DISSERTATION ON

ANALYSIS OF OUTCOMES OF FACIAL NERVE DECOMPRESSION

Submitted in partial fulfillment of the requirements for

M.S.DEGREE BRANCH -IV E.N.T.

of

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERISTY,

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CERTIFICATE

This is to certify that this dissertation entitled "**ANALYSIS OF OUTCOMES OF FACIAL NERVE DECOMPRESSION**" submitted by **Dr. R.VALLI,** appearing for Part II M.S.E.N.T.. Branch IV Degree examination in March 2009 is a bonafide record of work done by him under my direct guidance and supervision in partial fulfillment of regulations of the Tamil Nadu Dr. M.G.R. Medical University, Chennai. I forward this to the Tamil Nadu Dr.M.G.R. Medical University,

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DECLARATION

I solemnly declare that the dissertation entitled "ANALYSIS OF OUTCOMES OF FACIAL NERVE DECOMPRESSION " is done by me at the Madras Medical College and Government General Hospital, Chennai during 2007-2008 under the guidance and supervision of

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This dissertation is submitted to The Tamilnadu Dr. M.G.R Medical University, towards partial fulfillment of regulation for the award of

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I am extremely thankful to my family members for their continuous support. Above all I thank my God Almighty for His immense blessings.

CONTENTS

INTRODUCTION

Paralysis of facial nerve is a cause of significant functional and aesthetic compromise. It is also accompanied with various social and psychological consequences.

Most patients with facial paralysis recover spontaneously. Occasionally there lies as underlying potentially life threatening condition or a potentially curable condition which requires an early intervention. Few may spend their lives as facial cripples because treatment was not offered until death of facial nerve was established by electrical activity.

Functional concerns primarily involve adequate protection of eye with a real risk of exposure keratitis if not properly addressed. In addition swallowing , drooling and speech difficulties may arise. The degree of suffering these patients feel however is far greater than these functional problems alone would produce.

Patients with facial paralysis especially younger ones may experience tremendous psychosocial distress about the condition. Poor self-image and difficulty in interacting with peers and family members can be devasting.

Repair of facial nerve is generally a concern in case of permanent complete facial paralysis. Frustration arises in difficulty often found in achieving an excellent result. Synkinesis and hypo function are an expected result and these problems are among the challenges to be overcome. In this study we analyse in detail about the facial nerve decompression and various factors influencing its outcome.

AIMS OF THE STUDY

The aims of the study are to analyse various possible factors that would influence the outcomes of facial nerve decompression.

1. To study the age and sex distribution of the patients who undergo facial nerve decompression
2. To study the various etiological factors for facial nerve decompression
3. To study the role of investigations for facial nerve decompression
4. To study the outcomes of the decompression in relation to the time of surgical intervention.
5. To compare the intra operative findings in all the cases.
6. To identify the site of lesion and its relation to the outcome.

REVIEW OF LITERATURE

HISTORY

Galen , 200 AD discussed the possibility of nerve degeneration.

Paul , 600 AD first documented suture repair.

Sir charles Bell , 1821 discovered facial nerve and its role in innervation of muscles of facial expression.

Drobnick , 1879 – first nerve anastamosis by connecting facial nerve to spinal accessory nerve.

Waller , 1850 understanding peripheral nerve degeneration and regeneration

Ugo Fisch , bottleneck concept which has significantly changed the understanding the patho physiology of facial nerve in temporal bone.

Stacke , 1903 – resected a portion of facial nerve in fallopian canal and juxtraposed.

Balance , 1924 – anastamosis of facial to accessory , hypoglossal nerve.

Martin, 1927 – end-end suture in fallopian canal.

Bunnel , 1936 – first facial nerve graft.

Lathrop and Myers – advanced techniques of facial nerve decompression.

Miehlke and May , 1973 – spatial orientation of facial nerve.

Scaramella , 1974 – cross over graft.

John Conley , 1976 – in Zurich, at third international facial nerve.symposium, there was explosion of new ideas regarding facial reanimation.

Richard Jobe – popularised and made available the gold weight used to improve eye closure.

SURGICAL ANATOMY

A thorough knowledge of the intricate, convoluted course of the facial nerve and its anatomic relationship to other vital structures is essential to the surgeon.

INTRACRANIAL COURSE

The facial nerve exits the brainstem at the pontomedullary junction approximately 1.5 mm anterior to vestibulocochlear nerve. The

facial nerve is smaller in diameter (1.8mm)than the oval vestibulocochlear nerve(3mm in diameter).

A third smaller nerve , the nervous intermedius emerges between facial and vestibulocochlear nerve and eventually gets incorporated within nerve sheath of facial nerve. After leaving the brainstem, the nerve enters the porus of internal auditory meatus of temporal bone .

In internal auditory meatus, facial nerve occupies the anterosuperior quadrant for 8-10 mm . Then it enters the fallopian canal at the fundus of internal auditory meatus.

INTRATEMPORAL COURSE

The facial nerve runs in a bony canal called the fallopian canal, which is protective for the nerve and at the same time makes it more vulnerable to ischaemia.

1. Labyrinthine Segment:

- Narrowest and shortest segment- 4mm

- Forms meatal foramen 0.68mm narrowest portion
- From fundus of internal auditory meatus to the geniculate ganglion.

2. Geniculate Ganglion:

- First genu or the internal genu
- Facial nerve takes a sharp posterior turn of 75 degree
- Greater superficial petrosal nerve arises here

3.Tympanic or Horizontal Segment:

- From geniculate ganglion to the second genu
- 11mm in length
- More frequent site of dehiscence

4.Second Genu:.

- External genu
- Between horizontal segment and vertical segment

5. Vertical Or Mastoid Segment:

- From second genu to stylomastoid foramen

- 13mm in length

6. Third Genu:

- Before exit through the stylomastoid foramen makes an anterior turn

MICRO-ANATOMY OF THE FACIAL NERVE

Each nerve fiber consists of a nerve cell body and an axon which is surrounded by myelin produced by schwann cells. Has a nerve sheath which consists of three membranes.

1. Epineurium:

   Outer covering composed of loose areolar tissue which separates fascicles and hold them together.

2. Perineurium:

   Next more inner layer, which contains a dense layer of cells that are metabolically active and function as diffusion barriers. Provides considerable strength to nerve sheath.

3. Endoneurium:

Surrounds individual nerve fibers.

VASCULAR SUPPLY

From three main sources

(i) The labyrinthine artery- from anterior inferior cerebellar artery

(ii) The superior petrosal artery – from middle meningeal artery

(iii) The stylomastoid artery – from posterior auricular artery

These branches have anastamosis and runs in the epineurium.

PATHOPHYSIOLOGY

The electron microscopy of the damaged facial nerve reveals the degeneration of the myelin sheath and of the axon cylinder, the compression of vascular channels, the infiltration with lymphocytes and phagocytes, the proliferation of the endoneurium and multiplication of the connective tissue.

The nerve recovery is characterized by the recovery of these morphological changes.

SEDDON'S CLASSIFICATION:

Seddon , in 1943 first described three types of progressive nerve injury.

(i) Neuropraxia – a reversible blockage of transmission of nerve impulses due to pressure on the nerve fibers which interrupts axoplasmic flow .There is complete recovery of function without wallerian degeneration.

(ii) Axonotemesis –a more severe injury. There is loss of axons but endoneural tubules are preserved. Distal wallerian degeneration occurs.

(iii) Neurotemesis – total nerve transection.

SUNDERLAND'S CLASSIFICATION

GRADE	PATHOLOGY	PROGNOSIS
I	Compression Damming of axoplasm No morphological changes	Grade I –complete without evidence of faulty regeneration
II	Compression persists Increase in intraneural pressure Loss of axons but endoneurial tubes remain intact	Grade II – fair. Some noticeable difference with volitional or spontaneous movement.Minimal evidence of faulty regeneration
III	Increased intraneural pressure Loss of myelin tubes (neurotemesis)	Grade III-IV , Moderate prognosis. Obvious incomplete recovery to crippling deformity with moderate to marked complications of faulty regeneration
IV	Above with disruption of perineurium	Grade-V , Motion barely perceptible
V	Above with disruption of epineurium	Grade VI - none

ANALYSIS OF FACIAL NERVE PALSY

The facial nerve paralysis can be described in various ways in order to give prognosis and to follow up the therapy effects. These are scales based on the explorer's observation; likewise analysis can be done based on muscle movements. There is no universally applicable simple and reliable test ; nor is there any test based on the assessment by the patient.

IDEAL SYSTEM:

An ideal reporting system should

- allow for documentation and communication
- easy to use
- reliable
- sensitive enough to detect clinically important changes

I PEITERSON GRADING SYSTEM:

GRADE	**DEGREE OF PALSY**	**DESCRIPTION OF PALSY**
O	none	Normal function
I	Slight	Only visible when patient grimaces.
II	Moderate	Visible with small facial movements.
III	Severe	Function just visible.
IV	Complete	No function.

