Lateral Cervical Puncture for Myelography
Technical Note

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MYELOGRAPHY is one of the most frequently used and informative diagnostic procedures available to the neurologist and the neurosurgeon. The indications for myelography, type and amount of contrast agent used, and the techniques for the procedure have become fairly well standardized in the past several years.

In the majority of patients, routine lumbar myelography consists of: 1) lumbar subarachnoid tap; 2) withdrawal of cerebrospinal fluid for appropriate laboratory studies; 3) Queckenstedt's maneuver to detect possible intraspinal block; 4) injection of 6 to 9 cc of contrast agent; and 5) positioning of the contrast material in the areas to be studied and making the appropriate x-ray films.

When dealing with patients who have complicated intraspinal lesions, additional methods may be required for satisfactory study. In addition, there may be existing conditions that make the usual methods unacceptable.

Recently, we have used a lateral cervical percutaneous approach for the injection of the contrast agent in certain situations. The technique is a by-product of the perfection of the lateral cervical cordotomy as described by Mullan, et al.,1 and Ransohoff, et al.2 It has certain obvious advantages over the lumbar approach and also over the cisternal puncture. In our experience, the cervical subarachnoid space can be punctured easily without injury to the spinal cord or roots in individuals whose lumbar space could not be tapped. The contrast agent is always injected into the subarachnoid space and never into the subdural or epidural space, which gives confusing results. The lateral cervical approach seems safer, more easily learned and mastered than the midline cisternal tap. The neck does not have to be flexed with the lateral approach, which is a definite advantage when there is a cervical lesion. In patients with congenital anomalies or lesions around the foramen magnum, the cisternal puncture may be dangerous.

Technique

The patient is placed in the supine position with the head elevated 10° to 15°. A lateral cervical Polaroid or conventional film is made with a radiopaque marker taped to the skin over the mastoid tip (Fig. 1 left). The marker is removed and the skin prepared and infiltrated with local anesthetic. A No. 18 spinal needle is then introduced between the laminal arches of C-1 and C-2, with lateral x-rays or an image intensifier as monitor. The tip of the needle should be directed at the anterior one-third of the spinal canal to avoid injuring the cervical spinal cord (Fig. 1 right). Serial x-rays may be necessary to insure the proper position and direction of the needle. The sensation imparted to the operator by the dural puncture is similar to that of the lumbar puncture. After piercing the dura, the stylet is withdrawn, fluid obtained for examination, and 6 to 9 cc of contrast medium instilled slowly. The needle is then removed, and the patient is tilted appropriately to position the contrast medium at the suspected site of the lesion.

Indications and Examples

1. No Contact with Subarachnoid Space. Occasionally it is not possible to contact the subarachnoid space by lumbar puncture. This may be due to: 1) arachnoiditis resulting from inflammation or surgery, 2) primary or metastatic tumor extensively involving the cauda equina or extradural space, 3) extremely small subarachnoid space secondary to a congenital anomaly or acquired pathologic change, or 4) recent lumbar puncture with low cerebrospinal fluid pressure. In

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these situations the lateral cervical approach offers a safe route for the injection of contrast medium and insures against a subdural or epidural injection of contrast medium to complicate the study.

Case report. A 44-year-old achondroplastic dwarf had a history of progressive myelopathy and low back pain over a period of several months. A previous laminectomy had been performed 10 years before this admission for removal of a herniated nucleus pulposus at the L3-L4 interspace.

An attempt was made to perform myelography but the lumbar subarachnoid space could not be tapped because of an extremely narrow canal, which is characteristic of this disease. A lateral cervical injection was made without difficulty. Fig. 2 is a lateral x-ray film showing complete block at L-2 with spinal deformity and multiple myelographic defects. A laminectomy was performed with relief of compression of the conus medullaris and cauda equina.

