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ACCIDENTS IN AURAL PARACENTESIS.

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A severe hemorrhage from the ear, necessitating actual hemostatic measures for control, and a similar case with a less severe but continuous loss of blood for a period of several days occurred some time ago in my hospital service, following incisions in the tympanic membrane for acute purulent otitis media. These accidents, being the first of my experience and also in the larger experience of those gentlemen with whom I am associated, led me to search otologic literature with the idea of obtaining some information regarding the frequency of such cases. I have found but little to reward my search, either because accidents of the kind are rare or because professional pride places such episodes in the category of unreportable cases. I found in all less than twenty references to the subject, but sufficient, I hope, to interest you for a few moments.

When Riolanus first suggested the perforation of the tympanic membrane as a relief for deafness, in the middle of the seventeenth century, his proposal was based on the result of the accidental perforation of the drum in a deaf patient with subsequent partial restoration of hearing. His contention, and that of Plemp a few years later, that air was necessary in the tympanic cavity to permit normal hearing, was supported by Valsalva's demonstration that there was a passage of air from the mouth to the middle ear. The operation was first performed by Valsalva in 1740 without success, and again by Eli, who has something of the reputation of a charlatan, in 1760. The latter's success or failure is not on record.

In 1800, Cooper, who first published the experiments of Wm. Cheselden, cited four cases of deafness cured by perforation of the ear drum. These cases, together with a successfully operated case reported by Hymly, aroused a marked degree of enthusiasm in the profession and even among the

laity; and for a short time paracentesis was hailed as a panacea for deafness. Hymly and Cooper gave as indications for the operation the closure of the eustachian tube and blood extravasation into the tympanic cavity. Saunders, of London, in 1804, was probably the first to recommend empyema of the tympanum as an indication.

These indications were not universally accepted by the profession, and a great number of the medical men of the period practiced and advised the puncture as a cure for deafness. This large group includes such names as Ribes, Itard, Dubois and Deleau in France, S. Cooper, Hunold and Wright in England, and Rust, Kawerz and Arneman in Germany. In consequence of the activity of this school and the relatively few successful results of their work, the general enthusiasm was soon dampened, and the emphasis by Hymly on the fact that the operation could be applicable in only certain selected cases brought about a temporary discarding of the operation.

The accidents in the early days of paracentesis were many and varied. The records are, of course, meager and inexact, and in the light of present day knowledge, were practically entirely due to infections and the crude instrumentation of the time. Thus, Hymly, in 1806, cited examples of grave and fatal accidents following perforation, and Fuchs, in 1810, reported many cases in which the operation was followed by headaches, convulsions, and fevers of a serious nature. It is probable, judging from the incomplete evidence now obtainable, that the fatalities which occurred were due to sinus thrombosis, meningitis and intracranial abscess. Muller, in his inaugural dissertation at Halle in 1890, stated that the operative procedure was considered relatively if not absolutely free from danger until the middle of the nineteenth century when deaths were reported by Hubert-Valleroux in France and by Butcher, an English physician.

Secondary infection of the ear cavity was a frequent occurrence in those cases in which paracentesis was performed to relieve deafness. Schwartz found it in 20 per cent of the cases operated upon at Halle, and he intimates that this percentage increased proportionately as new and more complicated intraaural operative procedures were devised.

In present day otology the one accident complicating incision of the tympanic membrane in ordinary cases of suppurative otitis media seems to be extensive hemorrhage. The first case on record is mentioned by Gruber in the 1888 edition of his textbook. The accident occurred with a patient whose drum membrane had been opened a few days previous uneventfully. Symptoms requiring a repetition of the operation developed, and an incision was made in the posterior inferior segment. The blood poured out so copiously that it appeared as if a large vein had been divided. More than ten ounces of blood were lost before the hemorrhage was controlled by tightly packing the canal with cotton wool soaked with perchlorid of iron.

In 1890 Ludwig reported the first case of such hemorrhage in periodic literature. In this case a translucent blue coloration was noticeable in the posterior inferior quadrant, but was not considered of any importance. The first incision permitted a clear serous fluid to escape, and the opening was then dilated with a needle. This maneuver brought forth a sudden stream of dark blood which filled a large pus basin before the canal was effectively packed with firm tampons. Recovery was uneventful.