II HOUSE – BRACKMANN'S GRADING

The characteristics of facial paralysis has two main domains – gross observation and movement of forehead , eye and mouth. This is the most widely used system for grading facial nerve weakness

DEGREE OF INJURY	GRADE	DEFINITION
Normal	I	Normal symmetrical functions in all areas
Mild dysfunction	II	Slight weakness noticeable only on close inspection. Complete eye closure with minimal effort. Slight asymmetry of smile with maximal effort. Synkinesis barely noticeable. Contractures, spasm absent
Moderate dysfunction	III	Obvious weakness but not disfiguring .May not be able to lift the eyebrows. Complete eye closure. Strong but asymmetrical mouth movement with maximal effort. No disfiguring synkinesis , mass movement or spasm
Moderately severe dysfunction	IV	Obvious disfiguring weakness. Inability to lift eyebrows. Incomplete eye closure. Asymmetry of mouth with maximal effort. Severe synkinesis or mass movement or spasm

Severe dysfunction	V	Motion barely perceptible. Incomplete eye closure. Slight movement of corner of mouth. Synkinesis, contracture, spasm usually absent
Total paralysis	VI	No movement, no synkinesis, contracture or spasm

III SYSTEM OF MAY FOR REPORTING FACIAL PALSY

DEGREE OF INJURY	INCOMP-LETE LESIONS	TRANSECTED NERVE(AFTER REPAIR)
Normal	I	Excellent recovery; appropriate individual movement, eye closure, smile
Mild (barely noticeable)	II	Good; appropriate movement but mass movement present in eye or mouth
Moderate (obvious difference)	III	Fair; some movement and symmetry but inability to close eyes completely, oral incompetence

Severe (crippling-weakness spasm,synkinesis)	IV	Failure ; flaccid face
No movement	V	

IV. SYSTEM OF SMITH FOR REPORTING FACIAL NERVE FUNCTIONS

Scale

0 = no function

I = 0 to 25% function

II = 25 to 50% function

III = 50 to 75% function

IV = 75 to 100% function

Areas to grade

0 to IV – repose

0 to IV – forehead wrinkle

0 to IV – eye

0 to IV - mouth

INVESTIGATIONS

PURE TONE AUDIOMETRY

1. To detect if there is hearing loss and the degree of hearing loss
2. To find out the type of hearing loss
    a. Conductive hearing loss- seen in longitudinal fractures
        - Temporary –due to blood in external canal or middle ear
        - Persistent – due to ossicular discontinuity
    b. Sensorineural –
        - Seen in transverse fractures due to disruption of labyrinth
        - Seen in longitudinal fractures due to labyrinthine concussion.

Audiological evaluation helps us in deciding the surgical approach. Translabyrinthine approach can be used in patients with loss of cochlear function

ELECTRODIAGNOSTIC TEST

These are tests which helps in establishing prognosis

(i) Maximal Stimulation Test

Technique - compares muscle contraction at maximal nerve stimulation (5 ma) between two sides

Outcome - Equal response, reduced or absent response

Prognostic value – Loss of response within 10 days is associated with incomplete recovery

(ii) Nerve Excitability Test

Technique - Compares transcutaneous threshold required to elicit minimal muscle contraction between the two sides

Outcome - > 3.5 mA difference is considered significant

Prognosis - Indicates poor prognostic value

(iii) Electroneuronography (Evoked Electromyography)

Technique - Supramaximal stimulus is delivered to facial nerve trunk as it exits the

stylomastoid foramen and the evoked biphasic compound action potential (CAMP) is recorded

Outcome - >90% reduction in amplitude within 6 days requires surgical intervention within 3 weeks.

Most valuable prognostic indicator

Note - Not useful within 3 days because wallerian degeneration is seen after that time

-.Less value after 3 weeks due to nerve fiber desynchronisation

(iv) Electromyography

Technique -Measures active motor unit potential after voluntary forceful contraction

Outcome - Presence of active motor potentials in response to voluntary contractions indicates good prognosis

- -Defibrillation potentials suggest wallerian degeneration, Polyphasic potentials suggest reinnervation

(v) Strength Duration Curve

Technique	- strength duration curves are obtained by plotting current intensity of a stimulus delivered to muscle against the time required to excite.
Rheobase	- Threshold of an indefinitely long stimulus
Chronaxie	- The time needed for a stimulus of twice the rheobase
Outcome	- Rhoebase becomes increasingly indefinite below 100 ms and the curve is displaced to right suggestive of degeneration
Note	- takes 2-3 weeks for degeneration to reach the motor end plate

Limitations Of Electrophysiological Tests:

1. Electrical impulses cannot differentiate axonotemesis and neurotemesis . They can only stimulate normal or neuropraxic fibres
2. No useful information in complete facial paralysis

3. Evaluates the entire facial nerve and not its branches separately
4. No useful information in the immediate post paralysis period ie within 72 hrs.

TOPODIAGNOSTIC TESTS

These test are used to locate the site of injury without prognostic value

(i) Schrimer's Test

Branch tested – Greater Superficial Petrosal Nerve

Technique – 5 mm strips of filter paper are placed in inferior fornix for 5 minutes and the length of paper moistened is compared between two eyes.

Assessment - >75% unilateral decrease in lacrimation or bilateral decrease in lacrimation
(< 10 mm for both sides in 5 mins)

(ii) Stapedial Reflex:

Branch tested - Nerve to stapedius

Technique – Impedence audiometry for stapedial reflex.Assessment -Presence or absence of stapedial reflex

(iii)Testing Taste:

Branch tested – Chorda tympani

Technique - 1. Testing with solutions concentrated with sugar,salt, bitter, sour. With protruded tongue, solutions are placed over anterior two thirds of tongue on either side separately. After wiping the tongue. The patient recognizes the taste without retracting the tongue.

2. Electrogustometry -Tongue is stimulated electrically to produce a metallic taste and the two sides are compared

Assessment - 1. Results of all the four flavors are recorded and compared with opposite side.

2. Thresholds of the test are compared between the two sides.

(iv) Submandibular Salivary Flow Testing:

Branch tested	-Chorda tympani
Technique	-Warthin's duct is cannulated and salivary flow is measured over time following a gustatory stimulus (6% citric acid)
Assessment	-A reduction of 25% is considered abnormal

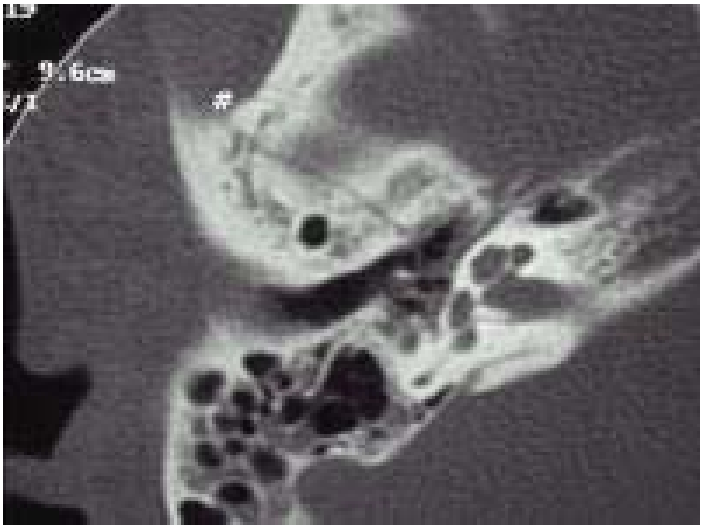
HRCT TEMPORAL BONE

CT taken at 1mm cuts allows better visualization of intra temporal course of facial nerve. Tympanic segment is the easiest to identify on axial cuts at the level of body of incus and its short process. From there it can be followed proximally and distally towards labyrinthine and mastoid segment respectively.

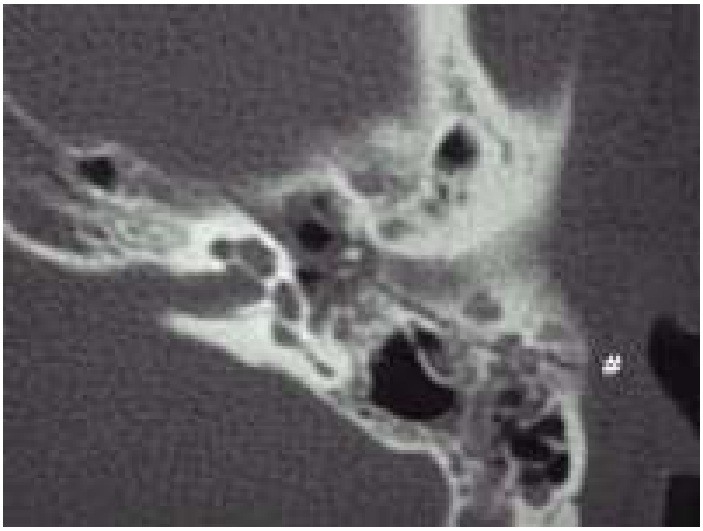
Labyrinthine segment is characteristically banana shaped in axial sections.

Sulcus for geniculate ganglion is well demonstrated in coronal sections.

Descending segment is best visualized in coronal or sagittal views.



TRANSVERSE FRACTURE



LONGITUDINAL FRACTURE

B- line-a tangent line extrapolated from the posterior border of basal turn of cochlea which falls within 1 mm of facial nerve on average. Mandatory before facial nerve decompression.

Useful in studying the fallopian canal

1. Temporal bone fractures – longitudinal or transverse or mixed and the involvement of nerve in fracture line
2. Erosion of fallopian canal in CSOM
3. Erosion in middle ear malignancies

SPIRAL CT:

Identifies course of the nerve better and hence the site of lesion

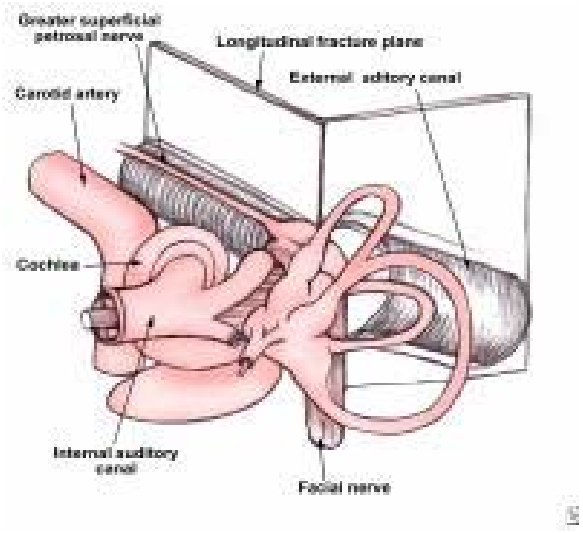
MAGNETIC RESONANCE IMAGING

MRI with gadolinium- DTPA allows better visualization of soft tissues, particularly in neoplastic and inflammatory lesions.

