

Facial Nerve Palsy

<number>

“

Anatomy and Function

”

<number>

Anatomy of Facial Nerve

Motor root

70 %

most of the muscles of facial expression, the digastric muscle, the stylohyoid muscle, & the stapedius muscle.

Sensory root

nerve of Wrisberg

Taste sensation from the anterior 2/3 of the tongue & general sensation from the concha and retroauricular skin.

Secretomotor

30%

Submandibular gland
Sublingual gland
Lacrimal glands
Nasal glands

Anatomy of Facial Nerve



Central nuclei

Facial nucleus

Solitarius nucleus
Geniculate ganglion

Superior salivatory
nucleus

<number>

Course

Both roots emerged from the brain between the pons & olive (cerebello-pontine angle).

Both roots passed through the internal auditory meatus.

In the facial canal, it runs lat. To ends in geniculate ganglion.

It runs backwards on the medial wall of middle ear.

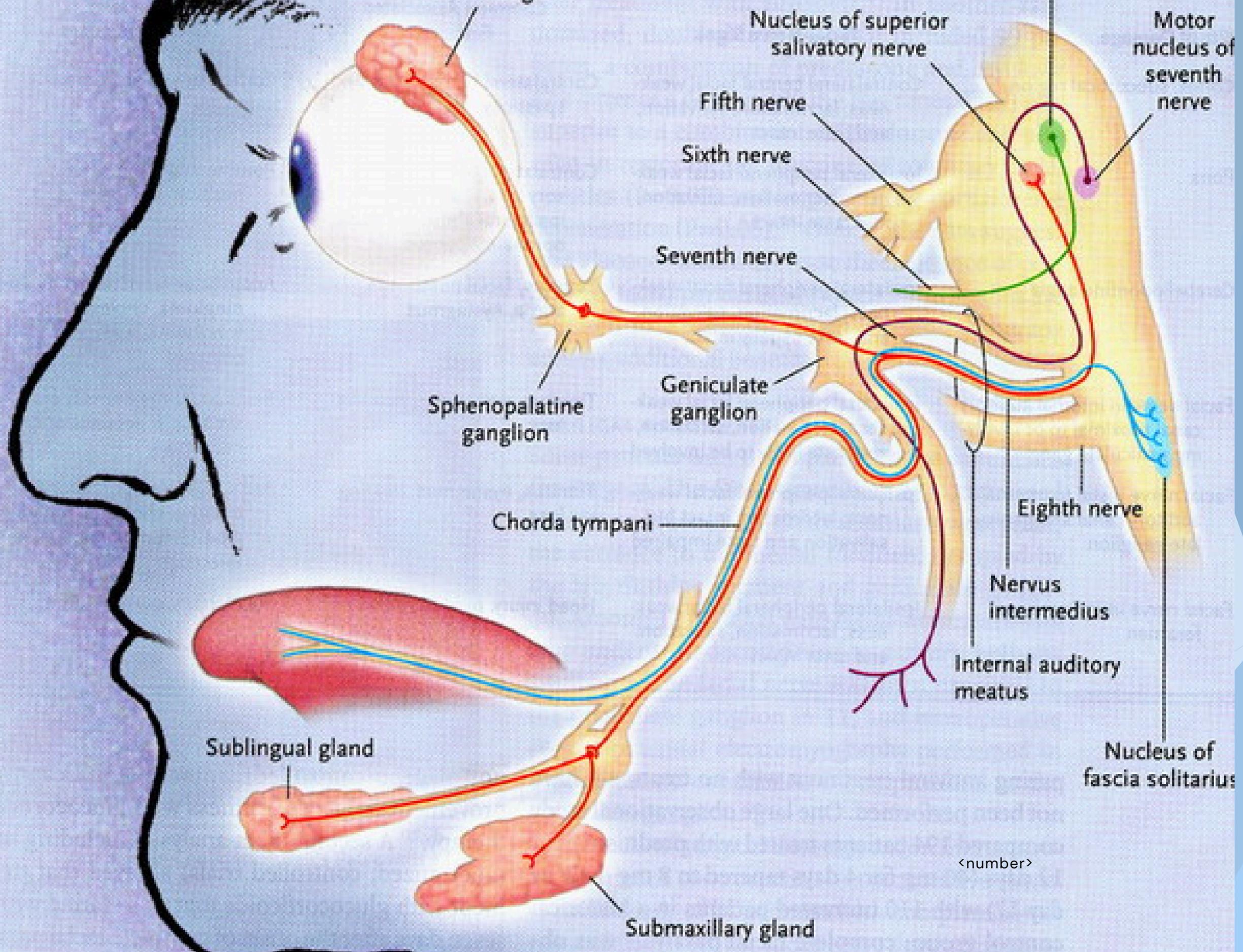
It runs downward behind tympanic cavity to reach stylomastoid foramen.

It emerges from the skull through the stylomastoid foramen.

It enters the posteromedial aspects of the parotid gland and divides into 5 terminal branches.

Roots

It is formed of 2 roots : motor and nervus intermedius.
The motor root : formed by the axons of the motor nucleus.
The nervus intermedius : formed by the parasympathetic taste, & sensory fibers.



<number>

Facial nerve segments course

Intracranial :Brain stem to entry into IAC

Intratemporal

- **Intrameatal :Within Internal Auditory Canal**
- **Labyrinthin :Fundus of I.A.C. to Geniculate ganglion**
- **Tympanic :Geniculate ganglion to pyramid**
- **Mastoid : Pyramid to stylomastoid foramen**

