



Facial nerve rehabilitation



PR B FRAYSSE. TOULOUSE
DR B. GARDINI TOULOUSE
DR B. LESCURE TOULOUSE

Facial nerve functions

Motor :

- muscles of facial expression
- postérieur belly of the digastric
- stylohyoid
- stapedius muscle

Sensory :

- Ramsay Hunt area
- anterior two thirds of the tongue

Parasympathetic

- Lacrimal glands (Petrous nerves)
- submandibular gland
- sublingual gland



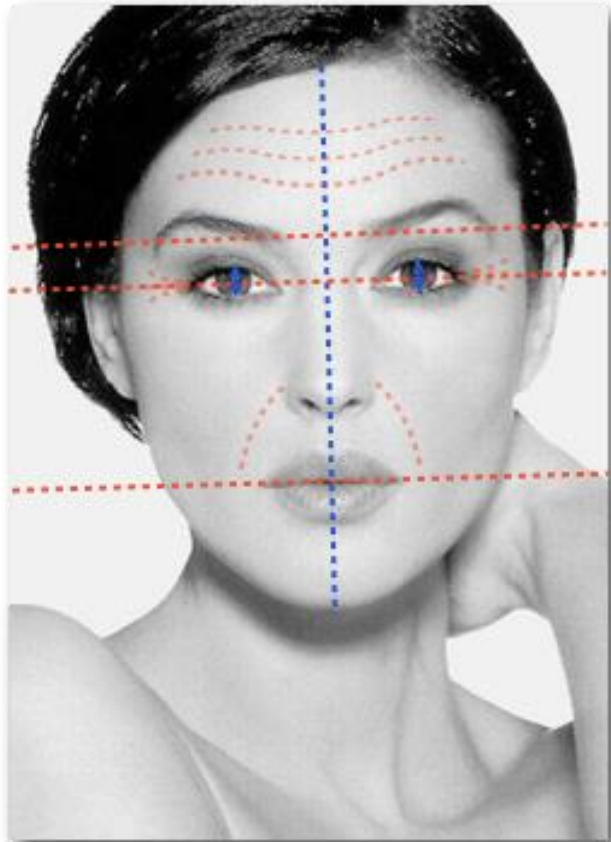
Clinic evaluation of the VII

- ▶ Peripheral vs Central
 - ▶ Motor deficit homogeneity
 - ▶ Charles Bell sign and Souques sign
 - ▶ No automatic voluntary dissociation

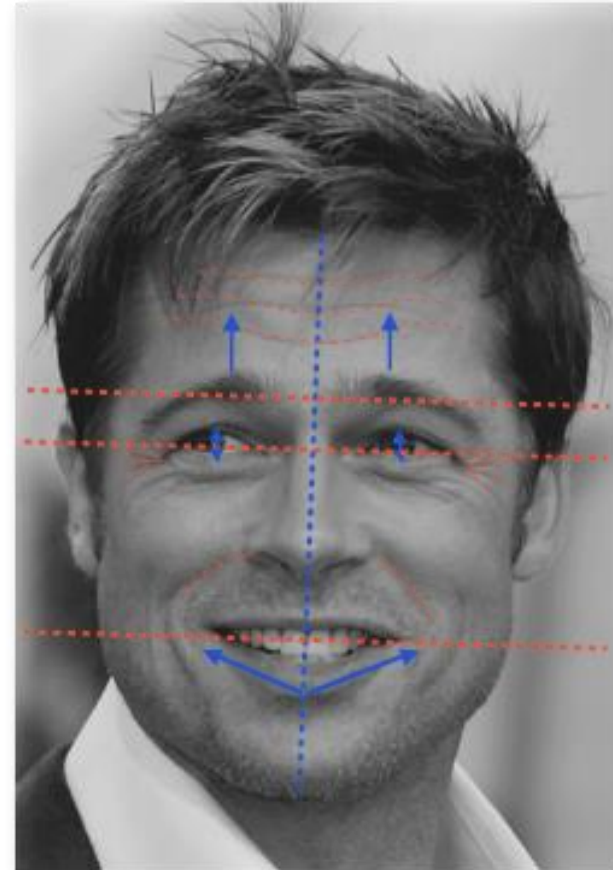


Clinic evaluation of the VII

At rest



Motion



Clinic evaluation of the VII

▶ House Brackman scale :

