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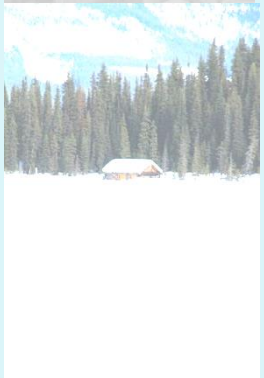
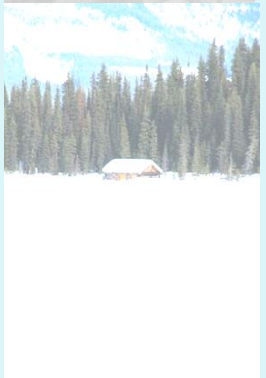
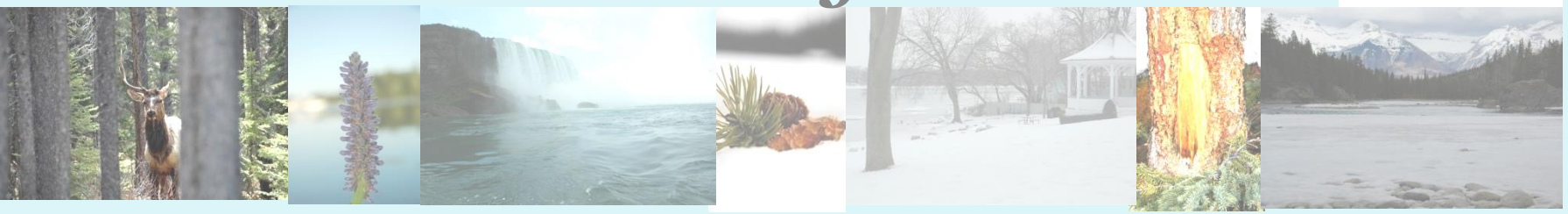


Surgical Management of Paediatric Facial Nerve Paralysis
"Smile Surgery "