Extracranial

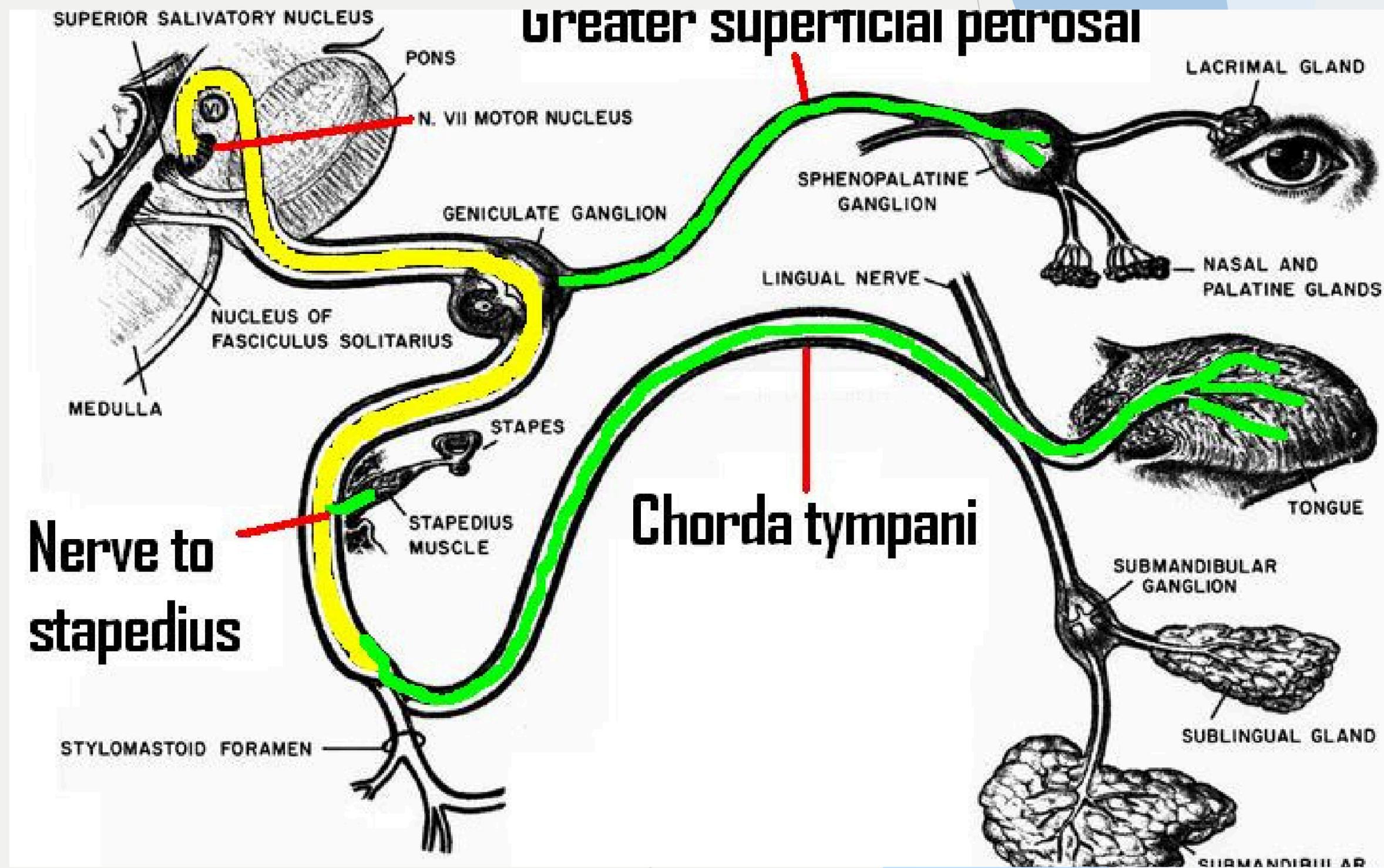
Primary branches of facial nerve

**Intra-temporal: greater superficial petrosal,
stapedius, chorda tympani**

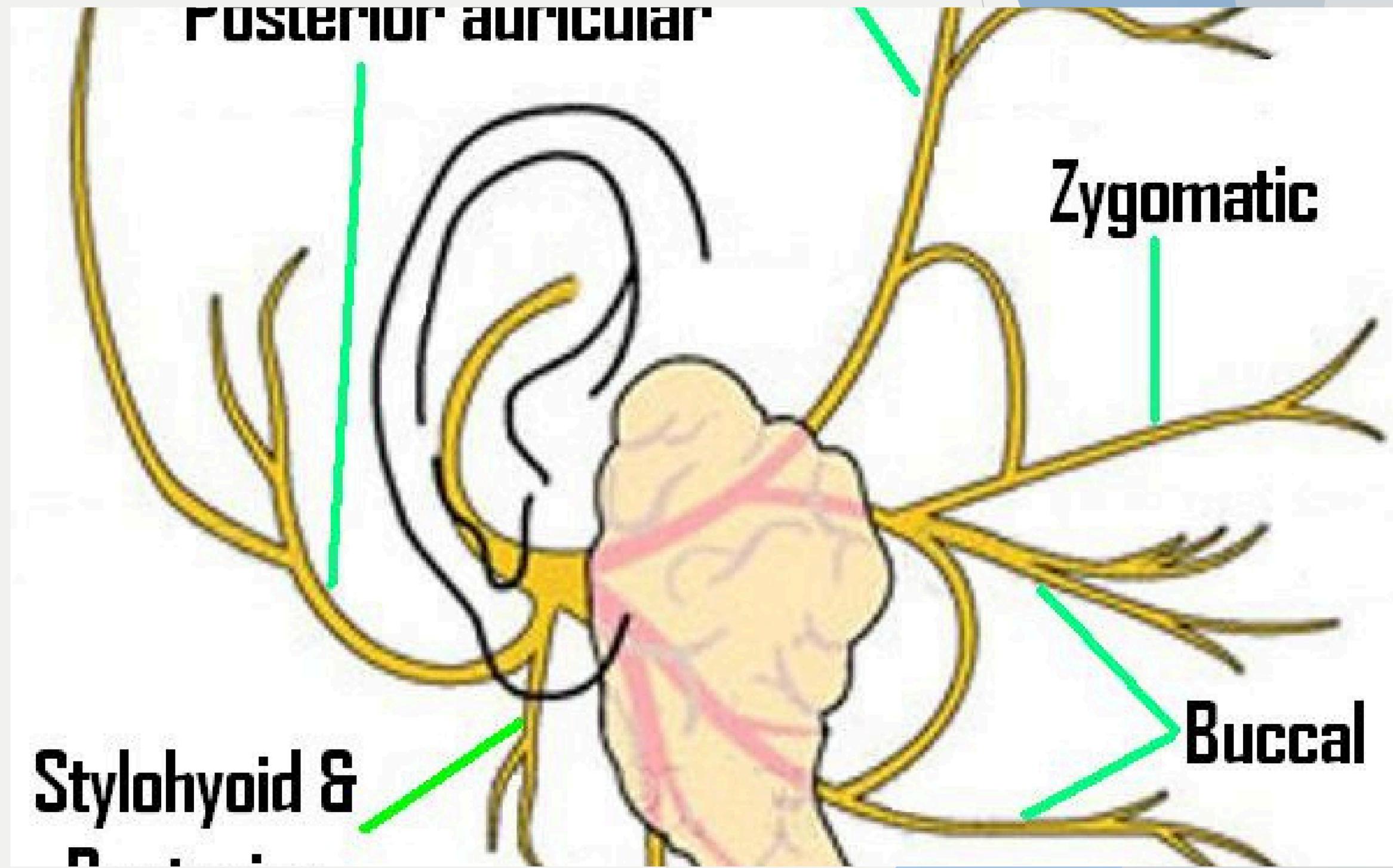
**Extra-parotid: post-auricular, stylohyoid, posterior
belly of digastric**

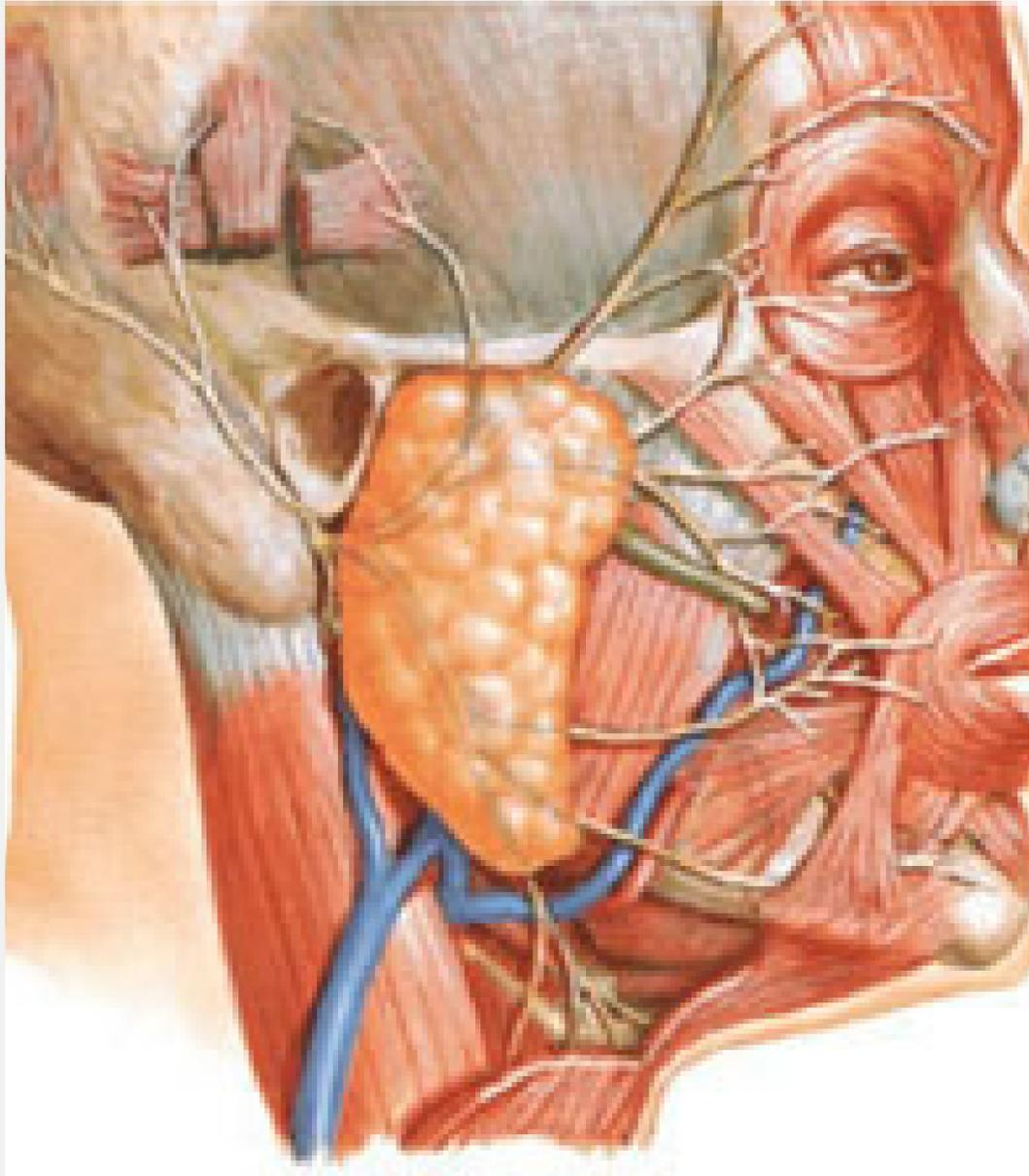
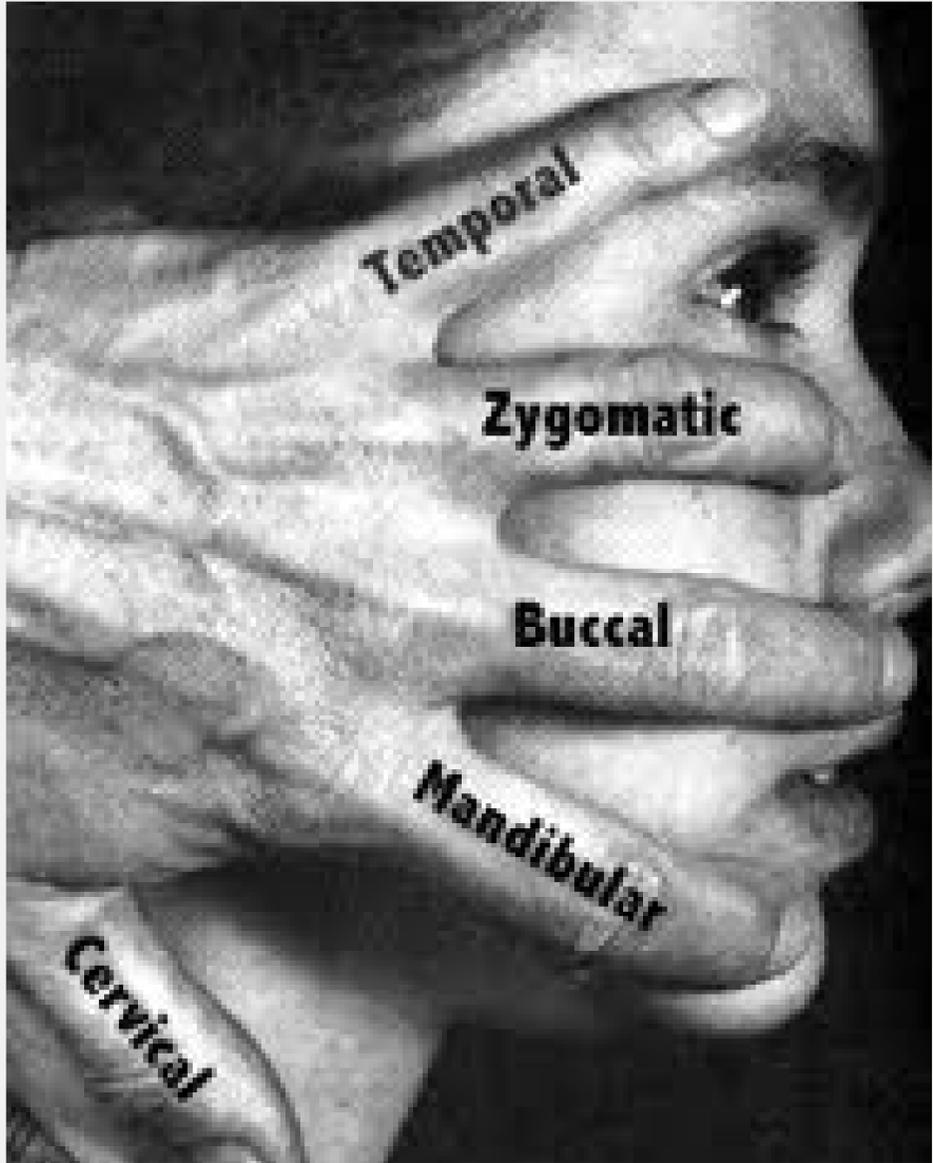
**Intra-parotid: temporal, zygomatic, buccal, marginal
mandibular, descending cervical**

