Facial Paralysis in Children

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Bells palsy is the most common etiology of facial palsy in children

Not as common As in adults

Has better Prognosis In children Than in adults

May's study on etiology of Facial palsy in children:
Bell's palsy – 42%
Trauma – 21%
Infections – 13%
Congenital – 8%
Neoplastm – 2%

Embryology & Applied anatomy of Facial nerve

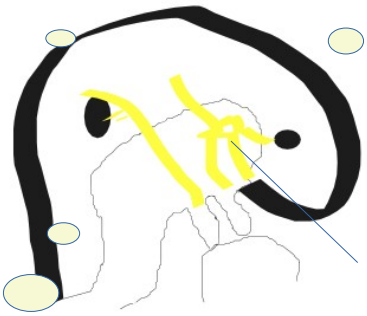
Otic placode forms the Otocyst giving rise To membranous Labyrinth

In the 4th Week facial nerve Becomes distinct

In the third week Of gestation Facio acoustic Crest is visible on the Dorsolateral aspect of the Hindbrain just cranial to The otic placode

Geniculate Ganglion Forms by 5th week

Malformations of Branchial arches Are associated with Anomalies of chorda



The facial nerve Nucleus is formed By neuroblasts In the pons with the 6th nerve nucles in close proximity

Pathology In pons will involve both 6th and 7th nerves

As the brain develops and the pons expands, the 6th nerve nucleus ascends so that the facial nerve fibers will have to whirl round the 6th nerve nucleus forming an internal genu

The facial nerve divides into its main Trunk, descending into the second Branchial arch and the chorda tympani, Which is the pretramatic branch. This Nerve curves cranially into the first Branchial arch
A pretrematic branch of the cranial nerve Is one that supplies the arch preceding The arch to which the cranial nerve Belongs.

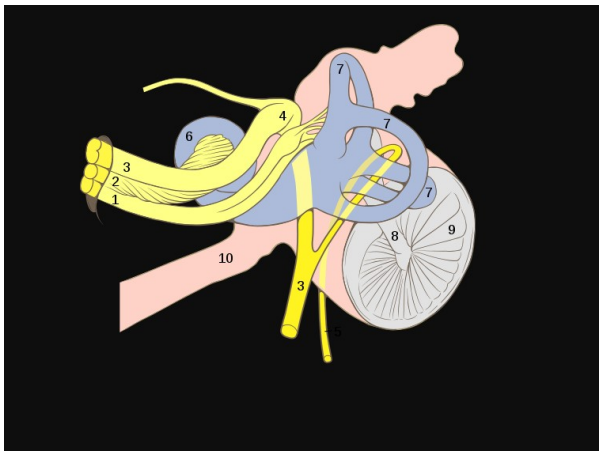
The chorda tympani and main trunk of The facial nerve are equal in size during The 5th week of gestation.

In Mobeus syndrome there is agenesis of the facial nucleus along with agenesis of 6th nucleus

