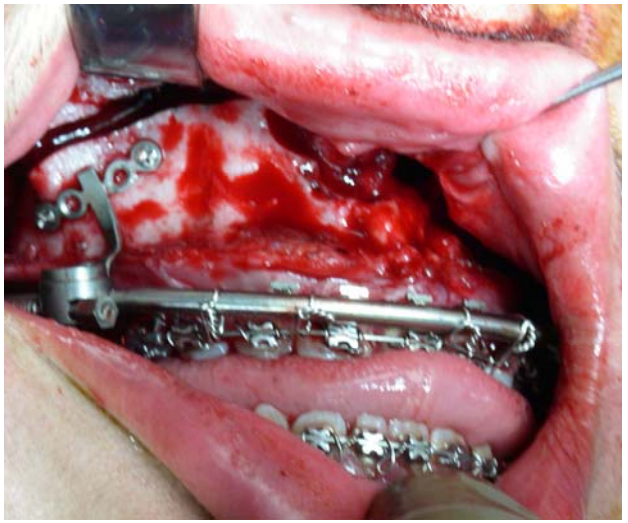
- Rotate vertical arms where they touch malar eminence & adjust for correct height
- Rigidly fixate the malar plates & post

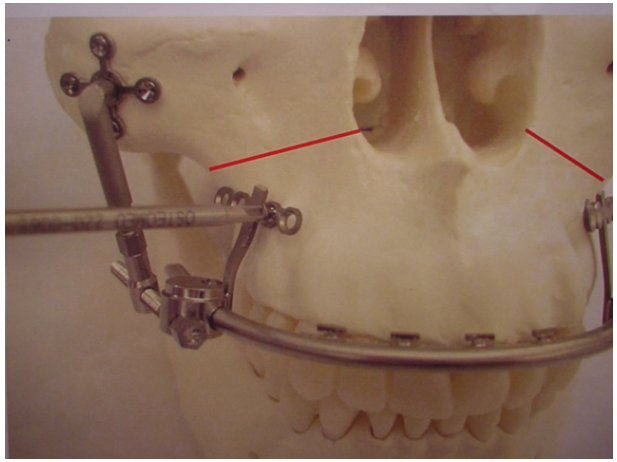




Surgical Technique

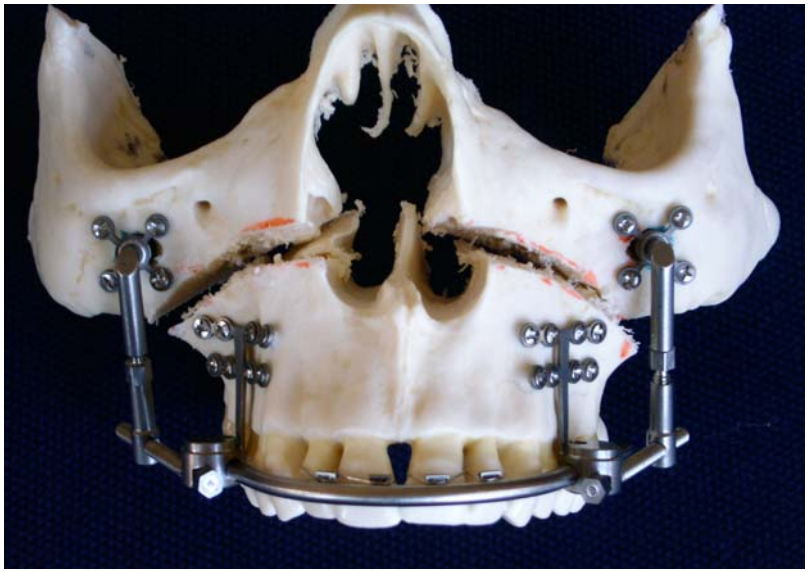
- At this point the maxillary plates can also be rigidly fixated to the Lefort I segment or removed





Surgical Technique

- Activated the distractor ascertain the completeness of the osteotomies & proper vector
- Activate the distractor and leave a 1-2 mm gap



Post-Op Care

- Patients are admitted to the hospital for 1-2 days for post-op pain management and IV hydration
- Strict oral hygiene
- Soft diet
- F/U w Orthodontist

Post-Op Care

- Distractors are activated at 2-4 days post-op by the Dr. and continued by family member
- Post-op cephalogram & panorex is used for evaluation of osteotomy and distractor.
- Distraction at a rate of 1 mm/day till desired occlusion is achieved
- Elastic bands used during tx
- Distractors left in place for 2 months of consolidation before removal

Pre & Post-Op Ceph. Analysis

Pt	Age	SNA pre	SNA post	Overjet pre	Overjet post	advancement
AT	16	76	89	Neg 11 mm	2 mm	13 mm
SM	22	76	80	Neg 3 mm	3 mm	6 mm
DG	21	73	75	Neg 3 mm	3 mm	6 mm
AV	14	76	78	Neg 1 mm	3 mm	4 mm
WP	47	72	80	Neg 4 mm	2 mm	6 mm
JR	20	70	78	Neg 11 mm	Neg 1 mm	10 mm
AM	15	73	80	Neg 13 mm	3 mm	16 mm
TH	14	75	80	Neg 6 mm	3 mm	9 mm
TS	17	72	78	Neg 4 mm	3 mm	7 mm
SB	15	73	87	Neg 7 mm	3 mm	10 mm