Intra-temporal branches



Extra-cranial branches





- The acoustic reflex (also known as the stapedius reflex, middle-ear-muscles (MEM) reflex, attenuation reflex, or auditory reflex) is an involuntary stapedius muscle contraction that occurs in the middle ear in response to high-intensity sound stimuli or when the person starts to vocalize.

Sensory (afferent) through vestibulocochlear nerve

Motor (efferent) through facial nerve

Facial Nerve Fibers	Origin	Function
Motor fibers	Facial nucleus	<ul style="list-style-type: none"> Muscles of facial expression • .Stapedius m •
Parasympathetic fibers	<ul style="list-style-type: none"> Superior - salivatory nucleus Lacrimary - nucleus Uncertain nucleus - 	<ul style="list-style-type: none"> Lacrimal & nasal glands • Submandibular gland • Sublingual gland •

Sensory fibers	Geniculate ganglion (nucleus solitarius)	Tactile sensation to skin of ear •
Special Sensory fibers (taste fiber)	Geniculate ganglion (Spinal Nucleus of V)	Taste sensation from anterior of tongue via 2/3 chorda tympani •

Main motor nucleus

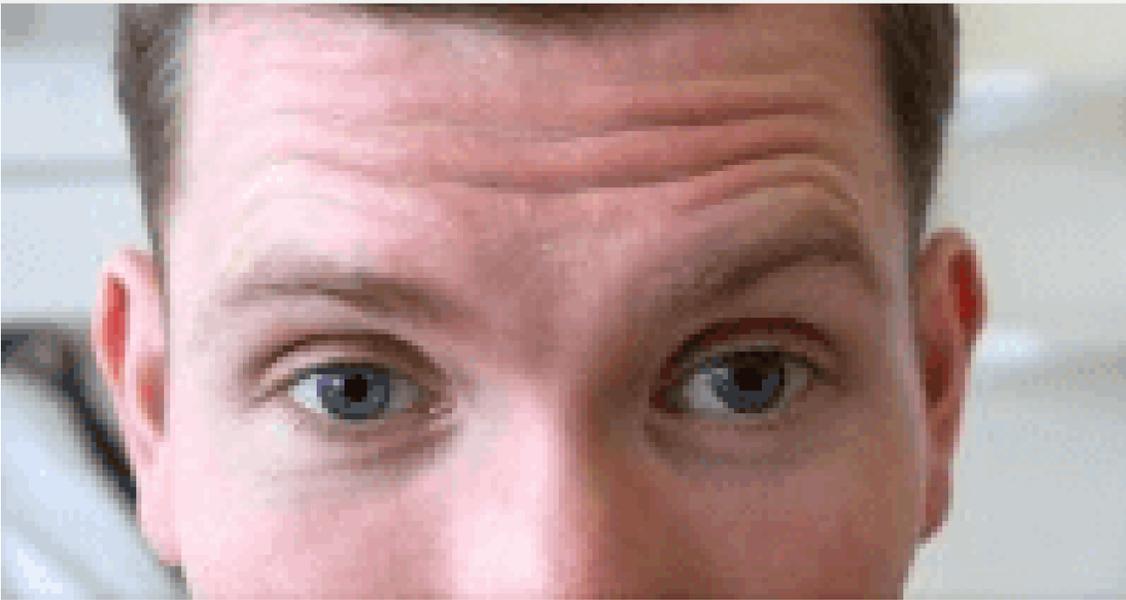
- It locates deeply in the reticular formation of the lower part of the pons .
- The part of the nucleus that supplies the muscles of the upper part of the face receives corticonuclear fibers from both cerebral hemispheres .
- The muscles of lower part ... the opposite cerebral hemisphere only .
- Another involuntary pathway exists ; it separates and controls mimetic or emotional changes in facial expression
- Gives efferent motor fibers to muscle of scalp, face, post. Belly of digasteric, stylohyoid, platysma & stapedieus .

