A History of Ventricular Neuroendoscopy

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Key words
- History
- Neuroendoscopy
- Neurosurgeon

Abbreviations and Acronyms
CSF: Cerebrospinal fluid
OD: Outside diameter

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■ OBJECTIVE: **To describe the history of neuroendoscopy through the history of the major neurosurgeons who worked and published in the field.**

■ METHODS: **All relevant data described in publications before 1980 about the history of neuroendoscopy and found through OVID MEDLINE searches and related references are reported.**

■ RESULTS: **Contributions of 14 neurosurgeons who were pioneers in neuroendoscopy are described in chronologic order: Lespinasse, Dandy, Payr, Mixter, Fay, Grant, Volkmann, Putnam, Dereymacker, Scarff, Feld, Guiot, Fukushima, and Griffith.**

■ CONCLUSIONS: **An historical review of ventricular neuroendoscopy remains by essence incomplete. Medical technical progress proceeds by leaps and bounds, related to the ingenuity of surgeons able to understand rapidly the value of a technical change to improve their surgical procedure. The ability to remain attentive to patients and evolving pathologies as well as the evolution of modern technology is required to make further progress in neuroendoscopy.**

INTRODUCTION

Neuroendoscopy is a subspecialty of neurosurgery in which the neurosurgeon works through a tube as narrow as possible on deeply located intracranial targets. The surgeon has to open the skull to visualize the target at the distal tip of the tube and to introduce instruments to work. The surgeon needs to bring additional light inside the tube; needs enough space for the instruments; and above all needs to see what he or she is doing either by direct observation or, with the increasing technical advances, through sophisticated optical systems.

The history of neuroendoscopy is the history of ingenious neurosurgeons who have designed and developed surgical strategies and tools to work deep in the brain through approaches as small as possible. Neuroendoscopy started with the early beginnings of neurosurgery. After some initial enthusiasm, neuroendoscopy was almost abandoned, probably because of the increased success of microsurgery and the introduction of shunts for the treatment of hydrocephalus. The high percentage of shunt complications led neurosurgeons to look for an alternative technique and to return third ventriculostomy. Endoscopy was reintroduced and has been widely used since the 1990s.

The history of neuroendoscopy is also time-linked with the history of the technology of the 20th century. The improvement of the telescope, especially the rod lens system; the development of cold light sources; and the creation of minimally invasive surgery created the conditions for the renewal of neuroendoscopy in the 1990s.

METHODS

Searches were conducted on August 11, 2010, in OVID MEDLINE without specified limits. Searches were performed using the following key words: "history" and "neuroendoscopy" (query 1); "history" and "endoscopy" and "neurosurgery" (query 2). The computer search identified 36 articles for query 1, of which we excluded 16 articles that were not directly related to history, and 190 articles for query 2, which allowed us to add 5 more articles of potential interest for our subject. This first search represents 15 articles (1, 11, 12, 19, 21, 24, 27-31, 35, 43, 46, 47). Looking at the reference lists in each of these articles, we added arbitrarily related articles selected as historical original articles on the basis of their publication date before 1980.

The history of neuroendoscopy can be related through different approaches, describing the evolution of the surgical techniques, the development of the tools, or the contributions of each individual on the field. We chose the last approach and summarize in this article the main contributions of each of the brilliant neurosurgeons to the history of neuroendoscopy. Cited references either were publications by the neurosurgeons themselves or were subsequent reports. The authors are presented in chronological order.

RESULTS

Lespinasse

The first report in the neurosurgical literature of Dr. Lespinasse's (born in Aurora,

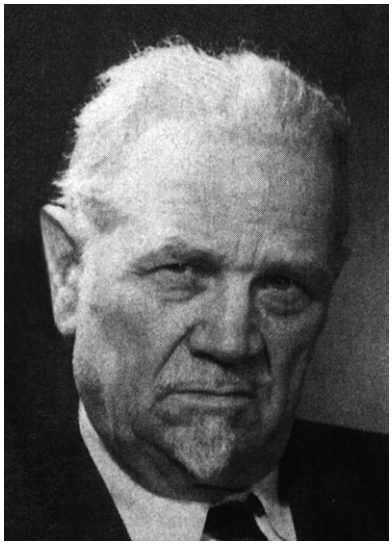

Figure 1. Victor Darwin Lespinasse.