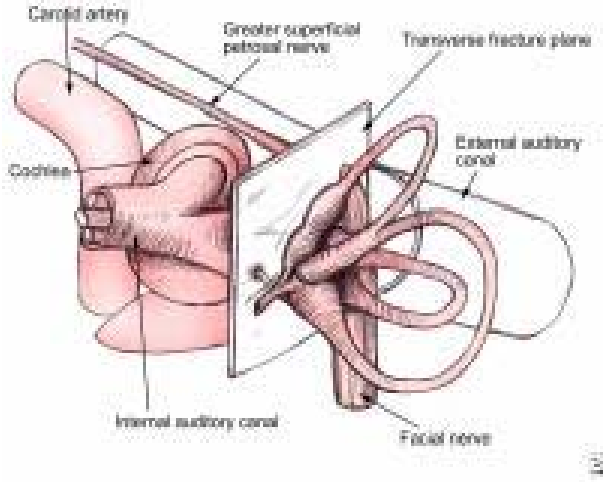
SPECIAL CONDITIONS

TEMPORAL BONE FRACTURES

LONGITUDINAL FRACTURES	TRANSVERSE FRACTURES	MIXED FRACTURES
70-80%	20-30%	Rare
Fracture line runs anterior to otic capsule	Fracture line passes through otic capsule	Combination of both
Blow to temporal and parietal area	Blow to frontal or occipital area	Mixed communited fracture
Conductive hearing loss – hemotympanum or ossicular disruption Sensorineural – labyrinthine concussion	Sensorineural – disruption of labyrinth or injury to neurovascular bundle	Either type of hearing loss depending on the fracture line
Facial nerve palsy very rare	Facial nerve palsy common	Facial palsy common



LONGITUDINAL FRACTURE



TRANSVERSE FRACTURE

Management Of Facial Nerve Paralysis Following Temporal Bone Fractures

The following things should be considered

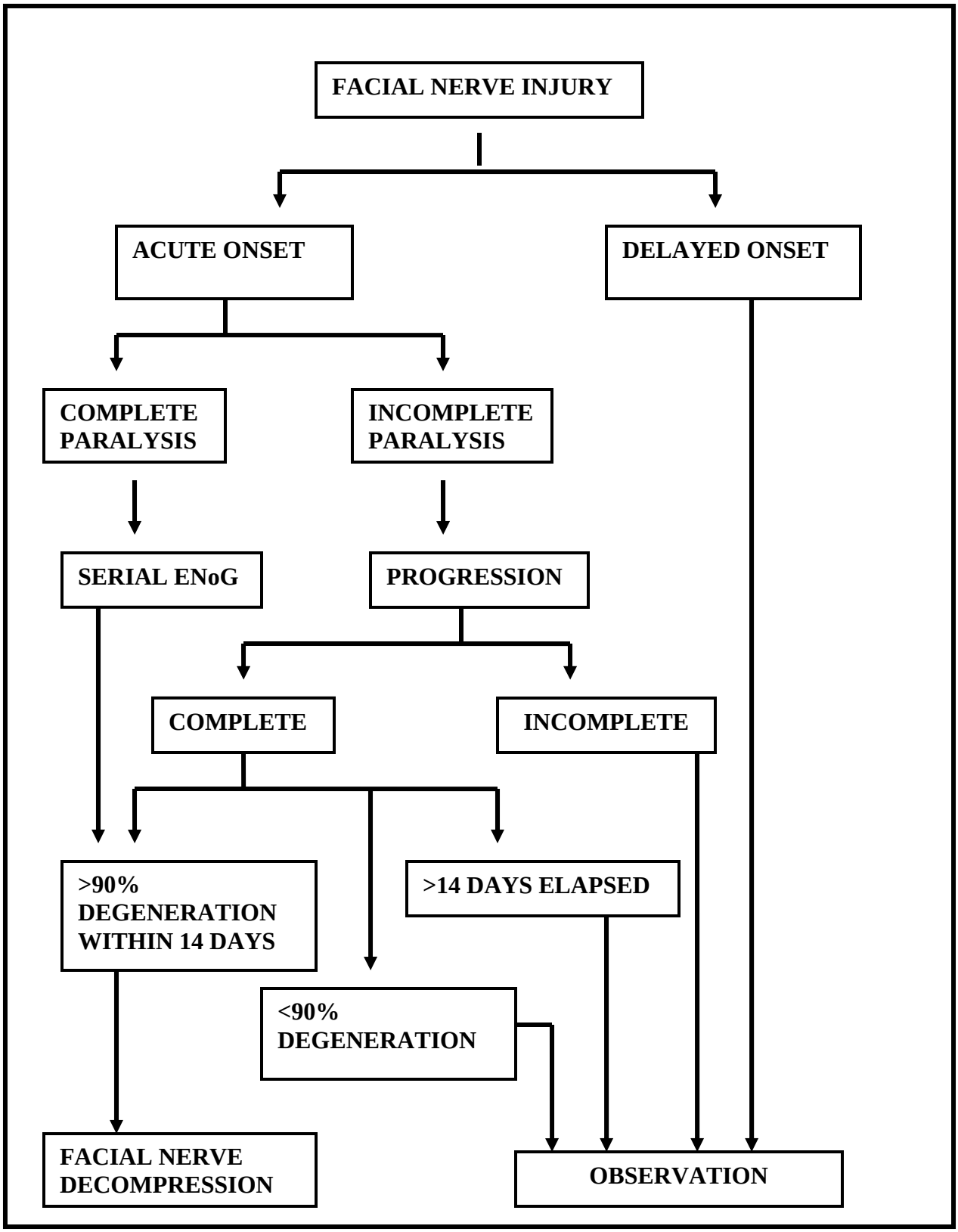
1. Is there a need for surgical exploration
2. When to operate
3. Optimal surgical approach
4. Which nerve repair technique to use

Goals Of Surgical Exploration

1. Decompress the nerve to prevent ischaemic injury
2. To remove bony fragments that impinges on the nerve
3. To re-establish continuity in case of transection

Indications For Surgery

- Immediate onset paralysis
- Complete paralysis
- 90% denervation within 6 days of onset of paralysis
- Incomplete paralysis progressing to complete paralysis over time
- If no return of facial function is observed 6-12 months after injury and there are no signs of polyphasic potentials


FACIAL NERVE INJURY
ACUTE ONSET
DELAYED ONSET
COMPLETE PARALYSIS
INCOMPLETE PARALYSIS
SERIAL ENoG
PROGRESSION
COMPLETE
INCOMPLETE
>90% DEGENERATION WITHIN 14 DAYS
>14 DAYS ELAPSED
<90% DEGENERATION
FACIAL NERVE DECOMPRESSION
OBSERVATION

IATROGENIC INJURY

Most common site of injury during middle ear or mastoid surgery is the distal tympanic segment including the second genu followed by the mastoid segment.

Intraoperatively:

- Exploration with decompression of the proximal and distal segments.
- If more than 50% of the circumference is disrupted, it should be repaired by either direct epineural suture or inlay graft.

Immediate postoperative period:

- Observe for few hours for waning of local anaesthetic induced weakness
- Removal of pack for any tight mastoid dressing causing pressure on the exposed facial nerve.
- If progression to full blown facial palsy, surgical exploration is considered.

INFECTION- CSOM /ASOM

Mechanism - Direct involvement of the nerve by infection through the dehiscent facial canal

- Bone erosion with osteitis
- Inflammatory edema leading to compression and secondary thrombosis of vasa nervosm
- Demyleination of the nerves due to bacterial toxins

Treatment

ASOM – steroids, myringotomy

CSOM – mastoid exploration and facial nerve decompression

FACIAL NERVE DECOMPRESSION

Principles of facial nerve surgery:

In temporal bone surgery the facial nerve should be regarded as a friendly landmark to be identified and used as a guide during surgical dissection of temporal bone

The nerve tolerates exposure and gentle manipulation but when pathological conditions produce pressure on the facial nerve. This should be released through decompression .