Facial nerve examination

- Motor function.
- Sensory :
 - 1- taste
 - 2- hearing
 - 3- schirmer`s test

- **Motor function :**

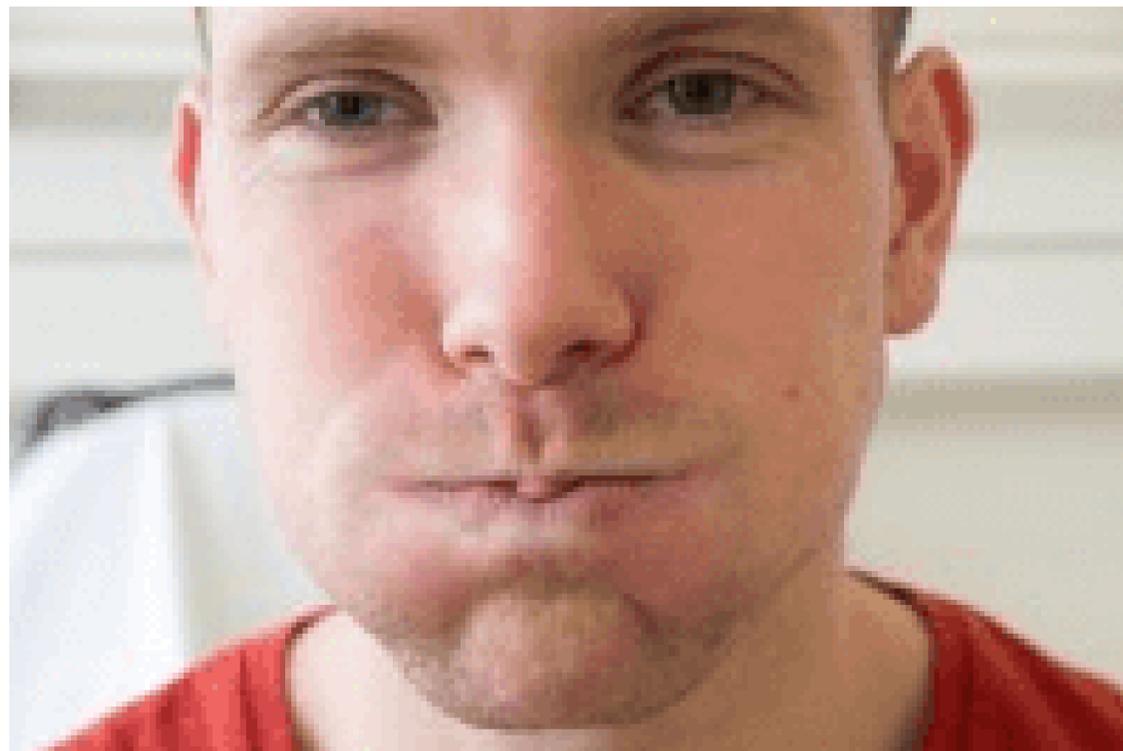
- 1.inspection (asymmetry of face , blinking or eye closure).**
- 2.Spontaneous/ involuntary movement .**
- 3.Wrinkling of forehead.**
- 4.Close eyes tightly and try to open them.**
- 5.Bare teeth .**
- 6.Blow out cheeks .**



Crease up the forehead



Keep eyes closed against resistance



- **Taste :**
 1. **Sweet (sugar)**
 2. **Sour.. (salt , vinegar)**
 3. **Bitter...(quinine solution).**
 4. **Rinse mouth between each test.**

Facial nerve palsy

paresis or paralysis of the facial muscles or any structures innervated by the facial n. usually unilateral, due to either a lesion involving the nucleus or the facial nerve or a supranuclear lesion in the cerebrum or upper brainstem.

Causes of facial nerve paralysis

Supra nuclear and nuclear :

Cerebral vascular lesions.
Poliomyelitis.
Cerebral tumors.

Infranuclear :

Bells palsy.
Trauma (birth injury , fractured temporal bone , surgical).
Tumors (acoustic neurofibroma , parotid tumors).
Suppuration (acute and chronic otitis media).
Rasmy hunt syndrome .
mastoiditis
Multiple sclerosis.
Guillian-barre syndrome.
Sarcoidosis.

The most common causes of the abrupt onset of unilateral facial weakness are stroke and Bell's palsy. The patient's history and neurologic examination will determine whether facial weakness is central or peripheral.

Lesion , Localization , Cause

- Unilateral involvement of the lower face , with near normal eye closure : (CONTRALATERAL , SUPRANUCLEAR lesion) .
Causes : vascular , tumor , demyelination , infection .
Spontaneous emotional expression may be unaffected with subcortical lesion .
- Unilateral involvement of the upper and lower face (Bell's palsy) with defective eye closure : (IPSILATERAL NUCLEAR or INFRANUCLEAR lesion) .
Spontaneous emotional expression affected .

**- Bilateral involvement of the upper and lower face :
(BILATERAL NUCLEAR lesions associated with other
features of pseudobulbar palsy).**

**Causes : pontine lesions (infarction , hemorrhage ,
demyelination , tumor infection .**

(BILATERAL INFRANUCLEAR lesion)

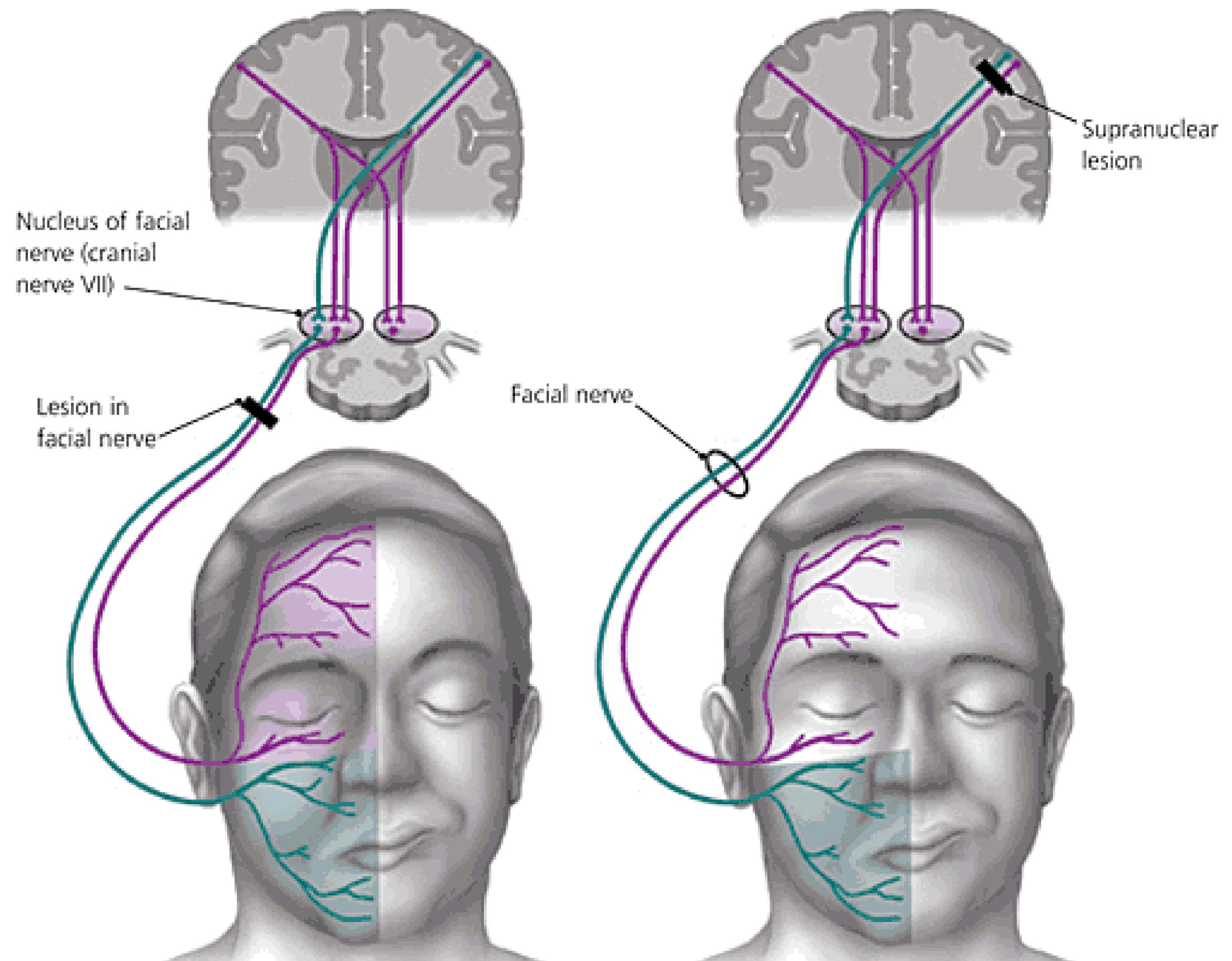
**Causes : Guillain Barre syndrome , Lyme disease ,
infectious mononucleosis , sarcoidosis .**

(MUSCLE DISEASE)

Causes : myasthenia gravis , muscular dystrophy .