Embryology of Geniculate ganglion

Separate
Origin from
That of 7th nerve

Well defined by
7th week of gestation

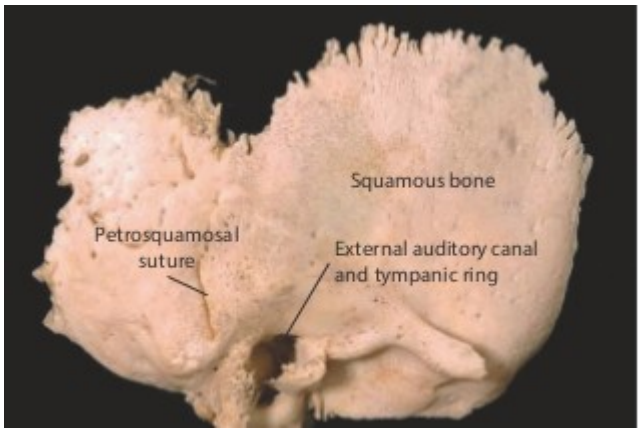


Facial nerve
Anamolies should
Be anticipated during
surgery

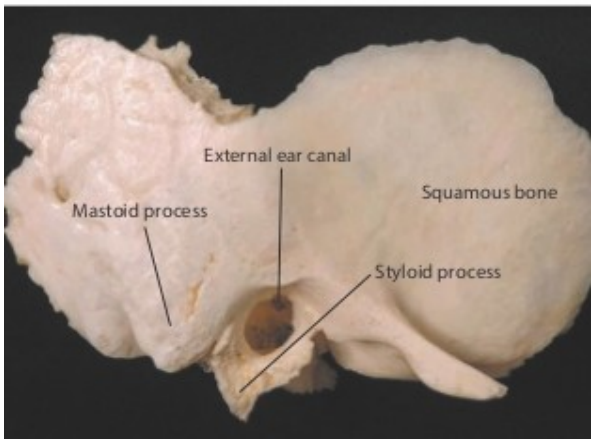
Malformations of the
1st and 2nd arch such
As Treacher Collins
And Goldenhar syndrome
Will have facial nerve
Abnormalities also

Geniculate ganglion is seen in
The 7th week.
It gives rise to sensory roots that
Courses through the nervus
Intermedius.
As the main facial trunk descends
Down the second arch there is
Caudal movement of the 1st arch
Due to rapid expansion, producing
Horizontal segment of facial nerve,
The first and second genu of the
Vertical nerve with greater superficial
Petrosal nerve acting as an anchor

Differences between adult / infant temporal Bones



Infant temporal bone



Adult temporal bone

At birth infant temporal bone does not have mastoid process. It has just an incomplete Tympanic ring. The U shaped tympanic ring has nodular prominences. On each arm, which seperate the annulus from the future. External canal and the foramen of Huschke.
By the end of 1st post natal year these processes fuse, lengthening the canal. The foramen usually closes sometime later. The chorda tympani and the facial nerve may exit through the stylomastoid foramen in the new born. The mastoid process and external canal are undeveloped so the nerve is very superficial.
The mastoid process develops and reaches adult proportions by the age of 12 years. In neonates and small children the second genu of the facial nerve is more acute and courses more laterally. The most common variation in the course of the facial nerve canal involves the tympanic segment. The bony wall may be dehiscent in 50% of population particularly above the oval window.

ASOM inneonates / children may present with facial palsy from neuropraxia or bacterial infiltration of the nerve sheath within the enclosed middle ear cavity. Dehiscence of this segment of facial nerve may be associated with a persistent stapedial artery in its course from the tympanic cavity to the middle cranial fossa where it becomes the middle meningeal artery. Foramen spinosum is absent on the side of the persistent stapedial artery as seen in CT images.

On leaving the stylomastoid foramen the facial nerve enters the parotid gland in a more anterior location than in the adult, as the parotid gland is smaller and more anteriorly placed. The nerve divides into two main divisions and these give rise to branches that supply the face and the upper neck muscles. Parotid surgery in children should take these anatomical factors into consideration.

History

Child with facial Paralysis may Not complain At all

Detailed clinical Assessment is Important. The muscle Tone could be good and Paralysis could become Evident only when the Child cries

History of Sucking Difficulty Should be sought

Paying attention To mother's Story will help

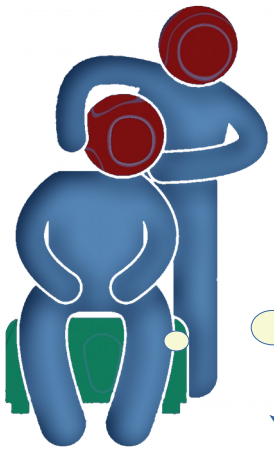
Clinical Examination

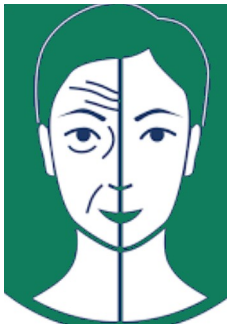
Otoscopy should be Performed and Inflammation Of ear Drum is commonly seen

Complete & Incomplete Paralysis should Be differentiated

Careful assessment Of each branch of Facial nerve should Be done

Nasolabial fold Is obliterated. Sagging of cheek





Lower eye lid Falls away from the Globe causing tears To collect in the Eye and spilling To the face

Craniofacial anomalies and Involvment of other cranial Nerves to be noted

Loss of forehead wrinkles & drooping of eyebrow are features of LMN 7th nerve palsy

