HISTORY OF NEUROSURGERY/
INDIAN NEUROSURGERY AND
NEUROSURGICAL GIANTS

Moderator : Dr Manmohan singh
Dr Sumit Sinha
Presented by : Mansukh Sangani
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 Western Medicine”
Neurosurgery

- Edwin Smith Surgical Papyrus
  - Oldest of all known medical papyri: 1700BC
  - Ancient Egyptian medical text on surgical trauma
  - Contain actual cases & not recipes
  - Rx: rational & mostly surgical
  - Special interest to neurosurgeon:
    - Description of cranial suture, meninges, surface of brain, CSF, intracranial pulsations, head injury treatment

Dr Mansukh
Neurosurgery

- Hippocrates
- 460BC-377BC
- Ancient Greek physician
- Father of Western medicine
- Hippocratic Oath
- Description of aphasia, unconsciousness, pupillary inequality & ophthalmoplegia, precise use of trephine
Neurosurgery

- History of Neurosurgery

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
   Before 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 (500-1500 AD)

- 625-690, Paul:
  Exploration & extraction of broken pieces of bone in spinal #

- 1170, Roger:
  Surgical Management of skull #

- 1296, Lanfrane:
  Suturing of divided peripheral nerve

- 1470-1530, Jacopo berengano:
  Cranial fracture Management
Neurosurgery (AD 1500-1700)

- **Ambroise Pare (1510-1590):**
  - Elevation of Depressed 
  - Wound debridement
  - Traction in spinal injury
  - Futility of treatment in cord injury

- **Fabricus Hildain (1560 – 1634):**
  - Earliest description of laminectomy

Dr Mansukh
Neurosurgery (AD 1700-1846)

- **Sir Percival Potts**: (1713-1788)
  - Used trephine in brain abscess

- **Louis Petit**: 1674-1750
  - Trephine in scalp wound with fracture

- **S F Morand**: 1972
  - Operated on temporal abscess

- **Gurthrie**: 1785-1856
  - Importance of EDH & its management

Dr Mansukh
Neurosurgery (AD 1846-1890)

- 1846 – 1848: Anesthesia (Ether/chloroform)
- 1867: Antisepsis by Lister
- 1870, Ernst von Bergmann, Germany
  - 1st Textbook of surgery on nervous system
- 1876, Pierre Paul Broca, Paris:
  - 1st to localize & drain brain abscess
- Sir William Macewan:
  - 1879-First surgery for meningioma
  - 1881 - diagnosed & drain abscess in the frontal lobe
  - 1883- Laminectomy
- 1884, Rickmann Godlee: operated on brain tumor
Neurosurgery

- 1885, Francesco Durante: *Olfactory groove meningioma*
- 1888, William Bennett: *posterior rhizotomy for pain*
- 1889, Wagner: *Osteoplastic cranioplasty*
Neurosurgery

- 1835-1911, John Hughlings Jackson: Founder of cerebral localization & Neurology
- 1888, Victor Horsley: cortical map
- Charles Sherrington (1857-1952): ‘Father of Modern Neurophysiology’
- William Keen Jr:
  - Pioneer American neurological surgeon
  - Suture duramater - decrease CSF leak
Neurosurgery

- 1908, Fedor Krause-
  *Founder of German Neurological surgery*
  *1st to study human cerebral cortex in detail*

- 1910, Oscar Hirsch-
  *Trans-septal approach to pituitary*

- 1920, **Society of Neurological surgeons**
  *Harvey Cushing (President)*
  *Ernest Sachs (Secretary Treasurer)*
  *Charles H Frazier*
  *Edward Archibald*
Neurosurgery

- 1929, Berger: introduced EEG
- 1932, W Gayle Crutchfield: Skeletal traction for cervical spine fractures
- 1935, Foerster & Penfield: 1st described ECoG
- 1952, Irving Cooper: Chemo-pallidectomy for parkinsonism
Neurosurgery

