



HISTORY OF NEUROSURGERY/ INDIAN NEUROSURGERY AND NEUROSURGICAL GIANTS

Presented by : Amit Thapa



Neurosurgery

“Only the man who knows exactly the art and science of the past and present is competent to aid in its progress in the future”

Christian Albert Theodor Billroth

Neurosurgery

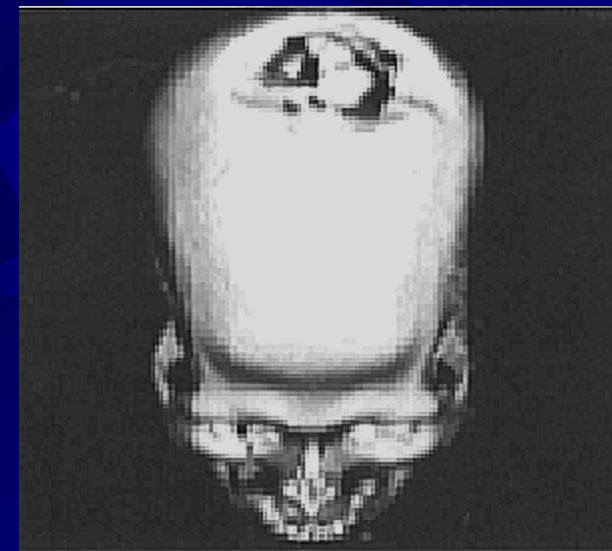
1700 B.C.- Edwin Smith surgical Papyrus

460- 377 B.C., Hippocrates, Greece

“Father of Medicine”



ANCIENT
SURGICAL
INSTRUMENTS
LIKE THIS
TREPANATION
KNIFE FROM
THE MIDDLE
CHIMU ERA
(CICA 1200 - 1400)
ARE FREQUENTLY
FOUND
IN ARCHEOLOGICAL
SITES
THROUGHOUT
THE WORLD.
ONE OF
THE EARLIEST
INSTRUMENTS
UNEARTHED IS
DATED FROM
ABOUT
300 B.C.
OF THE
MOCHICA PERIOD.



Circa 5100 B.C.--Ensisheim, France

Neurosurgery

History of Neurosurgery- 3 epochs

1. 3 technological advances

1. Cerebral localization theory
2. Antiseptic/ aseptic techniques
3. Anesthesia- general / local

2. Neurosurgery becomes distinct profession

Neurosurgery

1. Pre-modern: before Macewan, 1879
when all 3 tenets used in practice
2. Gestational: 1879- 1919
transition into distinct profession
3. Modern: after Cushing, 1919
develops into distinct profession
4. Contemporary: present day
operative microscope, imaging advances, GKS

Neurosurgery

★ 1835- 1911, John Hughlings Jackson:
Founder of cerebral localisation & Neurology

★ Cerebral localization of function:
1881, International Medical Congress, London
Goltz Vs Ferrier

★ 1888, Victor Horsley: *cortical map*

★ Charles Sherrington (1857-1952):
'Father of Modern Neurophysiology'
1906, *'The integrative Action of the nervous system'*

Neurosurgery

★ 1846: Anesthesia

★ 1867: Antisepsis

★ 1883, Camillo Golgi: Nerve network doctrine

★ Cajal: Neuron theory

★ Waldeyer: coined 'Neuron' for independent nerve unit

★ 1891: Asepsis

Neurosurgery

- ★ 1870, Ernst von Bergmann, Germany
1st Textbook on surgery on nervous system
- ★ 1876, Pierre Paul Broca, Paris :
1st to localize & drain brain abscess
- ★ Sir William Macewan :
1879- localized + excised tumor (meningioma)
1883- Laminectomy

Neurosurgery

- ★ 1884, Francesco Durante *diagnosed & removed Olfactory groove meningioma*
- ★ 1888, William Bennett- *posterior rhizotomy for pain*
- ★ 1908, Fedor Krause-
Founder of German Neurological surgery
1st to study human cerebral cortex in detail
- ★ 1929, Berger : *introduced EEG*
- ★ 1935, Foerster & Altenburger: *1st described EEG*