Speech changes in facial palsy:
Plosives are distorted with air blowing out on the paralysed side

House Brackmann grading of 7th nerve Paralysis

Grade	Description	Gross function	Resting Appearance	Dynamic appearance		
				Forehead movement	Eye closure	Mouth asymmetry
1	Normal	Normal	Normal	Normal	Normal	Normal
2	Mild	Asymmetry; slight Synkinesis; Mild	Normal	Slight asymmetry	Complete (minimal effort)	Mild
3	Moderate	Asymmetry; obvious Synkinesis; obvious	Normal	Slight movement	Complete (with effort)	Mild
4	Moderately severe	Asymmetry; disfiguring Synkinesis; obvious	Normal	None	Incomplete	Obvious
5	Severe	Movement; barely	Asymmetric	None	Incomplete	Obvious (slight nasal movement)
6	Total paralysis	Movement; None	Asymmetric	None	Incomplete	Obvious

Despite its limitiations House Brackmann scale is commonly used to grade facialy palsy in children.

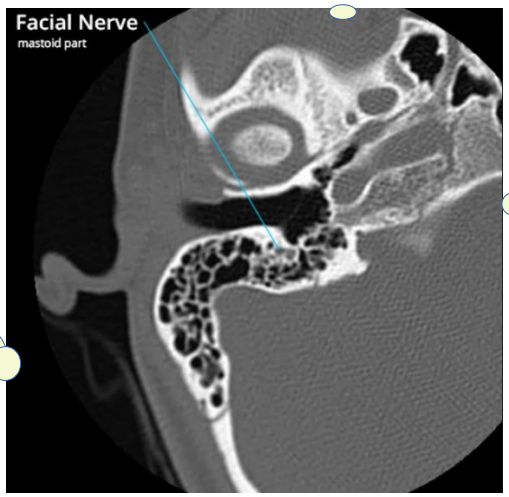
Imaging

CT is useful for identifying bony abnormalities of the intratemporal facial nerve, which can occur with congenital malformations, trauma, and cholesteatoma. MRI is useful for identifying soft tissue abnormalities around facial nerve, as seen in inflammatory disorders, neoplasms and hemifacial spasm.

Imaging plays a Critical role in Evaluation of facial Nerve disorders

Hemangiomas Occur in the Geniculate Ganglion and Show contrast Enhancement In MRI

MRI can differentiate Masses around facial Nerve that require Excision from those That should not be Excised until facial Function is affected



When gadolinum contast is used in MRI a normal facial nerve faintly enhances in the geniculate ganglion, tympanic and mastoid segments. The cisternal, intracanalicular, labyrinthine, and parotid segments of facial nerve dont normally enhance. Enhancement of facial nerve in these regions should raise suspicion of inflammatory or neoplastic processes. Asymmetric enhancement / thickening of tympanic and mastoid segments relative to the contralateral side should be considered normal

Patients with hemifacial spasm, a loop of the anterior inferior cerebellar artery, PICA, or vertebral Artery compresses the ipsilateral facial nerve at the root exit zone causing involuntary contractions of facial musculature.

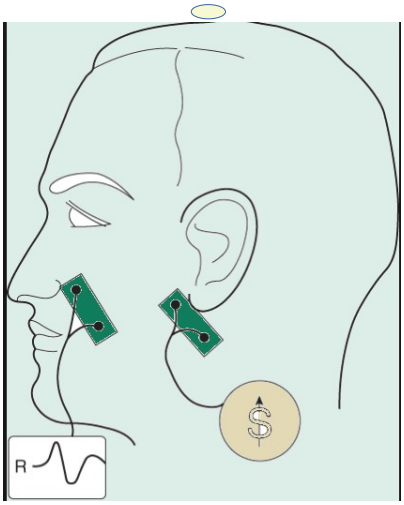
Ultrasound – has been used to predict facial nerve outcomes in Bell's palsy. Facial nerve diameter is measured proximally at the stylomastoid foramen, distally just proximal to the pes anserinus, and midway between these two points. The average diameter is calculated using these three measurements and is compared with blink reflex studies and nerve conduction studies.