**Eyes move outwards and upwards on attempted closure
(Bell's phenomenon).**

(Bell's palsy)



Features	Upper Motor Neuron Palsy	Lower Motor Neuron Palsy
Forehead wrinkling	B/L present	Same side absent
Eye closure	B/L present	Same side absent
Naso-labial fold	Opposite side absent	Same side absent
Drooping of angle of mouth	Opposite side	Same side

Bell's palsy

- Bell's palsy is a lower motor neuron facial palsy of unknown cause, but thought to be viral
- Occur by inflammation and swelling of the nerve within the stylomatoid foramen
- Usually unilateral, rarely bilateral

Risk factors to Bell's palsy

- between 15 and 60 years of age
- Herpes simplex.
- Diabetes.
- A common cold.
- The flu.
- High blood pressure.
- Lyme disease (chronic)
- Mononucleosis.
- HIV or another autoimmune disorder.
- Sarcoidosis.
- Head trauma

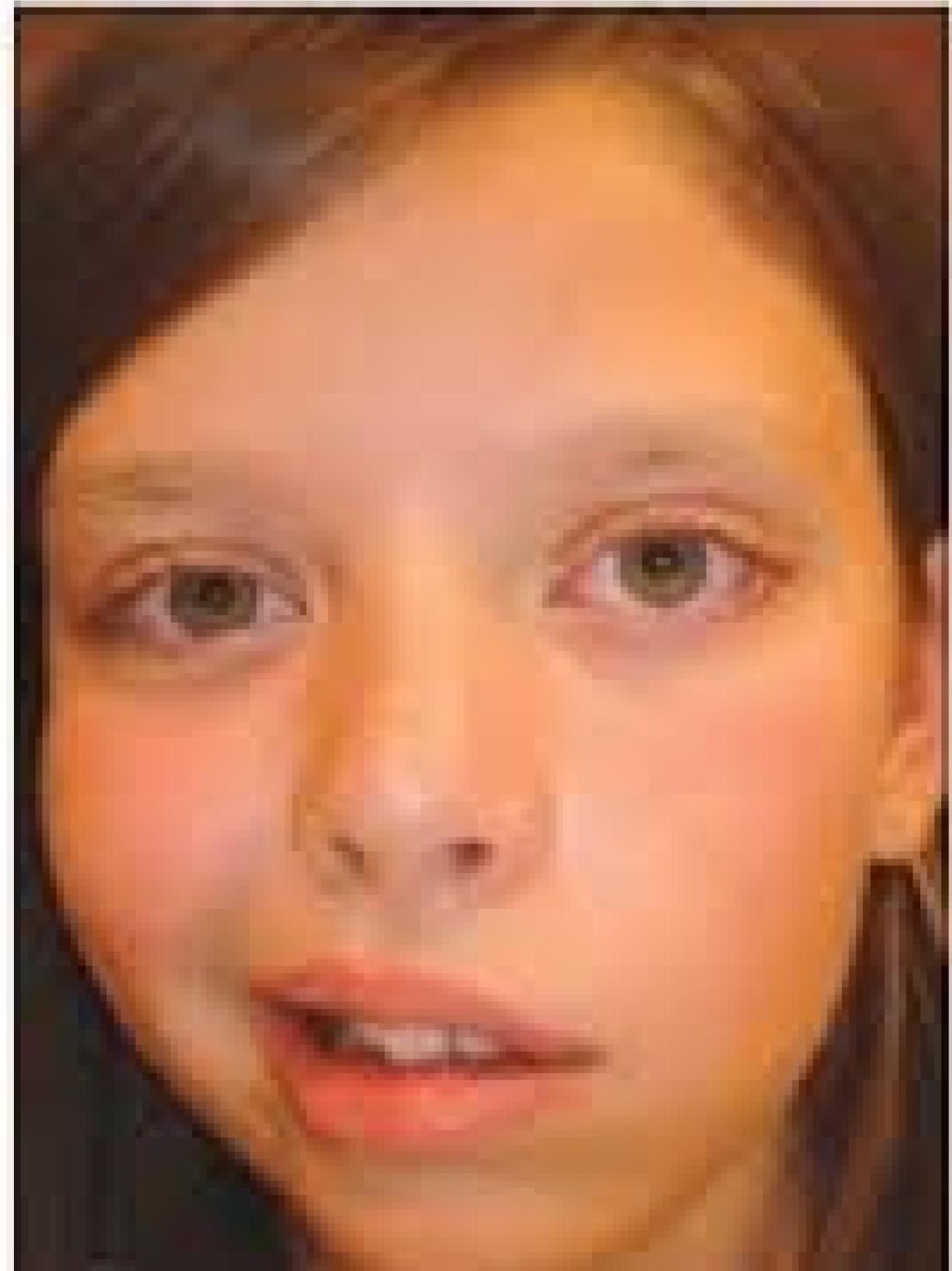
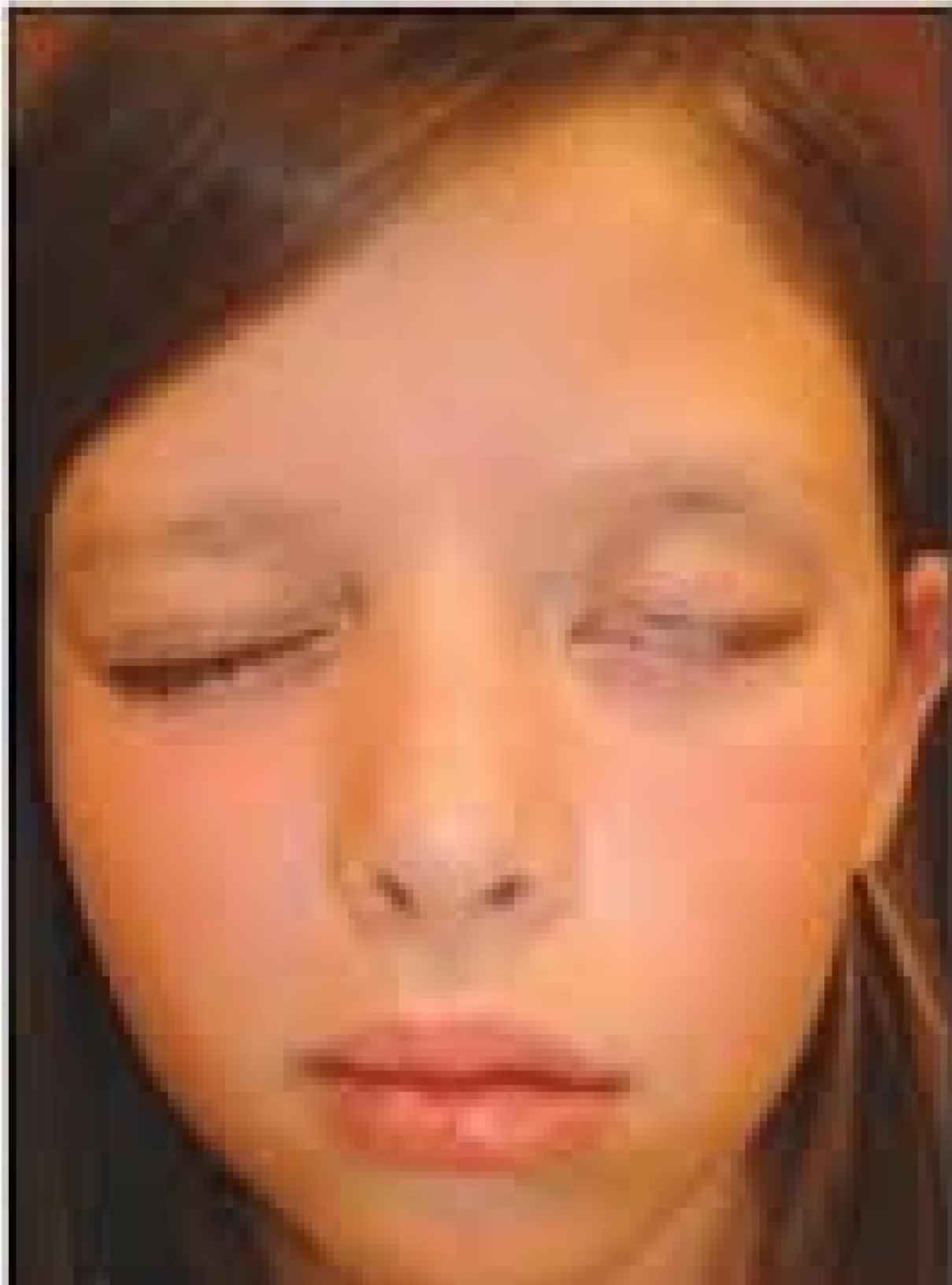
Symptoms of Bell's palsy

- Rapid onset of mild weakness to total paralysis on one side of the face – occurring within hours to days
- Facial droop and difficulty making facial expressions, such as closing the eye (dry eyes) or smiling
- Drooling
- Pain around the jaw or in or post-auricular on the affected side (precedes weakness)
- Increased sensitivity to sound on the affected side
- Headache
- A loss of taste
- Changes in the amount of tears and saliva the pt produce

Signs of Bell's palsy

- Facial asymmetry.
- Eyebrow droop.
- Loss of forehead & nasolabial folds.
- Drooping of corner of mouth.
- Uncontrolled tearing.
- Inability to close eye.
- Facial muscle atrophy (Late).

