



HISTORY OF NEUROSURGERY/ INDIAN NEUROSURGERY AND NEUROSURGICAL GIANTS



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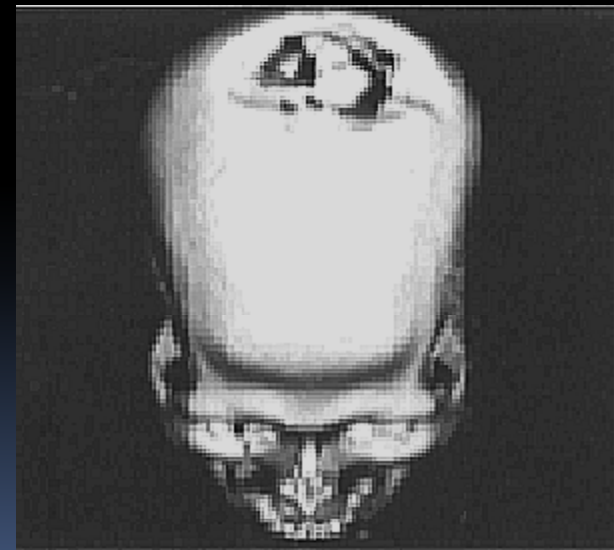
Neurosurgery

"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”



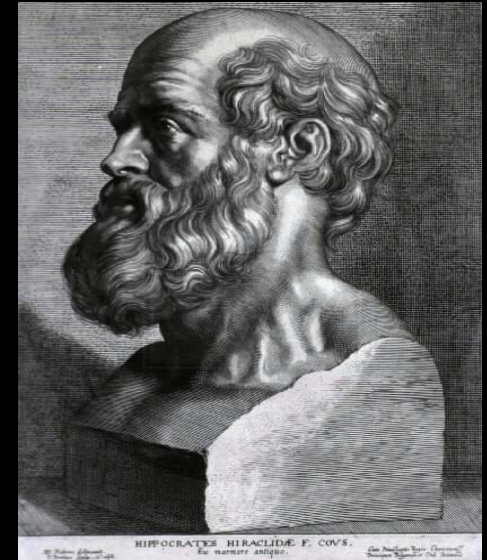
Circa 5100 B.C.--Ensisheim, France

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

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

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 : 1772*
 - Operated on temporal abscess
- *Gurthrie: 1785- 1856*
 - Importance of EDH & its management

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, Mixer- *1st ETV using urethroscop*

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- stereotactic 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 positing
- *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,--*1st EC-IC bypass*
- 1967: Jannetta & Rand,--*CN V decompression*
- 1968: Jules Hardy-- *TNTS*

Indian Neurosurgery

Legend and History

- Hindu mythology-

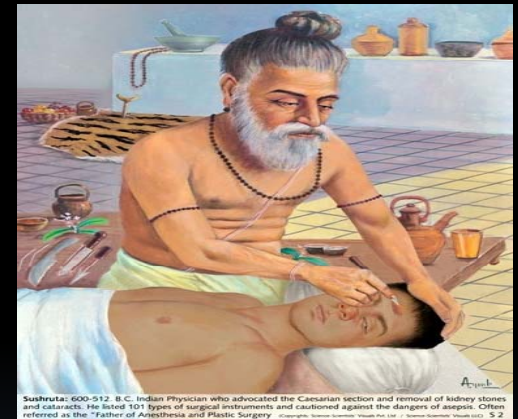
Ganesha: First recipient of head transplant

- Sushruta- 1000BC

'Sushruta Sanhita'

Greatest name in surgery of ancient India

Describe cranial N.(2,8), surgical procedure
(excising/probing/puncturing/suturing/evacuation)



Sushruta: 600-512. B.C. Indian Physician who advocated the Caesarian section and removal of kidney stones and cataracts. He listed 101 types of surgical instruments and cautioned against the dangers of asepsis. Often referred as the "Father of Anesthesia and Plastic Surgery".

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

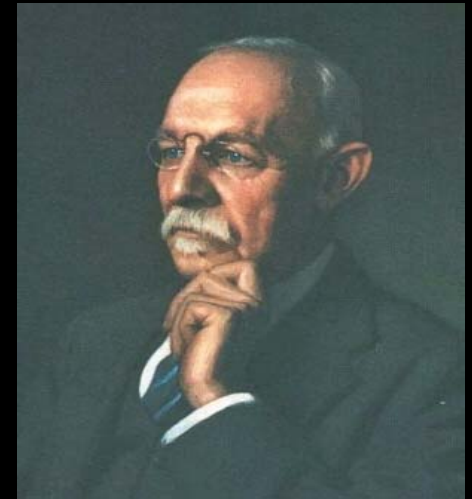
- Founder President: Dr Jacob Chandy
- Founder Treasurer: Dr Baldev Singh, S T Narasimhan
- Founder Secretary: B Ramamurthy
- 8th December, 1951
- 1st Meeting: Hyderabad, 1952; 30 members
- 1953, Journal of NSI
- 1974, Started CME
- 1985, Progress in Clinical Neurosciences
- Neurosurgery subsection: member of WFNS

- 
- AllMS 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

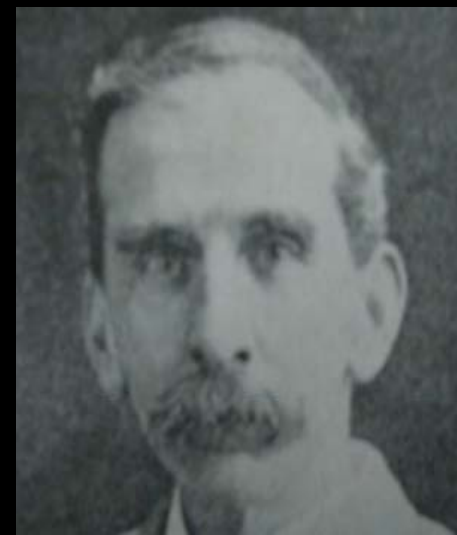
Motor function of internal capsule

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

Otfrid 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

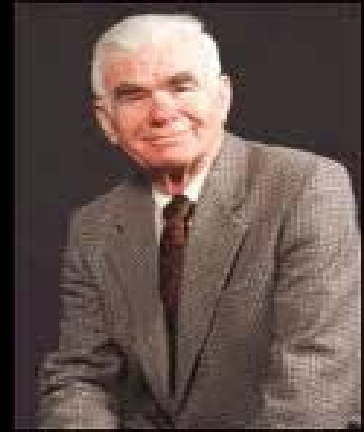
Irwing S Cooper



- 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 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

Indian contributions to neurosurgery

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



THANKYOU