Electrophysiological tests

Electrophysiological tests
Allow objective assessment
Of facial nerve function

This test can be
Performed in almost
All children

This test is not
An absolute
Predictor for
Return of function



Waveform amplitude
And morphology
Are consistent
With that of adult
Values except
In infants

Shambaugh recommends muscle biopsy in neonates with facial palsy when the electromyography is silent. If muscle is found early, reanimation is advisable.

Congenial Facial Paralysis

Syndromic and nonsyndromic forms of developmental facial paralysis occur. It could be unilateral / bilateral, complete, or incomplete. Prognosis is usually poor in these patients. Craniofacial anomalies associated with the first and second arch derivatives are common in this form of facial paralysis.

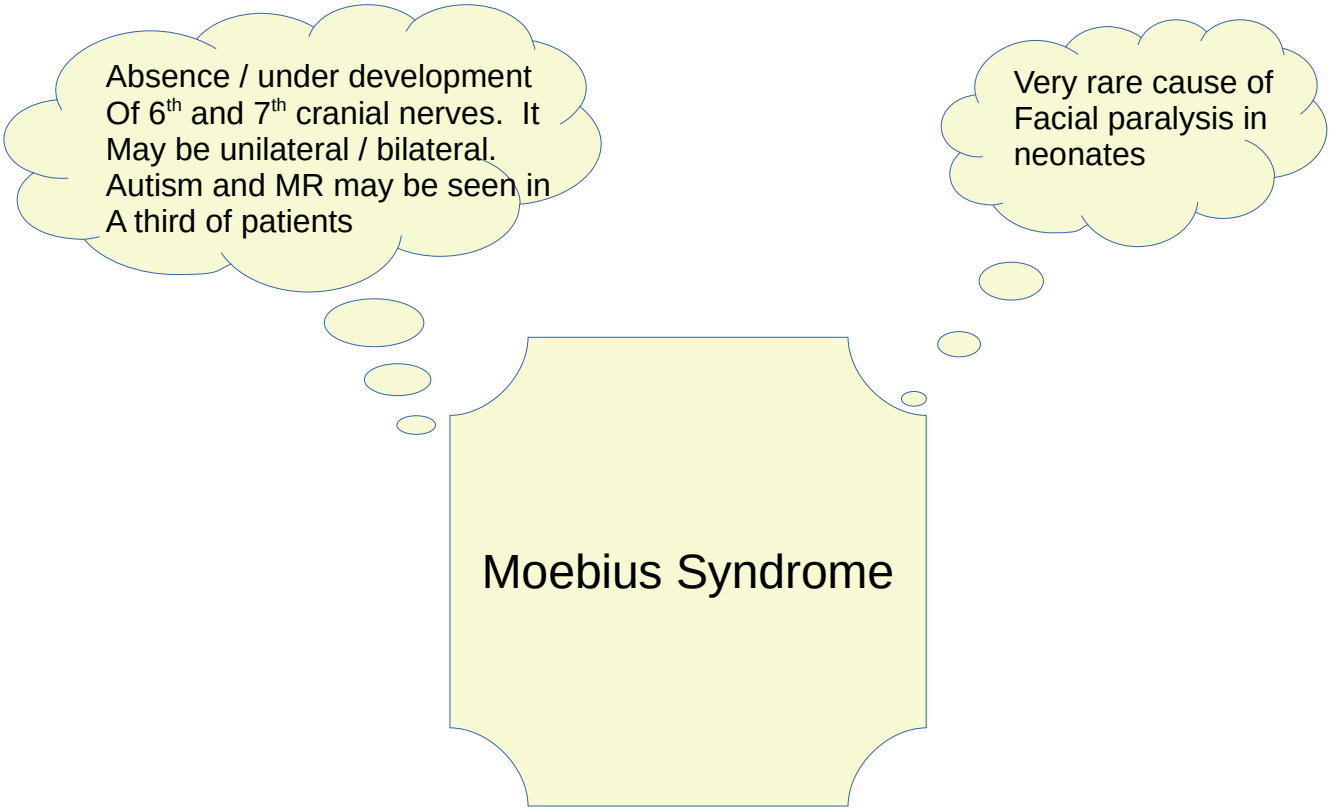
Nerve exploration is unrewarding. Reannimation may be considered. The most desired neural tissue source for rejuvenation of paralysed face is direct anastomosis or interpositional grafting.