Neuroendoscopy

★ 1879, Max Nitze- *1st modern endoscope*

★ 1910, L' Espinasse- *1st NSx endoscope*

★ *Fulguration of choroid plexus*

★ 1922, Walter Dandy-

★ *Endoscopic choroid plexectomy*

★ 1923, Mixter- *1st ETV using urethroscope*

Neuroradiology

- ★ 1895, Wilhelm Conrad Rontgen : *X rays*
- ★ 1901, Oppenheim : *Cranial Roentgenology*
- ★ Walter Dandy: *Ventriculography*
- ★ Arthur Schuller: *Father of modern Neuro-radiology*
- ★ 1947, George Moore: *Radionuclide imaging*
- ★ 1960s, Lars Leksell: *GKS*

Neurosurgery

★ William William Keen Jr:

Pioneer american neurological surgeon
Suture duramater - *decrease CSF leak*

★ **1920, Society of Neurological surgeons**

Harvey Cushing (President)

Ernest Sachs (Secretary Treasurer)

Charles H Frazier

Edward Archibald



Neurosurgery

World Federation of Neurological Societies

- ★ Founded in 1955
- ★ Brain child: Dr William B Scoville, Connecticut
- ★ Sir Geoffrey Jefferson, England (President)
- ★ First congress in 1957

Neurosurgery

- ★ 1910, Oscar Hirsch-
Trans-septal approach to pituitary
- ★ 1932, W Gayle Crutchfield- *skeletal traction for cervical spine fractures*
- ★ 1952, Irving Cooper-
Chemo-pallidectomy for parkinsonism

Microneurosurgery

- ★ 1892; 'microsurgery'- neurologic pathway, amphibia
- ★ 1950s: William Lougheed in lab
- ★ 1957: Theodore Kurze & William House, *acoustics*
- ★ 1960: Julius Jacobson- *1st microvascular neurosurgery*
MCA embolectomy
- ★ 1962: Jules Hardy, *M/E TNTS*
- ★ 1964: Robert Rand, *M/E Aneurysm Sx*
- ★ 1967: M Gazi Yasargil, *1st EC-IC bypass*
- ★ 1967: Jannetta & Rand, *CN V decompression*



Indian Neurosurgery

Legend and History

- ★ Hindu mythology-

Ganesha: First recipient of head transplant

- ★ Sushruta- '*Sushruta Samhita*'

- ★ '*Jivaka*' - *personal physician of Lord Buddha*
Removed intracranial tumors through trephine hole

Indian Neurosurgery

Legend and History

★ 2 drugs- '*sammohini*' and '*sanjivini*'

★ Neurology flourished before birth of Christ

★ **Yoga**- means to realise one's true self

★ Madras & Calcutta Medical College, 1835

★ Grant Medical College, 1848

Indian Neurosurgery

Legend and History

PRE- INDEPENDENCE

- ★ 1935, Col Anderson- *Trans-sphenoidal Hypophysectomy*
- ★ Bombay:
 - Ardeshir P Bacha, GV Deshmukh, RN Cooper, AV Baliga
- ★ Madras:
 - NS Narasimhan, CP Vishwanatha Menon, U Mohan Rao
- ★ Amritsar: Col R Mirajkar, Baldev Singh
- ★ Bangalore: Balakrishna Rao

Indian Neurosurgery

Legend and History

POST- INDEPENDENCE

★ Ram Ginde (Canada), Omar Jooma (UK)

★ Jacob Chandy:

- 1946, Montreal Neurological Institute

★ Narasimhan:

- 1946, New York Neurological Institute
- 1948, Private NSx and EEG clinic (Madras)

★ Ramamurthi: 1948, UK

Indian Neurosurgery

Legend and History

★ Jacob Chandy:


1949, 1st N.Sc Dept at CMC, Vellore

★ B Ramamurthi:

*1950, N.Sx Dept, Madras Medical College
Later became Institute of Neurology*

★ Ram Ginde:

1953, N.Sx Dept, Seth GSMC & KEM, Bombay



Indian Neurosurgery

Early Challenges

- ★ Misconceptions: brain tumors rare in indians
- ★ Brain tumors remained undiagnosed
- ★ Fear amongst public about brain surgery
- ★ 90% patients seen were blind
- ★ Few facilities for diagnosis and even fewer Rx
- ★ High operative mortality
- ★ Resource Crunch

