LXVIII.

ON THE EFFORTS OF NATURE TO CURE SEPTIC THROMBOSIS OF THE LATERAL SINUS.*

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Two cases have come under my observation which impressed me with the curative efforts of nature—if we may so call the processes which tend to circumscribe and eliminate the infected thrombus in the lateral sinus. When we consider the desperate prognosis of untreated cases, we are warranted in giving our attention to these observations, together with those that have been reported hitherto. In doing so there is not the slightest intention to minimize the danger of untreated thrombosis.

Case 1 has already been reported in another connection to this society.¹ A brief statement is as follows:

In December, 1913, I was called to see a child, two years of age, who had within a few months suffered from an attack of scarlet fever, followed by measles. Double purulent otitis media was the result. A swelling had appeared over the left mastoid, which a physician had incised three weeks before I saw the patient. I found a marked hard swelling, about an inch behind the incision, over the mastoid. The ears were both discharging. On the following day the mastoid operation was performed. No visible opening into the mastoid was found in the surface of the bone, which contained pus and granulations. The mastoid process having been cleaned out, a second incision was made, one inch perteriorly, into the abscess, and much pus evacuated. The bone was denuded. The patient made a good recovery, but both wounds continued to suppurate, and excessive granulations formed. In dressing the wounds we found that a probe could be passed far into the

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posterior one, but it was not possible to determine its exact position.

On February 3rd, the patient having been admitted into the City Hospital (Baltimore), I found that the probe passed far into the skull cavity. An incision was made which joined the two previous incisions and the bone was exposed. It was then found that a fistula extended from the posterior wound into the skull, the opening being situated in the mastooccipital suture. The opening was not more than five or six mm. in diameter and perfectly circular. It was enlarged and the bone removed forwards towards the ear, thus exposing the fistulous canal. We then found that the pus had not come from an extradural abscess, but that it was the lateral sinus itself which was continuous with the fistula. A grooved director was passed into the canal and it was slit open. In the sigmoid portion the part was found where the sinus had been exposed to the mastoid disease and where the infection had occurred. It was evident that a septic thrombus had formed, but had been securely shut off from the circulation by firm clots, and that the pus had evacuated itself through the emissary vein, thus producing the abscess.

The case just described furnished an example of the limitation of the septic thrombus which is to be regarded as a conservative effort of nature.

Case 2.—Katie S., aged eight years, was admitted to the Mercy Hospital (Baltimore), November 20, 1912. She had had measles when two years old, but not scarlet fever. The right ear had been discharging since she was five years old, the discharge having a bad odor for some time. When the discharge was free there was no pain, but when the ear was not running she complained of great pain in the head. For about a year there were frequent recurrences. The pain would last a few hours and would then pass off. She was able to go to school until four days before entering the hospital. At this time she became quick sick, and a physician was called in, who thought she had typhoid. She had high fever, was delirious and very weak.

On entering the hospital we found destruction of the right tympanic membrane and the middle ear filled with foul pus. There was no marked sensitiveness over the mastoid or over the course of the jugular vein. Her temperature showed a

pyemic character, with mild chills, high rises and rapid falls of temperature, as follows:

November 20th, 4 p. m., 100.4°; 8 p. m., 100.8°; 12 m., 105.4°.

November 21st, 4 a. m., 103°; 8 a. m., 102.4°; 12 n., 98.8°; 4 p. m., 98°; 8 p. m., 99°; 12 m., —.

November 22nd, 4 a. m., 99.6°; 8 a. m., 97.6°; 12 n., 97.8°; 4 p. m., 97.8°; 8 p. m., 98°; 12 m., 101.8°.

November 23rd, 4 a. m., 99°; 8 a. m., 98°; 12 n., 97°; 4 p. m., 97.8°; 8 p. m., 101.8°; 12 m., —.

November 24th, 4 a. m., 102°; 8 a. m., 100.4°; 12 n., 98.2°.

The urine showed some albumin and a few hyalin and granular casts and pus cells. The blood examination revealed polynuclear 76 per cent, small mononuclear 17 per cent, large mononuclear 6 per cent, and a total blood count of 20,500. A blood culture made on November 23rd, on agar plate, bouillon and serum water, was sterile. The eyegrounds were normal.