- ▶ The most common
- ▶ but unhelpful for the surgical outcomes

Grade	Description	Characteristics			Estimated Function (%)
		Gross	At Rest	Motion	
I	normal	normal	normal	normal	100
II	mild dysfunction	slight weakness noticeable on close inspection, may have very slight synkinesis	normal symmetry & tone	forehead: moderate to good function; eye: complete closure w/ minimum effort; mouth: slight asymmetry	80
III	moderate dysfunction	obvious but not disfiguring difference between 2 sides; noticeable but not severe synkinesis, contracture, and/or hemifacial spasm	normal symmetry & tone	forehead: slight to moderate movement; eye: complete closure w/ effort; mouth: slightly weak w/ maximum effort	60
IV	moderately severe dysfunction	obvious weakness and/or disfiguring asymmetry	normal symmetry & tone	forehead: none; eye: incomplete closure; mouth: asymmetric w/ maximum effort	40
V	severe dysfunction	only barely perceptible motion	asymmetry	forehead: none; eye: incomplete closure; mouth: slight movement	20
VI	total paralysis	no movement	asymmetry	no movement	0

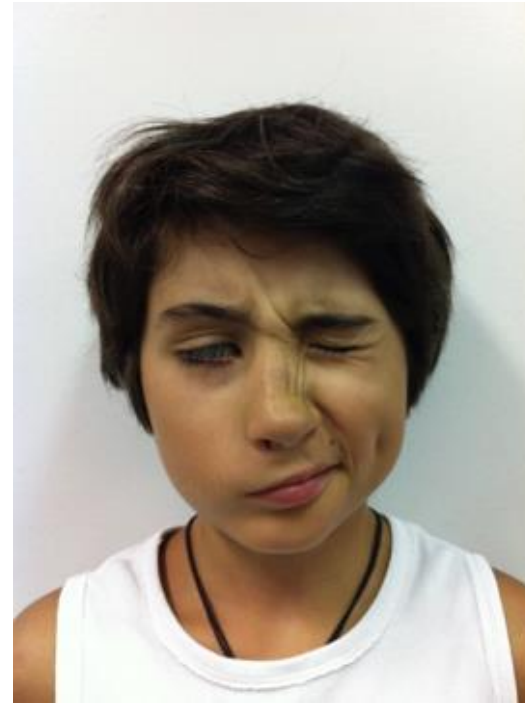
Clinic evaluation of the VII



Grade III



Grade IV



Grade V



Grade VI

Clinic evaluation of the VII

- ▶ Sunnybrook facial grading system
- ▶ Provide longitudinal numerical data which may help quantitate post surgical evaluation.

09:59 Mar. 10 nov. sunnybrook.ca 100% [max]

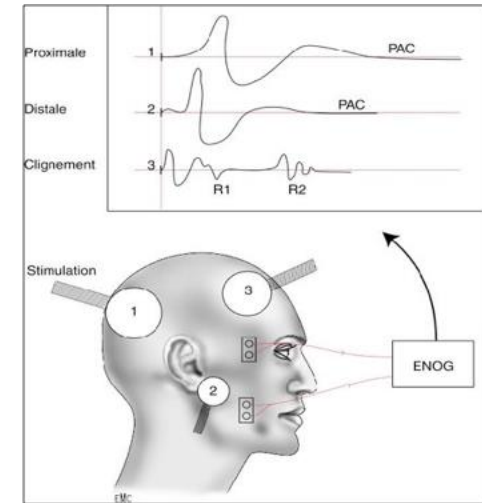
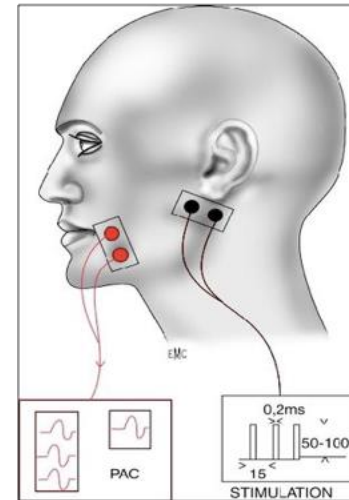
Sunnybrook Facial Grading System

