Walter Dandy

- Walter Edward Dandy (1886-1946)
- The effect of glucagon-like peptide-1 agonists on ocular parameters in idiopathic intracranial hypertension patients: a retrospective study
- The evolution of intracranial aneurysm clipping: a historical perspective
- Cranial Nerve IX and X Neurectomy for Glossopharyngeal Neuralgia: Case Report and Operative Video
- Harvey Cushing: France Military Hospital Surgical Unit Head and World War I U.S. Army Medical Corps Commissioner
- A spinal perimedullary arteriovenous fistula treated by Walter Dandy and illustrated by Dorcas Hager Padget in 1934
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- Obliteration of the Superior Petrosal Vein During Cerebellopontine Angle-Surgery: More Cons than Pros?

Walter Edward Dandy (April 6, 1886 – April 19, 1946) was an American neurosurgeon and scientist. He is considered one of the founding fathers of neurosurgery, along with Victor Horsley (1857–1916) and Harvey Williams Cushing (1869–1939).

Society

see Walter E. Dandy Neurosurgical Society

Discoveries and innovations

Up to the 1920s, plain X-ray films could demonstrate only calcified tumors, shifts in the midline position of a calcified pineal gland due to a mass in the cranium, or foreign metallic objects within the skull. Walter Dandy reported in 1918 that he visualized cerebral ventricles by introducing air as a contrast agent through a trocar into one of the occipital lobes or the right frontal horn of the ventricular system. Dandy localized lesions that distorted or shifted the ventricles.

In 1920, Dandy placed air by lumbar puncture into the spinal subarachnoid space that could visualize the brain and entire ventricles. Antonio Egas Moniz with the assistance of his neurosurgeon colleague, Almeida Lima, obtained X-ray images of the cerebral arteries of dogs and decapitated human heads from corpses after injecting strontium bromide into their carotid arteries. Satisfied by these experiments, Moniz injected strontium bromide directly into the carotid arteries of five patients which failed to show intracranial vessels. In the sixth patient, intracranial arteries were outlined but that patient died of cerebral thrombosis presumably due to the hyper-osmolality of that contrast agent. Finally, on June 18, 1927, Moniz injected 22% sodium iodine into a 20-year-old man and obtained clear visualization of his carotid artery and intracerebral branches after temporarily occluding the artery with a ligature. Direct percutaneous puncture of the cervical carotid artery remained the primary technique in the 1960s to visualize intracranial blood vessels until Seldinger's technique was introduced in 1953. Computerized axial tomography (CAT) and magnetic resonance imaging (MRI) replaced cerebral arteriography for localizing tumors and epidural or subdural hemorrhage. However, angiography is used currently for embolization of aneurysms and removal of thrombi or emboli in patients with acute stroke [1)].

Dandy is credited with numerous neurosurgical discoveries and innovations, including the description of the circulation of cerebrospinal fluid in the brain, surgical treatment of hydrocephalus, the invention of air ventriculography and pneumoencephalography, the description of brain endoscopy, the establishment of the first intensive care unit [2)].

Hydrocephalus Classification

He first described the basic mechanism and classification of hydrocephalus as:

Obstructive hydrocephalus or Non Obstructive hydrocephalus.

Despite advances in understanding the underlying process, current classification systems still rely upon Dandy’s classification scheme [3)].

He developed treatments for hydrocephalus such as removal of the choroid plexuses that remained in use until effective valved shunts became available in the 1950s. Essentially all subsequent classifications begin with this paradigm.

Over time there have been new classifications primarily focused on specific uses. Classifications in the sciences must be reviewed periodically to include new findings and new ideas. Since the expectation that hydrocephalus can be treated or even cured, new classifications tend to focus on the physics of CSF, the choice of treatment, and the outcome in specific subgroups. These thoughts should be seen as additions to the paradigm [4)].

Subtemporal decompression, first advocated by Walter Edward Dandy for the treatment of benign

intracranial hypertension or pseudotumor cerebri.

Dandy can be credited with the first detailed description of the vein of Galen malformation, the first description of x-ray visualization of an intracranial aneurysm, the first characterization of basilar artery dolichoectasia, and the publication of the first comprehensive operative case series of arteriovenous malformations, cavernous malformations, and developmental venous anomalies.

Dandy performed the first surgical trapping of a cavernous internal carotid artery (ICA) aneurysm by clipping the supraclinoid ICA and ligating the cervical ICA, the first clipping of an intracranial aneurysmand he also executed the first intracranial surgical clipping of the ICA to treat a carotid-cavernous fistula which marked the birth of cerebrovascular neurosurgery [5]. [6].

While selectively sectioning the pain fibers in trigeminal neuralgia (which usually lie posteriorly) of the trigeminal nerve via an occipital craniectomy Dandy, as quoted in Wilkins, noted that vascular compression of the trigeminal nerve at the pons was a frequent finding [7].

Hemispherectomy

For glioblastoma, legacy extensive resections, such as Walter Dandy’s 1928 concept of hemispherectomy not resulting in cure, [8] cast a nihilistic pallor on the quest for total or near-total resection.

Gliomas were considered incurable at that time. Presuming that the loss of motor function denoted a lack of useful tissue in that hemisphere, he pioneered radical removal of the involved cerebral hemisphere. Of the 5 patients operated on by Dandy, 1 died within 48 hours of hemorrhage because of a displaced vascular clip; 1 died of pneumonia in 2 weeks; 2 died of tumor recurrence, at 3 months and 3.5 years, respectively; and a fifth patient was lost to follow-up beyond the 2nd postoperative week. The authors queried the Thomson Reuters Web of Science and Scopus. A total of 88 papers fulfilled the inclusion criteria. Half of these papers (44/88) were published after 2012. Only 11% of papers (10/88) quoted Dandy's paper accurately; half of them were published before 1997. Most publications (76% [67/88]) quoted Dandy incorrectly, all of them from 1997 and later. In the remaining 11 papers (13%), the accuracy of the quotes was unclear. The authors found a trend toward more accurate citations in earlier papers. Critically reviewing Dandy's report, with an understanding of the historical context, allows a better understanding of his intentions and the value of his contribution [9].

Dural tenting

Walter Dandy reported dural tenting sutures as an effective way to prevent postoperative EDH. Over time, his technique gained in popularity and significance to finally become a neurosurgical standard. Yet, several retrospective reports and one prospective report have questioned the ongoing need for dural tenting sutures. Dandy's explanation that the hemostasis observed under hypotensive conditions is deceiving and eventually causes EDH may be obsolete. Today, proper intra- and postoperative care, including maintenance of normovolemia and normotension and the use of modern hemostatic agents, may be sufficient for effective hemostasis. Thus, there is a fundamental need to evaluate the necessity of dural tenting sutures in a solid, unbiased, evidence-based manner [10].

Publications

During his 40-year medical career, Dandy published five books and more than 160 peer-reviewed articles while conducting a full-time, ground-breaking neurosurgical practice in which he performed during his peak years about 1000 operations per year. [11].

He was recognized at the time as a remarkably fast and particularly dextrous surgeon. Dandy was associated with the Johns Hopkins Hospital University School of Medicine and the Johns Hopkins Hospital his entire medical career. The importance of his numerous contributions to neurosurgery in particular and to medicine in general has increased as the field of neurosurgery has evolved.

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