SPECIAL SERIES

Surgical Neurology at the Bombay Hospital, Mumbai

Chandrashekhar Eknath Deopujari

Department of Neurosurgery, Bombay Hospital and Institute of Medical Sciences, New Marine Lines, Mumbai, Maharashtra, India

Corresponding Author:
Chandrashekhar Eknath Deopujari,
Department of Neurosurgery, Bombay Hospital and Institute of Medical Sciences, New Marine Lines, Mumbai - 400 020, Maharashtra, India.
E-mail: d.chandrashekhar11@gmail.com

THE BEGINNING

Bombay Hospital Trust started as a philanthropic organization for quality patient care for the common man in the new spirit of independent India in 1949 under the chairmanship of Mr. Rameshwardas (R.D.) Birla. The amalgamation of the Singhania trust and Marwari trust within the new entity resulted in the formation of a hospital building (presently called the Old Wing) located at the marine lines in South Bombay (now Mumbai), which was inaugurated by Sardar Vallabhbhai Patel, then home minister of the new Indian Republic in 1951. Soon thereafter, the neurosurgery service was started at the hospital by the first neurosurgeon in West India, Prof. Ram Ginde in 1953.

STARTING NEUROSURGERY AND PLANNING OF A COMPREHENSIVE NEUROSCIENCE CENTER

Dr. Ram Ginde had just returned from training at the iconic Montreal Neuroscience Center in Canada and was deeply passionate in developing a comprehensive neuroscience center at the Bombay Hospital in 1953 [Figure 1]. He was joined by Eddie Bharucha for neurology and he sent Dr. Durga Prasad Dadhich [Figure 2] for training in neuroradiology to Oslo (Norway). Dr. Darab Dastur [Figure 2] later joined as a neuropathologist and started pioneering work on brain tumors and CNS tuberculosis with Dr. V. S. Lalitha who later joined him to create the first atlas on brain tumors and other space occupying lesions in India. This comprehensive team made it an immensely popular center not only for West India but also for patients all around the country.

Although Dr. Ginde was associated with several other centers developing in the city, both governmental, namely, KEM and JJ, and private, namely, Breach Candy, he continued his work mainly at the Bombay Hospital and was considered an expert in brain tumor management, spinal surgery, as well as surgery for trigeminal neuralgia. He was allotted a dedicated room in the operation theater complex and attracted several young neurosurgeons to work with him including Dr. V. G. Daftary, V. S. Dave, and Pramod Behari.

Dr. Gajendra Singh, another senior neurosurgeon in the city, was also appointed and neurology was further enhanced with joining of Prof. Noshir Wadia. Invasive radiological procedures were very complex in nature before the advent of CT and the expertise in carrying out pneumoencephalography, ventriculography, myelography, as well as cerebral angiography and its interpretation by Dr. Ginde's team with Dr. Dadhich was a great strength of the department.

Dr. Ginde was also an important member of the organized neurosurgery internationally as well as in the newly formed Neurological Society of India. He soon joined as the secretary of the organization culminating in his presidency of the society in 1955–1956. He organized the first Mumbai meeting of the NSI (1956). He then served as the editor of the society journal, namely, "Neurology India" from 1958 to 1965.

His methodical ways of clinical examination, interpretation of neuroradiology, technique of surgery, as well as writing of surgical notes are legendary.

DEVELOPING THE DEPARTMENT AT THE MEDICAL RESEARCH CENTER

Dr. S. N. Bhagwati was appointed as a full-time neurosurgeon in 1962 [Figure 3], followed soon after by appointment of Dr. B. S. Singhal [Figure 4], who had both returned from their training in the U. K. In the meanwhile, Dr. Pramod Behari and Dr. Vijay Dave returned to start neurosurgery in their respective states, namely, Rajasthan and U. P. Padma Bhushan Sahu Shreyans Prasad (S.P.) Jain took over the mantle of the Bombay Hospital Trust after the death of Mr. R.D. Birla in 1973 and with the expansion of the Bombay Hospital and creation of the medical research center in the early 1970s, neurosurgery was allotted a full dedicated floor with 2 operation theaters, 5 bedded ICU, and a 16 bedded general ward. The new building saw development of several academic activities in neurosciences with a library and electrophysiology unit on the 2nd floor as well as neuroepidemiology and neuropathology units on the 15th floor.