Other cranial nerves can also be involved. They include abducens nerve, hypoglossal nerve, oculomotor nerve, and trochlear nerve. The nerve least likely to be involved is the accessory nerve. Hence this nerve can b e a reliable donor for reannimation procedures.

Congenital facial paralysis is uncommon
And when present may cause
Problems in newborn. Seen in 8 – 14%
Of all pediatric cases of facial paralysis.
Developmental causes include those
Associated with syndromes and teratogens

Classification:
Traumatic
Developmental
Unilatera / Bilateral
Complete / Incomplete

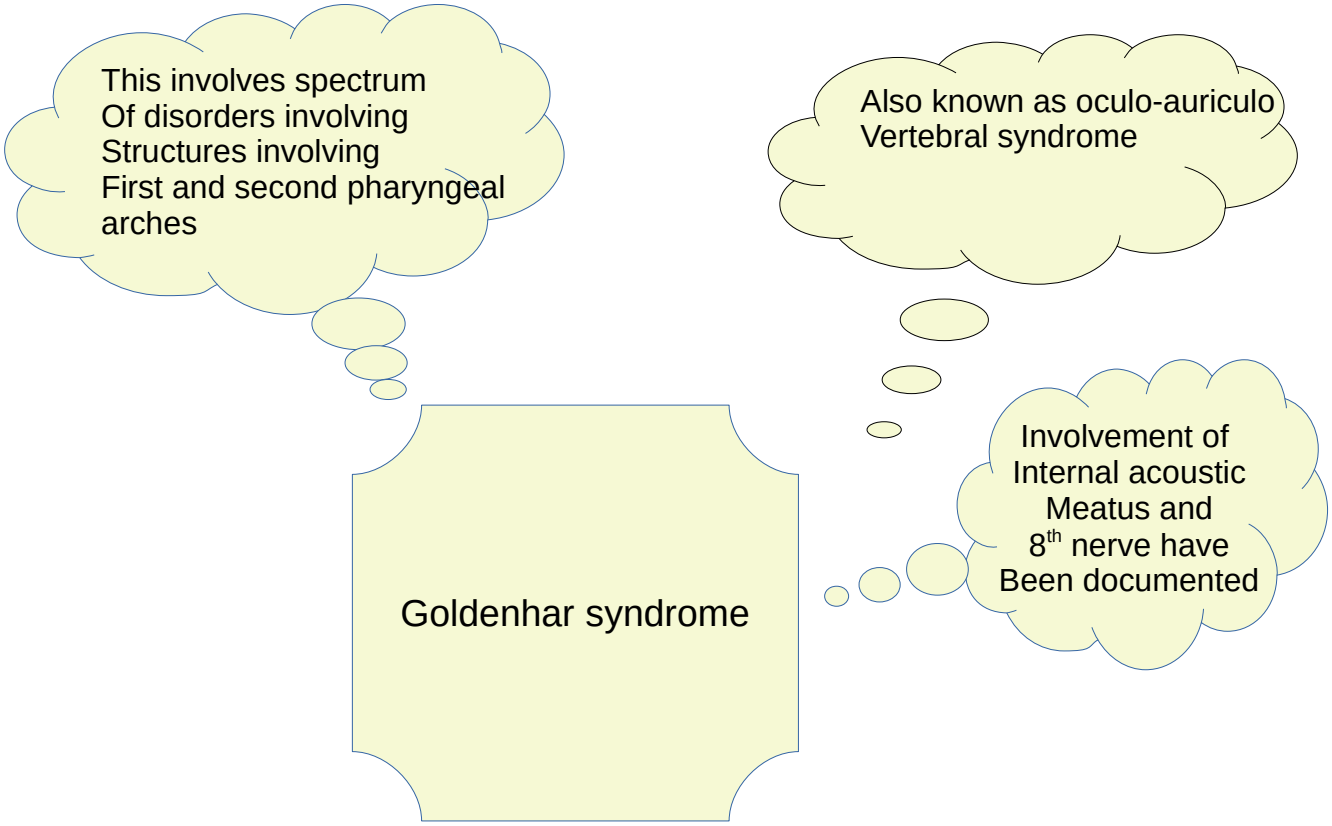
Moebius Syndrome



This disease is not progressive. These children have club foot. Brachial deformities / pectoral muscle hypoplasia are also seen.