- Herbert Olivecrona - AVM, *parasagittal meningioma*
- Norman Dott - Angiogram in UK - *aneurysm, CSF circulation*
- Sir Geoffrey Jefferson - *atlas #*
- Charles Harrison Frazier
  - *Subtemporal approach (tic douloureux), cordotomy*
- Charles Albert Elsberg - *spinal cord surgery*
- William Jason Mixter - *herniated PIVD, spinal injuries*
Neurosurgery

- Max Minor Peet - sensory root (gasserian ganglion) division, 50% dextrose in raised ICP, arterial HTN (B/L splanchnic section)

- Kenneth G Mckenzie - TCS, clips, skull tongs

- Gerard Guiot - hypothermia in NS, pituitary tumors (TNTS), thalamus, stereotactic frame

- Paul C Bucy - premotor cortex, oligodendroglioma

- Alfred W Adson - nerve regeneration, sympathectomy (PVD), ANS, upright position, vertical incision
Neurosurgery

- Howard Christian Naffziger-
  - SDH, CSF spaces, pineal shift, occipital flap, depressed skull fracture, orbital decompression in exophthalmos, scalenus anterior syndrome (Naffziger syndrome), B/L jugular compression test (Naffziger’s test)

- Falconer- amygdalohippocampectomy

- Lars Leksell- stereotaxis, radiosurgery, Leksell rongeurs, recanalisation of cerebral aqueduct in atresia

- Jules Hardy- microscopic transeptal approach

- Madjid Samii- microscopic nerve repair
Neuroendoscopy

- 1910, L’ Espinasse- 1st NSx endoscope
  - Fulguration of choroid plexus
- 1918, Walter Dandy-
  - Endoscopic choroid plexectomy
- 1923, Mixter- 1st ETV using urethroscope
Epilepsy surgery:

- Penfield - chief pioneer
- Victor Horsleys - excision of lesion – cure
- Forester & Penfield - structural basis of traumatic epilepsy
- ECoG (electrocorticography)
- Falconer – en block temporal lobectomy
- B Ramamurthi - stereotactonic lesion in medial temporal areas
- Rasmussen - series of surgical technique
Spinal cord surgery

- **Victor horsley:**
  - Excised IDEM tumor on basis of clinical localization

- **Elsberg** –
  - Tumor of spinal cord symptomatology
  - Cervical disc herniation

- **Cushing** –
  - Intramedullary ependymoma

- **Rasmussen** –
  - Pathological features of intramedullary tumor
Neuroradiology

- 1895, Wilhelm Conrad Roentgen: X rays
- 1901, Oppenheim: Cranial Roentgenology
- 1918, Walter Dandy: pneumoventriculography & pneumoencephalography
- 1921, Jean Sicard: Myelography
- Egas Moniz: Angiography
- Arthur Schuller: Father of modern Neuro-radiology
- 1947, George Moore: Radionuclide imaging
- 1960s, Lars Leksell: GKS
Neuroradiology

- 1972-CT scan: British engineer Godfrey Hounsfield & Allan Cormack, jointly awarded the Nobel Prize in 1979.
- 1940 -1970 –MRI
  - Block & Purcell
- 1981: Gd-DTPA
- 1991: fMRI
Position

- **Victor Horsley**: Position of patients
- **Harvey Cushing**:
  - Horse shoe head rest
  - Clipping just prior to surgery
- **Martel**:
  - Sitting positioning
- **Frank Mayfield**:
  - Three pin head rest
Microneurosurgery

- 1960: Julius Jacobson- 1st microvascular neurosurgery
  - MCA embolectomy
- Olivecrona – *first* AVM surgery
- 1964: Robert Rand-- Aneurysm Surgery
- 1967: M Gazi Yasargil,--1^st^ EC-IC bypass
- 1967: Jannetta & Rand,--CN V decompression
- 1968: Jules Hardy-- TNTS
Indian Neurosurgery