Dr. S. S. Wagh joined the department after a few years and formed a team with Dr. Vijay Daftary. He had a remarkable expertise in spinal surgery. Dr. Bhagwati brought with him the

Figure 1: Founder of Neurosurgery Department at BH: Prof. Ram Ginde. (a) President of NSI: 1955-56, (b) With Dr. Eddie Bharucha (Senior Neurologist), (c) At the inauguration of NSOT in MRC wing, Dr. Ambardekar (Consultant anesthetist) (Center), Prof. Ginde, Mr. Joshi (Director) (From left to right)

Figure 2: Development of Neurosciences. (a) Dr. Darab Dastur, Neuropathology, (b) Dr. Durga Prasad Dadhich, Neuroradiology

Figure 3: Department in Medical Research Centre with dedicated ICU and beds. From left to right – (1) Dr. S.N. Bhagwati, (2) Sister in-charge of NSOT, (3) Dr. Asopa (Neurosurgery trainee), (4) Prof. R.G. Ginde, (5) Another neurosurgery trainee, (6) Matron, (7) Dr. Vijay Daftari

expertise in treating vascular lesions and stereotactic surgery for Parkinson and other disorders. With the help of his engineer brother, he developed an indigenous stereotactic frame with an exceptionally good accuracy and started functional

Figure 4: Dr. B.S. Singhal and Dr. S.N. Bhagwati (From left to right)

neurosurgery in Mumbai after it had become immensely popular in India with great pioneering work by the Madras group. He became the driving force of the department after the untimely demise of Prof. Ginde in 1974. Dedicated anesthesiologist Dr. Choksi and later Dr. Datar joined him [Figure 5]. Dr. Rambhai Patel gave them support in physiotherapy and rehabilitation support with his innovative ideas. Dr. Asha Veer joined as a hemato-oncologist with her special interest in neuro-oncology and new research projects were launched. Bombay Hospital neurosurgery soon became a finishing school for contemporary neurosurgeons who joined for a year or two after completion of their training before getting into practice. Dr. Geeta Parulekar joined the department in 1985 as an associate neurosurgeon.

Under the new leadership of Mr. Madhav Prasad Birla and Mrs. Priyamvada Birla's vision, the hospital and medical research center flourished further. The technical advances in neurosurgery as well flourished in the 1980s with the availability of CT scans in diagnosing various pathologies and operating microscope in operating room to precisely identify, dissect, and remove those lesions. Bombay Hospital acquired the first new generation scan and appointed Dr. C. J. Thakkar as a CT radiologist. The insight with the technology was

further refined by weekly interdisciplinary meetings which attracted clinical neuroscientists from all over the city.

Microneurosurgery became not only a trend but also a genuine part of the neurosurgical technique with improvement in results. Dr. Keki Turel (1986) and Chandrashekhar Deopujari (1989) joined with their microsurgical training abroad and developed the techniques of skull base and cerebrovascular surgery further apart from introduction of minimally invasive spinal surgery [Figure 6].

MRI was soon added to the diagnostic facility allowing better management of stroke as well as several spinal diseases. Neurology further expanded with induction of Nadir Bharucha who joined his father and brought his expertise in stroke and neuroepidemiology to the unit. Toward the end of the decade, two young neurologists joined the unit, namely, Dr. Satish Khadilkar (after his fellowship in nerve/muscle disorders) and Jimmy Lalkaka (with his training in movement disorders). Dr. Khadilkar is currently heading the department of neurology and has additional responsibility of academic dean.

SPREADING WINGS

The opening up of the new wing building in 1991 and leadership of the new chairman, Mr. B. K. Taparia, allowed further expansion of neurosurgical services. A new theater complex was developed with 3 operating rooms, 10 bedded post-operative ICU, and step-down facility. This has been further expanded in 2000. The department currently carries out over 1200 surgeries of brain, spine, and peripheral nerves in a complex of four dedicated operating rooms and is well equipped with three surgical microscopes, high-speed drills, ultrasonic aspirators, HD endoscopy, neuronavigation, and facility for ICG as well as intraoperative catheter angiography.

The services are well known for skull base and other brain tumor surgeries. Management of complex hydrocephalous and other pediatric neurosurgical procedures including craniofacial surgery are being regularly performed with Dr. Nitin Mokal, a craniofacial surgeon. Special interest in endonasal endoscopic skull base surgery with association of ENT colleagues, especially Dr. Nishit Shah, has given us a 360-degree dimension in skull base procedures. Over 1500 endoscopic skull base surgeries have been performed and a fellowship has been created for ENT as well as neurosurgeons for post-doctoral training. This further enhanced the status of the department as a center of excellence for "minimally invasive neurosurgery." A dedicated neurosurgical ICU adjacent to the operation theater complex with special neurosurgical nursing and two consultant critical medicine specialists (Drs. Pravin Amin and Sanjay Wagle) facilitates comprehensive care.