Vijith Vijayasekaran

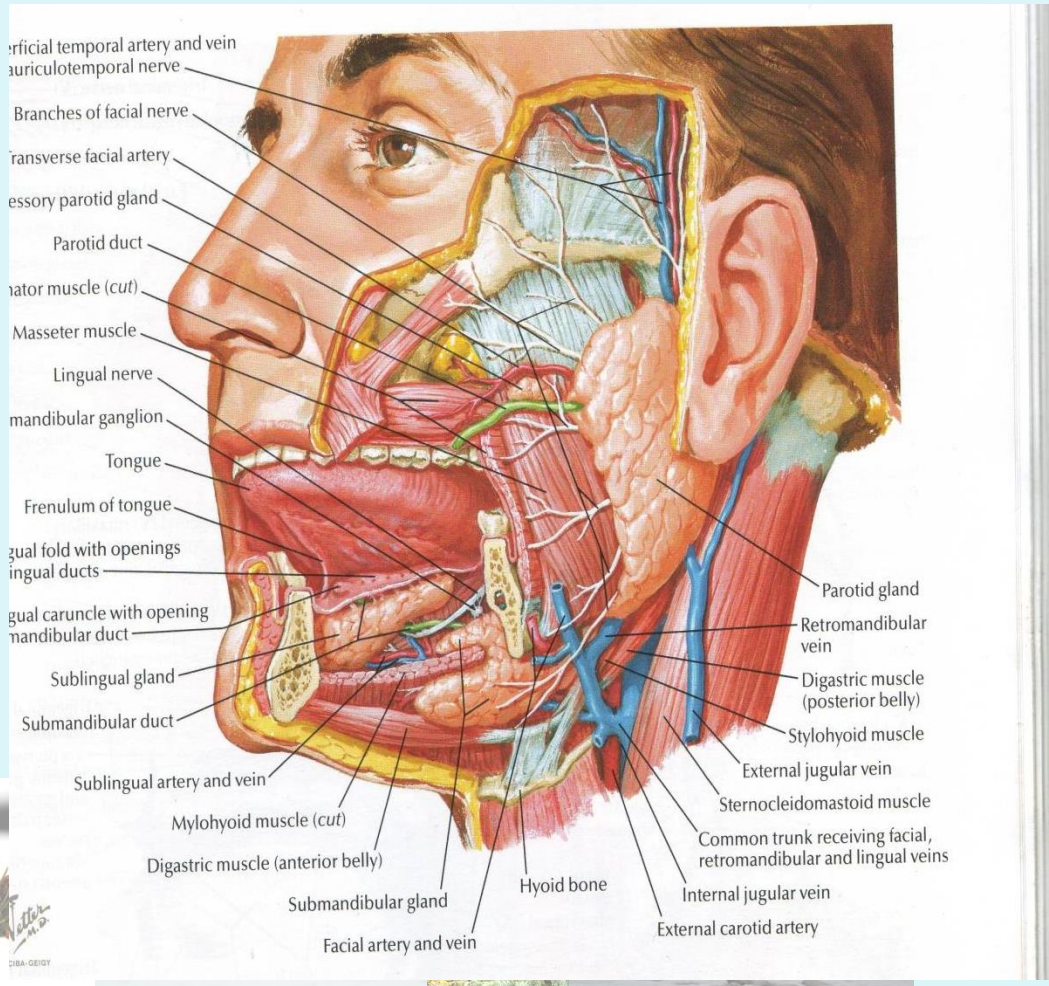
Plastic and Reconstructive Surgeon





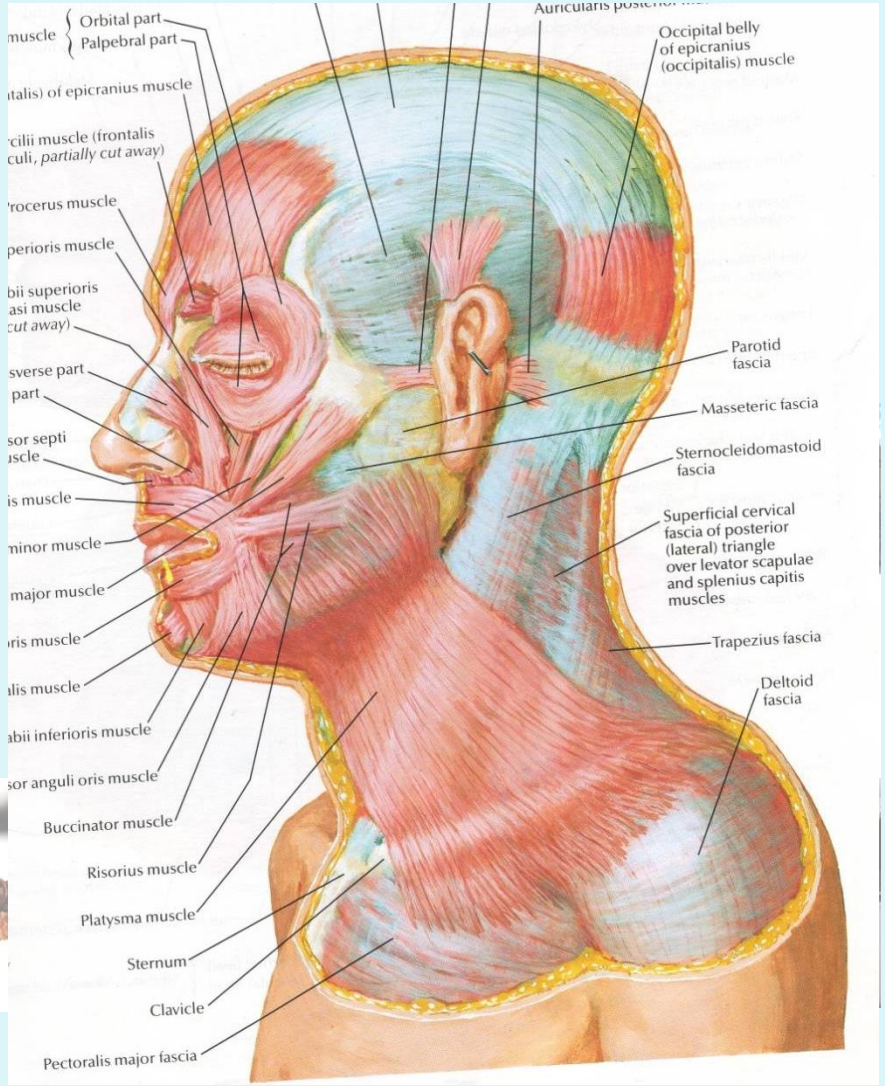
Anatomy

- 7000 neurons in the facial nerve nucleus – dorso-lateral pons
- Intra temporal portion
  - Geniculate ganglion
  - Greater petrosal
  - Nerve to stapedius
  - Chorda tympani
  - Ratio of nerve to canal less in children
- Extra temporal portion
  - 5 main branches
  - Variable branching pattern
  - Superficial location until mastoid develops



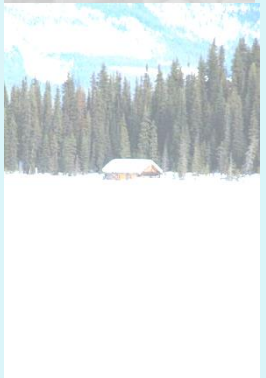
Anatomy

- 18 paired muscle
- Complex movement
  - Sphincteric function
  - Facial expression
- Clinically significant muscles
  - Frontalis
  - Orbicularis Oculi
  - Zygomaticus Major
  - Orbicularis Oris
  - Lip Depressors



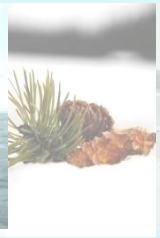
Paediatric Facial Palsy - Etiology

- Infectious (otitis media)
- Traumatic
- Iatrogenic
- Congenital
- Bell's/Idiopathic
- Relapsing
- Neoplastic



Congenital Facial Palsy

- 2.1 per 1000 live births
- 1. Developmental
  - Idiopathic
  - Mobius Syndrome
  - Hemifacial Microsomia
  - Hypoplasia of depressor anguli oris
- 2. Acquired
  - Birth Trauma
  - Forceps
  - Direct pressure during labour
  - Majority recover



Congenital Facial Palsy

- Developmental Facial Palsy
  - Variable presentation
  - Marginal branch most commonly affected
  - Brow elevation and eye closure rarely a problem
  - **Smile predominant functional problem**
  - Tone maintained
  - Musculature - fibrotic/poorly developed
  - Skeletal asymmetry
  - Re innervation not possible

Möbius Syndrome

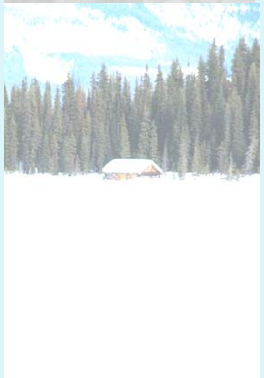
- Congenital Facial Palsy
- 1) Unilateral or Bilateral absence of abduction of the eye
- 2) Unilateral or bilateral complete or incomplete facial paralysis

Möbius Syndrome

- Incomplete spares lower face and platysma
- Other cranial nerve palsies
- Congenital anomalies of the extremities –Poland's syndrome
- Micrognathia
- Ear deformity
- Prominent epicanthic folds
- Mild mental retardation

Hemifacial microsomia

- Facial paralysis occurs in a small percentage of these patients
- Cheek and peri buccal musculature predominantly affected