Legend and History

- Hindu mythology -
  *Ganesha*: First recipient of head transplant

- Sushrutha - 1000BC
  *‘Sushrutha Sanhita’*
  Greatest name in surgery of ancient India
  Describe cranial N.(2,8), surgical procedure (excising/probing/puncturing/suturing/evacuation)
Indian Neurosurgery

Legend and History

- The principal authors of ancient Indian medical text were Sushruta, Charaka, Vagabhata, Bela and Madhava

- 2 drugs- ‘Sammohini’ and ‘Sanjivini’

- Jivaka-
  - Personal physician of Lord Buddha
  - Removed intracranial tumors through trephine hole
Indian Neurosurgery
Legend and History

PRE- INDEPENDENCE

- 1935, Col Anderson- Trans-sphenoidal Hypophysectomy
- Bombay:
  - A 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

Jacob Chandy:
- 1946, Montreal Neurological Institute

Narasimhan:
- 1946, New York Neurological Institute
- 1948, Private Neurosurgery and EEG clinic (Madras)

Ramamurthi: 1948, UK
Indian Neurosurgery
Legend and History

- Jacob Chandy:
  1949, 1st Neurosurgery Dept at CMC, Vellore

- B Ramamurthi:
  1950, Neurosurgery Dept, Madras Medical College
  Later became Institute of Neurology

- Ram Ginde:
  1953, Neurosurgery 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 treatment
- 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: Vishakhapatnam (1956)
- Dayanand Rao: Hyderabad (1957)
- Homi Dastur: Bombay (1958)
- R M Verma: 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 specialty

- **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; 30 members
- 1953, Journal of NSI
- 1974, Started CME
- 1985, Progress in Clinical Neurosciences
- Neurosurgery subsection: member of WFNS

Dr Mansukh
- AIIMS was inaugurated in 1956, built with a grant from the Government of New Zealand
- Dept of Neurosurgery started - March 1965, Prof. P.N. Tandon and Prof. A.K. Banerji
- M.Ch training program initiated in 1967, when Dr. Brahm Prakash joined as M.Ch. student.
- Jai Prakash Narayan Apex Trauma Centre (JPNATC) centre became fully functional on 26 November, 2007.
Neurosurgical Giants
William Halsted

- 1852-1922 father of modern surgery
- American surgeon
- ‘Asepsis’ practice
- Rubber glove
- Surgical technique
  - Gentle dissection
  - Fine silk ligature to secure vessels “only”
  - Sealing wound with silver foil
- Cocaine as local anesthetic agent- ‘truncal block’
Neurosurgical Giants
Sir William Macewan

- 1848-1924. Pioneer Scottish Neurosurgeon
- Chief pioneer of Craniocerebral surgery
- Antiseptic to aseptic surgery
- Abandoned wooden instruments
- 2 great advances
  - 1st to explore brain & spinal cord on basis of localized neurological dysfunction
  - Studied pyogenic infection of brain and spinal cord
Neurosurgical Giants
Sir William Macewan

- 1879 - localized and excised meningioma
- 1876 - diagnosed an abscess in the frontal lobe
- Macewan sign – hydrocephalus
- 1883 - Laminectomy
Neurosurgical Giants
Victor Horsley

- 1857-1916
- Born and educated in England
- Postgraduate training in Germany
- 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
     Motor function of internal capsule
     Cerebral edema
     Artificial respiration
Neurosurgical Giants
Victor Horsley

2. **Forms of treatment:**
   - Smooth anesthesia - preferred chloroform over ether
   - Excision of gasserian ganglion - *trigeminal neuralgia*
   - Significance of *papilledema*
   - Decompression to save eyesight in *raised ICP*
   - 1887, removed spinal neoplasm by laminectomy
   - Decompressive laminectomy for *pott’s spine*
   - Craniectomy for *microcephaly*
   - 2° debridement - infected craniocerebral wound
   - Lumbar Drain to decrease ICP
Neurosurgical Giants
Victor Horsley