Figure 5: Dr. Dadhich, Dr. Singhal, Dr. Choksi and Dr. Bhagwati (From left to right)

RECOGNITION AS AN ACADEMIC INSTITUTE

The recognition of the center for DNB courses around this time brought young neurosurgical residents enhancing the patient care as well as the academic activities of the department. The leadership of Prof. B. K. Goyal, the noted cardiologist, who had taken over as the dean of the institute and collective efforts of senior specialists including Prof. Bhagwati and Singhal, who had then retired from the J. J. Hospital, helped to develop this into a superspecialty teaching institute affiliated to the Bombay University in 1993. Prof. S. N. Bhagwati headed the department with Dr. Wagh as the associate professor and Dr. G. Parulekar and C. Deopujari as assistant professors. Later, the center got affiliated to the newly formed Maharashtra University of Health Sciences

Figure 6: Department over the years. (a) Dr. R.G. Ginde (1953–1974). (a) Dr. S.N. Bhagwati (1974–1997), (b) Dr. K.E. Turel (1998–2008), (c) Dr. C.E. Deopujari (2009 onwards)

(MUHS) and has successfully transited through Deanship of Prof. Jayaram (Internal Medicine) to the current academic Dean, Dr. S. V. Khadilkar.

At present, Prof. Deopujari heads the department which has been split into two units for convenience of scheduling surgeries, posting of residents, and ease of administration. Three students join every year from CET. Unit 1 is headed by Deopujari with Vikram Karmarkar (Associate Professor and teacher with special interest in cerebrovascular and neuroendoscopy), Chandan Mohanty (with a fellowship in minimally invasive spine and peripheral nerve surgery), and Naresh Biyani (with fellowship in pediatric neurosurgery) as consultants with one post-doctoral fellow and four residents and unit 2 has Keki Turel (Retired Professor specializing in skull base and spine microsurgery) and Mahesh Chaudhari and Suneel Shah (both Associate Professors) along with Nirav Mehta as consultants (all with comprehensive neurosurgical skills) with five residents. The department is also recognized for post-doctoral fellowships in skull base and neuroendoscopic surgery by the Maharashtra Health University.

DEPARTMENTAL ACTIVITIES

The weekly program consists of a weekly departmental teaching activity alternating between case discussions, journal club, and topic review apart from teaching rounds. The academic activities also have a round of Bombay neuro association meeting once a year in the hospital. Neurosurgery department also carries out an annual oration started by Bombay Hospital Trust, initiated by Prof. Bhagwati in 1991 in the name of Prof. Ginde every year in March for the past 26 years, where a leader in neurosurgery not only delivers his oration but also demonstrates his operative technique and engages in case discussions. A list of dignitaries over the years starting with Prof. Madjid Samii and Gazi Yasargil who have graced the occasion [Figures 7,8,9,10,11,12 and 13]. In legends to figures in [Figures 8], Goel to be replaced by Goyal. A whole range of topics starting with skull base surgery, cerebrovascular surgery, pediatric neurosurgery, as well as spine surgery have been covered over the years by senior neurosurgeons from all over the world and are enumerated in the accompanying Table 1.

The Ginde Oration was one of the first such activities in the country to celebrate an annual event of the department which has been followed subsequently at several teaching centers in the country. This has become an attractive event for several young as well as senior surgeons at it provides a platform for intimate interaction with the orator. It has also become a reunion of alumni and we recently celebrated the 25th alumni along with the last oration in 2019. Over 75 alumni of the department currently working all over the country as well as four of them settled abroad, joined the oration, and stayed back an extra day to celebrate with a special session of academic and non-academic talks and fellowship [Figures 14,15,16 and 17].

The department also carried out Continuing Medical Education (CME) programs with several organizations including

Figure 7: First Ginde Oration with Prof. Samii (1992). Prof. Samii, Dr. S.N. Bhagwati, Dr. Eddie Bharucha (From left to right)

Figure 8: (a) Dr. S.N. Bhagwati, Dr. Goel, Dr. Jacques Brotchi, Mrs. Muzumdar (From left to right), (b) Dr. S.N. Bhagwati, Mr. B. Taparia, Prof. VinkoDolenc, Mrs. Muzumdar (From left to right)