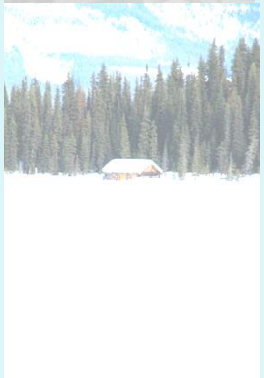


Asymmetric crying facies

- Normal resting tone but when cries has appearance of a marginal mandibular palsy
- 75% have other abnormalities
  - CVS, GUT, Respiratory musculoskeletal
  - Intrauterine insult at 5 weeks of gestation

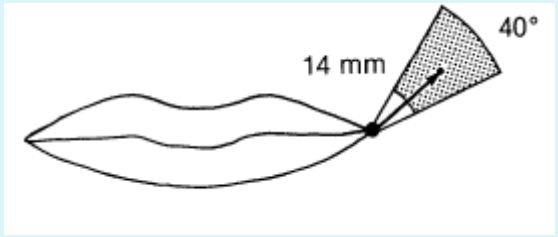
Pediatric Facial Palsy - Smile

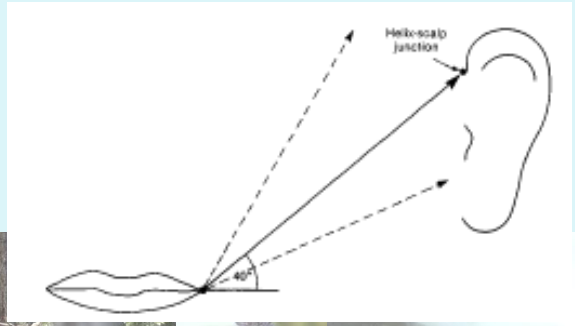
- Tone maintained
- Eyebrow elevation and eye closure less affected
- Smile predominantly affected
- Aim - Symmetrical spontaneous smile



Pediatric Facial Palsy - Smile

- Individual variation
  in commissure vector

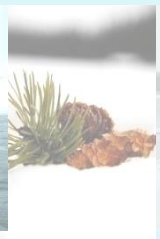




Buccolabial Muscles

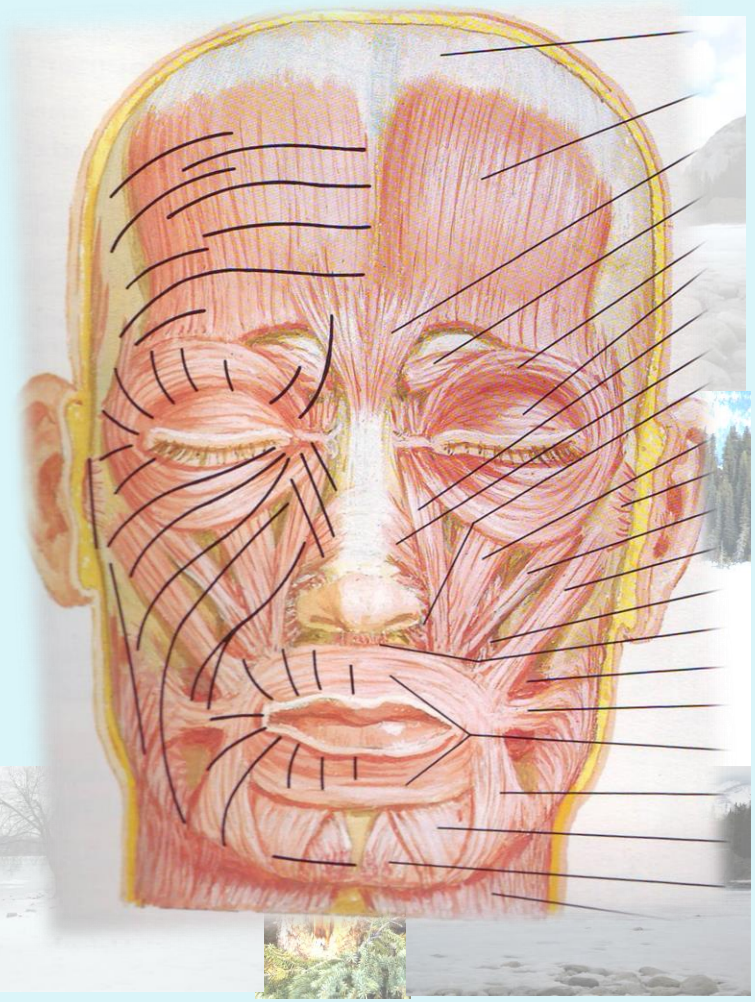
- Posture of lips controlled by sphincter (Orbicularis Oris and Buccinator) muscle group and surrounded by an elevator retractor group and a depressor retractor group
- LLSAN – Evert lip and flares nostrils
- LLS and Zy-min – elevates upper lip and creates NL furrow – disdain and contempt




Anatomy

- Zygomaticus Major – draws angle of mouth upward and laterally
- DAO- draws the angle of mouth down and laterally - express sadness



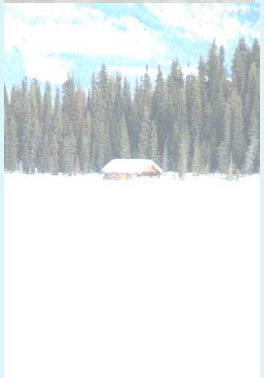
Treatment of Facial Palsy - Viable Target Muscles

- After 12-18 months if denervation reinnervation is much less successful or fails due to degeneration of target muscle fibers
- Management dependent on timing following the injury



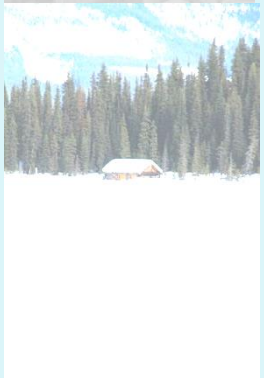
Treatment of Facial Palsy - Viable Target Muscles