Bell's phenomenon on attempting to close the eye and show the teeth , the one eye doesn't close and the eyeball rotates upward and outward . (normal eyeball movement on eye closure)



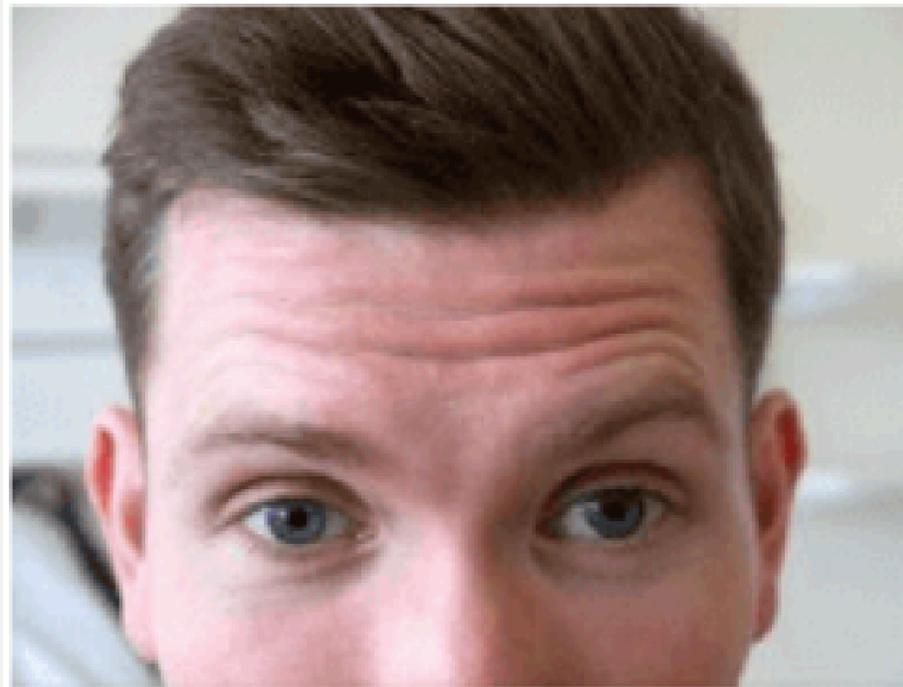
Physical examination:

Forehead wrinkling.

Eye closure.

Wide smile.

Blowing.



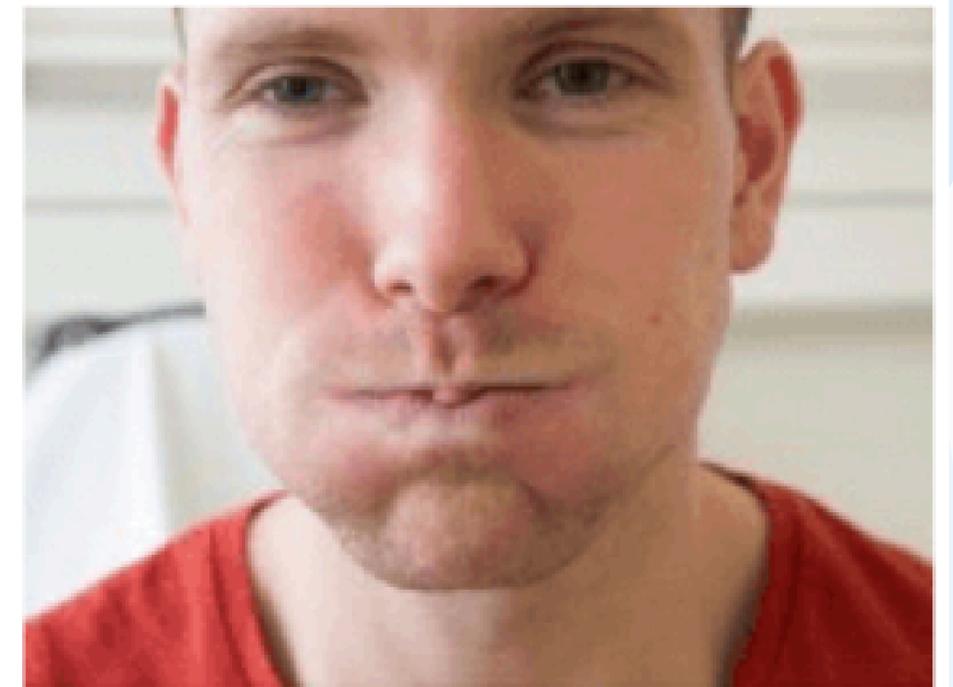
Crease up the forehead



Keep eyes closed against resistance



Reveal the teeth



Puff out the cheeks

Assessment and investigations of Bell's palsy:

- CT or MRI scanning may be needed if the symptoms persist or a specific cause (i.e. other than Bell's palsy) is suspected.
- Electrodiagnosis is used in the assessment of the degree of involvement of the nerve and includes nerve conduction tests and electromyography, it's done by percutaneous stimulation of facial nerve



Management of Bell's palsy

- Prednisolone given orally is the treatment of choice, but it must commence in the first 72 hours.
- An eyepad, a tape over the eyelids at night or in persistent cases a 'tarsorrhaphy' (surgical approximation of the eyelids) may be needed.
- Antivirals such as acyclovir seem to offer little benefit.
- Persistent facial palsy warrants referral and thorough investigation, including CT or MRI scanning.

Physiotherapy after 2 weeks

Prognosis

- **70 % recover in 4 – 8 weeks without treatment .**
- **Corrective surgery for residual facial asymmetry .**
- **Incomplete paralysis indicates a good prognosis .**

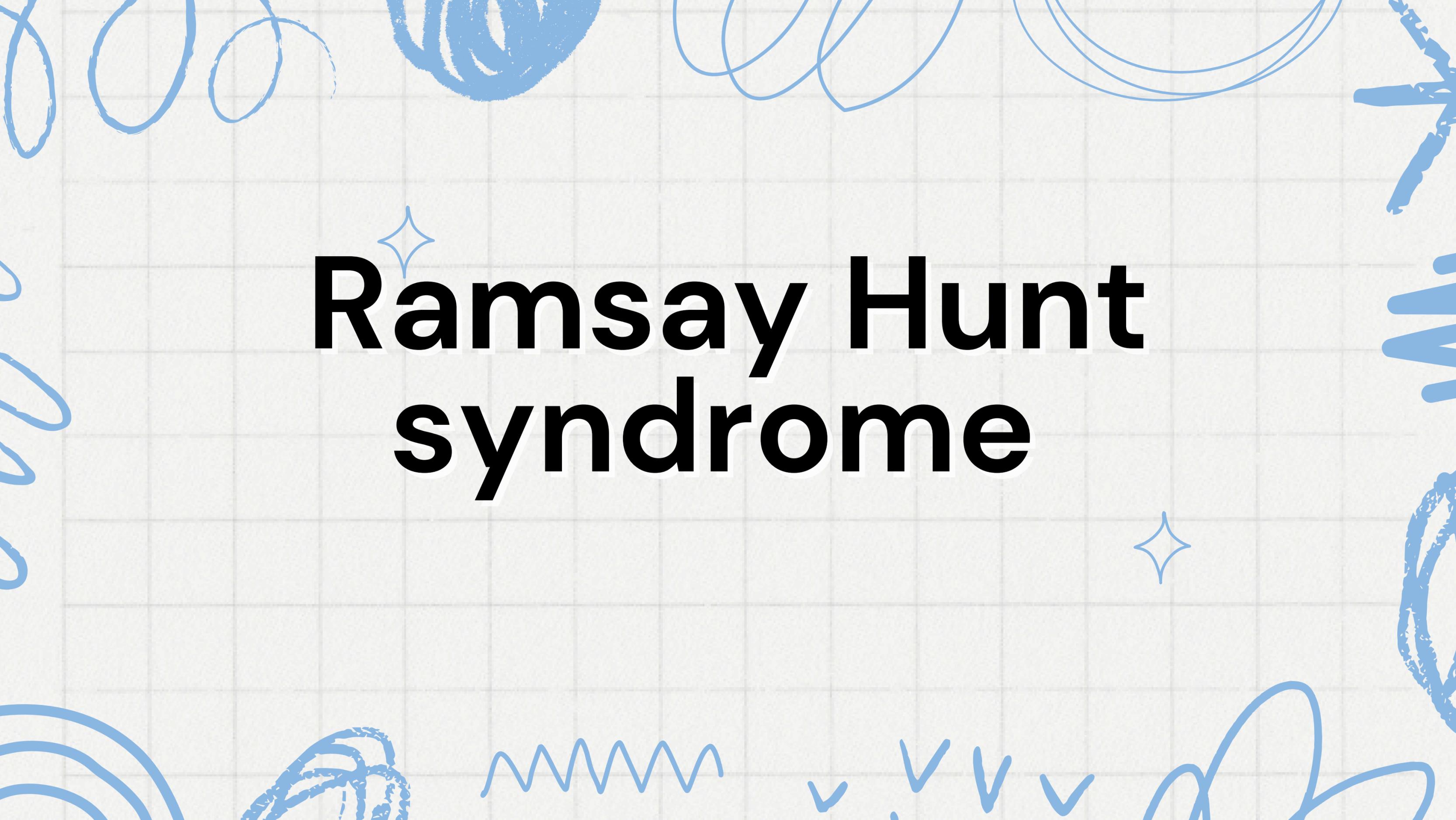
- **Bad prognosis in:
Elderly.
DM.
Progressive (complete).
Pregnant.**

Complications

1. Irreversible damage to facial nerve which could lead to weakness
2. Synkinesis: Abnormal regrowth of nerve fibers. This may result in involuntary contraction of certain muscles when the pt is trying to move others
3. Partial or complete blindness of the eye that won't close due to excessive dryness and scratching of the cornea.