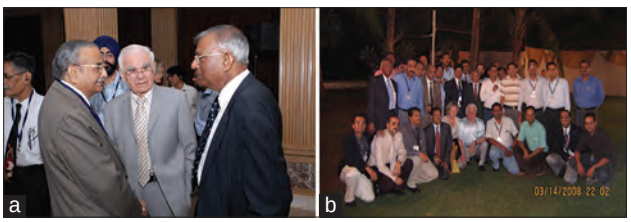

Figure 9: Ginde Oration by Prof. Yasargil and Social evening. (a) Dr. S.N. Bhagwati, Prof. Yasargil, Dr. R.P. Sengupta (From left to right), (b) A social evening

Figure 10: Ginde Orators over the years. (a) Dr. Suneel Shah, Dr. S.N. Bhagwati, Dr. Geeta Parulekar, Dr. Axel Perneczky, Dr. C.E. Deopujari, Dr. M.P. Chaudhari (From left to right), (b) Dr. Eddie Bharucha, Dr. S.N. Bhagwati, Dr. Jim Ausman (From left to right)

the World Federation of Neurological Surgeons (WFNS), International Society of Pediatric Neurosurgery (ISPN) [Figure 18], and International Society of Neuroendoscopy

Figure 11: Ginde Orators over the years. (a) Dr. C.E. Deopujari, Dr. Goyal, Chairman Shri B K Taparia, Dr. William Harkness, R.V. Patil, (b) Dr. K.E. Turel, Dr. C.E. Deopujari, Dr. Anil Nanda, Shri B K Taparia, Dr. S. Jayaram, Mr. R.V. Patil

Figure 12: Ginde Oration attended by several delegates and hospital doctors including Dr. Singhal, Dr. Bharucha, and Dr. Sorabjee

Figure 13: Hands-on workshop on endovascular work at Ginde oration with ParitoshPande

(IFNE). The first educational course and mock examination of NSI was also hosted by the department in 2012.

Another activity over the past 16 years has been in the field of endoscopic neurosurgery developed with ENT skull base colleagues, where international leaders have demonstrated their technique of surgery and carried out hands-on workshops for the attendees followed by cadaveric training. This pioneering activity has been exceedingly popular with trainees and young surgeons from all over the country and neighboring areas. An

Figure 14: Neurosurgery consultants and anesthesiologists. Top row, from left to right – Dr. V.S. Karmarkar, Dr. Suneel Shah, Dr. C.E. Deopujari, Dr. Nootan Sharma, Dr. K.E. Turel, Dr. C. Mohanty, Dr. N.K. Biyani, Dr. U. Andar, Dr. D. Baheti. Bottom row, from left to right – Dr. N. Karmarkar, Dr. R. Gandhe, Dr. T. Meshri, Dr. S. Sharma, Dr. Ranjana Das, Dr. A. Parakh, Dr. P. Joshi, Dr. N. Sharma, Dr. R. Deopujari, Dr. P. Kothari

Figure 15: 1st Alumni Meeting. Dean Dr. S.V. Khadilkar, MD R.V. Patil, Dr. V.S. Karmarkar, and Chairman Shri B.K. Taparia (From left to right)

oration during this workshop has been started for the past 8 years in the name of Prof. Bhagwati and Shah for their early support. A galaxy of skull base surgeons has done the honor and is listed in Table 2 [Figure 19]. An interdisciplinary book has been published on "endoscopic transsphenoidal surgery" (Thieme publishers) by our joint efforts.

The department has also carried out an Indo Japanese friendship meeting, cerebrovascular [Figure 20] and pediatric neurosurgery updates over the years in the hospital and hosted several national and international meetings, namely, Asia-Oceanic skull base meeting, Academia Eurasia Neurochirurgica, 1st Indian as well as 17th Annual meeting of International Society of Neurosurgery, 1st national as well as 6th International federation of Neuroendoscopy meeting, Biennial meeting of the International Society of Pituitary surgery, and

Figure 16: The Alumni meeting

Figure 17: 1st Alumni Meet (2018). (a) Dr. Deopujari with Dr. Salman Shaikh (2016–2018), (b) Dr. Dean Dr. Khadilkar with Dr. Koshy George (1984–1985), (c) Last batch (2019) Dr. K. Shroff, Dr. H. Hegde, Dr. A. Bhagwat (From left to right)

Figure 18: Pediatric Neurosurgery course, Dr. A.K. Banerji, Dr. S.K. Kalyanraman, Dr. P.M. Udani, Dr. M. Choux, and Dr. S.N. Bhagwati (From left to right)

Figure 19: Skull base stalwarts at Endoscopic skull base course. Dr. Henry Schroeder, Dr. Chandranath Sen and Dr. Fred Gentilli (From left to right)

WFNS courses on Complications and Neuroendocrinology. Several students and young have visited the center for observation from all over the world including Germany, Italy, Bangladesh, Nepal, Indonesia, Japan, and the UK.