Resting Symmetry	Symmetry of Voluntary Movement	Synkinesis
Compared to normal side	Degree of muscle EXCURSION compared to normal side	Rate the degree of INVOLUNTARY MUSCLE CONTRACTION associated with each expression
Eye (choose one only) normal 0 narrow 1 wide 1 eyelid surgery 1	Unable to initiate movement/no movement Initiates slight movement Initiated movement with mild exertion Movement almost complete Movement complete	NONE: No synkinesis or mass movement MILD: Slight synkinesis MODERATE: Obvious but not disfiguring synkinesis SEVERE: Disfiguring synkinesis/ Gross, mass movement of several muscles
Cheek (naso-labial fold) normal 0 absent 2 less pronounced 1 more pronounced 1	Standard Expressions Forehead Wrinkle (FRO) 1 2 3 4 5 <input type="checkbox"/> Gentle eye closure (OCS) 1 2 3 4 5 <input type="checkbox"/> Open mouth smile (ZYG/RIS) 1 2 3 4 5 <input type="checkbox"/> Snarl (LLA/LLS) 1 2 3 4 5 <input type="checkbox"/> Lip Pucker (OOS/OOI) 1 2 3 4 5 <input type="checkbox"/>	0 1 2 3 <input type="checkbox"/> 0 1 2 3 <input type="checkbox"/> 0 1 2 3 <input type="checkbox"/> 0 1 2 3 <input type="checkbox"/> 0 1 2 3 <input type="checkbox"/>
Mouth normal 0 corner drooped 1 corner pulled up/out 1	Gross Asymmetry Severe Asymmetry Moderate Asymmetry Mild Asymmetry Normal Symmetry	
Total <input type="checkbox"/> Resting symmetry score Total X 5 <input type="checkbox"/>	Total <input type="checkbox"/> Voluntary movement score: Total X 4 <input type="checkbox"/>	Total <input type="checkbox"/> Synkinesis score: Total <input type="checkbox"/>
Patient's name _____ Dx _____ Date _____	Vol mov't score <input type="checkbox"/> - Resting symmetry score <input type="checkbox"/> - Synk score <input type="checkbox"/> = Composite score <input type="checkbox"/>	