General Surgical Techniques

1. A system for monitoring facial nerve function during surgery should be employed
2. The largest diamond burr that the operating area can accommodate should be employed
3. Continuous suction irrigation keeps the burr clean and also dissipates heat which can induce neural damage
4. The final layer of bone over the nerve should be removed by blunt elevators which are thin but strong enough to remove a thin layer of bone
5. If neurolysis (incision of sheath) is planned , it is done by sharp dissection
6. The medial surface of the nerve usually adheres to the bone and contains a rich vascular supply. Bleeding from this region is controlled with bipolar cautery

APPROACHES

In the order of frequency of use

1. Transmastoid Approach – Facial Recess Approach

   Canal Wall Down Approach

2. Middle cranial fossa approach

3. Retrosigmoid approach

4. Translabyrinthine Approach

STRUCTURES AT RISK DURING SURGERY

(i) The auditory system

- contact of ossicles with the rotating burr may result in significant and irreversible sensorineural hearing impairment
- inadverant entry into labyrinth can cause profound and irreversible hearing impairment
- dislocation of ossicles can cause conductive hearing loss

(ii) Vestibular system

- invasion of semicircular canal or vestibule

  drilling can cause marked disturbance in balance and profound sensorineural hearing loss

(iii) Venous circulation

– bleeding from sigmoid sinus requires packing with surgicel and a large opening requires distal ligation of internal jugular vein

– jugular bulb should be protected in translabyrinthine approach

(iv) Dura

- can be injured during middle or posterior cranial fossa Approach

- recognized and repaired to prevent CSF leak

-if incised, closed either by suturing or packing the defect with fat or muscle

SURGICAL TECHNIQUE

I.TRANSMASTOID APPROACH

With a postaural incision , simple mastoidectomy done

Lateral semicircular canal identified

Expose sinus plate, dural plate and digastric ridge

Aditus opened to identify fossa incudis

Posterior canal wall thinned , facial recess opened which is bounded medially by vertical segment of facial nerve , laterally by chorda tympani superiorly by fossa incudis

Opening this recess allows access to middle ear and tympanic portion of facial nerve without disturbing ossicles

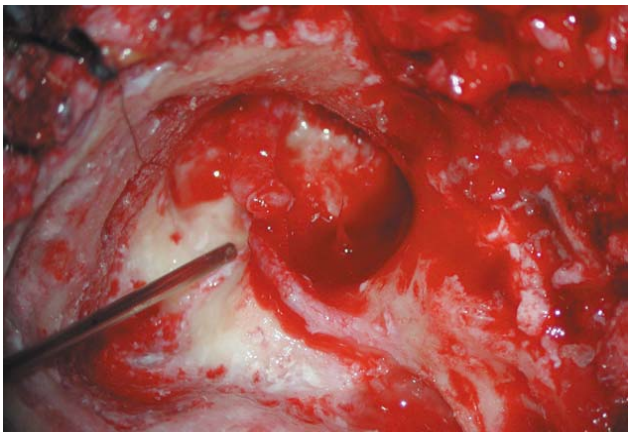
The incus separated from stapes

The incus separated from malleus but left attached to fossa incudis by its ligaments

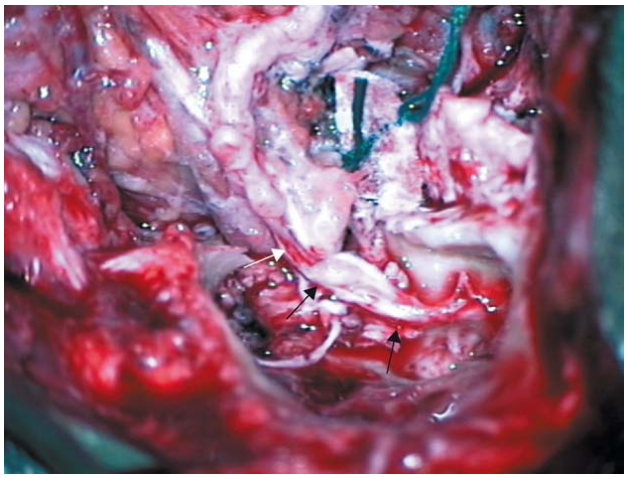
With the incus rotated towards mastoid the facial nerve can be followed proximal to cochleariform process

The incus is next rotated into middle ear so that the facial nerve can be exposed as it courses past the malleus head to form the geniculate ganglion and bent acutely back toward the horizontal semicircular canal as the labyrinthine segment

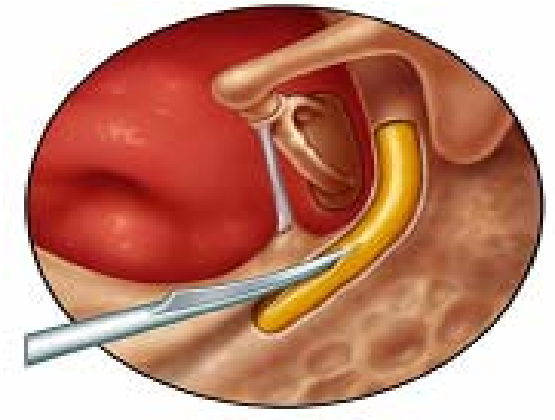
The bone is shaved away from the nerve using a 1 mm diamond burr, working from the geniculate ganglion towards the ampullated end of horizontal semicircular canal. The superior semicircular canal is skeletonized. Once the facial nerve is skeletonized from stylomastoid foramen to geniculate ganglion the shea th is opened and chorda tympani is divided.



MASTOID SEGMENT OF FACIAL NERVE



TEMPORAL PART OF FACIAL NERVE



INSCING NERVE SHEATH

The incus is then replaced in its anatomical position and wound closed

Advantages :

Provides excellent exposure of the mastoid and tympanic segments of the facial nerve. The geniculate ganglion and the take off of the greater superficial petrosal nerve can be uncovered if necessary which requires removal of incus which can be replaced at the end of the procedure.

Limitations :

Limited access to geniculate ganglion and inability to reach the labyrinthine segment

Possibility of conductive or sensorineural hearing loss

II. MIDDLE CRANIAL FOSSA APPROACH

A. Incision

An incision is made approximately 5mm anterior to tragus and then extended superiorly and curving first posteriorly then anteriorly for approximately 10 - 12 cm extending to the level of temporal fossa.

Skin flap is elevated and kept forward with a stay suture.

An incision is then made posteriorly, superiorly at the tendinous insertion of muscle which is reflected anteroinferiorly and held with silk suture.

B. Elevation of bone flap

5 cm square craniotomy opening made in squamous portion with two- third anterior and one third posterior to external auditory canal.

Incise bone with cutting burr

Thin plate of bone left over dura to preclude lacerating dura with burr

Bone fractured and removed with forceps to leave dura intact

C. Elevation of dura

Dura separated from margins of craniotomy defects.

As dura is elevated , first landmark to be identified at middle Cranial fossa is cranial enterance of middle meningeal artery at foramen spinosm which marks anterior limit of dural elevation..

Arcuate eminence is identified which passes parallel to petrous ridge from geniculate ganglion anteriorly to middle meningeal artery to which it lies medial

Greater superficial petrosal nerve is followed to the hiatus.

A hole made in the tegmen above geniculate ganglion via transmastoid approach.

Geniculate ganglion lies anterior to the hole.

D. Exposure of facial nerve

Using a large diamond burr facial hiatus identified and bone removed from hiatus to geniculate ganglion.

Thin shell of bone over ganglion should be left over

Labyrinthine segment followed from geniculate ganglion to the internal auditory meatus which courses parallel to superior semicircular canal

Bone removed about 50% of circumference.

Exposed nerve from geniculate ganglion to tympanic segment decompressed upto processus cochleariformis via transmastoid route.

Removal of a small piece of tegmen , the nerve can be traced to the site of prior exposure.

Avoid exposing head of malleus which can cause sensorineural hearing loss

Nerve sheath is opened .

Decompression is adequate when CSF flows

Advantage :

The only method that can be used to expose the entire internal auditory meatus and labyrinthine segment with preservation of hearing

Limitations:

- The anatomy of the floor of middle cranial fossa is quite variable and presents some difficulty in identification of landmarks
- Dural elevation can be difficult as it may be very adherent or it can be thin
- Persistent CSF leak
- Injury to internal auditory artery can result in loss of inner ear function
- Uncontrolled bleeding or injury to anterior inferior cerebellar artery

III. RETROLABYRINTHINE APPROACH

The retrolabyrinthine approach provides excellent exposure of the intracranial segment of facial nerve and may be performed after the mastoid and the middle cranial procedures have been completed.

This extension is associated with little additional risk, and is a means of ensuring that the intracranial portion of the nerve is intact.

It is recommended primarily in cases of severe head injury where intracranial portion of the nerve is suspected to have been injured.

In such cases, palsy of other cranial nerves and evidence of brainstem dysfunction are usually present as well as dysfunction of facial nerve.

This approach is not recommended as a routine part of facial nerve surgery

IV. TRANSLABYRINTHINE APPROACH

When there is total loss of function preoperatively, the most direct method of exposing the entire course of facial nerve is translabyrinthine approach..

A. Incision

A postauricular incision is made approximately 2 cm behind the postauricular crease.

The incision is curved anteriorly to allow anterior retraction of pinna. And posteriorly to allow access to the area behind the sigmoid sinus so that a

complete view of cerebellopontine angle along the posterior fossa dura is obtained

B. Bone removal and exposure of facial nerve

A complete mastoidectomy is done with removal of bone posterior to sigmoid sinus

The facial nerve is identified just beneath the horizontal semicircular canal, where its position is constant

After the mastoid cells have been removed to the level of labyrinth, the labyrinthectomy is completed by removal of all the semicircular canals.

During this course of this bone removal, the facial nerve is skeletonized in its tympanic and mastoid courses, leaving a thin shell of bone on the facial nerve to prevent inadverant injury.

Bone removal is then continued around the internal auditory canal until half of the circumference of the entire internal auditory canal including porus is exposed.

Inferiorly cochlear aqueduct is identified. Dissection must be limited to the area superior to the cochlear aqueduct as ninth, tenth, eleventh cranial nerves lie medial to the aqueduct.

After bone has been removed from the internal auditory canal, the lateral end of internal auditory canal is dissected away and the facial nerve is identified at its exit.

INCISING NERVE SHEATH

Using a diamond burr , the fallopian canal is thinned from the end of internal auditory canal to the geniculate ganglion and then distal from geniculate ganglion into its horizontal segment

Finally, the thin shell of bone is removed from the entire course of the facial nerve

D. Sectioning the cochlear and vestibular nerves

Advantages :

The entire length of the nerve can be exposed

Limitations:

The hearing and balance function must be sacrificed to obtain total exposure of facial nerve

V. COMBINATION APPROACHES

Middle cranial fossa approach is combined with transmastoid approach to obtain exposure of the entire nerve

NERVE GRAFTING

Whenever the continuity of the nerve has been compromised its continuity is restored by an end-end anastamosis if possible else with an interposition graft.

