Neurosurgical Classic—XX

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Approximately fifty years ago Dr. Walter E. Dandy converted a personal disappointment into a major advancement in the understanding of a common neurological disorder—hydrocephalus. Following his graduation from the Johns Hopkins Medical School in 1910, Dandy worked for a year with Dr. Harvey Cushing in the Hunterian Laboratory of Experimental Medicine. He then spent 1911–1912 as Cushing's clinical assistant, and was invited to accompany Cushing the following year to the newly built Peter Bent Brigham Hospital in Boston. Because of clashes of personality between the two men, the offer was withdrawn. By that time, however, Dr. William S. Halsted had filled all of the positions on his surgical house staff for 1912–1913, and Walter Dandy was left without an appointment. Through the kindness of the director of the hospital (Dr. Halsted was on vacation), Dandy was given a room and was allowed to work in the Hunterian Laboratory. There Dandy and Kenneth D. Blackfan, instructor in pediatrics, performed their basic studies of hydrocephalus and the circulation of the cerebrospinal fluid which were to revolutionize medical thought in these areas.

Until that time there had been no adequate theories advanced to explain the circulation of the cerebrospinal fluid or the development of hydrocephalus. Furthermore, there were still no satisfactory methods of treating hydrocephalus. Although this condition was known to the ancients, the only operative treatment developed prior to the nineteenth century was ventricular puncture. Then open ventricular drainage to the surface of the head was proposed in 1881, and later was carried out by a number of surgeons. During the following three decades a great variety of other operations were also devised for the treatment of hydrocephalus. Ventricular fluid was shunted into the subcutaneous or sub-arachnoid spaces, into the venous system, or into the peritoneal cavity. The choroid plexuses were destroyed or removed, and operations were developed for the drainage of the spinal subarachnoid fluid into the peritoneal or retroperitoneal spaces. However, the results of these ingenious operations were very discouraging.

Then Dandy and Blackfan began their important investigations.

“Dandy was able, in the dog, to produce dilatation of the lateral and third ventricles by obstructing the aqueduct of Sylvius, to produce distention of one lateral ventricle by obstructing its foramen of Monro and to prevent the latter by previous removal of its choroid plexus. By separating the Pacchionian granulations from the great venous sinuses both over the vertex and at the base of the dog's brain, he demonstrated that hydrocephalus did not result, and, therefore, that cerebrospinal fluid absorption did not occur in that manner (as was widely believed) but rather, directly into the blood vessels in the subarachnoid spaces. "In the autopsy room an obstruction either at the aqueduct of Sylvius or at the foramina of Luschka and Magendie or along the basilar cisterns was demonstrated in every case of 'idiopathic' hydrocephalus. This disorder was thus reclassified, upon a solid basis of anatomical and physiological study and of clinical observation, into communicating and non-communicating types...."

These studies, and the operations that Dandy devised as a result of them (third ventriculostomy, choroid plexectomy, and catheter drainage of the third ventricle through the aqueduct of Sylvius) were of basic importance to the development of successful shunting procedures for hydrocephalus.

Throughout his life Dandy continued to contribute to the understanding of hydrocephalus, and his last published work was on this subject.

References

34. TORKILDSEN, A. A new palliative operation in cases of inoperable occlusion of the Sylvian aqueduct. Acta psychiat., Kbh., 1939, 14: 221.