Ross, Fradet, Nedzelski 1992

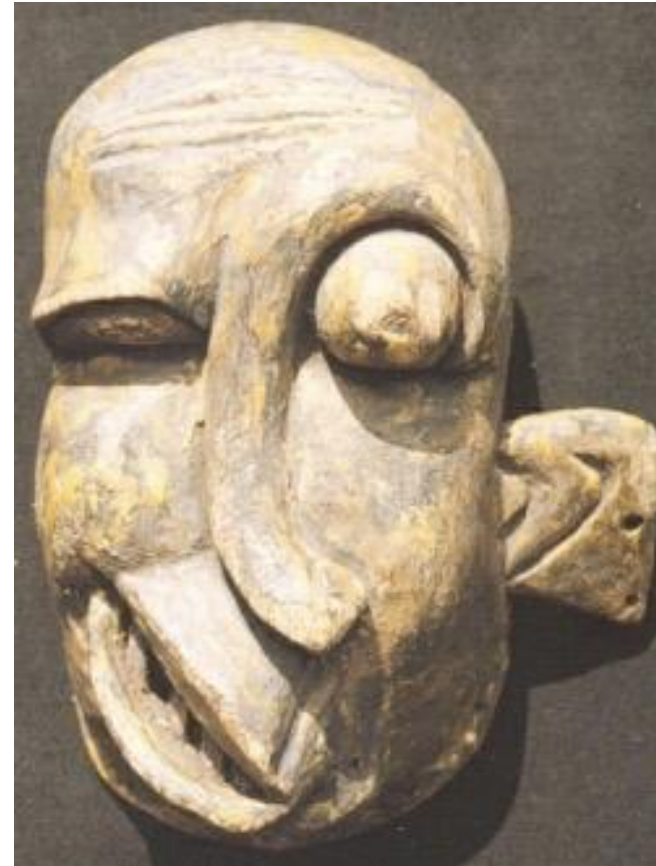
Paraclinic tests

- ▶ Audiometric test, stapedian reflex
- ▶ Electromyography
- ▶ RMI, CT Scan
- ▶ Facial vessel Hand held Doppler to assess the suitability as recipient vessel if free tissue transfert is to be done.
- ▶ Blood test (serologies , diabet test...)



Sequela

- ▶ Psychological, esthetic impacts.
- ▶ Ocular complication .
- ▶ Labial dysfunction.
- ▶ Synkinesis.
- ▶ Hemi facial Spasms.
- ▶ Secretory syndrom.



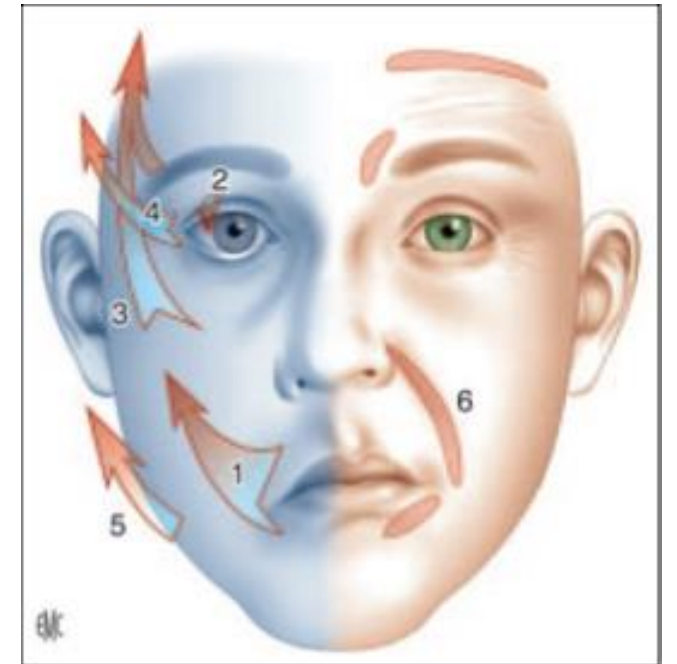
Facial paralysis : sequelae treatment

- ▶ Eyes :
 - ▶ Lagophtalmy
 - ▶ Keratitis
 - ▶ Weeping
- ▶ Labial sphincter dysfunction
- ▶ Spasms
- ▶ synkinesis