A nerve graft is a specialized conduit with tube containing schwann cells.

A nerve graft bridges the gap without tension.

It must match the proximal and distal endoneural surface to allow regeneration.

Length and axon volumes are the most crucial features of a nerve graft. It is these factors that help the clinician to choose an appropriate graft

DONARS AVAILABLE	LENGTH (cms)	DONAR SITE	NUMBNESS
Greater auricular nerve C2, C3	7 - 10	Upper neck	Ear lobe
Supraclavicular nerve C3, C4	10 - 15	Lower neck	Lower neck
Medial cutaneous nerve	10 - 15	Upper arm	Upper forearm
Lateral cutaneous nerve	15 - 20	Thigh	Lateral thigh
Saphenous nerve	25 - 40	Medial knee	Medial lower limb
Sural nerve	Upto 40	Lateral ankle	Lateral foot

LASER FACIAL NERVE DECOMPRESSION :

The ideal surgical laser for bone ablation is it should be able to cut or ablate bone with high precision and minimal injury to the surrounding tissues.

Of the currently available lasers, the Erbium – YAG (Er:YAG) is most suited for bone ablation. The Er:YAG laser provides a

pulsed output that minimizes heat accumulation in the target tissues and a precise efficient bone ablation .The energy of Er:YAG is not transmitted well enough through the currently available optical fibers to ablate bone, making the clinical applications limited.

The Ho: YAG laser is a pulsed infrared laser that functions at a wavelength that is transmitted well through optical fibers and readily ablates bone. However, the unacceptably high temperature generation and severe thermal injury to nerve limits its application.

The ultraviolet 308nm Excimer laser, which is capable of fiber optic delivery, also has been found to be quite effective in bone ablation and results in a very small thermal damage. This laser appears to ablate bone through a non thermal photoablative mechanism, and its ability to cleanly ablate bone is impressive. However this wavelength is found to be mutagenic.

The Free Electron Laser (FEL) which uses a beam of free electrons (not bond to atoms or molecules) in a vacuum that is directed through a magnetic field that forces the electrons to oscillate .This is under research.

Laser decompression of facial nerve is purely theoretical at this time because of lack of proper optical delivery system and the heat generated at most laser wavelength.

MATERIALS AND METHOD

This study was done at the Upgraded Institute of OtoRhinoLaryngology, Government General Hospital, Madras Medical College, Chennai- 3 during the period of 2007 – 2008.

This study consists of series of 20 patients with lower motor neuron type of facial paralysis who were screened with the following tests:

- Baseline investigations :
  - Complete hemogram
  - Renal function test.
- Pure Tone Audiogram
  - To evaluate if there is hearing loss
  - Type of hearing loss
- Electrodiagonostic Test

  Maximal stimulation test

- ♦ Topodiagnostic Test - To identify site of lesion
    - o Schrimer's test
    - o Impedence audiometry
    - o Taste over anterior two thirds of tongue
- ♦ High Resolution CT – Temporal Bone
    - o Evidence of temporal bone fracture

Patients with lower motor neuron facial paralysis with the following inclusion criteria were selected

- ✓ Intratemporal pathology confirmed by above tests
- ✓ Complete paralysis
- ✓ Immediate onset paralysis
- ✓ Delayed onset paralysis not responding to conservative management.
- ✓ Electrical evidence of loss of activity.

Patients who the following criteria were excluded from study

- Extra temporal (Intracranial/Peripheral) causes of facial paralysis
- Associated cerebrovascular accidents
- Electrophysiological study showing evidence of nerve regeneration

- Poor performance status
- Significant improvement with medical therapy
- Chronic suppurative otitis media with disease directly involving the facial nerve or neuroma formation

All the patients who underwent facial nerve decompression were followed up postoperatively and improvement assessed. House Brackmann's grading was used to evaluate patients.

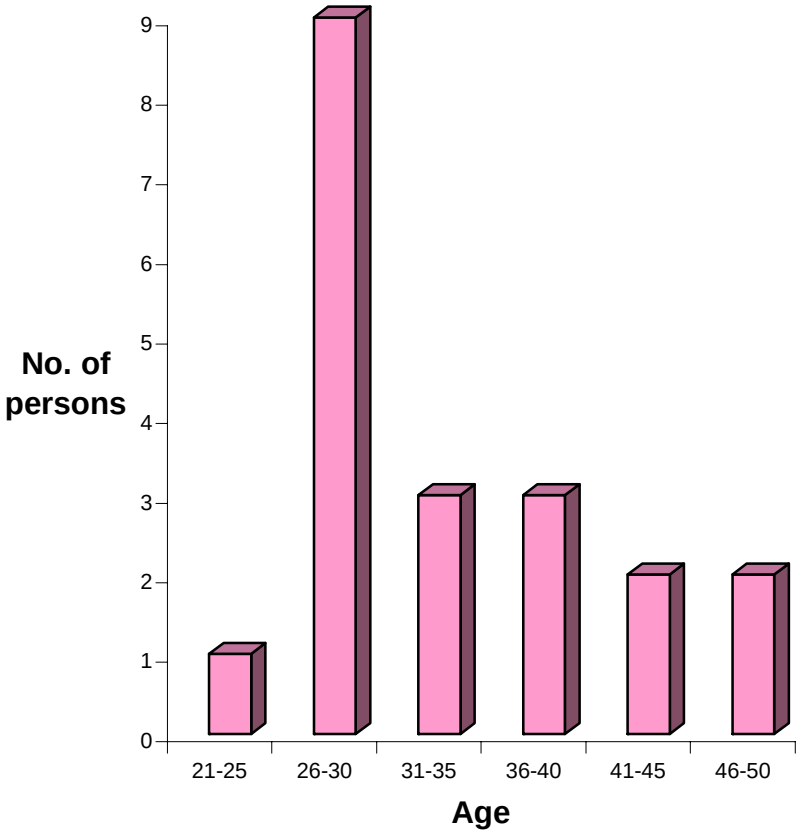
OBSERVATIONS AND RESULTS

The following results were obtained from the 20 patients whose facial nerve were decompressed and were followed up in our hospital. These patients were followed up postoperatively for 6 months.

I. AGE DISTRIBUTION

AGE GROUP	NO OF PATIENTS
21 - 25	1
26 - 30	9
31 - 35	3
36 -40	3
41 - 45	2
46 - 50	2

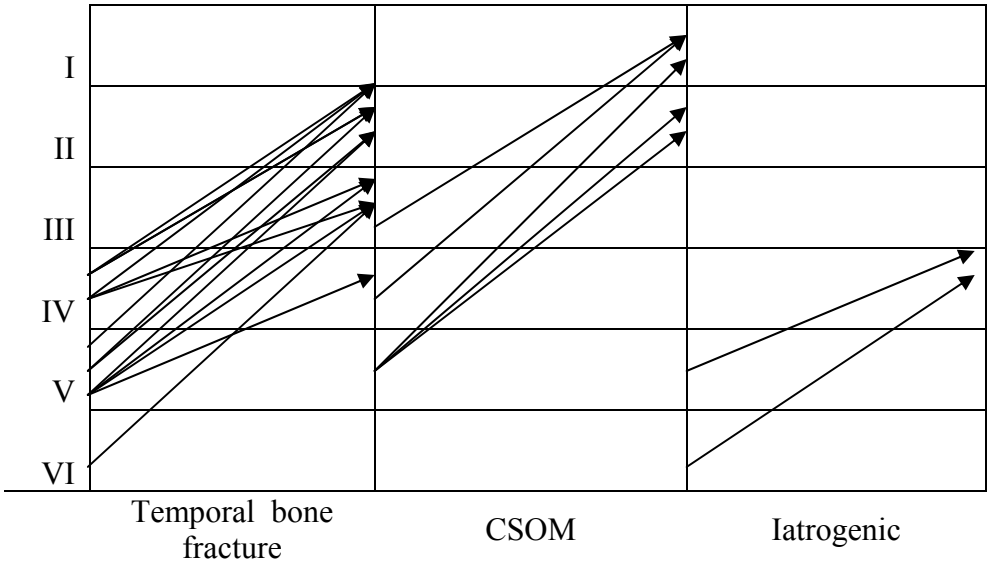
I. AGE DISTRIBUTION



II. SEX DISTRIBUTION

SEX	NO OF PATIENTS
Male	13
Female	7

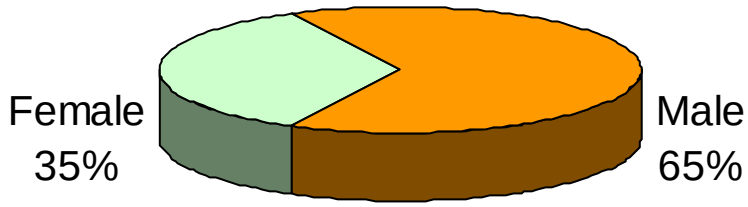
III. ETIOLOGY



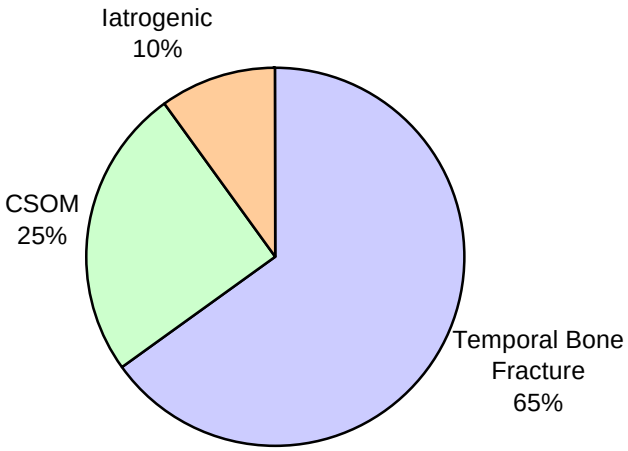
The vertical line on the left side of each column indicates preoperative grading of facial weakness and the one on the right side indicates postoperative grading