Indian Neurosurgery *Leaders*

- ★ Col Ray: 1st Indian Army Neurosurgeon
- ★ R N Chatterjee, Calcutta (1955)
- ★ Victor Rao, Delhi (1956)
- ★ Balaparameswara Rao, Vishakapatnam (1956)
- ★ Dayanand Rao, Hyderabad (1957)
- ★ Homi Dastur, Bombay (1958)
- ★ R M Varma, Bangalore (1958)
- ★ P N Tandon, Lucknow (1961)
- ★ Desraj Gulati, Chandigarh (1962)

Indian Neurosurgery *Leaders*

★ Dr Baldev Singh:

- ★ Founder of Modern Neurology in India
- ★ Dr T K Ghosh: another father figure

★ University of Madras: 1st recognized NS as speciality

★ CMC, Vellore & Madras Medical College,
Madras: 1st started training programs

★ MS Neurosurgery: Madras University, 1961

★ Dr K V Mathai: CMC, Vellore first recipient

Indian Neurosurgery

Neurological Society of India

- Founder President: Dr Jacob Chandy
- Founder Treasurer: Dr Baldev Singh, S T Narasimhan
- Founder Secretary: B Ramamurthy
- 8th December, 1951
- 1st Meeting: Hyderabad, 1952; 32 members
- 1953, Journal of NSI
- 1974, Started CME
- 1985, Progress in Clinical Neurosciences
- NSx subsection: member of WFNS

Neurosurgical Giants

William Halsted

★ 'Asepsis' practice

★ Rubber glove

★ Surgical technique

- Gentle dissection

- Fine silk ligature to secure vessels "only"

- Sealing wound with silver foil

- Avoidance of drainage and frequent dressing

★ Cocaine as local anaesthetic agent- 'truncal block'

Neurosurgical Giants

Sir William Macewan



1848- 1924 . Pioneer Scottish Neurosurgeon

Chief pioneer of Craniocerebral surgery

Antiseptic to aseptic surgery,

Abandon wooden instruments

2 great advances

- 1st to explore brain & spinal cord on basis of localized neurological dysfunction
- Study pyogenic infection of brain and spinal cord

Neurosurgical Giants

Sir William Macewan



Introduce

- Endotracheal intubation in place of tracheostomy (1880)
- New radical cure of hernia
- Chromic catgut
- Pneumonectomy (1895) - 'severe' tuberculosis

Transplantation of bone-

- repair of skull defect

Neurosurgical Giants

Victor Horsley

1857- 1916

Founder of modern Neurological Surgery
'First specialized surgical neurologist'

3 contributions

1. Experimental research

Electrical stimulation of motor area, rhesus monkey
- localization, 1888 Horsley's cortical map

Surface markings for the underlying cortex

Epilepsy

Motor function of internal capsule

Cerebral edema

Artificial respiration



Neurosurgical Giants

Victor Horsley



Forms of treatment

Acceptable operative mortality

Antiseptic technique

Smooth anaesthesia- preferred chloroform over ether

Excision of gasserian ganglion- *trigeminal neuralgia*

Significance of *papilledema*

Decompression to save eyesight in *raised ICP*

1887, removed spinal neoplasm

Decompressive laminectomy for *potts*

Craniectomy for *microcephaly*

2^o debridement - infected craniocerebral wound

Lumbar Drain to decrease ICP

Neurosurgical Giants

Victor Horsley



Surgical craft

Dexterity - Speed of operating

small vessel hemorrhage- hot saline douches

bone bleed- *'bone wax'*

use muscle to control bleed

curved skin incision

1886, 1st Sx for focal epilepsy

1890, retrogasserian neurotomy - *tic douloureux*

+ Clarke (1908)- stereotaxic apparatus

Neurosurgical Giants

HARVEY WILLIAMS CUSHING



★ April 8, 1869- October 7, 1939

★ American first neurosurgeon, Father of modern NSx

★ W S Halsted & William Osler- teachers

★ + Ernest Amory Codman: 1st anaesthetic , “Ether Chart”

★ First to map human cerebral cortex with faradic stimulation in conscious patients

★ March 1909, first operation for acromegaly

★ 1910, small silver clip (Cushing’s clip).