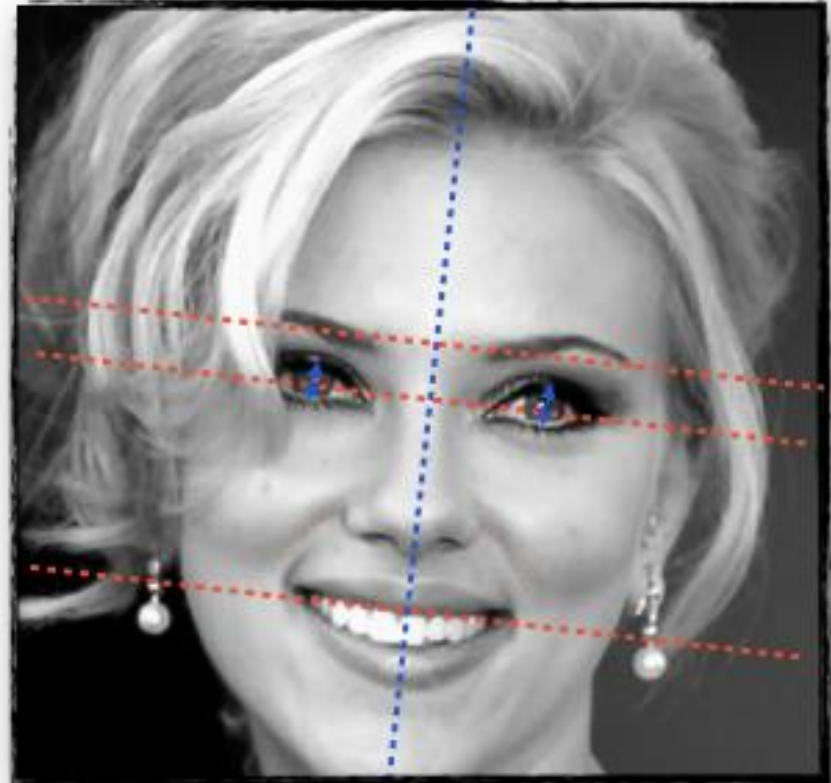
Sequela treatment

- ▶ It can be surgical or non surgical
- ▶ Facial rehabilitation : static procedure
- ▶ Facial reanimation : dynamic procedure
- ▶ Process are adapted to the face part and this impact



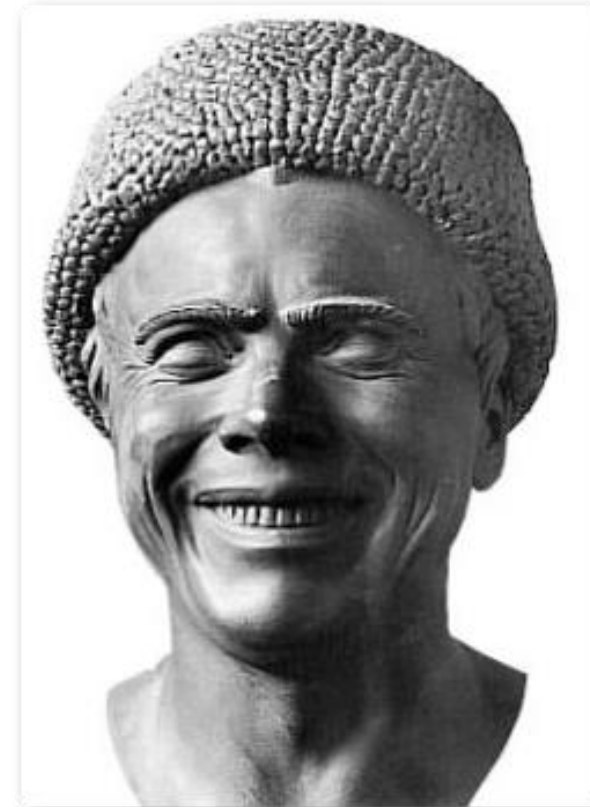
Objectives

- ▶ At Rest symmetry.
- ▶ Motricity and symmetry in motion.
- ▶ Eye protection and eyes closure.
- ▶ Labial function .
- ▶ Improve the quality of life



Static procedure

- ▶ Indications :
 - ▶ Elderly .
 - ▶ Unwilling prolonged surgery.
 - ▶ Unviable facial musculature.
 - ▶ Massive facial defects.
 - ▶ Failed dynamic procedure.
- ▶ Spasms and synkinesis : botulinum toxin.