Hildebrant reported a case in 1891 occurring in a rhacitic child showing well marked deformities of the joints and cranium. Paracentesis was performed on a lusterless, reddened bulging membrane in the usual manner. Immediately there escaped a stream of venous blood as large as the small finger in diameter. Because the canal was promptly packed the loss of blood was not great. It was shown later on this patient that the light reflex on the affected side changed its shape when the internal jugular vein of that side was compressed. It was also noted that all the veins of the neck and scalp were enlarged on this side.

The first fatal case was reported by Brieger in 1892. After paracentesis of the membrane in this case, the incision was enlarged with the pointed galvanocautery, and the jugular vein was perforated. The hemorrhage was readily controlled by tamponade, but pyemia and death resulted.

Seligman demonstrated a case of injury to the bulbus vena jugularis during paracentesis, in 1893, and McKernon reported

the first instance of the kind in this country in 1894. The latter case McKernon claimed was arterial hemorrhage, the blood spurting out with rhythmic pressure for a distance of two feet. Firmly tamponing the canal, and pressure on the carotid artery for half an hour controlled the bleeding.

Other instances recorded are those of Max (1905), Castex (1905) and two of Lueder's (1912). Castex's patient developed a facial paralysis nine days after the injury to the bulb. In one of Lueder's cases bleeding recurred in spite of all external precautions, and it was necessary to expose the lateral sinus and pack above and below the bulb. Pyemia developed in this case and resulted fatally.

The anatomic changes necessary to produce these accidents are not many. A congenital absence or thinning of the bony capsule of the bulb may exist, or the condition may be acquired through metabolic disease in the early developing years of life. Friedlowsky, in 1868, published a report on the dissection of one thousand skulls, in only one of which the bulb protruded into the tympanic cavity. Muller found more frequent anomalies, and these occurred in skulls which showed other anatomic defects of bone formation, partly congenital and partly as a result of rhacitis. The cases of Ludwig, Hildebrandt and Max, cited above, were definitely rhacitic, the osseous changes being apparent in joints and skull. Körner in 1892 published his study of two negro heads, wherein, had paracentesis been performed, severe hemorrhage could scarcely have been avoided. Zuckerkandl, Toynbee, Von Troltsch and others have made similar observations, and I might add the unusual case of Lannois, a "venous hernia," in which the jugular fossa was dilated to an extent that it replaced the middle ear cavity and a portion of the external auditory canal.

In 1903 Hansen reported a case in which the internal carotid artery coursed through the tympanum in such a way that if the ear drum had been incised during life the vessel must have been seriously injured. A similar case was published by Max, discovered during life, attention being called to it by the rhythmic pulsation of the drum synchronous with the heart beat, and which was not apparent after firm pressure was applied to the internal carotid artery. It is very probable that McKernon's case was one of this type, in which, during

violent exercise the artery or an anomalous branch ruptured within the tympanic cavity and thus produced the symptoms for which the ear drum was incised.

The following cases attracted my attention to the literature on this subject:

Case 1.—C. S., age 8 years. After thirty-six hours of acute earache he had been taken to a physician's office, where, after otoscopy, a paracentesis was performed, following which there was an immediate gush of blood from the auditory canal, which evidently was sufficient to cause concern to the operator, who hastily inserted a firm wad of cotton and brought the patient to the hospital. When seen by us, blood was steadily oozing through the temporary packing. On removal of the cotton wad the gushing of venous blood was resumed, and the only course to pursue was immediate firm repacking of the canal. This served to control the bleeding and the patient recovered uneventfully. The patient was subsequently examined by Dr. Abt, who was able to demonstrate a Harrison's groove, some deformities of the heads of the long bones and the remnants of a rhacitic rosary.

Case 2.—B. D., age 7 months. This infant was brought to the hospital forty-eight hours after a paracentesis, during which period he had continued to ooze a slow but steady drip of blood from the ear. The little canal had been packed with gauze twice without success, and the condition was becoming serious. Pallor was marked and pulse rapid.

An adrenalin soaked tape was inserted deeply into the canal and tightly packed. This treatment evidently slowed up the hemorrhage, for though the packing was blood soaked in a few hours there was no further bleeding. Subsequent history and examination revealed the fact that the patient was a hemophilic. The patient made a recovery after treatment with horse serum, which was in vogue at the time, and a course of calcium internally.