Chapter 1

Introductory Chapter: History of the Hydrocephaly

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1. Introduction and the history of hydrocephaly

In the modern era of medicine, the term hydrocephaly (from Greek hydro = water + kefale = head) indicates an excessively increased volume of cerebrospinal fluid (CSF) with dilated ventricle system.

The first physician who documented the hydrocephaly was Hippocrates (fifth century BC), the father of medicine. Furthermore, he attempted to treat with subdural or subarachnoid punctures. In the works of Galen (130–200 AD), one can find footprints of the hydrocephaly, as he believed the condition occurred from the accumulation of the fluid in the extra-axial spaces. As descendants of Hippocrates and Galen, many ancient Greek physicians reportedly treated hydrocephaly by trephined openings to the skull [1].

At the University of Padua, Vesalius (1514–1564) was first to report that "the water had not collected between the skull and its outer surrounding membrane, but within the ventricles of the brain" [2].

Thomas Willis, in 1664, was first to come up with the idea that CSF is produced by choroid plexus of the ventricles [3]. In 1774, Cotugno demonstrated that ventricles were filled with fluid during fluid during lifer and he successfully aspirated the fluid via percutaneous methods [4]. Till to modern era, the pathophysiology of hydrocephaly was poorly understood and initial therapeutic attempts were generally failed.

As human kind technologically developed, in the twentieth century, physiology of CSF dynamics and pathological mechanisms causing hydrocephaly have more definitely determined. This new knowledge caused the discovery of more rational and radical treatments. In 1891, Quincke was first to describe lumbar puncture as an effective treatment for hydrocephaly. Continuous ventricle drainage was primarily performed by Keen. Attempt to drain ventricular CSF to the subgaleal, subdural, and subarachnoid spaces was being tried by Miculicz firstly with the use of gold tubes and catgut strands [5].

Balkenstich method, which the callosotomy was performed to drain lateral ventricle to the subdural space, was introduced by Anton and von Bramann. Unfortunately, this procedure was withdrawn due to high mortality rates [6].

In 1908, by using vein grafts, Payr created a drainage corridor between the ventricles and sinus sagittalis superior or jugular veins [7]. In the very same year, Kausch performed ventriculoperitoneal drainage system with rubber tubes [8].

In the same period, Heile performed several spinal CSF diversions to the peritoneum and urinary system with various methods [9].

As a pioneer neurological surgeon, Cushing also described a technique of lumboperitoneal CSF diversion by silver cannulas via L4 vertebral corpus [5].

Dandy was reported that CSF production was made grossly by choroid plexus and this in turn led Dandy to introduce bilateral choroid plexectomy to reduce CSF production [10]. To treat infantile hydrocephaly, this method had been used as a procedure of first choice in the United States. Endoscopic choroid plexectomy followed this development in the late 1930s [11]. Dandy also innovated the lamina terminalis penetration to the third ventricle via subfrontal or subtemporal approaches. This technique was further developed by endoscopic approaches.

Takildsen developed a shunt system between lateral ventricle and cisterna magna (ventriculocisternostomy). By the time, efforts of CSF diversions to other body cavities, such as ureter, heart, jugular vein, thoracic duct, pleural space, gallbladder, fallopian tube, ileum, and salivary ducts had developed [5].

In 1952, Nulsen and Spitz worked with John Holter, whose child also suffering from hydrocephaly, introduced valve-regulated shunt system with spring and ball valve [5]. At the same time, Pudenz produced one-way slit valve from silicone [1]. Ventriculoperitoneal shunt systems were popularized by the attempts of Ames [12] and Raimondi and Matsumoto [13]. Since then, new hardwares were developed. Nowadays, there are numerous options for valves, catheters, antisiphon devices, programmable valves for CSF diversion procedures.

Past three decades, neuroendoscope once again gained popularity, the benefits of which include accurate placement of ventricular catheter and third ventriculostomy [14]. Furthermore, stereotactic localization and neuronavigation secured the procedures and warrant exact localization of ventricular catheters.

2. Conclusion

Despite those technological developments, treating a hydrocephalic patient still remains a challenging procedure for present neurological surgeons. We, neurological surgeons, still continue to face with numerous, inevitable complications of procedures performed to treat hydrocephaly. As my mentor always mentioned “if you shunted a patient, you solemnize a marriage with her or him”.

This book will provide vulnerable knowledge to whom dealing with challenging hydrocephaly.

Conflict of interest

None.

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