Static procedure

- ▶ Superior part of the face
 - ▶ Bow dropping :
 - ▶ Forehead lifting
 - ▶ Brow suspension
 - ▶ Lagophtalmy :
 - ▶ Temporary or permanent tarsorrhaphy
 - ▶ Gold weights (1-1,6 g)
 - ▶ Mullerectomy



Figure 10: Tarsal plate exposed
www.owa.edu/display/protocols/Platinum-weighting

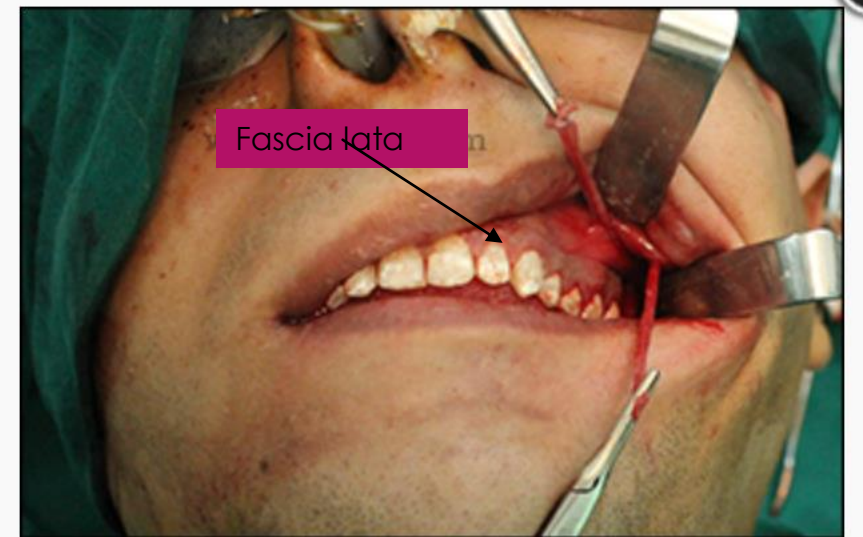


Figure 11: Gold weight centered over the dial limbus of the iris



Static procedure

- ▶ Middle part of the face
 - ▶ Cheek tissues ptosis :
 - ▶ Centro-facial lifting
- ▶ Inferior part of the face
 - ▶ Oral comissure droop
 - ▶ Elevate corner of the mouth (TFL 5-25 cm)
 - ▶ Labial hypotrophy :
 - ▶ lipofilling, hyaluronic acid
 - ▶ Depressor anguli oris :
 - ▶ controlateral botulinum toxin



Fascia lata was tied to the orbicularis oris muscle in the left corner of the mouth and symmetry of the lips and laugh line was corrected

Static procedure

- ▶ Botulinum toxin :
 - ▶ Homolateral : Spasms and synkinesis
 - ▶ Controlateral if hyperactivity
 - ▶ Controlateral to symmetrise a smile



Dynamic procedure

- ▶ Nerves repair
 - ▶ Nerve graft
 - ▶ VII XII anastomosis
 - ▶ cross facial anastomosis
- ▶ Muscular transferts:
 - ▶ Temporalis myoplasty
 - ▶ Masseter or ant belly of the digastric flap
 - ▶ Free flap transfer

Dynamic procedure

- ▶ **General Rules :**

- ▶ **Early (<1 year) : nerve based reconstruction**
 - ▶ **Use the contralateral facial nerve if it's possible**
- ▶ **Late (> 1 year) : muscle based reconstruction**
 - ▶ **Free muscle transfers : versatility, precision**

Dynamic procedure : nerve repair

Rules

- ▶ Less is more approach
- ▶ No tension (8/0 gauge suture to have an under too much tension)
 - ▶ Minimally debride the nerve ends
 - ▶ Free the nerves from the surrounding tissues
- ▶ Accuracy of coaptation and sutures (microscope)
 - ▶ Use the least number of suture



Dynamic procedure : nerve repair

- ▶ Nerve graft :
 - ▶ Greater auricular nerve
 - ▶ Easy to harvest
 - ▶ Same surgery time
 - ▶ Sural nerve
 - ▶ Easy to harvest
 - ▶ Two teams approach
 - ▶ Minimal morbidity

14).