- Primary nerve repair - tension free repair
- Ipsilateral nerve graft – indicated if tension free repair not possible
  - Status of the facial muscle
  - Scar in graft bed
- Cross face nerve graft
  - Indicated when proximal nerve stump is not available but distal stump intact



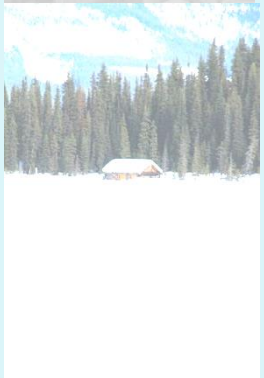
Treatment of Facial Palsy - Viable Target Muscles

- Cross Face Nerve graft – (< 12 post denervation)
- Cranial nerve transfer (hypoglossal to facial nerve transfer)
  - Paralysis and atrophy of the ipsilateral tongue
  - Involuntary grimacing (synkinesis) with normal tongue movement
  - No spontaneous facial expression
- Cranial nerve transfer and a cross face nerve graft

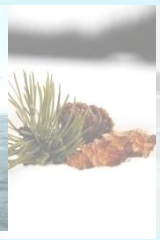


Non Viable Ipsilateral Facial Muscles

- Gold standard operation -
  - Cross face nerve graft with free muscle transfer
    - Unilateral facial palsy with viable contra lateral facial nerve
  - Nerve to masseter with free muscle transfer
    - Bilateral facial nerve palsy or insufficient donors in contra lateral facial nerve

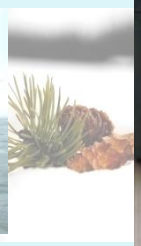


Segmental gracillis functional muscle transfer



Post Fellowship Experience

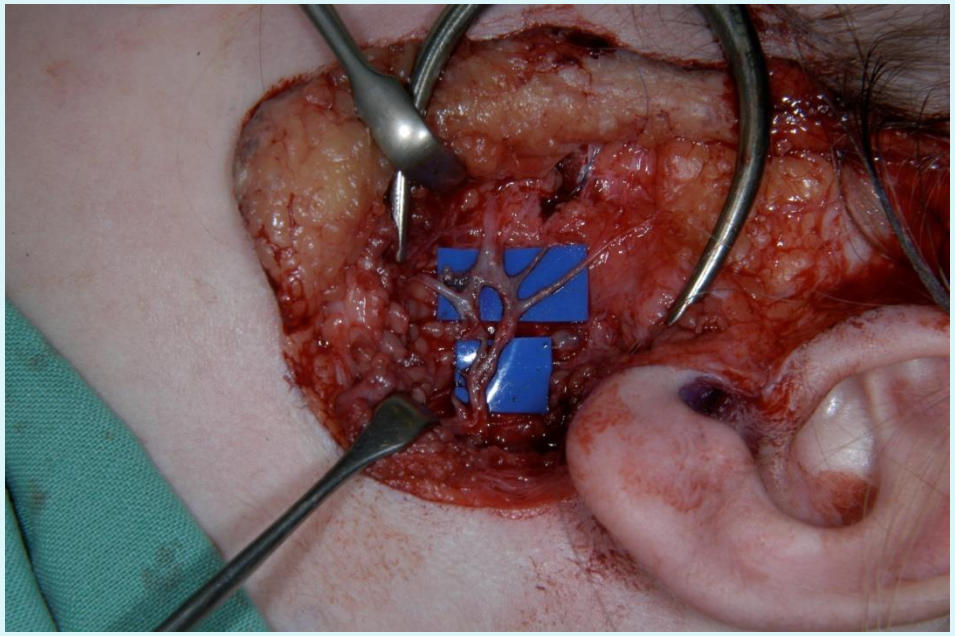
- **1.** Christopher Coombs - Royal Children's Hospital, Melbourne, Victoria.
- 2. Ronald Zuker – Hospital for Sick Children, Toronto, Canada



Cross Face Nerve Graft and Free Gracillis Transfer

- Identify smile vector
- Mark vector
- Face lift incision
- Landmark (commissure and tragus)
- Identify at least two buccal branches that mimic smile (bipolar nerve stimulator)
- Sacrifice one of two branches
- Sural nerve graft -Banked in upper lip
- Short nerve graft vs. long Nerve graft
- Meticulous nerve coaptation
- 6 -12 months later free segmental gracillis

Cross Face Nerve Graft



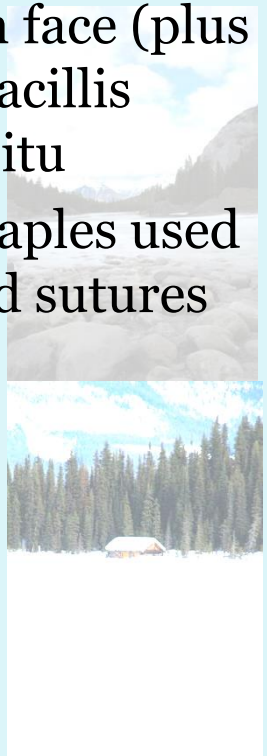
Segmental Free Innervated Gracillis

- 6-12 months post cross face nerve graft
- Tinels sign
- 2 team
- Pre operative markings
- Pre auricular incision
- Affected side face dissected
- Fibrotic musculature
- Facial vessels/Superficial temporal identified

