A DOUBLE SIGMOID PORTION OF THE LATERAL SINUS.*

DR. JOHN MACKENZIE BROWN, Los. Angeles.

Variations of the lateral sinus and especially those regarding the reduplication of all or part of it are fairly rare, as only a few references are found in literature. Hahn, in 1914, studied the question of double lateral sinuses, and collected a series of thirteen cases. In his series only one case is mentioned as having a double sigmoid portion. The following cases were collected and reported by him:

Knott: One case in which a horizontal septum divided the sinus for a portion of its length. He also states that he has seen a case of diminutive size of the right lateral sinus and one case of complete absence of the left lateral, as far as the usual point of entrance of the superior petrosal sinus. The continuation of the latter with some small tributary veins formed a diminutive representative of the lower part of the sinus. Knott also mentions a case where both lateral sinuses were very small and the occipital and marginal sinuses being very large. Henle alludes to this abnormality. Sperino reports one case in which he found the horizontal portion of the lateral sinus double for one and one-half centimeters. Streit reports ten cases of double lateral sinuses collected from reports by Hallett, Meckle, Dumont and his own. Six were on the left side and four on the right. Streit's own case was one of a double sigmoid. He states that the vessels were separated by a ridge of bone, but does not mention anything about the length of the double portion, nor the exact position, except that it was found in the sigmoid portion. Heine, during a mastoid operation on a boy thirteen years of age, observed a double lateral sinus. At autopsy he found two distinct segments of the sinus. They were separated from each other by a distance of 12 mm. The two segments were about equal in caliber. The exact location of this duplication is not mentioned. Beyer, during a mastoidectomy on the right side in a boy twelve years old, noted a double lateral sinus.

The specimen represents a section of the left half of the occipital bone and the petrous portion of the temporal bone. The occipital bone was not cut in the median plane posteriorly so the proximal

*Read before the Western Section of The American Laryngological, Rhinological and Otological Society, Los Angeles, January 29, 1921.

portion of the lateral sinus is wanting. The caliber of the left lateral sinus is apparently normal and has a total length of seven centimeters. As it approaches the asterion (junction of the occipital, temporal and parietal bone) it makes a gentle curve anteriorly and downward, at the distal half of the curve the lateral sinus divides into two parts, and the two channels are separated from each other by a ridge of bone. The distance between the duplicated channels of the lateral sinus is eight millimeters; they are parallel to each other and again unite just as the jugular foramen is reached. The length of the duplicated portion of the lateral sinus is approximately four centimeters, no appreciable difference in their caliber is noted. The superior petrosal sinus terminates at the point of division in the channel lying most anteriorly. From the floor of the posterior channel an emissary vein is given off and leaves the skull through a small foramen

in the occipital bone. The left occipital sinus empties into the posterior channel near the point of union of the two duplicated portions of the lateral sinus. (See Fig. 1.) The duplicated portion of the lateral sinus overlies the mastoid cells. The channel more posteriorly overlies the posterior margin of the mastoid cells while the channel more anteriorly overlies the main portion of the mastoid cells. The course of the occipital sinus is abnormal, as it lies more lateral to the foramen magnum than usual, its termination is also unusual, as it empties into the posterior channel of the duplicated lateral sinus instead of the proximal part of the lateral sinus. Both the superior and inferior petrosal sinuses are normal in their course and ter-

mination. The sigmoid portion of the lateral sinus is duplicated and represents that part lying between the superior petrosal sinus and the jugular foramen.

The following summary of the development of the venous sinuses of the dura mater is largely based on the work and observation of Streeter and Mall.

The early drainage of the head consists of a primary head vein, which lies on the lateral side of the brain stem. It originates principally from three capillary plexuses, passes in a caudal direction along side the brain stem and terminates in the duct of Cuvier. The capillary plexuses on either side of the brain are designated as the anterior, middle and posterior plexuses. The primitive head vein as well as the plexuses play an important role in the development of the dural channels. As the otic vesicle develops, the primary head vein is deflected in its course, and soon becomes obliterated in this region. To accommodate this adjustment an anastomosis takes place between the middle and posterior capillary plexuses. This anastomosis between the two lateral plexuses represents the anlage of the sigmoid portion of the transverse sinus. The main stem of the middle plexus develops into the permanent superior petrosal sinus. An anastomosis also takes place between the anterior and middle capillary plexus, so that the only remaining part of the primary head vein is to be found lying anteriorly to the otic vesicle which develops into the cavernous sinus and caudally where it passes through the jugular foramen to become the internal jugular vein. In an embryo 21 mm. long the sinuses of the head have acquired essentially all their connections about the otic vesicle. Streeter has followed out the development of the sinus in six embryos, varying in size from 4 mm. to 80 mm. in length. In this series he finds that the primitive veins change their position for two main reasons: the first is due to some flexion of traction force acting upon the vein. The second is due to a spontaneous migration where there is a change in the position of the blood stream only by an anastomosis the blood stream develops a new channel in the adjacent loops of the plexus with a corresponding dwindling of the previously used channel.

To explain a double channel in the sigmoid portion of the lateral sinus from an embryological or developmental viewpoint seems plausible, if we keep in mind the mechanics involved in the formation of the venous sinuses. The sigmoid portion develops by a process of migration; that is, subsequent channels forming in new loops of capillary until a mechanical equilibrium is reached. As the growth of the head continues, an adjustment of the dural channels is neces-

sary to accommodate the new structures. It is probable that during the shifting of the position of the sinus that a double sigmoid evolves; that is, a new venous plexus develops before an old channel is completely abandoned. Under ordinary circumstances the old channel disappears when a new channel is formed. But in a case like this specimen the old channels persisted as well as the new.

BIBLIOGRAPHY.

1. BEYER: Cited by Hahn, Parow Schafers Beitrage, vol. V, 1912.
2. BIRMINGHAM: British Med. Jour., 1890, II, 683.
3. HAHN, R.: Anomalie del seno laterale. Arch. ital. de otol. Torino, 1914, XXV, 203-209.
4. HALLETT: Med. Times, 1848, cited by Knott.
5. HEINE: Citato da Beyer e da Blumenthal. Petrosquamosi, Ed. Clausen, Torino, 1903.
6. KNOTT, J. F.: The Cerebral Sinuses and Their Variation. Internat. Med. Cong., 7. Sess., London, 1881, I, 191-199.
7. LIEBTAUD: Cited Reference Handbook of Med. Science, Vol. VIII, p. 204.
8. LOBBE: Anomalies de la sinus de la dura mare, etc. Arch. de Phys. Norm. et pathol., 1883, 3, sec. I, 1-27.
9. MALL, F. P.: On the Development of the Blood Vessels of the Brain in the Human Embryo. Amer. Jour. Anat., Vol. IV, 1905.
10. MANNU, A.: Il confluente dei sem della dura madre, le sue variazioni e il suo. Internat. Monatsschr. f. Anat. p. Phys., 1907, XXLV, 304-397.
11. CUSTON: Case of Abnormally Placed Lateral Sinus. Northumberland Durham, Med. J. Newcastle on Tyne, 1910, XVIII, 34.
12. SPERINO: Cited by Hahn—Circolazione venosa del capo, Torino, 1884.
13. STREETER, GEORGE L.: The Development of the Venous Sinuses of the Dura Mater in the Human Embryo. Am. Jour. Anat., Vol. 18, No. 12, 1915, p. 145.
14. STREIT: Cited by Hahn. Archiv. fur Ohrenheilkunde. Vol.. 57-58.