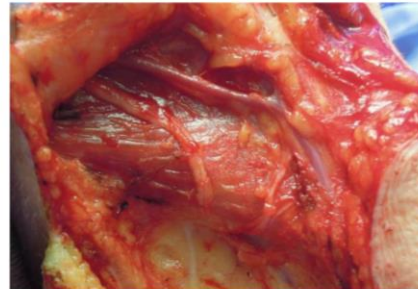


Figura 13: Greater auricular nerve runs parallel to external jugular vein. Note transverse cervical nerves coursing anteriorly from Erb's point



Figure 14: Greater auricular nerve dividing into two branches



Figures 15a, b: Sural nerve harvesting techniques

Dynamic procedure : nerve repair

- ▶ Cross facial nerve grafting :
- ▶ Hypoglossal nerve transfer :
- ▶ Nerve to masseter reanimation technique :

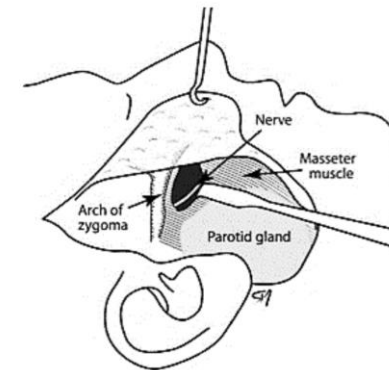
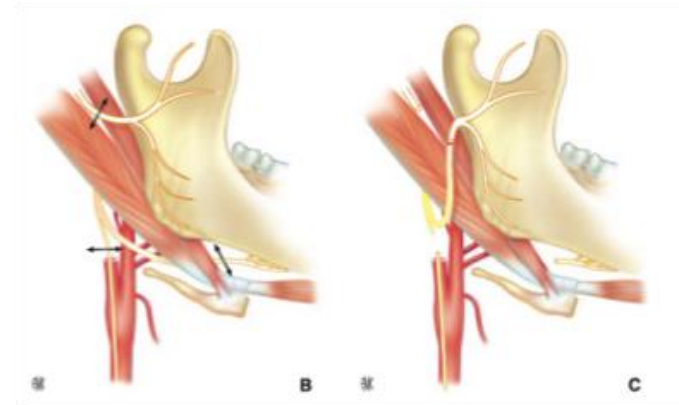
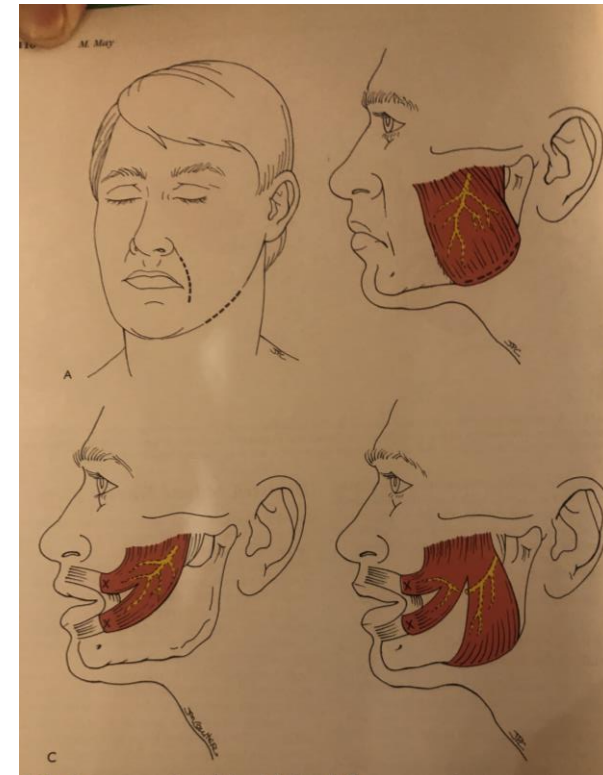