Segmental Free Innervated gracillis

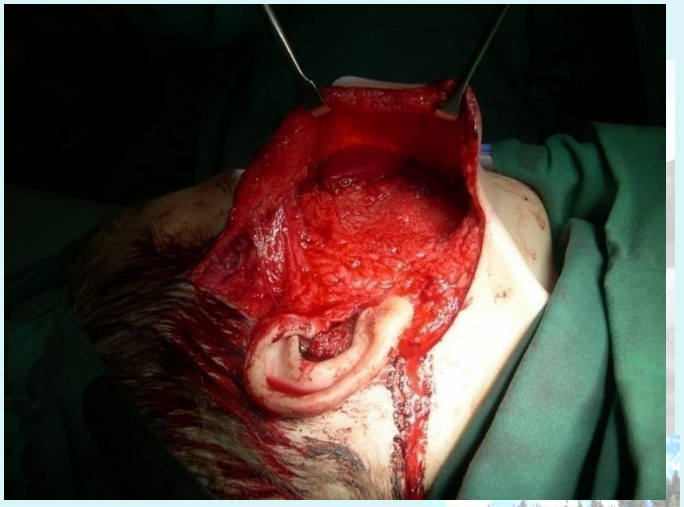
- Ipsilateral Segmental gracillis harvest
- Medial circumflex femoral artery vein
- Nerve to gracillis muscle
- 18 – 22 g muscle (30-50%)
- Sufficient length – commissure to deep temporal fascia or zygomatic arch
- Short muscle reduced excursion

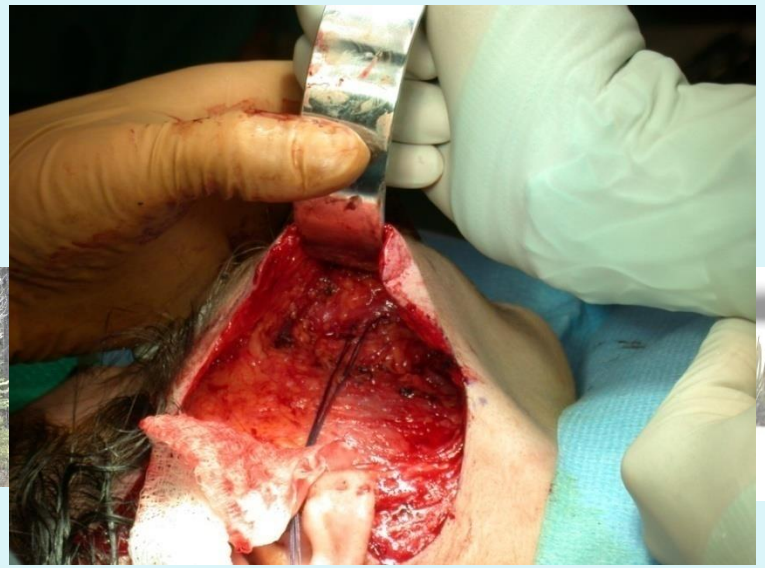
- Length of muscle in face (plus 2cm) - length of gracillis muscle at rest in - situ
- Sutures or bowel staples used at either end to hold sutures

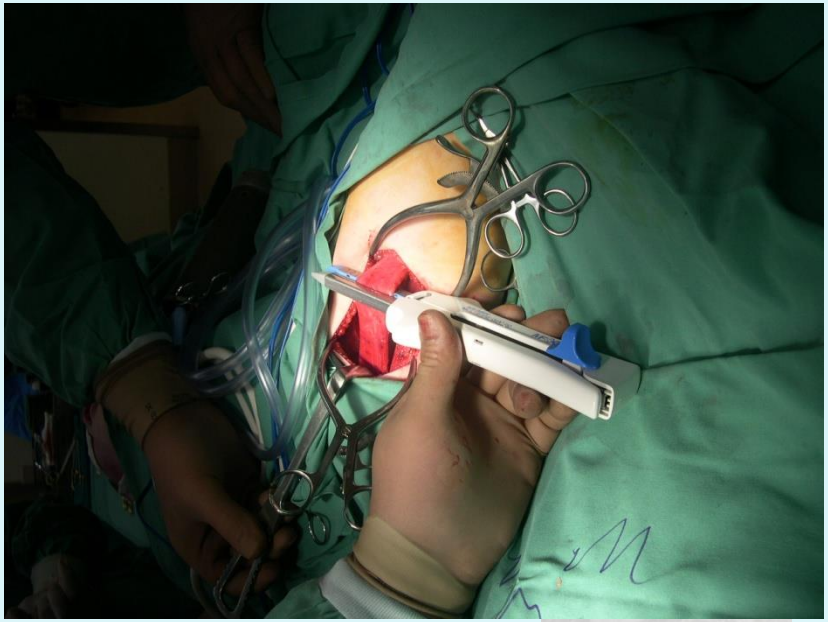


Segmental Free Innervated Gracillis

- Sutures Placed to create Nasolabial fold (3-4)
- Non functioning orbicularis muscle visualized
- Critical part of operation