The operation was performed November 24, 1912. Ether anesthesia. The regular mastoid incision was made, extending from the level of the top of auricle down to a point below the tip of the mastoid. The bone was exposed widely on both sides. A minute fistulous opening was found above the mastoid antrum, from which pus of a very foul odor exuded. This opening was enlarged with chisels; the bone was very sclerotic; a large cavity was entered, filled with the same character of pus, pulsating actively. The sinus was found exposed extensively. The antrum was then opened and contained a cholesteatoma. A radical mastoid operation was performed, thoroughly cleaning the middle ear of pus and cholesteatomatous masses. The bone over the sinus was next removed upward to the knee and downward to the bulb. The upper half of the sigmoid sinus appeared distended and covered with coarse, thick granulations. The lower half was smooth, whitish and seemed collapsed. On close examination the entire wall of this part of the sinus was seen to have been destroyed over a distance of about 2 cm. Venous blood flowed freely from the upper and after-incision. A probe was introduced and, when followed down a short distance, showed firm closure of the sinus and demonstrated the complete destruction of outer wall below. Bleeding was stopped with pressure. At the lower end an opening was found entering

the sinus for a short distance and discharging pus. For evident reasons the jugular was not tied. A plastic was made by splitting the posterior part of the canal lengthwise, with incisions downward and upward in the form of a "Y." The canal was packed and a drain placed into the lower end of the sinus, and the wound was dressed as usual. From the pus taken from the mastoid wound, short chain streptococci developed in pure culture.

The temperature after the operation became normal and at no time rose to 100.° The patient made an uneventful recovery and was discharged from the hospital January 2, 1913, the wound almost completely healed.

In this case it is seen that the sinus was completely and firmly closed at both ends, and that the thrombosed portion had relieved itself entirely by destruction of almost the entire outer wall of the affected portion.

These cases brought to my mind others in which complete closure was found at one end of the thrombosed sinus—or even at both ends; in the latter case so firm as to convert the diseased part of the sinus into a tensely filled pus sac.

A number of cases have been reported in which complete obliteration of the sinus by collapse or, more probably, by organized thrombus has been observed, either during the operation or after death. Thus Griesinger² described a post-mortem case of complete obliteration of the entire sigmoid sinus by a firm thrombus. Schwartz³ published a like case in 1873. Similar cases were also published by Alt,⁴ Politzer,⁵ and Zaufal.⁶ Torök⁷ reported a case in which there was injury of the sinus during an operation. Six months later, pyemic symptoms; the sinus was exposed and found to contain, from the tip of the mastoid to the knee, an organized thrombus of firm connective tissue. At the autopsy the obliteration was found to extend to the torcular. Purulent phlebitis had developed beyond this and had been the cause of death. Grüning⁸ found destruction of the wall of the sigmoid sinus and a perisinus abscess and the peripheral portion of the sigmoid sinus converted into a solid cord. Barr,⁹ in a case of temporosphenoidal abscess, found "complete occlusion of the sigmoid sinus, the walls of which were converted into a fibrous cord." Suckstorff and Henrici¹⁰ report a case of spontaneous cure of thrombosis; at the autopsy the transverses sinus was

found to be completely obliterated by connective tissue. The thrombosis had run a latent course.

A number of cases are reported of thrombosis running a nonfebrile course in which obliteration of the sinus took place.¹¹

A number of these cases presented fistulous openings in the sinus walls. The nonfebrile course is variously explained—by the aseptic character of the thrombus, by the mild nature of the infection or by the discharge of pus when formed through an opening in the external wall.

We cannot determine with certainty how the obliteration takes place—whether by direct organization of the thrombus without its disintegrating, by emptying of the pus formed through the outer wall, or by collapse and agglutination of the walls.

A large number of cases bearing marked similarity to those reported by me are to be found in our literature. Hoffmann¹² reports one case in which the central and peripheral ends of the thrombosed sigmoid sinus at the operation were found to be closed by connective tissue obliteration of the sigmoid sinus¹³ in a child with extensive defect of the inner wall of the mastoid process and extradural abscess. On splitting the sinus, it was found firmly closed by organized thrombus with but a little of the lumen retained. The fever subsided immediately. Wernicke¹⁴ found the sigmoid converted into a 2.5 cm. long and 1.0 cm. wide abscess, completely shut off above and below by organized masses. In a second case the obliteration existed only toward the central end. These cases were cured by operation. Wernicke gives a complete bibliography of the early cases up to 1900. Streit¹⁵ reports a case of spontaneous cure of thrombosis by obliteration of sinus. There were no symptoms of sinus thrombosis. The operation was done for mastoiditis and exposed a cavity whose inner wall was covered with granulations and was found to be the obliterated sinus. Hölscher¹⁶ reports one case in which all symptoms of thrombosis were absent, while in the second there were rigors and swelling in the neighborhood of the emissary veins, but otherwise only headaches and slight evening temperature. On opening, a perisinus abscess was found; the sigmoid sinus was absent in both cases, being replaced by granulation tissue which passed over directly posteriorly into

