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Neurosurgery:

AN HISTORICAL SKETCH

Most readers of this book know that the operation of trephining the skull is the oldest known surgical procedure. But in following the evolution of this and other neurosurgical operations through the centuries, every reader will come upon many interesting nuggets of information which are new to him. Photographs of Sir Victor Horsley, Harvey Cushing, Charles H. Frazier, Thierry de Martel, Walter E. Dandy, Clovis Vincent, and Otfried Foerster head the list of great neurosurgeons pictured.

Learn what were the indications for performing neurosurgical operations from the earliest times down to our own.

Review the great advances in technic, the increasing number of conditions which have come within the neurosurgical sphere.

142 pages 69 illustrations 181 references

American Lecture Series®



NEUROSURGERY

-An Historical Sketch-

By

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Foreword

THE STORY of neurosurgery reaches far back beyond the dawn of recorded human history. Its beginnings, as will be seen, are to be found in the evidence we have from the trephined skulls which have been discovered in the caves of Neolithic man long before civilization blossomed forth in Egypt and Mesopotamia. From these earliest attempts designed to relieve conditions associated with nervous system difficulties, the efforts of those concerned with the healing art have increased in number and in magnitude through century after century until at the present time a relatively new specialty has come into being — a group of surgeons who are particularly trained, and therefore particularly qualified, to deal with various disorders of the brain, the spinal cord and the peripheral nerves.

The present treatise makes no claim to completeness in telling this long story. It does, however, attempt to touch the high points of the various eras and to summarize as well as may be the important advances which were made from one epoch to another. Although numerous original articles and works have been consulted, much necessarily has been quoted from authors who have written upon certain phases of the subject, and in these instances their deductions or quotations from the original works have been noted freely.

In addition to the references given subsequently, several books have afforded very abundant general information. These were: Garrison, F. H., *An Introduction to the History of Medicine*; Castiglione, A., *A History of Medicine*; Mettler, C. C., *History of Medicine*; Osler, W., *The Evolution of Modern Medicine*; and Cushing, H., *Surgery*

of the Head (in Keen's *System of Surgery*). Likewise, special mention should be made of the Thomas Vicary Lectures on *A Glimpse into the History of the Surgery of the Brain*, by Sir Charles Ballance; *The Lettsomian Lectures*, by Donald Armour, on *The Surgery of the Spinal Cord and its Membranes*; and, finally the excellent summary of *Recent Advances in Neurosurgery*, by Cobb Pilcher from which I have derived much valuable information.

The writing of this historical sketch of neurosurgery was undertaken and completed in its original form some five or six years ago at the instigation of Dr. Lewis H. Pollock of Chicago. At that time a new *Journal of Neurological Sciences* had been contemplated in which short histories of Neurology and its allied subjects were to have been published in the early issue. Because of World War II and various difficulties arising out of it, the publication of this new Journal was deemed unwise. For this reason the manuscript, with some amplifications, was submitted to my friend, Mr. Charles C Thomas, who has most kindly accepted it to be issued as a monograph.

I am greatly indebted also to Miss Charlotte Thompson, Mrs. Evelyn Senecal and Mr. George Buchanan of the Lahey Clinic Staff for their kind assistance with certain aspects of the original manuscript, and to Miss Anna C. Holt, Librarian of the Harvard Medical School for her many kindnesses. I am especially grateful to Mrs. Louise M. Poe of the Lahey Clinic for her untiring efforts "out of hours" on the final revision, typing and corrections necessary to complete this sketch.

G. H.

Boston, Massachusetts

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I AM GRATEFUL to the following for their kind permission in allowing me to use copies of illustrations as noted in the text.

W. B. Saunders Company for illustrations from Keen's *Surgery*, Cushing's *Tumors of the Nervus Acousticus* and Garrison's *An Introduction to the History of Medicine*.

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G. H.

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NEUROSURGERY

- *An Historical Sketch* -

Introduction

ALTHOUGH neurosurgery, as a specialty, may be said to be a development of the twentieth century, nevertheless surgical procedures which are now recognized as coming within this field have been performed from the earliest times. Indeed, the operation of trephining the skull is undoubtedly the oldest known major surgical procedure. It is incumbent upon us, therefore, to follow the evolution of this and other neurosurgical operations through the centuries; to learn what were the indications for performing these operations from the earliest times down to our own; and finally to review, especially in the modern era, not only the great advances in technic, but also the increasing number of conditions which have come within the neurosurgical sphere, together with the results which have been enormously better with our increasing diagnostic, pathologic, physiologic and technical knowledge.