Figure 2. Walter Dandy.

Figure 3. Edwin Payr.

Illinois, 1878; died in Chicago, Illinois, 1946; **Figure 1**) contribution to neuroendoscopy was made by Davis (8) in his textbook *Neurological Surgery* published in 1936: "the first attempt to remove a choroid plexus for hydrocephalus with which I am familiar was made by Dr. V. L. Lespinasse of Chicago. In 1910, Lespinasse introduced a small cystoscope into the ventricle and fulgurated the plexus bilaterally in two infants. One of his patients died postoperatively and the second lived five years. The method was presented before a local medical society and was not otherwise recorded" (8). Lespinasse was a Chicago urologist, well known at that time as the American pioneer of testicular transplantation. The only direct proof of Lespinasse's neurosurgical interest is his application form to the American College of Surgeons in 1913 where he listed among his research interests "destruction of the choroid plexus for internal hydrocephalus." Lespinasse did not realize the interest of this new procedure, describing it later to his daughter Victoire, a Chicago obstetrician, as "an intern's stunt" (20).

Dandy

For the neurosurgical community, Dr. Dandy (born in Sedalia, Missouri, April 6, 1886; died in Baltimore, Maryland, April 19, 1946; **Figure 2**) is recognized as the father of neuroendoscopy. In 1918, the year that he finished his residency, Dandy published his paper on air ventriculography, describing an x-ray technique allowing neurosurgeons to visualize the ventricles for the first time: "All of the injections have been made in children varying from six months to twelve years of age. Invariably the lateral ventricle has been sharply outlined in the radiogram. In two instances the third ventricle and the foramen of Monro were visible. In none, however, have we observed the fourth ventricle or the aqueduct of Sylvius. The practical value from pneumoventriculography is expected principally from the shadows of the lateral ventricles" (7). In 1922, Dandy published the first endoscopic observations of the ventricles, using an endoscope with a light reflected into the scope from an exterior lamp via a head mirror, and coined the term "ventriculoscopy" (28) "It was possible to see practically the entire extent of the lateral ventricle, the foramen of Monro, the septum pellucidum with numerous perforations in it, and the entire extent of the choroid plexus . . ." (4). However, with the ventriculoscope used at that time, Dandy was unable to remove the choroid plexus and had to admit that "the remarkable vizualisation of the ventricular system provide by the ventriculoscope did not surpass the images produced by the more routine pmeumoentriculography" (29). In 1923, he used a small cystoscope lent by Kelly, a gynecologist at John Hopkins Hospital, and succeeded in removing the choroid plexus in two cases (19), which were followed by others in succeeding years, achieving outcomes similar to outcomes with a craniotomy (1). After the first years of enthusiasm, Dandy found only limited use for endoscopy and noted at the end of his brilliant career in 1945 that "its usefulness is probably restricted to infants and young children, and to those tumors which are accidentally disclosed during choroid plexectomies rather than tumors, however small, that are causing obstruction to the ventricular channels" (6).

Payr

Professor Payr (1871–1946; **Figure 3**), Professor of Surgery at the University of Leipzig, presented at the Leipzig Medical Society on November 25, 1919, the preliminary tests, tools, and technical ability of Enzephaloskopie and was considered the pioneer of neuroendoscopy in Germany. However, Payr was mostly well known for the use of vein grafts to drain the cerebrospinal fluid (CSF) from the ventricles into the sagittal sinus and jugular veins (34).

Mixter

Dr. Mixter (born in Vienna, December 5, 1880; died 1958; **Figure 4**) was appointed first Chief of the Neurosurgical Service of Massachusetts General Hospital from