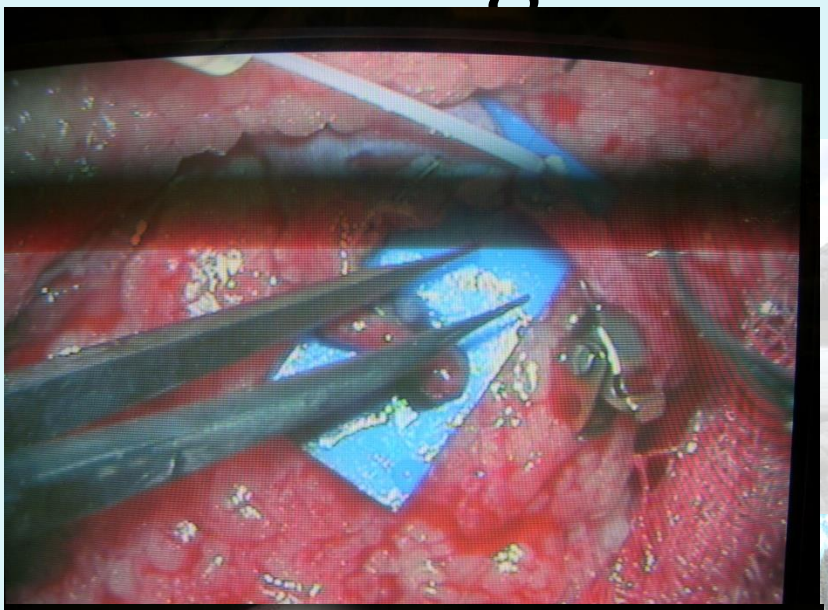


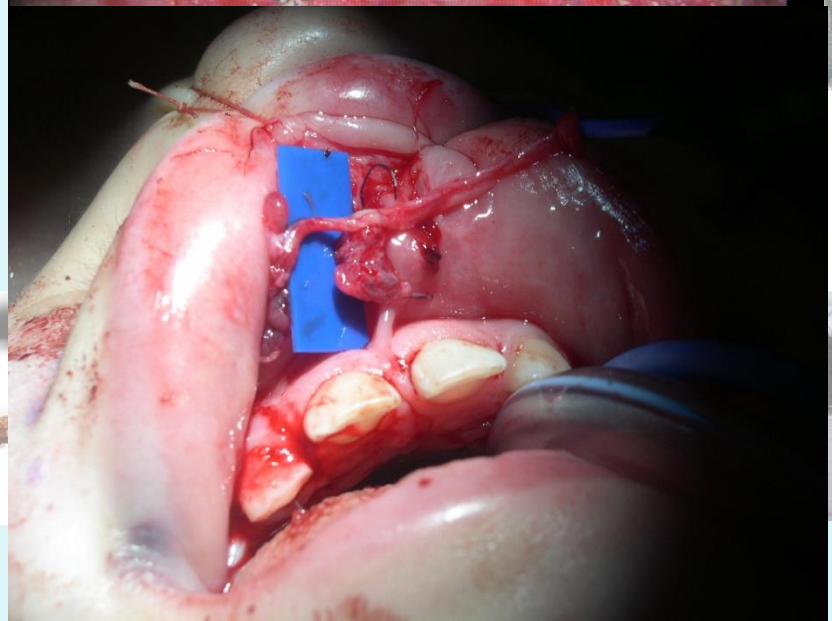


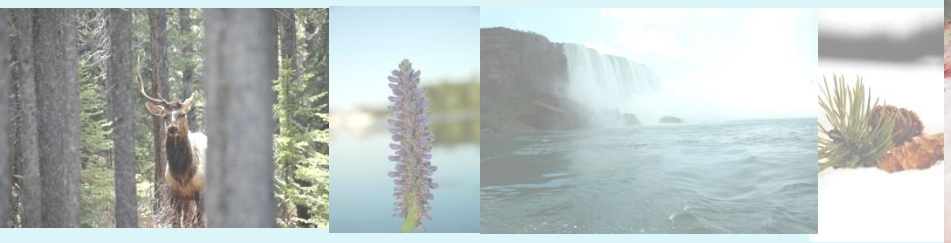


Segmental Free Innervated gracillis

- Muscle sutured to the Temporalis fascia
- Arterial and venous anastomosis
- Nerve coaptation in upper buccal sulcus