The department members have written five books in neurosurgery, contributed several chapters in national and international textbooks, and published several papers in peer-reviewed journal on a variety of neurosurgical disorders. Dr. Deopujari has also edited three special supplement issues of Neurology India focusing on "Craniopharyngiomas" (1993), Spinal Dysraphism (1995), and "Surgical Neuroendocrinology" (2020) and

Table 1: Ginde Orators since the inception of the oration in 1992

Madjid Samii	(1) Acoustic neuroma and (2) brachial plexus reconstruction	1992
Robin Sengupta	Giant aneurysm and endarterectomy	1994
Vinko Dolenc	Cavernous sinus meningioma	1995
Robert Spetzler	Petroclival meningioma	1996
James Ausman	Basilar bifurcation aneurysm and arteriovenous malformation	1997
Donlin M Long	Recent advances in the management of acoustic tumors	1999
Axel Perneczky	(1) ETV and (2) clipping of MCA aneurysm	2000
Peter Janetta	Microvascular decompression	2001
Rudolf Fahlbusch	Advanced techniques in pituitary surgery	2002
Tetsuo Kanno	Accumulation of fine (small) technical improvements in brain surgery	2003
Richard Hayward	Philosophy of management in craniosynostosis	2004
Jacques Brotchi	Intramedullary spinal cord tumors	2005
Hirotoshi Sano	History of cerebrovascular microsurgery	2006
Hae-Dong Jho	Minimalism in brain and spine surgery	2007
Gazi Yasargil	Reflections on the history of microneurosurgery	2008
Paola Cappabianca	The contribution of the endoscopy to the renaissance of skull base surgery	2009
Amin Kassam	Lessons learnt from 10 years of minimally invasive skull base (1000) surgeries	2010
Juha Hernesniemi	Aneurysm and arteriovenous malformations	2011
Madjid Samii	Management of giant craniopharyngiomas	2012
Volker Sonntag	Cervical spine instrumentation: Past, present, and future	2013
Chandranath Sen	Management of clival chordomas	2014
James T. Goodrich	Advances in craniofacial surgery	2015
William Couldwell	Rationalization of approach in skull base surgery	2016
William Harkness	Reflections on multidisciplinary working in pediatric epilepsy surgery	2017
Anil Nanda	Are we doing enough/too much?	2018
Giuseppe Cinalli	Further insights in hydrocephalus after advent of endoscopy	2019

Figure 20: Dr. Dadhich, Senior Neuroradiologist along with Guest Dr. Mehta (Detroit, USA), Dr. D Modi, and Dr. C.E. Deopujari (From left to right)

the special annual supplement of Child's Nervous System (2018).

Table 2: Endoscopic skull base surgery orators (Shah-Bhagwati Oration)

Ricardo Carrau, Pittsburgh, USA, 2009
Fred Gentili, Toronto, 2010
Henry Schroeder, Griesfwald, Germany, 2011
Amin Kassam, Santa Monica, USA, 2012
Dharambeer Sethi, Singapore, 2014
Milind Kirtane, Mumbai, 2015
Andre Grotenhuis, Nijmegen, Netherlands, 2016
Devender Rai, 2017
Davide Localtelli, Milan, 2018
Rudolf Fahlbusch, Hannover, Germany, 2019

CONTRIBUTION TO ORGANIZED NEUROSURGERY

Apart from the founder of the department, Prof. Ram Ginde, his successors have also been associated with organized

neurosurgery with Prof. Bhagwati becoming president of NSI in 1988–1989, Keki Turel in 2011–2012, and Deopujari in 2012–2013. Dr. Bhagwati (1995–1996) and Deopujari (2014–2015) have presided over the International Society of Pediatric Neurosurgery. Dr. Turel has also been president of Academia Eurasia Neurochirurgica in 2010–2011 and currently chairs the neurocomplication committee of the World Federation. Dr. Deopujari has been the president of the Asian Australian Society for Pediatric Neurosurgery (2017–2019) and currently chairs the neuroendocrine and neuroendoscopy committees of the World Federation of Neurosurgery (WFNS).

FUTURE

With the glorious history of the past, the department is hoping to start dedicated superspecialty clinics with neurologists, neurophysiologists, neuroanesthesiologists, and neuroradiologists to offer comprehensive learning as well as be future ready for patient care.

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