Case report. A 34-year-old woman had a history of progressive weakness and numbness of the legs. A myelogram was done by another service which revealed a large extradural defect at T12-L1; the anteroposterior view (Fig. 3 left) shows persistent defect on the left. Because of the unusual picture of contrast column with obliteration of the cord shadow, a repeat study was carried out with a lateral cervical percutaneous puncture (Fig. 3 right) which showed a normal cord shadow and no defect at T-11, T-12, and L-1.

2. Complete Block. When a complete block is encountered at myelography two questions arise: What is the extent or length of the mass in the spinal canal? Are there one or more lesions above the one demonstrated? The answers are obviously of great importance to the neurosurgeon in planning his approach. These possibilities are even more significant when dealing with a metastatic tumor or when the demonstrated lesion does not correspond to the clinically suspected spinal segmental level.

Case report. A 34-year-old woman had

Fig. 1. Lateral cervical Polaroid x-rays showing radiopaque marker between C1-C2 (left) and spinal needle directed between C-1 and C-2 and in the anterior one third of the spinal canal (right).

Fig. 2. Lateral x-ray showing multiple myelographic defects and complete block at L-2.
Fig. 3. Anteroposterior myelographic film (left) showing an apparently extradural defect at T-12 and L-1 on the left (lumbar injection). Anteroposterior view of same area (right) following subarachnoid injection by lateral cervical percutaneous method, showing normal cord.

an ependymoma of the conus removed in 1955. Because of a deterioration in neurologic function, she was readmitted in 1964 for further contrast study. An anteroposterior myelographic film of the low dorsal and upper lumbar area (Fig. 4 left), after the contrast material below had been placed in through the lumbar route, showed a complete block. The upper column of Panto- paque was put in from above; it showed the upper extent of the recurrent tumor (Fig. 4 right).

3. Spinal Fracture. Myelography can be of great value as a diagnostic tool in many patients with fractures or dislocations, or both, of the spine without neurological deficit. When indicated, a Queckenstedt test and myelography performed through lumbar puncture should be carried out for dorsal and lumbar injuries. In cervical injuries, however, routine myelography may be contraindicated because the extension of the neck necessary to perform the study may be dangerous or even lethal. We have therefore used the lateral cervical approach to position the contrast agent in the cervical subarachnoid space. After injecting the material, the patient is simply turned from the supine to the prone position without flexing or extending the neck. We have carried out myelography primarily on those patients with a par-
tial cord injury whose neurological picture suggested an anterior cord injury (arm and hand weakness with corticospinal tract involvement and preservation of position sensation).

Case report. A 26-year-old man was admitted with a history of injury of the cervical spine in an automobile accident. He had paraparesis with preservation of position sensation. A myelogram was carried out through the lateral cervical percutaneous approach. The lateral horizontal view (Fig. 5) showed angulation of C-5 on C-6 and a mass at the C5-C6 disc space protruding posteriorly into the spinal canal. A ruptured midline disc compressing the spinal cord was removed and an anterior cervical fusion was performed.

Summary and Conclusions
The advantages of the cervical percutaneous route for myelography have been discussed. The technique, which is easily learned, has been described. The indications for using this method along with examples of cases have been presented.

As yet, we have had no complications from the procedure and have obtained a satisfactory study with each patient. Possible complications such as trauma to the spinal

Fig. 4. Anteroposterior view (left) of defect at L-1 and L-2 representing regrowth of tumor. Lateral view (right) of same area showing superior and inferior portions of the mass.

Fig. 5. Lateral horizontal x-ray of cervical area showing anterior extradural defect at the C6-C7 interspace.
cord or vertebral artery seem unlikely if proper technique and precautions are used. Local pathological change at the C1-C2 level probably would be a contraindication to the lateral cervical puncture, and routine lumbar puncture or a cisternal tap should be done in these cases.

We feel that this additional method for performing myelography in properly selected patients will add to the diagnostic armamentarium of the neurologist and neurosurgeon.

References