Poland sequence – characterised by ipsilateral hand malformations and by partial / complete absence of pectoralis muscles and breast is seen concurrent with Mobius syndrome. This is seen in 15% of these patients.

Goldenhar syndrome



1. Unilateral craniofacial microsomia
2. Lateral facial dysplasia
3. Otomandibular dysostosis
4. 1st & 2nd arch syndrome
5. Vertebral anomalies

Other Syndromes

Asymmetric crying facies:

Congenital asymmetric
Crying facies is uncommon
And is caused by congenital
Hypoplasia / agenesis of
Depressor anguli oris muscle
On one side of the mouth.
May be associated wtih:
CVS, head and neck,
Musculoskeletal, respiratory,
Gastrointestinal, CNS and
Genitourinary abnormalities

CHARGE Syndrome:
1. Colobomata
2. Heart defects
3. Choanal atresia
4. MR
5. Genital hypoplasia
6. Ear anomalies
7. Hearing loss
8. Facial nerve dysfunction
9. Feeding & swalloing difficulties

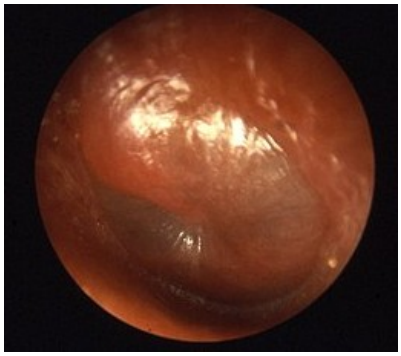
Familial facial paralysis:

This has been reported
In three male members
From three generations
In a family. The paralysis
Becomes more pronounced
With every successive
generation

Widening of facial
Canal:

Widening of facial
Canal has been
Reported as a cause
Of multiple ipsilateral
Facial palsy in a child.
Childhood recurrent
Fever+ thickened facial
Nerve and widened canal.
This is due to pressure
From inflammation & oedema

Acquired facial paralysis



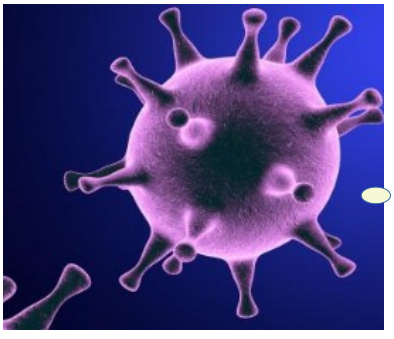
Acute otitis media

Chronic otitis media

Lyme disease

Infection caused by
Borrelia burgdorferi.
14 days incubation
uni/bilateral facial palsy

Elisa is diagnostic
Doxicycline is the choice
Most common cause of
Facial palsy in US children



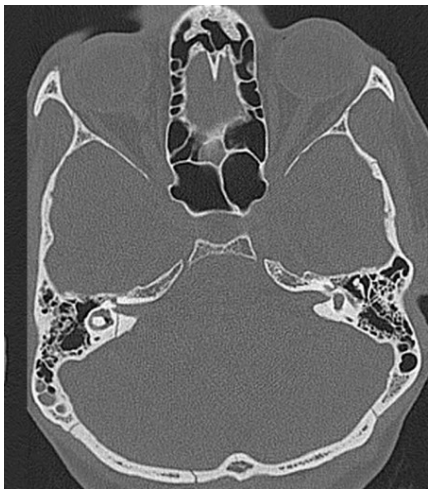
Ramsay Hunt syndrome
Herpes zoster

Trauma Temporal bone

Birth trauma
Is known to
Case facial
Palsy. Common
In forceps delivery

Iatrogenic injuries during
Mastoid and parotid
Surgeries can cause
Facial palsy

Bruising on
The side of
Facial palsy
Is an indicator



Fracture can be longitudinal / transverse. Longitudinal fractures cause conductive hearing loss while transverse fractures cause sensorineural hearing loss. A third of fractures are transverse and are associated with facial palsy. Longitudinal fractures rarely cause facial paralysis. In head injury sudden deceleration creates a shearing force on the facial nerve causing paralysis. Hemotympanum is common in these patients. CSF otorrhoea may also be present.