FURTHER OBSERVATIONS ON MEDULLARY SPINOthalAMIC TRACTOTOMY*

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SINCE our previous report there has been considerable interest in the problem of medullary spinothalamic tractotomy for the relief of pain. We feel it would be valuable to report additional cases and to give a more detailed description of the technique employed. Special reference will be made to 3 of the cases, because in them there occurred some trigeminal sensory changes which are of interest anatomically.

In our previous communication, in February 1947, we reported 11 cases in which the operation was performed for relief of arm and shoulder pain. Three of the patients died early postoperatively. All patients obtained satisfactory analgesia up to the C3 or C2 levels. D’Errico and Klemme have described similar satisfactory experiences.

We are reporting 8 additional cases of unilateral, intractable shoulder-arm pain. In 6 of these cases the pain was caused by metastatic carcinoma. In the other 2 the pain was from non-malignant causes. Three of the 8 patients died before discharge from the hospital. All had extensive general and pulmonary malignancy. One died suddenly and unexpectedly from pulmonary embolism on the 10th postoperative day. The others lived either to die of their malignancy or are still alive and largely relieved of pain.

TECHNIQUE

During surgery, the sitting position was used for all patients except one because it seemed to one of us (A.S.C.) that the ease of operating thus outweighed the risks entailed, viz. air embolism, operative shock and subsequent hemorrhage. However, operative shock and subsequent headache from aspirated subarachnoid air are less apt to occur in the horizontal position, and this is the method of choice in those cases in which the risks are more serious.

We prefer to operate under local infiltration and block anesthesia together with appropriate sedation. A few patients were so apprehensive that intravenous sodium pentothal was given. The patients were permitted to regain consciousness at the time of the medullary section. Their reactions were not as accurate as they would have been had the operation been done completely under local anesthesia, but the results were satisfactory.

The incision (Fig. 1) has been inverted U-shaped, extending from below and just medial to the tip of the mastoid process and arching upward and

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medially and then downward in the midline to about the level of the 4th cervical spine. The highest part of the incision is about the level of the line of insertion of the suboccipital muscles. These muscles should be cleanly dissected away from the occiput, exposing the atlas.

The ring of the atlas is resected from midline laterally to the edge of the groove of the vertebral artery. This artery should be visualized and protected with a thin spatula to prevent injuring it with the rongeur.

The foramen magnum should be enlarged by removing sufficient bone so that the cerebellar tonsil can be elevated to visualize the obex, which is an essential landmark. After the dura has been opened, the arachnoid is punctured and cerebrospinal fluid drained out and the area kept dry with suction.

To visualize the lateral wall of the medulla, the posterior inferior cerebellar and vertebral arteries may need to be pushed laterally. They should be protected with a thin cottonoid strip. Often there are a number of fine attachments of arachnoid which have to be carefully cut with fine scissors. If the patient is conscious and feels pain at this stage, the area can be anesthetized, using small flat oblong cottonoid stamps moistened, but not dripping, with 1 per cent novocain solution.

One must be certain that the site of puncture is caudal to the lower pole of the olive. The olivary eminence can usually be seen by looking ventrally beyond the line of emergence of the rootlets forming the 10th and 11th cranial nerves. If it is not safe to force a view anteriorly to visualize this, one can fairly safely be guided by the obex and the nerve rootlets. The site of puncture is in the lower medulla cephalad to the decussation of the pyramids. This site is usually 3 to 4 mm. caudal to the obex near the junction of the rootlets forming the 10th and 11th cranial nerves and just ventral to them (Fig. 2). These rootlets emerge from the medulla immediately ventral to the eminence of the spinal tract of the trigeminal nerve. The dentate ligament cannot be used as an accurate guide at this level because it has already terminated.

The instrument for the medullary incision is optional. We use a set of four knives made for this special operation. The cutting blade is about 1 mm. wide and is set at a 90° angle and tilted about 30° upwards in the long axis of the handle. Two are sharpened on the underside with a slight hook