Figure 27: Nerve-to-masseter

Dynamic procedure : muscular transfer

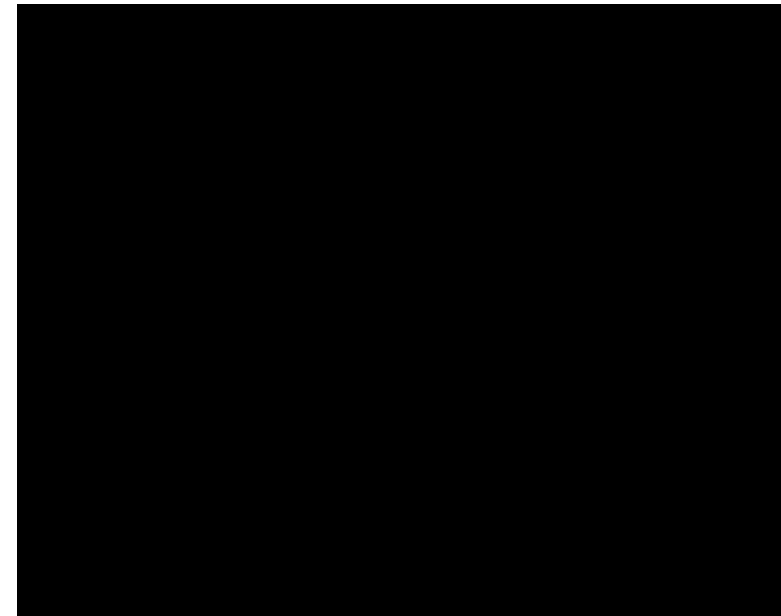
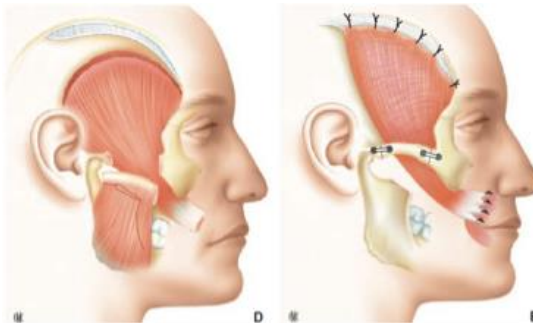
- ▶ Local muscle flap or free flap transfer
- ▶ After long standing atrophy
- ▶ Also used as a adjunct to the mimetic muscle.

- ▶ Local flap :
 - ▶ Masseter flap
 - ▶ Detached from the lower mandibular border



Dynamic procedure : muscular transfer

- ▶ Local flap :
 - ▶ Temporalis lengthening myoplasty:
 - ▶ Good option for smile reinnervation
 - ▶ It may also used with a VII XII anastomosis.
 - ▶ Neurological and vascular assess before the surgery
 - ▶ Physical therapy is necessary but good results because of the cortical plasticity



Dynamic procedure : muscular transfer

- ▶ Free flap :
 - ▶ Gracilis :
 - ▶ Minimal donor morbidity
 - ▶ No functional deficit
 - ▶ Reliable anatomy
 - ▶ Nerve and vascular pedicle easy to harvest.

75, 77). One may need to resect skeletal fat or subcutaneous fat to accommodate the bulk of the muscle and to achieve a normal facial contour.



Figure 39: Gracilis muscle with nerve and vascular pedicle

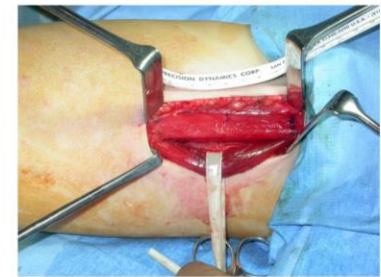


Figure 41: Segmental muscle dissection to reduce bulk

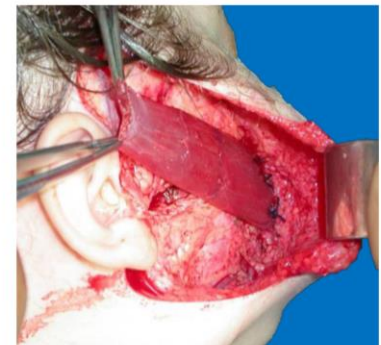


Figure 42: Inset into orbicularis oris

Conclusion

- ▶ There a lot of to do to improve the sequelae of facial palsy
- ▶ The procedures depends of the experience of the surgeon and the length of palsy.
- ▶ The sequelae treatments must be consider area by area.