For the purpose of giving some general outline to the work, the various periods of time which are to be considered may be divided roughly as follows:

1. The prehistoric and Egyptian eras—from the Stone Age up to 500 B.C., i.e., to the time of Hippocrates.
2. The Greek or Hippocratic and Galenic era—500 B.C.—circa 500 A.D.
3. The Mediaeval period, circa 500-1500 A.D.
4. The Renaissance—1500—circa 1700.
5. The pre-Listerian period—1700—circa 1850.

6. The pre-Horsley period—1850—circa 1890.
7. The era of neurosurgery as a specialty, 1890 to the present.

In an attempt to trace the status of this branch of surgery through the long period from Hippocrates to the present era, it would, I think, be somewhat confusing as well as too time-consuming to look up and annotate the comments of a large mass of writers who may have made some reference to the subject in hand. It must suffice to review the work of the great master surgeons of the centuries insofar as they pertain to surgery of the nervous system, and to take their opinions as evidence of what was considered the best surgical practice of their day. In the modern era, in addition to certain outstanding personalities, we shall deal more particularly with the achievements of neurosurgery as a specialty from the standpoint of its widening scope and its technical developments.

Prehistoric and Egyptian Eras

TREPHINED SKULLS from the neolithic period of the Stone Age have been found in nearly all parts of the world and many of them are in an excellent state of preservation. In most instances a single, well cicatrized operative opening is present, showing that the patient recovered and lived for a considerable space of time. Cushing³⁰ gives an illustration of a trephined Peruvian skull in which cranioplasty had been practiced by using a silver plate (Figure 1) and Courville²⁹ described and depicted two doubly trephined Incan skulls.

The technic of these ancient trephinations was varied. They were all performed with a sharp cutting instrument of stone utilized in different ways, as shown by Tello¹⁷¹ (Figure 2). Perhaps the three commonest methods were: (1) making four cross cuts and removing the central piece as in Figure 3; (2) merely scraping the bone down to the dura as in Figure 4; (3) making multiple small round perforations close together in the form of a circle and removing the disk of enclosed bone (Figure 5).

What were the purposes of these operations? Horsley⁸⁹ was led to believe from his studies that they were undertaken for depressed fractures and he surmises that they may have cured focal epilepsies which would have been present. Osler¹³⁶ says, "The operation was done for epilepsy, infantile convulsions, headache and various cerebral

diseases believed to be caused by confined demons, to whom the hole gave a ready method of escape.” Courville²⁹ makes the following statement, quoting Moodie as reference: “The possible military significance of the procedure is suggested by the frequency of trephine openings in the skulls found in the burial grounds of the great

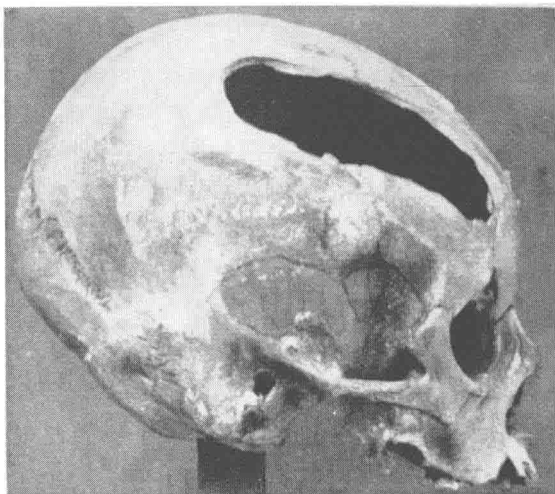


Figure 1. Trephined prehistoric Peruvian skull in which cranioplasty had been practiced by the use of a silver plate. (From Cushing, H., in Keen's *Surgery*, Vol. III, 1908.)

mountain fortresses of the Incas, while in the agricultural or pastoral communities of the coastal plains no trephined crania have been found. The finding of trephined openings in fractured skulls lends further support to this supposition since injuries to the head were probably sustained largely in battle. On the other hand, trepanation was also done for relief of unexplained and unbearable pain (sinus in-

