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THE SURGICAL ASPECTS OF DR. WOOD'S CASE OF BRAIN TUMOR.

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The surgical problem in this very interesting case was to expose the occipital lobe, and especially the cuneate portion of that lobe in such a manner as to permit of its inspection, its palpation, and the exploration by the finger of its under and internal surfaces, and of the corresponding portions of the tentorium and falx cerebri. As there was also an evident possibility that the disease affected the angular gyrus, it was necessary to bear in mind the relation of that portion of the cortex to the original trephine opening.

It was also apparent that, thoroughly to investigate the region of the cuneus, it would be necessary to remove the skull not only on the horizontal level of the tentorium, which it must be remembered is convex upward, its centre being higher than its circumference, but also almost to the middle line, so that the posterior portion of the longitudinal fissure could be entered with the finger. Of course this involved very close proximity to both the lateral sinus, inclosed in the convex border of the tentorium, where it is attached to the transverse ridges upon the inner surface of the occipital bone, and to the posterior portion of the superior longitudinal sinus contained within the broad convex margin of the falx.

The points necessary to outline on the scalp were therefore as follows: inferiorly, the level of the attachment of the tentorium, *i. e.*, the line of the lateral sinus; superiorly, the line of the external parieto-occipital fissure and the region of the angular gyrus; internally, the line of the attachment of the falx, *i. e.*, the line of the longitudinal sinus.

Presented by the author.

These were easily determined in the following well-known manner: Reid's base line, running from the lower border of the orbit through the centre of the bony meatus of the ear, was first drawn. The line of the great longitudinal fissure was indicated by a line drawn from the glabella to the external occipital protuberance. The fissure of Sylvius was located by a line drawn from a point an inch-and-a-quarter behind the external angular process of the frontal bone to a point three-quarters of an inch below the most prominent part of the parietal eminence. Continuing this line backward, so that it would unite with the line of the longitudinal fissure, the posterior inch-and-a-half of the former indicated the external parieto-occipital fissure. The region between the anterior end of this line, and the posterior end of the fissure of Sylvius, including a portion of the cortex slightly above and below that level, is the region of the angular gyrus. Or that region may be said to lie on that level and behind a line passing through the posterior border of the mastoid process and perpendicular to the base line. The line of the lateral sinus was one extending from the external occipital protuberance to a point an inch behind the external meatus. The correctness of this line was verified by Dr. Osler and myself the day before the operation.

The obvious surgical difficulties peculiar to this case were: 1. The necessity for so closely approaching the two great venous sinuses; 2. the very great inequality in the thickness of the skull at this region, rendering the trephining itself somewhat more dangerous than usual; 3. the need for affording room for such displacement of the occipital lobe in a direction superiorly and externally as would admit of palpation of the cuneus, falx, and tentorium.

The operation was performed by Dr. Agnew, assisted by me. The first trephine opening was made at the lower internal angle of the right occipital lobe, the instrument being placed so that the teeth would clear the lines of the lateral and longitudinal sinuses by from a quarter to a half inch, the variations constantly occurring in the width, and the attachments of those venous channels being carefully considered. It was proposed to cut away subsequently with the rongeur any portion of bone remaining which might interfere with the examination of the suspected regions.

At about the completion of the trephining a jet of blood, from the lower and outer third of the circumference of the wound, showed that a large vessel was opened. The circle of bone was instantly pried up with a lever and removed, when it was found that a trephine tooth had torn a slight nick in the extreme upper margin of the lateral sinus, which was congested and swollen beyond its natural limits. A pledget of gauze instantly and completely arrested the bleeding. A second trephine opening was then made over the region of the gyrus, and the openings made to communicate by means of the rongeur. The brain protruded abnormally. The secondary cystic deposit was recognized and removed, and further search for a tumor was abandoned, no definite symptoms having pointed, so far as my knowledge of cerebral localization goes, to the main growth in the temporo-sphenoidal lobe.

At the conclusion of the operation, which lasted for one hour and ten minutes, and during which twelve ounces of ether were administered, and perhaps ten to fifteen ounces of blood lost, the patient's condition was one of extreme

shock. He recovered consciousness, recognized his wife, spoke to me rationally, complaining bitterly of pain in his right eye and in his right arm, but died some hours later in collapse.

The cause of death was multiple—shock, ether, and hemorrhage doubtless each exerting its influence. It is impossible to be quite sure as to their relative importance, but I am of the opinion that the first two were chiefly concerned, for the reason that there was no leakiness of the skin, no profound or persistent depression of temperature, no blanching of the lips or cheeks, no constitutional symptoms of hemorrhage. On the other hand, the degree of handling and interference with brain structure was of necessity exceptionally great, and the portion removed was quite considerable. I am inclined, too, to agree with Dr. Wood in the belief that in brain tumors a relatively small quantity of ether produces alarming symptoms, and I would include in this statement most operative cases of disease or injury of the cranial contents, associated with the removal of a portion of the skull. The only possible explanation which has occurred to me is that, under these circumstances, the lessening of external resistance, as shown in the occasional protrusion of portions of even healthy brains through a trephine opening, may favor the rapid absorption and expansion of the ether vapor in that region, so that, with the same amount given, a relatively large proportion reaches the great nerve centres. This is a mere suggestion, however, possibly faulty in its very premises, and relating to a question which must be solved by the experimental therapeutist rather than by the surgeon.

As to the hemorrhage from the sinus, there is nothing in that *per se* necessarily fatal, or even alarming. Many instances of recovery after such wounds have been reported, and Pott is even said to have successfully performed venesection from the longitudinal sinus. The bleeding is always easily arrested, if the wound of the sinus can be exposed, the lightest pressure serving, as in most other forms of venous bleeding, to control it. This is so well known that surgeons do not hesitate, in the presence of proper indications, to trephine directly over the course of either the lateral or the longitudinal sinus. The fatal cases have been those in which a sinus was wounded either by trephine or by bony spiculæ before the portion of cranium could be elevated so as to expose the wound. In one of the earliest cases of so-called "brain surgery" which occurred in Philadelphia, I trephined a patient of Dr. C. K. Mills over the course of the longitudinal sinus and removed from beneath the dura a fragment of bone and a small pistol ball, together with some surrounding sclerosed and adherent brain tissue, with the result of curing the patient of an inveterate epilepsy.