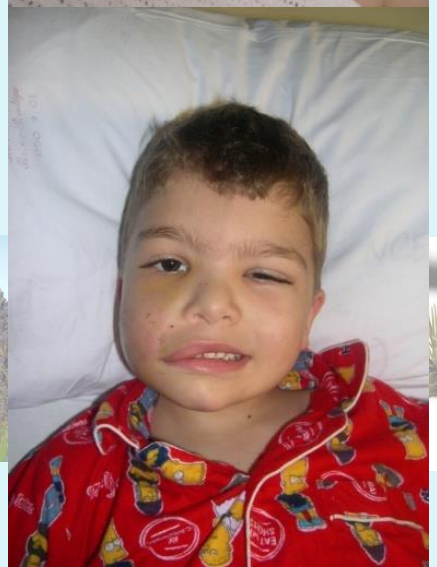






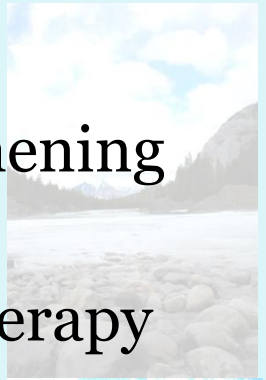
Post Operative Therapy

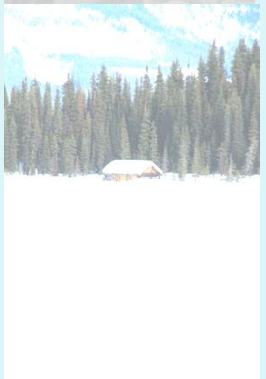
Day 1

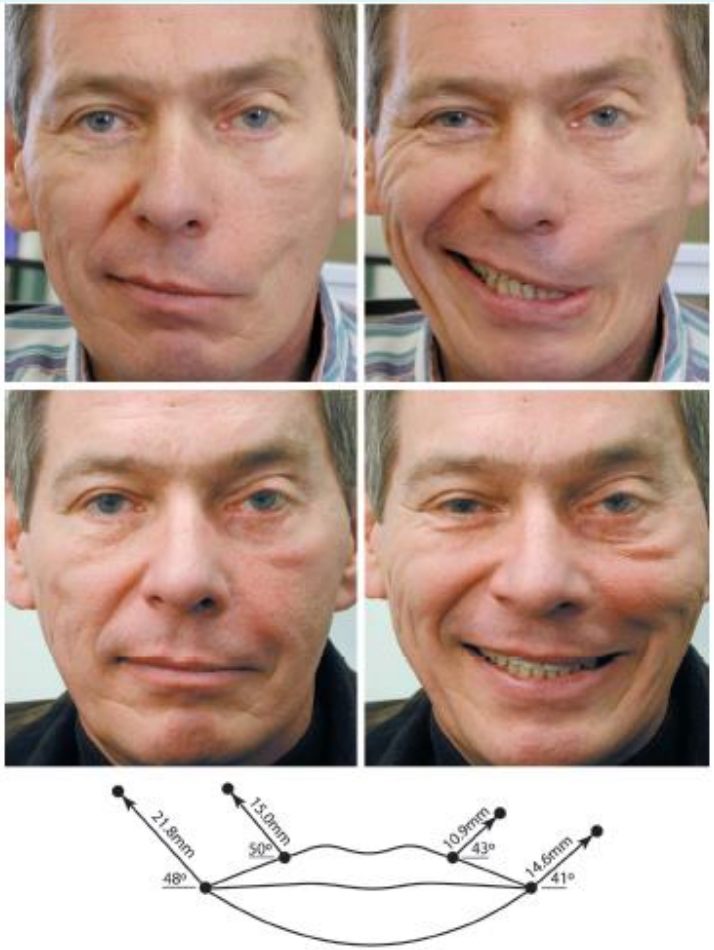


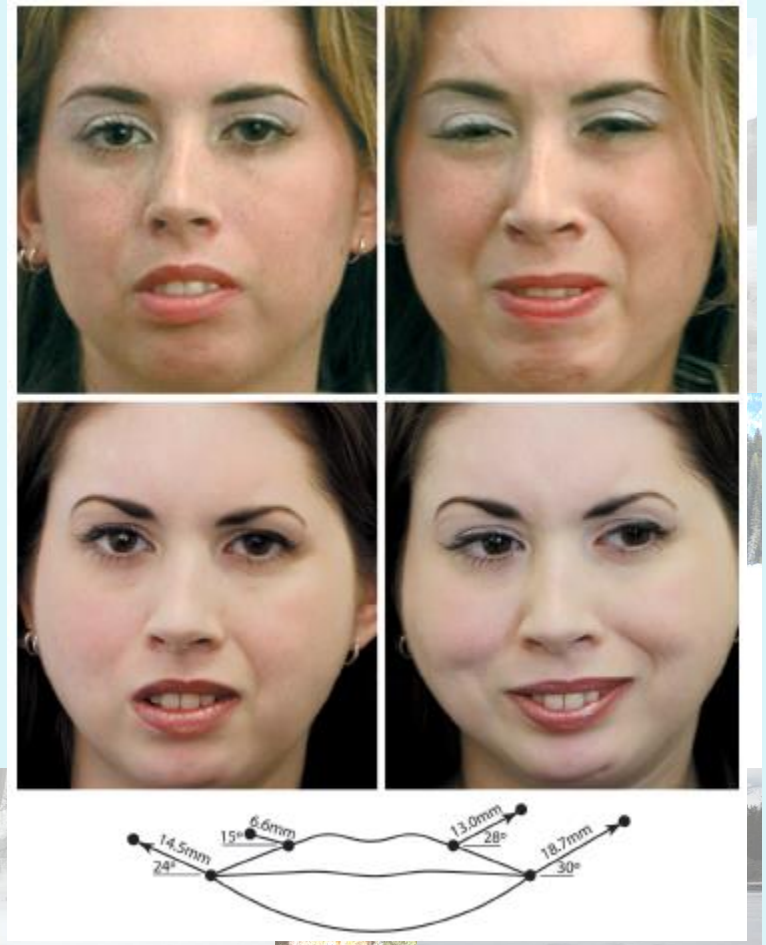
Post op therapy

- Post op strengthening exercises
- Occupational therapy department



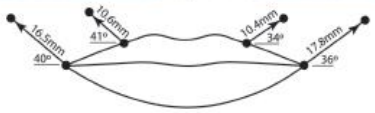



21.8mm
48°
15.0mm
50°
10.9mm
43°
14.6mm
41°


14.5mm
24°
15°
6.6mm
13.0mm
28°
18.7mm
30°

Cross face nerve graft vs. Nerve to masseter

- Masseter nerve
  - Bilateral facial palsy
  - Smile when Biting
  - 59 % spontaneous smile
  - 29% occasional spontaneous smile
  - Greater excursion than compared to cross face nerve graft.
  - Similar excursion to normal smile