Neurosurgical Giants

HARVEY WILLIAMS CUSHING



- ★ Introduced suction to deal with
blood in deep recesses of brain
- ★ Described Cushing's law & Cushing's triad
- ★ + Dr William Bovie: electric coagulation (1926)
- ★ Defined acoustic neuroma & syndrome of CPA
- ★ Syndromes & Clinical entities:
 - ★ Cushing's Syndrome
 - ★ Rokitansky Cushing Ulcer
 - ★ Neurath-Cushing syndrome
 - ★ Cushing's symphalangism

Neurosurgical Giants

HARVEY WILLIAMS CUSHING



Standardisation of Surgical techniques-

- *Compressing scalp for hemostasis,*
- *Waxing the bone edges,*
- *Hemostatic clips,*
- *Electrocautery, motor driven suction*

Classified brain tumors with Percival Bailey

Exp with cocain nerve blocks,

- coined ' regional anaesthesia'

Medical Historian: Biographer of Sir William Osler
(Pulitzer, 1926)

Neurosurgical Giants

Walter Edwards Dandy



April 6, 1886- April 19, 1946

- ★ + Kenneth Blackfan, established modern concept of **circulation of CSF** and **hydrocephalus**.
- ★ Developed choroid plexectomy, third ventriculostomy and catheterisation of aqueduct of sylvius
- ★ First to discover **pneumoperitoneum**
- ★ **Ventriculography** in 1918.
- ★ Expose & resect **pineal tumor**

Neurosurgical Giants

Walter Edwards Dandy



- ★ 1917, Remove 1st acoustic neuroma completely
- ★ Pioneer in Sx of **AVM and intracranial aneurysm**
(clip aneurysmal neck)
- ★ Rx Meniere's disease by sectioning CN VIII
- ★ First to **intracranially section CN IX** -
Glossopharyngeal neuralgia.
- ★ Section sensory root of CN V - *tic douloureux*
- ★ "Dandy's embryo"

Neurosurgical Giants

Antonio Egas moniz



- ★ Portugese neurologist, Lisbon: 1874-1955
- ★ 1920s-Cerebral angiography & encephalography (Nominated for nobel prize, 1928)
- ★ **Founder of neuroradiology**
- ★ 1935- prefrontal leucotomy for schizophrenia (Nobel prize, 1949)
- ★ Coined term – psychosurgery.

Neurosurgical Giants

Francesco Durante



1844-1934

Durante- Conheim theory:

- *genesis of tumors from enclosed embryonic rests*

General surgery:

- Cure of surgical TB with iodo-iodurate
- cuneiform resection of knee articulation
- Partial/ total astragalectomy
- First arterial suture

Successfully removed olfactory groove meningioma

Osteoplastic flap

Hypophysectomy by pharyngeal approach

Neurosurgical Giants

Fedor Krause

★ 1856- 1937

★ **Father of German surgical neurology**

★ Extensively used radiography for diagnosis

★ 'Modified' Preganglionic resection of CN V-
trigeminal neuralgia

★ Transfrontal craniotomy- pituitary tumors

★ Acoustic neuromas-

★ sitting position, intradural posterior fossa craniectomy

★ Suprasellar subtentorial approach
to pineal gland & posterior third ventricle

Neurosurgical Giants

Otfrid Foerster



★ 1873- 1941

★ Foerster's operation: *dividing posterior roots did not cause spasticity in hemiplegic*

★ Defined dermatomal borders

★ Anterolateral cordotomy: for pains

★ Successful removal of intramedullary tumor

★ Surgery for post traumatic epilepsy

★ + Altenburger: 1st EEG of brain tumor

★ Hyperventilation to evoke seizure

★ Coined psychomotor epilepsy

Neurosurgical Giants

Wilder Graves Penfield



- ★ 1891- 1976, “Greatest living canadian”
- ★ Centrencephalic theory of generalised epilepsy
- ★ + Herbert Jasper: Montreal procedure
 - t/t seizure by destroying originating nerve cells
- ★ ‘Penfield dissector’
- ★ “Montreal neurological institute”



Neurosurgical Giants

A Earl Walker

- ★ 1907- 1995
- ★ Topical application of penicillin (EEG)
- ★ Stereotaxic or functional neurosurgery
- ★ Post traumatic epilepsy
- ★ Anatomic studies on thalamic systems
- ★ Dandy Walker syndrome