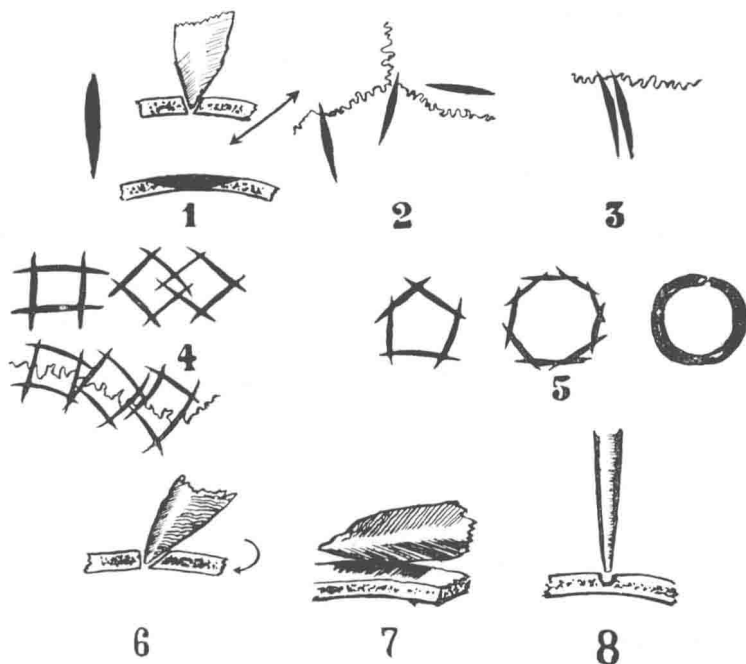


Figure 2. Methods of making trephine openings with a sharpened piece of stone. (From Tello, J. C.: *Proc. 18th Internat. Cong. of Americanists.*)

fections), increased intracranial pressure, melancholia and for other unexplained and possibly for superstitious or religious reasons. It was also done post-mortem to give the young shaman-surgeon technical experience." Local anesthetics such as coca leaves containing cocaine may have been used (Hrdlicka, A., quoted by Courville). Lucas-Championniere,¹¹⁴ an eminent authority, believed that trephining was done to relieve headache not helped by other means.

The thaumaturgic or religious basis for prehistoric trephining is well discussed by Lambert Rogers,¹⁵³ who

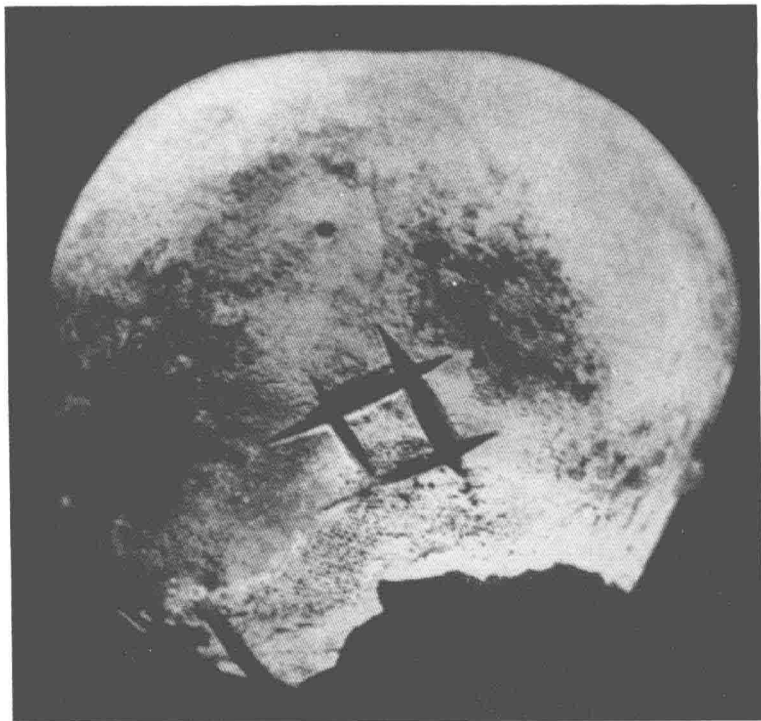


Figure 3. Skull trephined by four cross cuts after which the section in the center was removed. (After Tello.)

says in part: "Probably the operation was most often performed as a religious or thaumaturgic rite applied to cases of epilepsy with a view to releasing imprisoned evil spirits." This view is supported by the fact that numerous amulets of bone disks taken from neolithic skulls have been found in France. However, no such amulets have been found in Peru, and Rogers therefore concludes: "Since in the Peruvian skulls fractures are quite common, it appears as if in that part of the world the operation had a basis more definitely surgical than religious."