Improvement by Grade	Trauma	CSOM	Iatrogenic
1	3	0	1
2	5	1	1
3	5	3	0
4	0	1	0

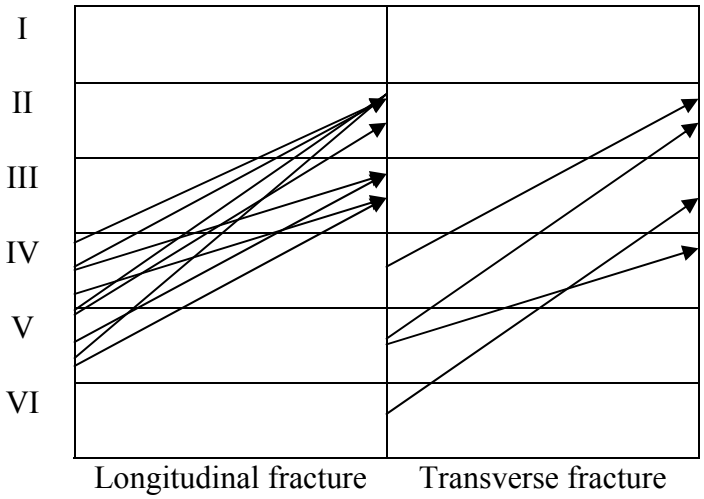
II. SEX DISTRIBUTION



III. ETIOLOGY



IV. TEMPORAL BONE FRACTURES



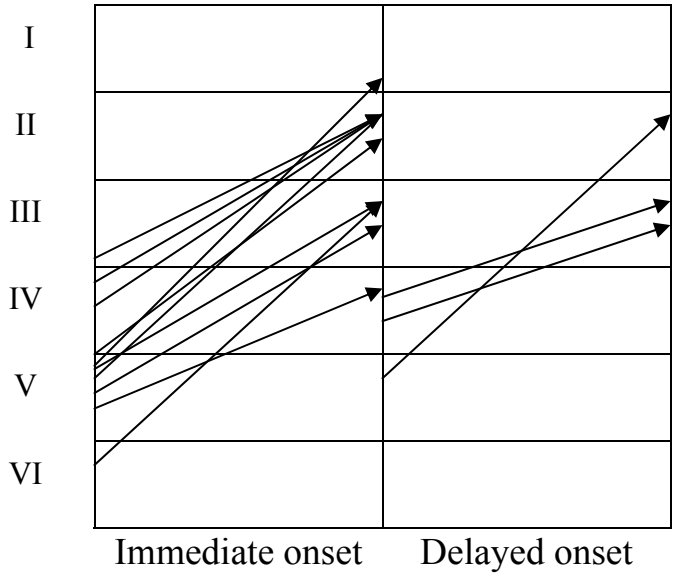
The vertical line on the left side of each column indicates preoperative grading of facial weakness and the one on the right side indicates postoperative grading

Improvement by Grade	LF	TF
1	1	1
2	5	1
3	3	2
4	0	0

Improvement by grades	Longitudinal fractures	Transverse fractures
≤ 2	6	2
>.2	3	2

(P= 0.68)

V. ONSET OF PARALYSIS



The vertical line on the left side of each column indicates preoperative grading of facial weakness and the one on the right side indicates postoperative grading

Improvement by Grade	Immediate onset	DelayedOnset
1	1	1
2	5	1
3	4	1
4	0	0

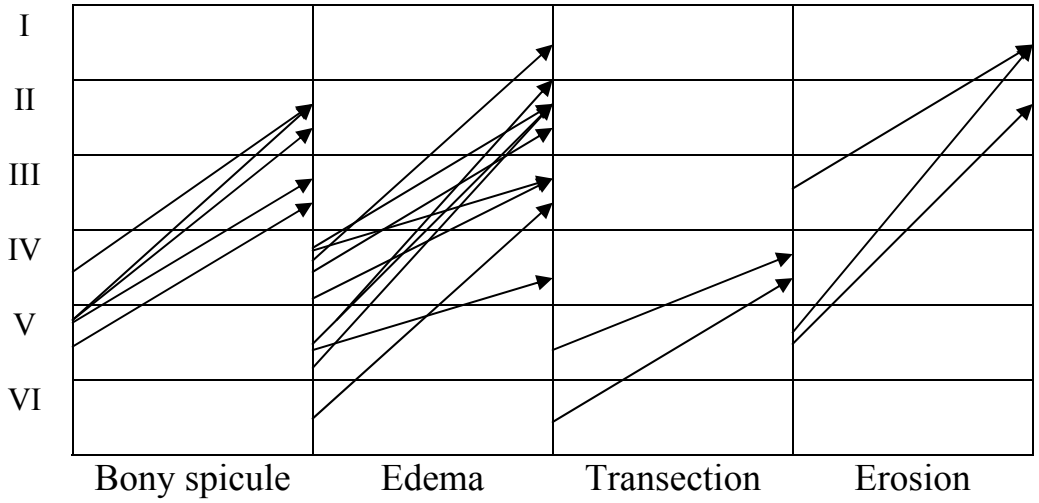
Improvement by grade	Immediate onset	Delayed onset
≤ 2 grades	6	2
> 2 grades	4	1

(P = 0.51)

VI. AUDIOLOGICAL EVALUATION :

TYPE OF HEARING LOSS	NO OF PATIENTS
Sensorineural	6
Motor	10
Mixed	4

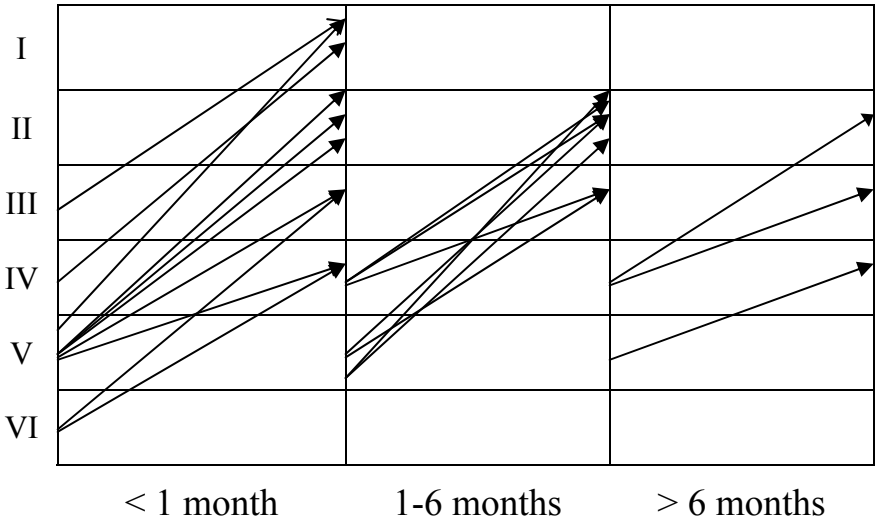
VII.PATHOLOGY



The vertical line on the left side of each column indicates preoperative grading of facial weakness and the one on the right side indicates postoperative grading

Improvement by Grade	BONY SPICULE	EDEMA	TRANSECTION	EROSION
1	0	2	1	0
2	3	3	1	1
3	2	5	0	1
4	0	0	0	1

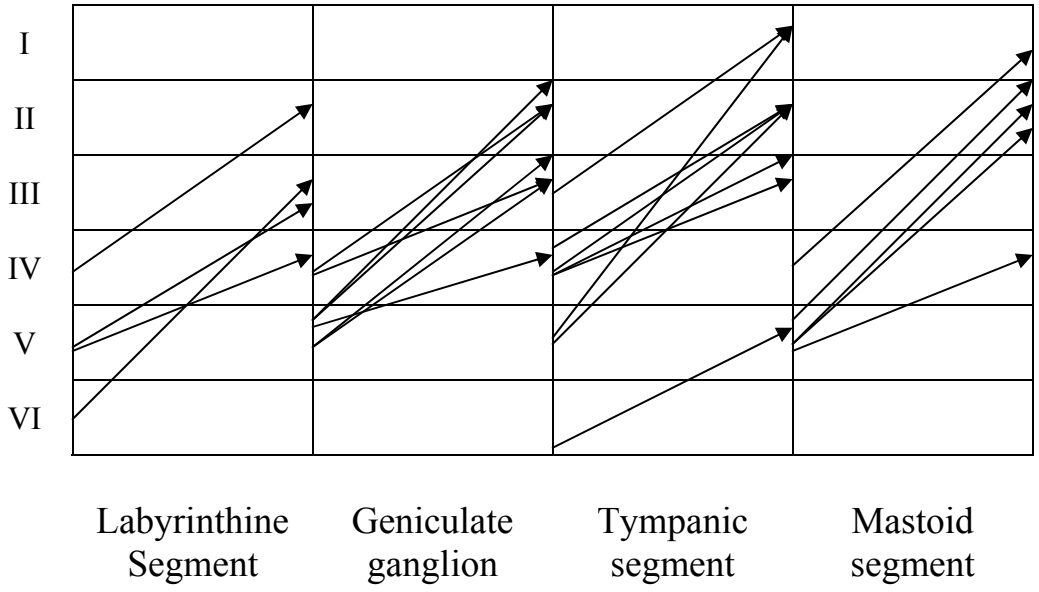
VIII. TIMING OF SURGERY:



The vertical line on the left side of each column indicates preoperative grading of facial weakness and the one on the right side indicates postoperative grading

Improvement by grades	< 1 month	1-6 months	> 6 months
1	1	0	2
2	3	4	1
3	5	2	0
4	1	1	0

IX.SITE OF INJURY:



The vertical line on the left side of each column indicates preoperative grading of facial weakness and the one on the right side indicates postoperative grading

Improvement by grades	Labyrinthine segment	Geniculate ganglion	Tympanic segment	Mastoid segment
1	1	2	2	2
2	2	3	4	0
3	1	2	1	3
4	0	0	1	0

DISCUSSION

In this study 20 patients with lower motor neuron type facial palsy where managed surgically by facial nerve decompression were analyzed.