Results

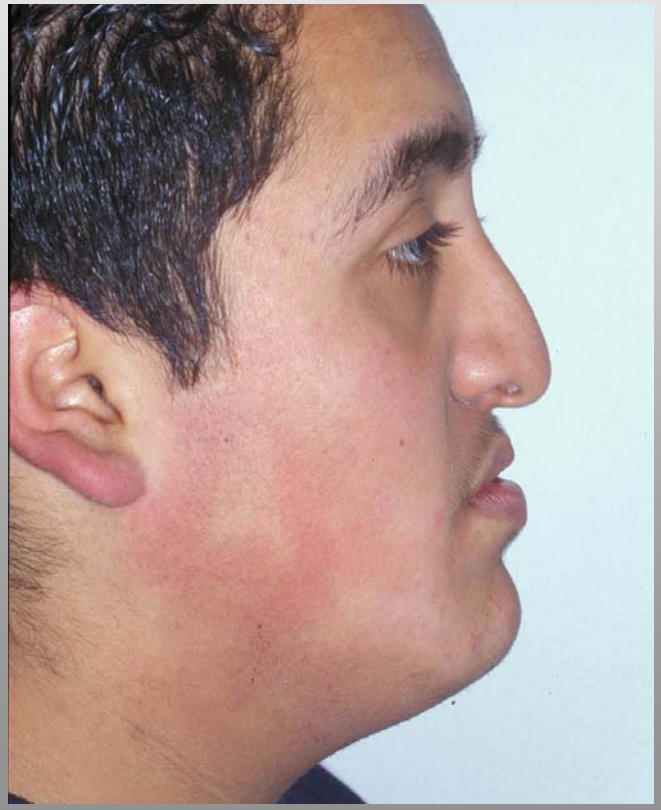
- Average Pre-op SNA 74 degrees (70-76)
- Average Post-op SNA 81 degrees (75-89)
- Average Pre-op over-jet neg 6 mm (neg 1-13)
- Average Post-op over-jet 2 mm (1-3)
- Average distraction of 9 mm (4-16)

Results

- Longest f/u of 19 months w/o change in the position of the maxilla
- No major or minor complication
- At the time of distractor removal rigid fixation was used if necessary
- No post-op VPI developed

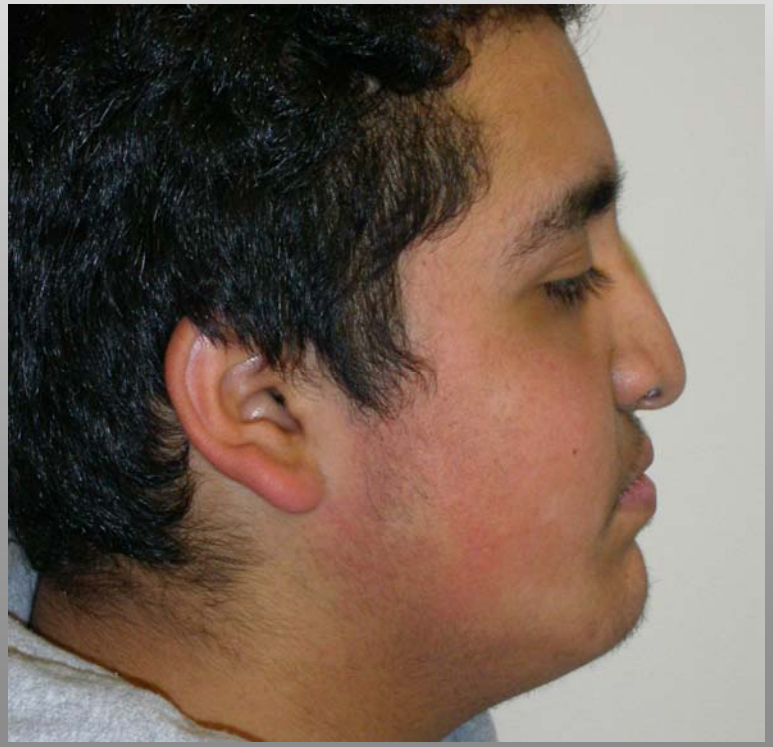
Case Presentation

- Pre-Op



Case Presentation

- Distractor activation



Case Presentation

- Traction with elastic during distraction

Case Presentation

- Post-Op

Case Presentation

- Occlusion Case II

Conclusion

- This device incorporates positive components of the internal & external distractor design
  - Internal
  - Intra-oral activation
  - Increased amt of distraction
  - Bi-directional
  - Less torque, greater effective force vector
  - Well accepted
  - Easily adjusted

Conclusion

- The device is well tolerated by the patient and not visible to others.
- The results have been stable and functional.
- The bilateral nature of the device makes it stable and easy to insert and control the vectors.
- Force of distraction is shared across a larger surface area