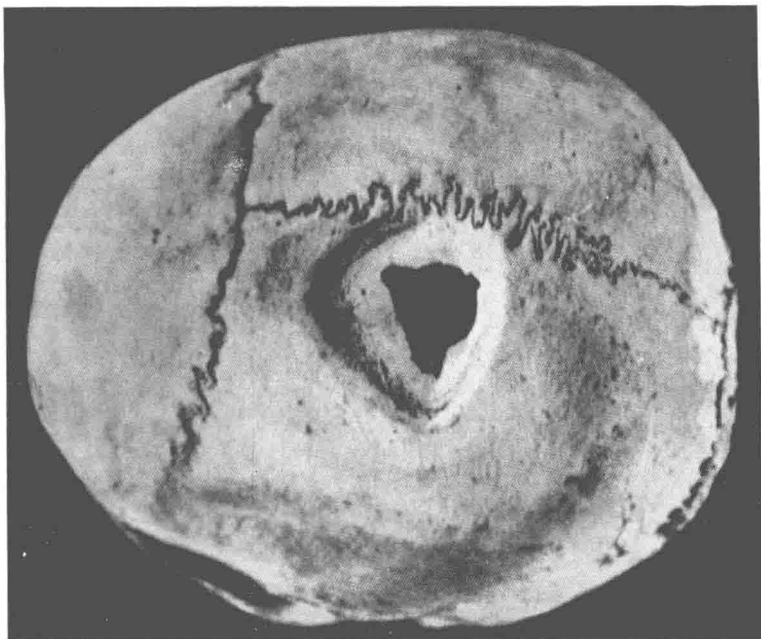


Figure 4. Trephine hole made by scraping the bone down to the dura.
(After Tello.)

Leaving conjectures aside, we have at least certain objective evidence. In the Tello collection* of trephined prehistoric crania in the Warren Museum of the Harvard Medical School there are some 400 specimens. A large number of these show obvious fractures or signs of inflammatory disease at or near the site of the operative opening (Figure 6). From his careful study of these crania, Tello¹⁷¹ concludes as follows: "Examination of the majority of trephined skulls in our collection shows that four fundamental motives led the operator to adopt therapeutic measures:

* Through the kindness of Dr. Myrtle Canavan, the curator, I have examined many of these skulls, and she has also been most helpful in giving me information on the literature concerned with them.

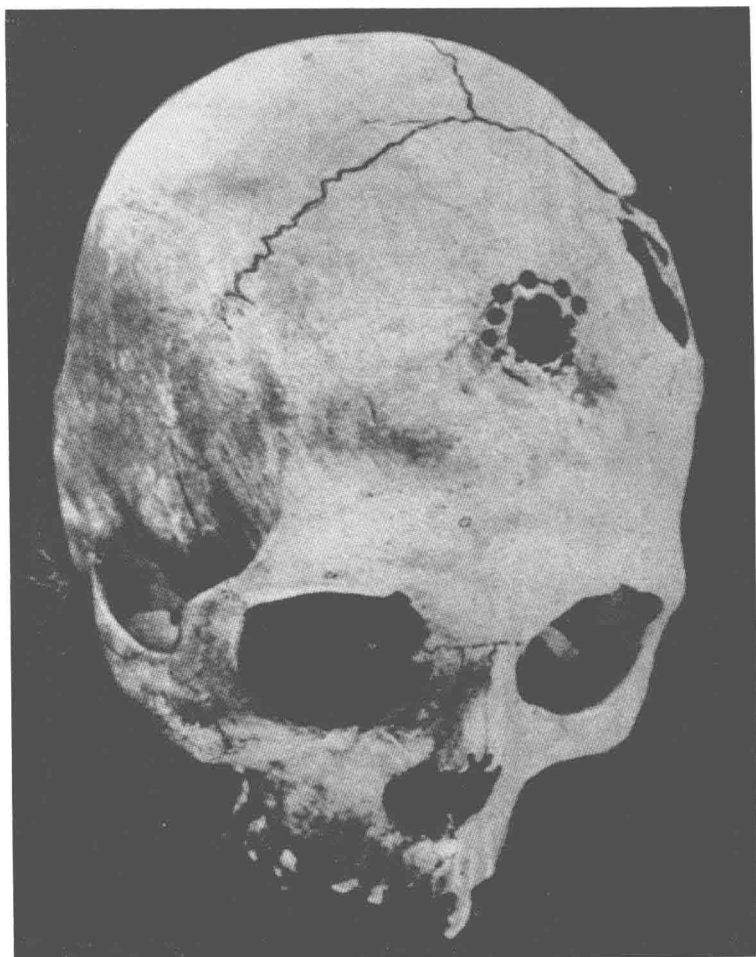


Figure 5. Skull opening made by a series of holes placed in a circle.
(After Tello.)