I. AGE DISTRIBUTION

Among 20 patients mean age of presentation was 23-50 years, of which majority of the cases were in age group of 26 – 30 yrs.

Most of the cases was traumatic and were common in middle age group .

II. SEX DISTRIBUTION

Most of the patients 65% were males (n = 13) and the remaining 35% (n = 7)of the patients were females. Mean age of presentation among females were 23 – 48 yrs. Mean age of presentation among males were 26- 50 yrs.

Most cases of temporal bone fractures were seen in males whereas chronic suppurative otitis media were seen in females.

III . ETIOLOGY

Among the patients who underwent facial nerve decompression, majority 13/20 patients had temporal bone fractures, 5/20 patients had chronic suppurative otitis media, and 2/20 patients had iatrogenic facial nerve injury.

Among the patients with temporal bone trauma, most patients presented with grade IV – V paralysis which improved to grade III – II. 38.5 % (n=5) of patients improved by grade 2 and 3 each. The remaining 23% (n= 3) patients improved by 1 grade. Most patients showed significant improvement following decompression for traumatic facial nerve paralysis.

Of the patients with CSOM, 2 patients prevented with grade V facial nerve palsy, 1 with grade IV and 1 with grade III palsy. Of these 4 patients, 3 patients improved to Grade I i.e. normal and 1 patient to grade II. 60% of patient with CSOM improved by 3 grades,20% patients improved by 4 grades and remaining 20% patients improved by 2 grades .Patients who had

CSOM with minimal erosion of facial canal or edema of facial nerve whose nerve was decompressed along the entire course were followed up. In patients where the disease was directly involving the nerve or neuroma formation were excluded. Patients with CSOM improved well with facial nerve decompression.

Of the two patients with iatrogenic facial nerve injury, 1 patient underwent facial nerve decompression with neurolysis and the other patient had facial nerve grafting with greater auricular nerve. The patient who underwent facial nerve grafting improved by 1 grade and the other patient improved by 2 grades. Iatrogenic injury undergoing facial nerve decompression did not show much significant improvement.

Patients with CSOM showed better improvement following decompression, iatrogenic etiology patients showed least improvement.

IV. TEMPORAL BONE FRACTURES

Among the 20 patients, 13 patients had temporal bone fracture, 9/13 patients had longitudinal fractures and remaining 4/13 patients had transverse fractures.

Among the patients with longitudinal fracture majority presented with grade IV and V paralysis which improved to grade II and III.

Of the patients with longitudinal fracture 55.6% (n=5) showed improvement by 2 grades, 33.3% (n=3) showed improvement by 3 Grades and 11.1% (n=1) showed improvement by 1 grade.

Among the patients with transverse fracture presented with grade III – V improved to grade II and III.

Of the patients with transverse fracture 50%(n=2) showed improvements by 2 grades, 25% (n=1) showed improvement by 2 grades. Statistically there was no difference between the two types of fractures

V. ONSET OF PARALYSIS

Among the patients with temporal bone fracture, who underwent facial nerve decompression, patients with immediate onset paralysis were 76.9% (n=10) majority of them presented with grade IV – V who improved to grade II and III. 50% patients (n=5) improved by 2 grades, 40% (n=4) improved by 3 grades and 10% (n=1) improved by 1 grade. If the patients with delayed paralysis n=3 33.3%(n=1) patients improved by grades 1,2,3 each.

Statistically there was no significant difference between outcomes of facial decompression of immediate onset and delayed onset

VI.AUDIOLOGICAL EVALUATION :

Among the 20 patients , 6 patients had sensorineural hearing loss of which 3 patients had a transverse fracture and 3 patients had longitudinal fractures. The lesion was involving geniculate ganglion and labyrinthine segment. Of these 1 patient had a labyrinthine concussion. So a mild hearing loss which improved on follow up.

10 patients had conductive hearing loss and in most of the patients it was self limiting and improved. 1 patient had ossicular discontinuity which was confirmed intraoperatively and corrected.

4 patients had a mixed hearing loss . Most of these patients had a chronic suppurative otitis media

Most patients with total sensorineural hearing loss had a lesion involving labyrinthine segment. But a mild sensorineural hearing loss was seen in a patient with a lesion involving the horizontal segment due to

labyrinthine concussion. Patients who had conductive hearing loss improved during follow up.

VII. PATHOLOGY

On analysing the pathology found intraoperatively among patients who underwent facial nerve decompression

50% (n=10) had edema of facial nerve

25% (n= 5) had a bony spicule compressing on the facial nerve

15% (n= 3) had erosion of the fallopian canal with edema of facial nerve

10% (n= 2) had nerve transection

After opening the fallopian canal and incising the nerve sheath, 50% of patients with edema showed improvement by 3 grades, 30% showed improvement by 2 grades , 20% patients showed improvement by 1 grade.

Among the patients with a bony spicule impinging on the nerve 60% (n=3) patients showed improvement by 2 grades and 40% (n=2) patients showed improvement by 3 grades.

Among the patients who had transection of facial nerve one patient had partial transection which was repaired primarily and showed improvement by

2 grades. Other patient showed complete transection which was sutured with greater auricular nerve graft showed improvement by 1 grade.

Among the patients with erosion of bony fallopian canal and edema of the facial nerve, 33.3% (n=1) patient improved by grade 2,3,4 each.

Patients with edema of facial nerve had a better prognosis followed by those compressed with a bony spicule and worst prognoses was seen in patients with transection facial nerve.

VIII. TIME OF INJURY

Among the patients who had undergone facial nerve decompression the earlier the patient underwent decompression the better was the results. Of the patients decompressed within one month 55.5% (n=5) patients showed improvement by 3 grades, 33.3% (n=3) showed improvement by 2 grades, 11.1% (n=1) improved by 4 grades and 1 grade each. Majority of these patients had good improvement. Of the patients who had decompressed between 1-6 months , 57.1% (n=4) patients improved by 2 grades, 28.6% (n=3) improved by 2 grades, 14.3% (n=1) improved by 4 grades. The patients who are decompressed after 6 months showed less improvement in

facial weakness. 66.6% (n=2) improved by 1 grade and 33.3% (n=1) improved by 2 grades.

So to conclude the earlier the decompression, the better were the results.

IX. SITE OF INJURY

The site of injury was made out with HRCT temporal bone in 8/20 patients. In the remaining patients the site of injury was made out intraoperatively.the radiologically identified site of injury was confirmed intraoperatively

8/20 patients had injury involving tympanic segment, 7/20 patients had injury involving geniculate ganglion, 5/20 had injury involving mastoid segment and 4/20 patients had injury involving labyrinthine segment. Few patients had injury at multiple sites. 50% (n=2) of the patients with injury involving labyrinthine segment, 25% (n=1) improved by 1 and 4 grades each. Of the patients having lesion involving geniculate ganglion 42.8% (n = 3) patients improved by 2 grades, 28.6% (n = 2) of the patients improved by 3 grades and 28.6% (n = 2) of the patients improved by 1 grade. Of the patients having lesion involving horizontal segment 50% (n = 4) improved by 4 grades, 25%(n = 2) improved by 1 grade and 12.5% (n =1) improved by 3

grades and 4 grade each. Of the patients having mastoid segment 60% (n = 3) of the patients improved by 3 grades and 40% (n = 2) improved by 2 grades.

Patients with lesions involving mastoid segment had better prognosis , followed by those involving tympanic segment. Prognosis was poor in lesions involving labyrinthine segment.

Quaranta et al[17], 2001 studied retrospectively facial nerve decompression. 9 patients satisfied traditional electrophysiological criteria. They were operated between 27 –90 days after trauma.78% (n=7) showed improvement to grade I- II, the remaining 2 patients improved by grade III after 3 months follow up.

Lambert[18] , 1998 reviewed results of facial nerve decompression according to the type of temporal bone fracture, site of damaged facial nerve, pathology of nerve injury, timing of surgical intervention and method of decompression. No statistical difference with regard to type of temporal bone fracture, site of injury or epineural opening in method of decompression. The site of major pathology in this study were geniculate ganglion, labyrinthine segment, tympanic and mastoid segment respectively. Final recovery was worst in

cases with injury to labyrinthine segment but with no significant statistical difference.

Angelo et al[28] , 2007 studied piezosurgery in facial nerve decompression. Piezosurgery proved effective in sclerotic and pneumatic mastoid. This approach results in decreased blood loss and better visibility in surgical field. No side effects were detected during unintentional contact with the nerve. There was complete recovery on follow up.

Rafa E quinonez et al [29], studied 20 patients who underwent facial nerve decompression for complete facial palsy, 6- temporal bone fracture, 7- bell's palsy, 7- Ramsay Hunt syndrome.16 patients were treated by transmastoid route, 4 by middle cranial fossa approach.. 55% improved to grade II, 45 % to grade III.