Neurosurgical Giants

William H Sweet

- ✦ + Gordon Brownell- PET
- ✦ Boron Neutron Capture therapy for brain tumors
- ✦ Pituitary stalk section –
 - ✦ diabetic retinopathy
- ✦ Percutaneous thermal rhizotomy
 - ✦ Trigeminal neuralgia
- ✦ hypothermia during neurosurgical operations
- ✦ First carotid bifurcation reconstruction



Neurosurgical Giants

Irwing S Cooper

- ★ **Pioneer in functional neurosurgery**

- ★ **Parkinson Disease**

- ligated anterior choroidal artery to control tremor and rigidity

- chemopallidectomy and cryothalamectomy

- ★ **electrical stimulate cerebellum/ thalamus**

- to treat spasticity

Neurosurgical Giants

Mahmud Gazi Yasargil

- ★ Turkish, **Greatest 20th century neurosurgeon**
- ★ **Founder of microneurosurgery**
- ★ 1967: first cerebral vascular bypass under M/E
- ★ Invented
 - ★ floating microscope,
 - ★ self retaining adjustable retractor,
 - ★ microsurgical instruments,
 - ★ ergonomic aneurysm clips and appliers



Neurosurgical Giants

Albert Rhoton Jr

- ★ University of florida
- ★ Fatherly figure for microscopic neurosurgery
- ★ Brain anatomy - microsurgical perspective
- ★ Microneurosurgical techniques



Neurosurgical Giants

Prof. Balasubramaniam Ramamurthi

★ 1922–2003

★ October 24, 1950 started the neurosurgical service at the Government General Hospital, Chennai.

★ December 8, 1951 - Neurological Society of India- founder Secretary

★ First editor of *Neurology India*

★ 1970, Institute of Neurology
- 1st comprehensive neurosciences center, South Asia

Neurosurgical Giants

- ★ Herbert Olivercrona- *AVM, parasagittal meningioma*
- ★ Norman McOmish Dott- *aneurysm, facial pain*
- ★ Sir Geoffrey Jefferson- *atlas #*
- ★ Charles Harrison Frazier
 - ★ *subtemporal approach (tic douloureux), cordotomy*
- ★ Charles Albert Elsberg- *spinal cord surgery*
- ★ James Clark White- *ANS, chronic pain, neuroprotection*
- ★ William Jason Mixer- *herniated PIVD, spinal injuries*

Neurosurgical Giants

- ★ Max Minor Peet- *pineal gland, sensory root (gasserian ganglion) division, 50% dextrose in raised ICP, arterial HTN (B/L splanchnic section), favored local anaesthesia*
- ★ Kenneth G Mckenzie- *TCS, clips, skull tongs*
- ★ Hugo Krayenbuhl
- ★ Gerard Guiot- *hypothermia in NS, pituitary tumors (TNTS), thalamus, stereotaxic frame, parasagittal approach*
- ★ Paul C Bucy- *premotor cortex, oligodendroglioma*
- ★ Alfred W Adson- *nerve regeneration, sympathectomy (PVD), ANS, upright position, vertical incision*

Neurosurgical Giants

- ★ Howard Christian Naffziger-
 - ★ *SDH, CSF spaces, pineal shift, occipital flap, fascial fringe closure, depressed skull fracture, orbital decompression in exophthalmos, scalenus anterior syndr (Naffziger syndrome), B/L jugular compression test (Naffziger's test)*
- ★ Murray Falconer- *amygdalohippocampectomy*
- ★ Lars Leksell- *stereotaxis, radiosurgery, Leksell rongeurs, recanalisation of cerebral aqueduct in atresia*
- ★ Frank Henderson Mayfield
- ★ Jules Hardy- *microscopic transeptal approach*
- ★ Madjid Samii- *microscopic nerve repair*

Neurosurgical Giants

Three Frontal lobe Guys:

1. Egas Moniz
2. Walter J. Freeman (lobotomist)
3. Spafford Ackerly

“The Tritarians” 3 great figures of 20th medicine

1. Harvery Cushing
2. Arnold Carl Klebs (Switzerland)
3. John Farquhar Fulton

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THANK YOU

Dr Amit Thapa