

The History of Pediatric Neurosurgery. A Brief Historical Overview

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Technically, this subspecialty was actually developing when in various countries pioneering neurosurgeons such as Harvey Cushing, Walter Dandy, Norman Dott, and Kenneth McKenzie operated on children who suffered from hydrocephalus or newly diagnosed brain tumors. By the early 1950s, the identity of pediatric neurosurgery was being defined in the world's major cities, Boston, Chicago, London, Paris and Toronto, to name but a few; each had freestanding children's hospitals that were served by committed pediatric neurosurgeons. Nevertheless, it was common at that time for surgeons treating children to maintain a part-time adult practice as well.

Pediatric neurosurgery owes most of its routines, techniques, and instrumentation to the neurosurgery of adults, but, as we know, there are important differences in scale, anatomy, physiology, and pathology. All of these significantly affect management. Nonetheless, the momentum was under way: Now, 60 years later, scores of neurosurgeons around the world are full time pediatric neurosurgeons.

A review of the available historical information from some of the leading children's hospitals reveals that in many instances the development of surgical programs for children came about at the whim of an institution's powerful pediatric medical establishment. In due course, surgical treatments were required for birth defects, some infectious disease processes, and trauma. All the while, pediatric surgeons often had to battle with the medical leadership in their institutions to obtain admission privileges, access to the few operating rooms, and their own identity.

A few practitioners who had received neurosurgical training at the hands of a master, or who as general surgeons were 'deputized' to a neurosurgical career, began providing specialized care for children in the early 1930s. Yet it often remained the case in many centers that children with major neurological problems requiring surgery were referred to the senior neurosurgeon in the institution for treatment. Surgery was often performed in the adult neurosurgical unit after which the child was transferred back to the pediatric facility for postoperative care.

Individual who were practicing pediatric neurosurgery around the world by the mid-1960s, took steps to assign identity to their craft. Hirsch reflected that "Three pre-requisites were to be fulfilled before a specialty can be recognized as such: (1) individualization of a specific body of knowledge; (2) recognition of the specific nature of this knowledge by people who will create the means necessary to the practice and development of the specialty; (3) conferring an official status on it by way of political decisions and the creation of dedicated learned societies. Organized pediatric neurosurgery was about to move beyond 'individual visits by one neurosurgeon to another' when it obtained recognition as a subspecialty of neurosurgery at this time.

Specialty organizations were created. The European Society for Pediatric Neurosurgery (ESPN) was founded at the first European Congress of Pediatric Neurosurgery held in Vienna in 1967; Donald Matson was the guest of honor. In 1972, what was identified then as the American Association of Neurological Surgeons, Pediatric Section, met for the first time in Cincinnati. Several specialty sections have arisen since then within this association. The American Society of Pediatric Neurosurgeons (ASPN) was formed in 1978. Similar professional organizations have arisen in Japan (1973), Mexico (1999) and Australia (2002). The birth of these professional societies reflected the increasing attention to children's neurosurgery that was taking place around the world and the bonding of their members who were seeking to develop their skills exclusively for the benefit of children.

All of these societies, national and international, devote themselves and their academic endeavors to the research, diagnosis, and care of surgical lesions residing within the child's nervous system.

Certainly, the pediatric neurosurgeon is just as reliant upon the same contemporary electrodiagnostic, imaging and surgical technologies as is the colleague who treats adults. Nevertheless, some would suggest that the learning curve is more arduous for the pediatric practitioner who has to accommodate the 'differences in scale, anatomy, physiology, and pathology' that exist in the infant and child. That said, technological advances have not only been enormously beneficial for the child but have helped adults as well.

For many, the signature technological event that is associated with the progress of pediatric neurosurgery would be the elusive search for the devices designed to by-pass obstructed CSF circuits.

As early as 1909, McClure addressed the routing of CSF between the lateral ventricles and the lymphatic or venous system. Although the idea was attractive, a basic practical problem was how to ensure that the one-way flow of CSF would not become clogged within a drainage tube. Frank Nulsen and Eugene Spiltz in 1951 introduced the concept of a ball valve-regulated device. However, it was not until later in the 1950s that several types of one-way shunt valves, a key to the success of the diversionary shunting techniques, became available. Holter designed a valve that permitted ventriculoperitoneal shunting. There were two novel features to the Holter apparatus: the valve mechanism itself and the material used to make it. The early results of these shunts were encouraging; there were lower mortality and revision rates.

Pediatric neurosurgeons may have taken a lead position within the neurosurgical community in their commitment to evidence-based medicine. Their efforts continue with respect to hydrocephalus treatments and to those treatments for spasticity relating to cerebral palsy. They have recognized the 'complexity of treatment selection in contemporary practice' for certain conditions, and have moved way beyond earlier anecdotal and retrospective reviews. These and other continuing efforts have made important contributions to pediatric neurosurgery and continue to advance new breakthroughs in children's neurosurgery.

A pediatric neurosurgeon treats a patient who grows, develops, and changes from a neonate to an adolescent. If called upon, each surgeon has an opportunity to influence the maturation of that being significantly. Perhaps this explains the inspiration that arouses in physicians the need to take on additional responsibilities related to their care.

For decades, pediatricians have effectively championed the child's cause through the committees of the American Academy of Pediatrics. To their credit, pediatric neurosurgeons by the mid-1970s began speaking out on behalf of the children who have suffered from birth defects, intracranial neoplasms, and trauma in the central nervous system. One of the founding fathers of this neurosurgical discipline spoke to professional groups and parents' organizations about the consequences of head trauma and the measures that could be taken to protect our children. For example, some have established residential facilities and rehabilitation camps for children and young adults with spina bifida.

Jonathon Peter has summarized clearly our heritage. 'Pediatric Neurosurgery has developed *pari passu* with the general acceptance that children's diseases are best understood and treated in an environment specially centered to their unique requirements. That is not to say that pediatric neurosurgery is an offshoot of pediatrics *per se*; it is very much a surgical progeny. The skills, diagnostic techniques and technologies all have a common origin in the neurosurgical sciences. The nature of children's pathologies, however, both congenital and acquired, and their management are essentially different to those of adults. The awareness and understanding required to help young children and their often devastated parents is one of the special tasks of the pediatric neurosurgeon.

By the year 2030, how will pediatric neurosurgeons recognize themselves? What would Ingraham and Matson and all the other professional founders think at that time? No doubt, they would recognize that our purpose, identity and accomplishments are now a matter of record of which to be proud...

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