4. Crocodile tears: 6% (lacrimation after salivary stimulus)

1. preganglionic parasympathetic fibers regrow and enter the major superficial petrosal nerve. Such aberrant regeneration may lead to lacrimation after a salivary stimulus

The background features a light blue grid pattern with various hand-drawn blue doodles. These include several overlapping circles and loops at the top, a starburst shape on the right, a wavy line at the bottom, and several checkmarks at the bottom right. Two four-pointed starburst icons are placed near the text.

Ramsay Hunt syndrome

Its an infection of herpes zoster to the geniculate ganglion that could lead to facial weakness with vesicular eruption in the external auditory meatus

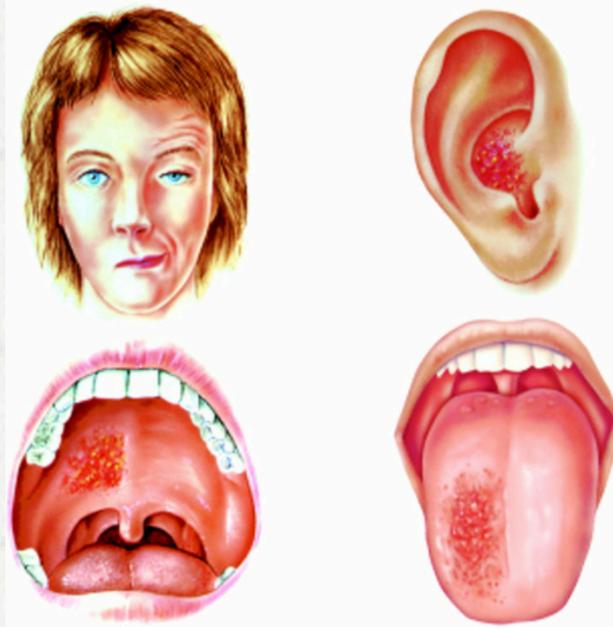
- Pain may precede the facial weakness
- Serosanguinous fluid (blood or serum) may discharge from the ear
- Cranial nerves from 5-12 could be affected; if 8th cranial nerve is affected it could lead to deafness

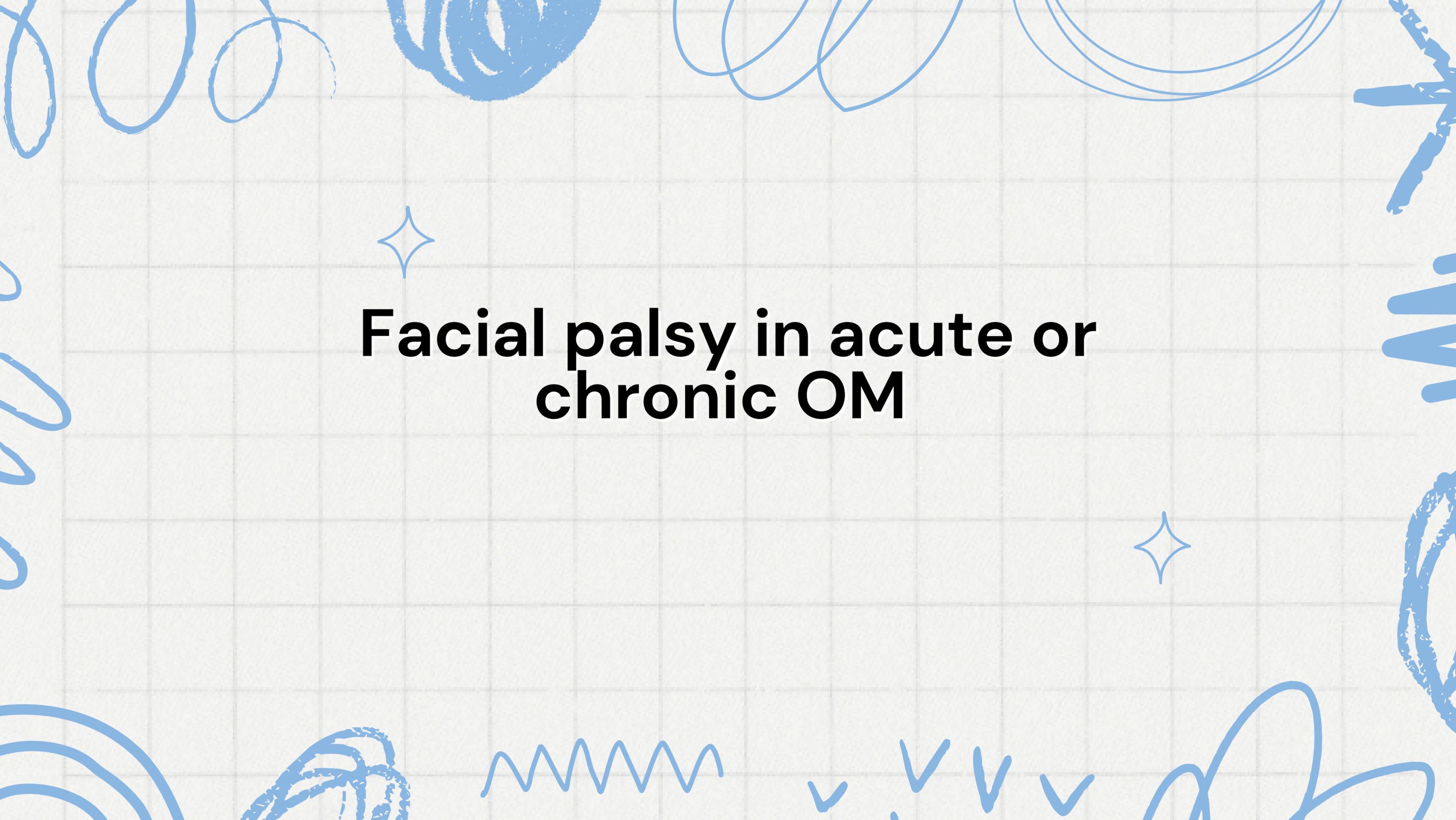
Ramsay Hunt syndrome

Can occur to anyone who had chickenpox
The patient is usually elderly comes with :-

- severe pain precedes the facial palsy and the herpetic eruption in :
- ear.
- tongue.
- palate.
- vertigo.
- hearing impairment

Antiviral medication : acyclovir
steroids:prednisone
physical therapy : warm eyepads and artificial tears
analgesic medication





**Facial palsy in acute or
chronic OM**

Otitis media is an infection in the middle ear, which can spread to the facial nerve and inflame it, causing compression of the nerve in its canal.

Once suspected, there should be immediate surgical exploration to determine if a cholesteatoma has formed as this must be removed if present. Inflammation from the middle ear can spread to the canalis facialis of the temporal bone .

In the case of inflammation the nerve is exposed to edema and subsequent high pressure, resulting in palsy. This requires immediate expert advise and urgent surgery is usually necessary.