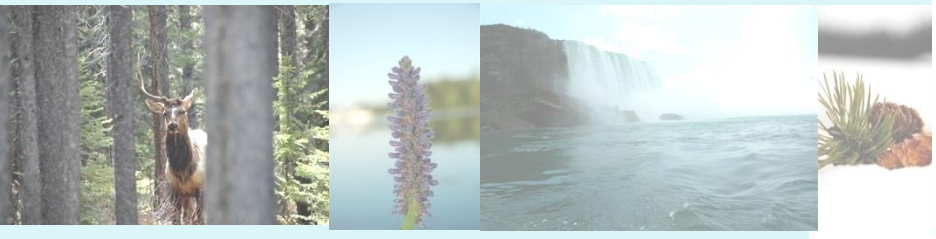
Procedures about the eye

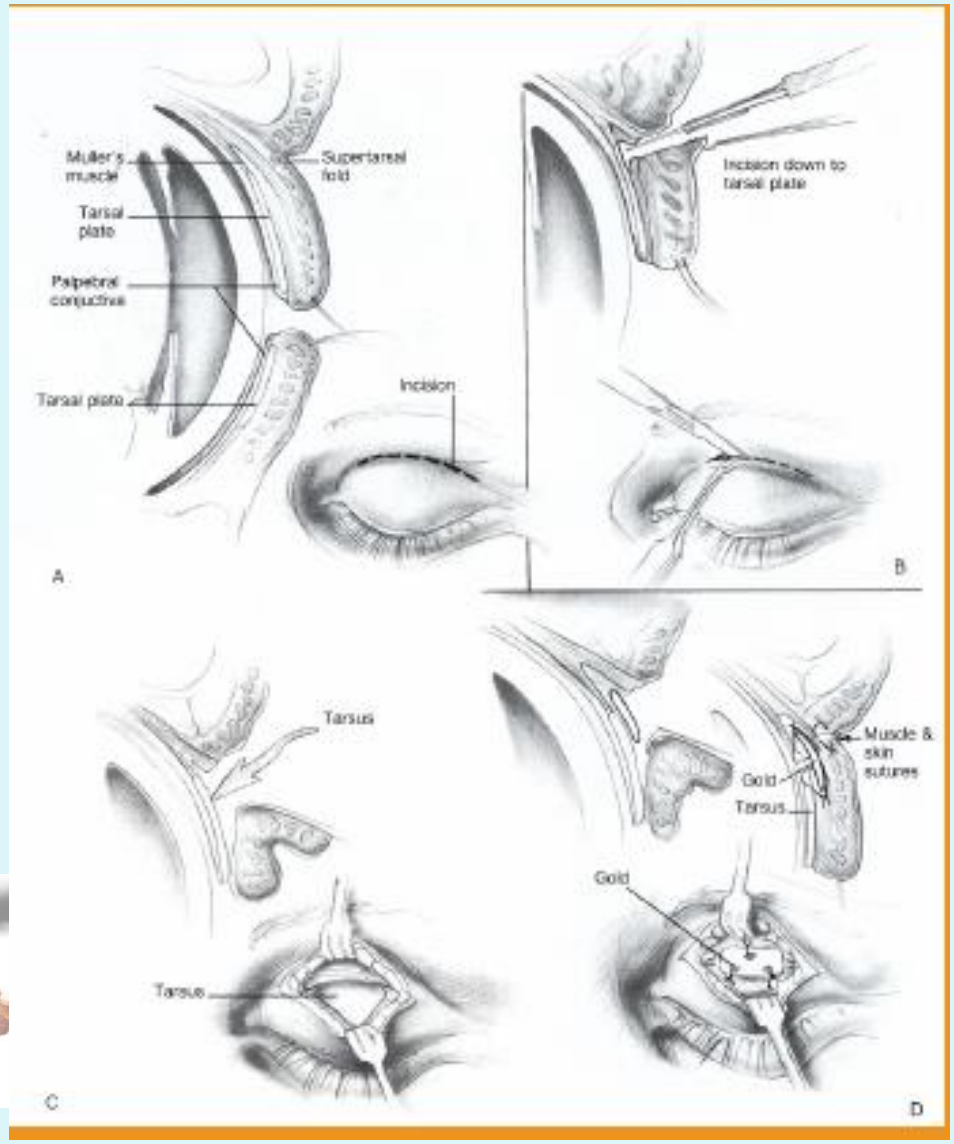
- Protect the eye
  - Voluntary eye closure
- Prevent tearing
  - Position the lower lid against the globe
- Aesthetically pleasing appearance to the eye

- Lower lid
  - Static procedures
  - Cartilage grafts
  - Wedge resection
  - Canthopexy (mild)
  - Fascial slings(severe)
  - Tarsorrhaphy (moderate)

Upper lid

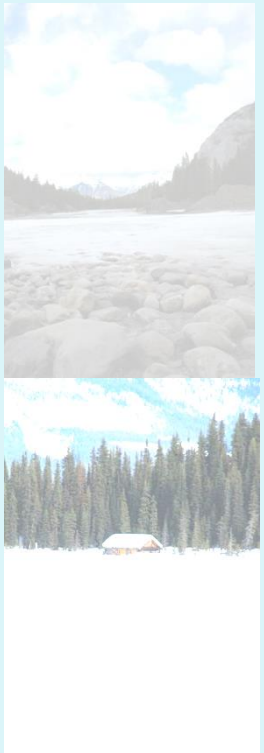
- Dynamic procedures
- **Gold weight for lid loading**
- Palpebral Springs
- Temporalis transfers
- Free muscle transfers
- Tarsorrhaphy





Brow

- Endoscopic brow lift
- Direct brow lift
- Frontal neurectomy (surgical or Botulinum toxin)

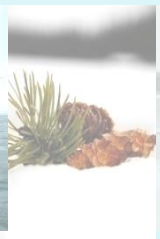


Nose

- Collapse of nasal ala resulting in nasal obstruction
- Static procedures to reposition ala
- Ala base repositioning and secured to periosteum
- Tendon grafts

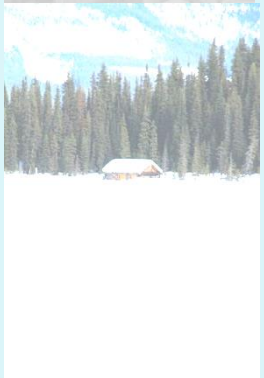




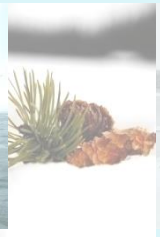



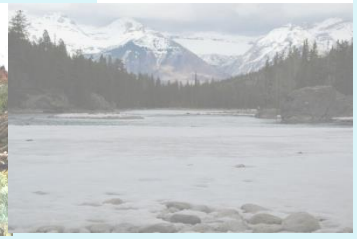

Princess Margaret Hospital

- Two Team approach
- Pediatric and Adult facial Palsy Service
- View to set up a multi disciplinary clinic
- Experience from Canada, Australia and England







Thank you