SINUS THROMBOSIS—GRUNERT'S OPERATION—
RECOVERY.*

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Grunert's operation, so-called from Prof. Grunert of Halle, a/S., Germany, who in 1901 suggested it,¹ is the free exposure of the sinus and jugular bulb by the removal of the outer bony wall of this venous channel, together with the outer wall of the jugular foramen, thereby making an open gutter of bone in which lie the sinus and jugular bulb; and hence the operation is also called the "gutter operation."

The operation is generally done from without inwards, working through the overlying integument and muscles down to the bone and then removing the bone from below upwards. Voss, however, in 1904² suggested that the operation be done from the sinus end, working downwards and not dividing the overlying soft parts. He considered it an easier method and one resulting in less deformity.

The chief dangers of the operation lie in the possible wounding of the facial nerve and in a hemorrhage from the inferior petrosal sinus, if the jugular clot has not extended into this sinus sufficiently far to shut it off.

Although a well indicated operation, it has not, however, often succeeded in saving the patient's life. I am inclined to think that this is because it is generally undertaken too late, when general septic infection has already begun.

In February last I was called to see a seven-year-old child who was showing all the symptoms of acute mastoiditis on the left side. Eight weeks before he had developed scarlet fever, and from that had come an acute middle ear suppuration, now three weeks old. The discharge was abundant, the upper and

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posterior walls of the canal were bulging, and there was marked tenderness over all the mastoid, with a slight beginning redness of the mastoid integument. The patient's (rectal) temperature was 102.4° F.; pulse, 120; respirations, 26. There had been severe pain in the ear since the previous day.

The patient was at once sent to the New York Eye and Ear Infirmary and I operated that same afternoon. Examination of the pus from the mastoid wound showed a streptococcus infection; the blood count was 9,400 white, with a differential of 68 per cent polynuclear cells. The mastoid was much infiltrated with pus, while a large perisinus abscess had already developed. The sinus was not healthy in color, rather gray, but evidently contained fluid blood, and so no exploration of it was made.

During the next four days the temperature fell steadily and the patient's condition was satisfactory. On the fifty day, however, the temperature suddenly rose to 106.2°, and during the next twenty-four hours showed the usual severe fluctuations which indicate sinus thrombosis. The blood count was altered, the white numbering 14,800 and the polynuclear rising to 91 per cent. A jugular operation was done. In this operation the vein was found to be quite empty and was resected. The sinus was curetted well down into the bulb without bleeding, and back for an inch towards the torcular until free bleeding occurred. Examination of the vein and of the clot from the sinus showed no infection. But the temperature after this operation remained down only one day and then rose to 105.2°, falling soon after to 98.2°. Culture of the discharge from the open sinus showed streptococcus infection towards the bulb and towards the torcular.

Acting on the advice of Dr. Dench, who kindly saw the case with me, I made a surgical exposure of the jugular bulb, or, in other words, I did the Grunert operation, proceeding however by the method suggested by Voss, i. e., from above downward. Just at the conclusion of the operation a very severe hemorrhage from the inferior petrosal sinus weakened the patient's pulse so seriously that a free operation towards the torcular, which I had expected to do, had to be postponed. However, enough of this clot was removed to obtain a little bleeding.

No facial injury resulted from the "gutter operation," and the patient slowly recovered from the hemorrhage. Still, al-

though he improved in strength, yet every day there was an elevation of temperature, which, though slight at first, later became 104° and 105°. The blood count, however, during the next day was good, the white cells numbering 10,500 and the polynuclear being 65 per cent. Moreover, there was no longer any streptococcus infection down in the bulb. I felt, therefore, that the trouble lay in the posterior clot extending towards the torcular, and so decided to make a freer exposure of this. Accordingly the boy was again etherized and the sinus exposed and curetted for full two inches further back, until the bleeding was very free. The patient made a good recovery from the operation and there was no further elevation of temperature or occasion for further anxiety. Some two weeks later I did a plastic operation on the open and granulating surface, which added much to the comfort of the patient and materially shortened the time of healing.

I desire to thank Dr. Dench for his interest and advice in this difficult case, and also to express my obligations to Dr. Perkins, who assisted me at these operations.

REFERENCES.

1. Grunert, K.: Original article, *Archiv f. Ohrenheilk.*, vol. 53, 1901, p. 286.
2. Voss: *Zeitschrift f. Ohrenheilk.*, vol. 48, 1904. p. 265.