3. **Surgical craft:**
   - Bone bleed - ‘bone wax’
   - Used muscle to control bleed
   - Curved skin incision for skin flap
   - 1890, retrogasserian neurotomy - *tic douloureux*
   + Clarke (1908) - stereotaxic apparatus
   - Ligation of the *carotid* artery to treat cerebral *aneurysms*,
   - Transcranial approach to the *pituitary gland*
Neurosurgical Giants
HARVEY WILLIAMS CUSHING

- April 8, 1869- October 7, 1939
- First American neurosurgeon, Father of modern NS
- W S Halsted & William Osler- teachers
- + Ernest Amory Codman: 1st anesthetic, “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 triad
- + Dr William Bovie: electric coagulation (1926)
- Defined acoustic neuroma & syndrome of CPA
- Syndromes & Clinical entities:
  - Cushing’s Syndrome
  - Rokitansky Cushing Ulcer
  - Cushing's symphalangism
Neurosurgical Giants
HARVEY WILLIAMS CUSHING

- Standardization of Surgical techniques-
  - Compressing scalp for hemostasis,
  - Hemostatic clips,
  - Electrocautery, motor driven suction

- Classified brain tumors with Percival Bailey

- Experiment with cocaine nerve blocks,
  - Coined ‘regional anesthesia’

- Medical Historian: Biographer of Sir William Osler
  (Pulitzer, 1926)
Neurosurgical Giants
Walter Edwards Dandy

- 1886-1946 American neurosurgeon
- + Kenneth Blackfan, established modern concept of circulation of CSF and hydrocephalus.
- Developed choroid plexectomy, third ventriculostomy and catheterization of aqueduct of sylvius
- Pneumo Ventriculography in 1918.
- Expose & resect pineal tumor
Neurosurgical Giants
Walter Edwards Dandy

1917, Removed 1st acoustic neuroma completely

Pioneer in Surgery of AVM and intracranial aneurysm
*(clip aneurysm 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*
Neurosurgical Giants
Antonio Egas Moniz

- Portuguese 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
  - 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
- Supracerebellar infratentorial approach to pineal gland & posterior third ventricle
- Acoustic neuromas -
  - sitting position, intradural posterior fossa craniectomy
Neurosurgical Giants
Otfried Foerster

- 1873-1941 **German** neurologist and neurosurgeon
- **Foerster’s operation**: rhizotomy for the treatment of spasticity
- Defined *dermatomal* borders
- Anterolateral *cordotomy*: for pains
- Successful removal of *intramedullary* tumor
- Surgery for post traumatic epilepsy
- Hyperventilation to evoke seizure
- Coined *psychomotor* epilepsy
Neurosurgical Giants
Wilder Graves Penfield

- 1891-1976, American born Canadian neurosurgeon
- Chief pioneers of epilepsy surgery
- Centrencephalic theory of generalised epilepsy
- + Herbert Jasper: Montreal procedure
t/t seizure by destroying originating nerve cells
- ‘Penfield dissector’
Neurosurgical Giants
A Earl Walker

- 1907-1995 Canadian-born American neurosurgeon, neuroscientist
- Dandy Walker syndrome
- Stereotaxic or functional neurosurgery
- Post traumatic epilepsy
- Anatomic studies on thalamic systems
Neurosurgical Giants
William H Sweet

- Canadian philosopher
- + Gordon Brownell - PET
- Boron Neutron Capture therapy for brain tumors
- 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
  Sup tempo to MCA
- 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 Balasubramanian 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
Indian contributions to neurosurgery

- Craniovertebral anomalies, encephalocoele
- Tuberculous meningitis, tuberculomas, anti-tuberculous therapy for intracranial tuberculous disease, Rx of parasitic infections
- Stereotactictic surgery and fluorosis.
THANK YOU