the normal sinus. He reports a third case of death from cerebellar abscess without symptoms of sinus thrombosis; no sinus was found at the operation. At the postmortem the transverse sinus was found enlarged from torcular to knee, and from this point on completely closed by a firm thrombus. Bárány¹⁷ describes a case of spontaneous cure of sinus and bulb thrombosis. The case was one of mastoiditis with extensive subperiosteal abscess. On opening the mastoid the sinus and dura were found extensively exposed, greatly thickened, and in the neighborhood of the bulb a black opening was found in the sinus through which a sound could be entered for a short distance in both directions. The sinus was thin and obliterated. Recovery took place without further operation. In the discussion Urbantschitsch¹⁸ stated that he had demonstrated a similar case of cured sinus thrombosis with obliteration of the lumen. On exposing the sinus in a case of putrid cholesteatoma, a tablespoon of foul green pus was discharged, the wall of the sinus, which was discolored, was slit up; the whole sinus was found filled with nonpurulent thrombotic masses. Toward the sinus transversus the sinus walls were completely adherent to each other.

Recent experimental studies of this subject have brought interesting results. Haymann¹⁹ was able to produce and study sinus thrombosis and pyemia in dogs and monkeys. Among his conclusions the following are to be specially mentioned: The thrombi in their earliest stages may contain microorganisms, or the latter may enter the thrombi subsequently from without or be brought to the thrombi by the blood stream. The number of organisms contained in the thrombus vary greatly, but the ends of the thrombus are usually most benign. A moderate number of organisms does not prevent organization of the thrombus. Experimental infected thrombosis shows a marked tendency to spontaneous recovery; and even malignant forms, in which the only wall was destroyed, at times showed organization, vascularization and recanalization of the sinus.

In a subsequent paper Haymann²⁰ considers the processes tending to spontaneous cure of sinus thrombosis in man. He reports a case of purulent otitis media for a year with death from meningitis. The sigmoid sinus was obliterated throughout a large part, completely closed by firmly organized connect-

ive tissue with distinct evidences of beginning recanalization, a condition similar to his findings in experimental thrombosis. He insists that the thrombosis must not be looked upon as non-infected because of the spontaneous recovery, though the infection may not have been very virulent. This conclusion is supported by his experimental observations. This is the first case in which histologic proof is brought of complete spontaneous cure of a sinus thrombosis of otitic origin. He refers to the case of Miodowski,²¹ in which there were similar histologic findings, but points out that though the jugular and sinuses were thrombosed, the infection was from a cervical gland and therefore not otitic. He concludes that processes tending to spontaneous recovery in sinus thrombosis in man are not of rare occurrence. The recovery may be so complete that recanalization is established.

Voss and Haymann have emphasized the importance of these processes in their practical bearings. Voss,²² in a paper bearing the startling title "*Lasst den Thrombus in Ruh*," warns against the removal of the thrombus with the sharp spoon; he points out that the entire outer wall of the diseased part should be carefully removed, and he only incises the thrombus. The practice to leave the firm ends undisturbed would appear to be in accord with the experience which the cases described and referred to afford. A source of danger which must be emphasized is that of incising the collapsed sinus or the inner sinus wall when the outer wall has been destroyed, with the intent of opening the sinus. Thus Grünert and Dallmann²³ reported a case in which the sinus became obliterated after injury during operation, and an incision through the fibrous cord passed directly into the cerebellum. In another case, Uchermann²⁴ in this manner opened a cerebellar abscess by incising through a collapsed lateral sinus. And Herzfeld²⁵ had a similar experience in a case of cholesteatoma. He opened into a sinus, the outer wall of which was covered with granulations, and incised directly through the obliterated sinus into the brain. The patient recovered.

The firm closure of both ends of the thrombus with breaking down in the middle is less apt to lead to metastasis and general infection. But, as Hessler²⁶ has shown, the advantage is not entirely on this side, for those cases in which general infection occurs are less apt to develop cerebral abscess and meningitis, and vice versa.

Another, though remote, source of danger was pointed out by Hoffmann,²⁷ namely, that an organized thrombus may subsequently disintegrate and lead to grave results. Brieger²⁸ reported a case of such reinfection of a healed sinus and jugular thrombosis.

We are warranted in concluding that the course of a thrombosis varies according to the virulence of the infection and other influences. It may become organized without disintegration, and the lumen may even become reestablished. But even in those cases in which it becomes purulent in its central part, the firm closure of both ends and the formation of a fistula or the entire destruction of the outer wall may permit its more or less successful drainage, and thus tend to its spontaneous cure. This process in its nature is the same that takes place in every case in which conditions are brought about by operation which permit the formation of a noninfected thrombus at both ends of the infected portion of the sinus. It is apt to be incomplete when spontaneous, since the anatomic structure of the temporal bone places many obstacles in the way of its complete and easy drainage.

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