Mckennan and chole[30], 1992 studied the outcomes of surgical decompression performed in 14 patients with immediate onset paralysis. 8 patients had nerve transection. Of the remaining , 4 improved to moderately severe dysfunction. The remaining 2 patients showed mild dysfunction. It was concluded that nerve transection showed a poor prognosis

Darrouzet et al[31] , 2001 retrospectively studied 115 patients with posttraumatic facial paralysis. Immediate palsy and electro physiologically severe facial paralysis with a fracture line in CT were surgically intervened. Delayed or severe paralysis with a mixed electro physiological pattern were managed medically. 80% patients had immediate onset paralysis, 3% delayed onset paralysis, 17 % unknown delayed paralysis. 94% showed improvement to grade I – III, 6% to grade IV.

Keki turel et al [32],studied post traumatic facial paralysis treatment options and strategies. Out of 10 patients , 4 had severe facial paralysis (group 1- grade 5) and 6 had very mild to moderate facial paralysis (group-2, grade 2 to 3). All these patients were followed by conventional EMG at interval in 3-6 months. Group 2 patients recovered completely in 6-8 months whilst group 1 patients converted to moderate facial weakness

Dragoljub et al[33], studied traumatic facial paralysis . it was predominantly incomplete (62.9%) with other otological symptoms. The temporal bone fracture was verified in 88.6% of the patients the nerve edema and fracture line are often found. Various surgical techniques were applied such as

decompression in 84%, termino-terminal anastomosis in 9% and nerve transplant in 7% of the cases. The facial nerve function recovery was fast and good in nerve decompression group while anastamosis and transplant were similar with poorer and slower recovery.

SUMMARY AND CONCLUSIONS

All the patients undergoing facial nerve decompression were analyzed and the outcomes were observed

1. The most common age group presented in our study was between 26- 30 years. Most of the patients were females.
2. The etiological study showed the most common cause to be trauma with temporal bone fractures.
3. Patients with infective etiology showed better outcome whereas those with iatrogenic facial palsy showed worst outcome
4. Surgical therapy of precisely determined case of temporal bone fractures gives good result.
5. Decompression of facial nerve had a better outcome than nerve grafting
6. The type of temporal bone fracture showed no difference in degree of improvement

7. The degree of improvement obtained in cases with immediate onset and delayed facial paralysis showed no difference
8. The HRCT was able to identify the site of lesion in 40 % of patients. Spiral CT could improve the accuracy of identifying the site of lesion.
9. The earlier the intervention , the better were the results. However there was significant improvement in facial weakness in patients who were operated even after 6 months.
10. Transection of nerve had worse prognosis when compared to edema of facial canal
11. Labyrinthine segment and geniculate ganglion had worse outcome than those involving mastoid or tympanic segment

PITFALLS IN THE STUDY

1. An ideal reporting system for grading facial weakness is not available. The most commonly used House- Brackmann's grading has inter observer variation
2. The grading system used for assessing improvement is a qualitative grading system , so an appropriate statistical analysis could not be used
3. Analysis was based on improvement by the number of grades. Improvement from grade VI – IV is not the same as the improvement from grade III – I , which was considered as improvement by 2 grades for analysis
4. Sample size was small to arrive at definitive conclusions

Follow up time to show significant improvement was variable between patients, which was not taken into consideration. Nerve grafting takes a longer time to show improvement in facial nerve weakness. So a standardized period of follow up can produce fallacies.

PORFORMA

CASE NO:

NAME : IP NO :

AGE : OP NO:

SEX : D.O.A:

OCCUPATION: D.O.S:

INCOME: D.O.D:

ADDRESS:

PHONE NUMBER:

PRESENTING ILLNESS:

1. EAR DISCHARGE
2. EAR PAIN
3. HARD OF HEARING
4. SYMPTOMS OF FACIAL WEAKNESS
    - ABSENCE OF WRINKLING OF FOREHEAD
    - EYE CLOSURE
    - DEVIATION OF ANGLE OF MOUTH
    - LOSS OF TASTE
5. TINNITUS
6. VERTIGO
7. H/O TRAUMA

8. FEVER
9. SYMPTOMS OF INTRACRANAIAL COMPLICATIONS
    - HEADACHE
    - VOMITING
    - SEIZURES
10. H/O SURGERY

PAST HISTORY:

FAMILY HISTORY:

PERSONNEL HISTORY:

EXAMINATION:

EAR:

PREAURICULAR REGION

PINNA

POSTAURICULAR REGION

EXTERNAL CANAL

TYMPANIC MEMBRANE

MASTOID TENDERNESS

TFT: RINNE

WEBER

ABC

FACIAL NERVE

WRINKLING OF FOREHEAD

CLOSURE OF EYE

NASOLABIAL FOLD

DEVIATION OF ANGLE OF MOUTH

TASTE OVER TONGUE

FISTULA TEST

VESTIBULAR SYSTEM

NOSE:

THROAT:

DIAGNOSIS :

PLAN:

INVESTIGATIONS

BASELINE INVESTIGATIONS – HEMOGRAM

- RENAL FUNTION TEST

CHEST X RAY

ECG

X RAY MASTOID

HRCT TEMPORAL BONE

AUDIOGRAM

MAXIMAL STIMULATION TEST

SURGERY:

APPROACH:

INTRAOPERATIVE FINDING:

POST OPERATIVE FOLOW UP

MASTER CHART

Sl.No	Name	Age	Sex	IP NO	Etiology	Fracture	Onset	Pathology	Time of surgery	Site of lesion	HBG PREOP	POST OP
1	Velu	35	M	41784	TBF	LF	Immediate	Bony Spicule	1mth	GG+LS	V	III
2	Sudhakar	42	M	40708	TBF	LF	Delayed	Edema	3mths	HS	IV	III
3	Linganathan	30	M	34521	TBF	LF	Delayed	Edema	6mths	GG+LS	IV	III
4	Narayanan	26	M	31098	TBF	LF	Immediate	Bony Spicule	5mths	GG	V	III
5	Chandran	30	M	56922	TBF	LF	Immediate	Bony Spicule	< 1mth	HS	V	II
6	Jayganesh	27	M	15703	TBF	LF	Immediate	Bony Spicule	3 mths	MS	V	II
7	Subramani	50	M	40380	TBF	LF	Immediate	Edema	3 mths	HS	IV	II
8	Amudha	40	F	84258	TBF	LF	Immediate	Edema	4 mths	GG	V	II
9	Ravi Shankar	32	M	7632	TBF	TF	Delayed	Edema	3 mths	GG	V	II
10	Prabakaran	30	M	63214	TBF	TF	Immediate	Edema	< 1mth	LS	VI	III
11	Maria Das	26	M	39803	TBF	TF	Immediate	Bony Spicule	6 mths	GG+LS	IV	II
12	Aruna devi	23	F	76363	Iatrogenic	---	---	Transection (Partial)	< 15 days	HS	VI	IV
13	Sumithra	27	F	19775	Iatrogenic	---	---	Complete Transection	< 15 days	MS	V	IV
14	Surya	32	F	40426	CSOM	---	---	Edema	< 15 days	MS	IV	I
15	Nehamadhu	40	F	5622	CSOM	---	---	Edema	< 15 days	MS	V	II
16	Jamuna	48	F	5859	CSOM	---	---	Erosion	< 15 days	HS	V	I
17	Vanamyel	36	F	28769	CSOM	---	---	Erosion	< 1 mth	HS	III	I
18	Dhinesh	30	M	26549	CSOM	---	---	Erosion	< 1 mth	MS	V	II
19	Kumar	30	M	17852	TBF	LF	Immediate	Edema	3 mths	HS	IV	II
20	Jagan	41	M	21743	TBF	TF	Immediate	Edema	6 mths	GG+LS	V	IV

ABBREVIATIONS

TBF - Temporal Bone Fracture

LF - Longitudinal Fracture

TF - Transverse Fracture

GG - Geniculate Ganglion

LS - Labyrinthine Segment

HS - Horizontal Segment

MS - Mastoid Segment

HBG – House Brackmann's Grading

IO - immediate onset paralysis

DO - delayed onset paralysis

CSOM – chronic suppurative otitis media

INSTITUTIONAL ETHICAL COMMITTEE

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K.Dis.No.16328 P & D3/Ethics/Dean/GGH/08 Dated: 8.9.2008

Title of the work : "Analysis of ~~the~~ outcomes of facial Nerve decompression"

Principal Investigator : Dr- R. Valli

Department : ENT, MMC & RGGGH.

The request for an approval from the Institutional Ethical Committee (IEC) was considered on the IEC meeting held on 10th September 2008 at 2 P.M in Government General Hospital, Deans, Chamber, Chennai-3.

The members of the Committee, the Secretary and the Chairman are pleased to approve the proposed work mentioned above, submitted by the principal investigator.

The principal investigator and their term are directed to adhere the guidelines given below:

1. You should get detailed informed consent from the patients/participants and maintain confidentiality.
2. You should carry out the work without detrimental to regular activities as well as without extra expenditure to the Institution or Government.
3. You should inform the IEC in case of any change of study procedure, site and investigation or guide.
4. You should not deviate form the area of the work for which I applied for ethical clearance
5. You should inform the IEC immediately, in case of any adverse events or serious adverse reactions.
6. You should abide to the rules and regulations of the institution(s)
7. You should complete the work within the specific period and if any extension of time is required, you should apply for permission again and do the work.
8. You should submit the summary of the work to the ethical committee on completion of the work.
9. You should not claim funds from the Institution while doing the work or on completion.
10. You should understand that the members of IEC have the right to monitor the work with prior intimation.

SECRETARY
IEC, GGH,CHENNAI

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DEAN
GGH &MMC, CHENNAI

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