Neoplasms

27%

**of patients with tumors involving the facial nerve
develop acute facial paralysis**

- Most common causes: schwannomas, hemangiomas (usually near geniculate ganglion) & perineural spread such as with head and neck carcinoma, lymphoma & leukemia

Schwannoma of the vestibular portion of CN VIII

01

most common intracranial tumour causing hearing loss
starts in the internal auditory canal and expands into cerebellopontine angle (CPA),

02

Presentation

- usually presents with unilateral sensorineural hearing loss
dizziness and unsteadiness may be present, but no true vertigo
- facial nerve palsy and trigeminal (V1) sensory deficit (corneal reflex)
late complications

03

Diagnosis

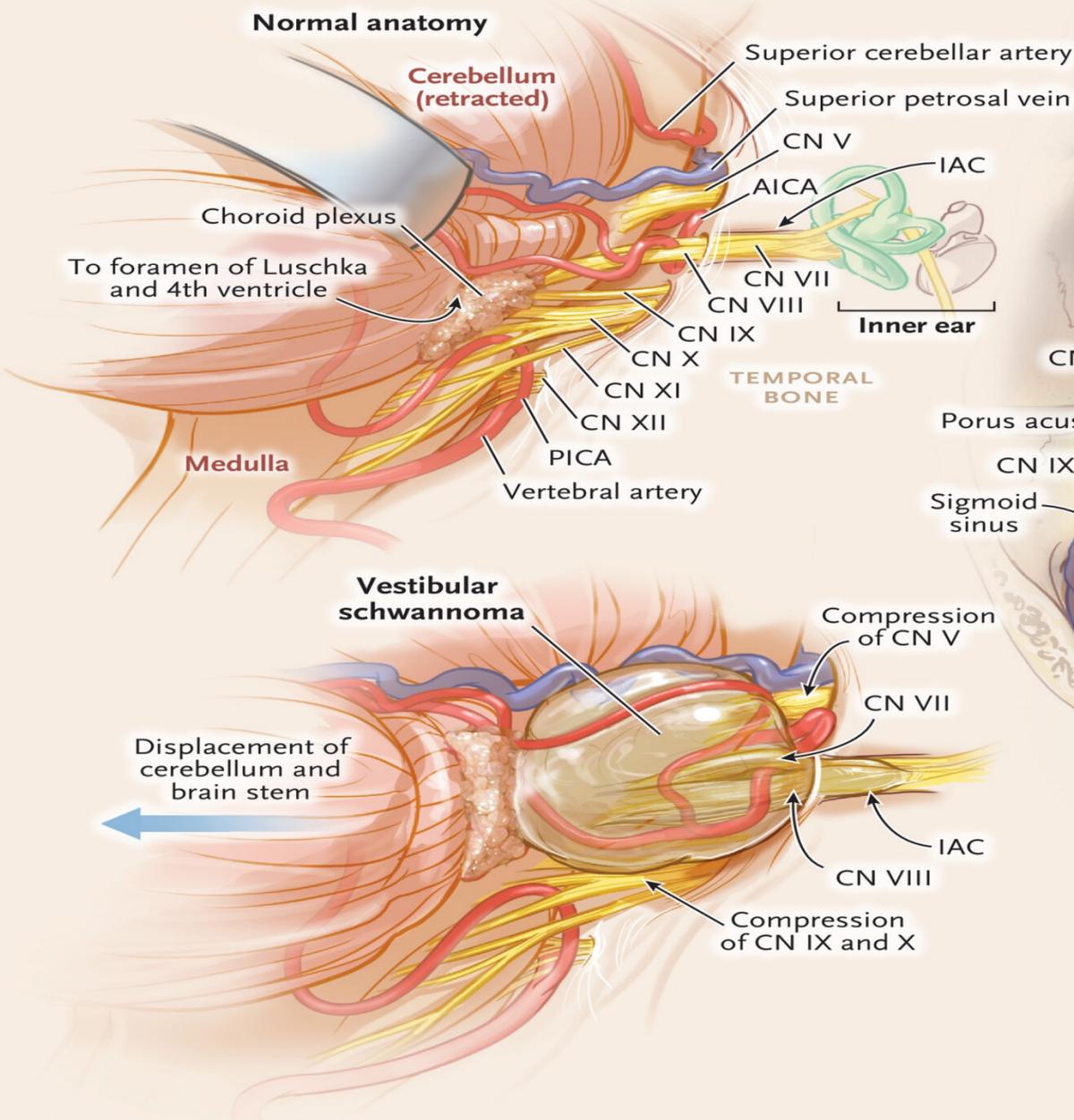
MRI, CT (contrast enhancing mass in CPA)
audiogram, BAEP (brainstem auditory evoked potentials)
if bilateral: neurofibromatosis type II

04

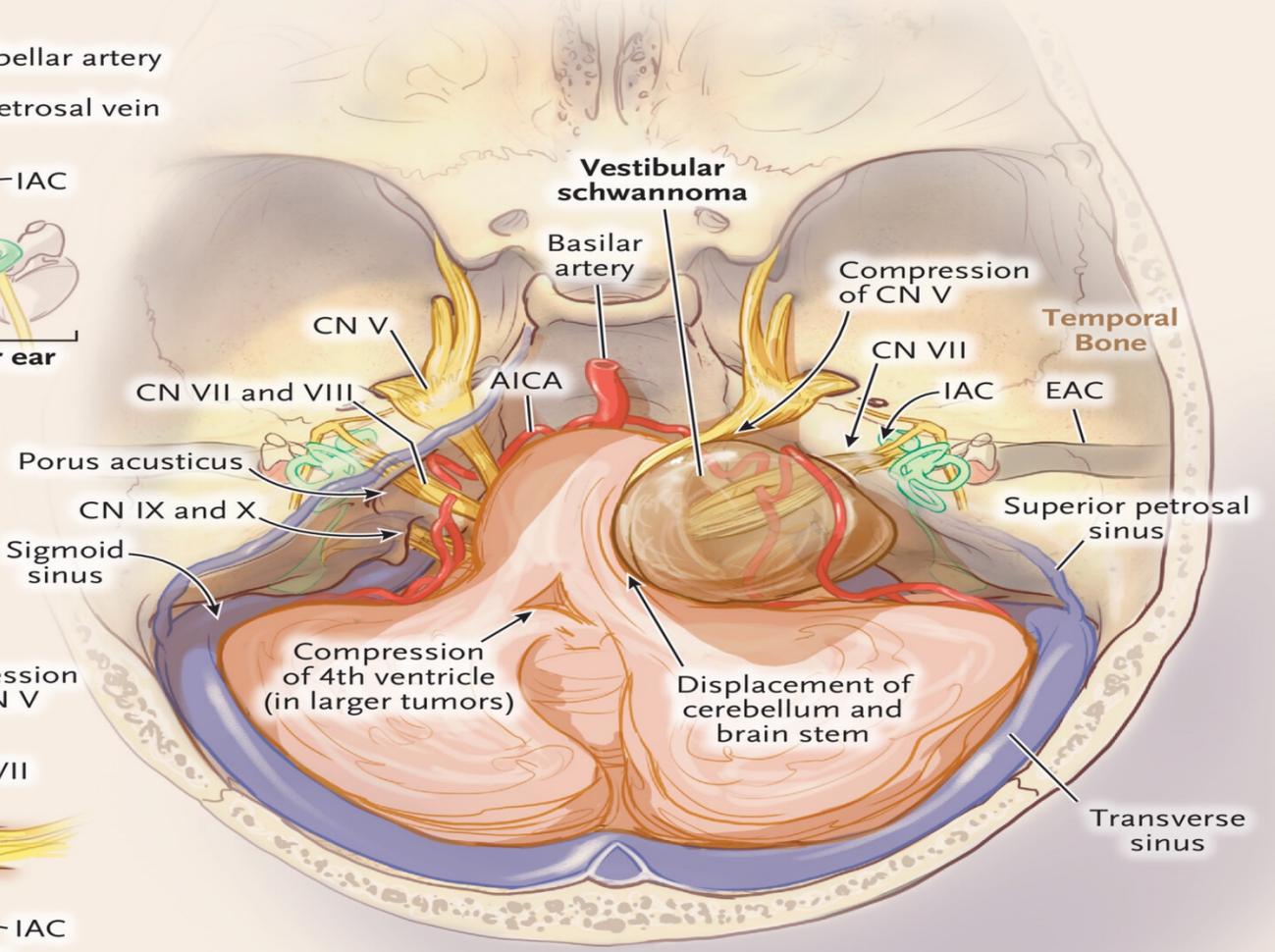
Treatment

conservative “wait and see”
definitive management is surgical excision
other options, such as gamma knife

A Posterolateral view of the cerebellopontine angle



B Superior view (axial cross section) of the posterior cranial fossa





✧ Traumatic facial palsy ✧

Traumatic facial palsy

This may result from: fracture of the temporal bone or from ear surgery (iatrogenic).

If the onset is delayed recovery is to be expected but if there is immediate palsy urgent surgical exploration and decompression or grafting will be required .
(Edema vs direct damage)

Fracture of temporal bone

Facial nerve damage in temporal bone fracture :

Longitudinal fracture .:

80% (most often temporary and frequently delayed in onset)

Compression due to the edema .<< steroid << no response < surgery to reduce the compression .

Patients may present with :

- Hemorrhage (blood coming out of the external auditory meatus)**
- Tympanic membrane tear**
- Fracture of external auditory canal and conductive hearing loss.**

Transverse fracture .:

20% (severe, usually permanent, and immediate in onset)

cutting of the nerve < suturing or grafting

Patients may<number> also present with

- Hemotympanum (blood behind the tympanic membrane).
- Sensory deafness , vertigo – the latter two symptoms due to damage to vestibulocochlear nerve (cranial nerve VIII) and the inner ear

Iatrogenic facial palsy

The most common procedure being performed during the injury was:

**Mastoidectomy (55%),
Tympanoplasty (14%)
Removal of exostoses (14%).**