Combined isotope ventriculography and lumbar myelocisternography in the diagnosis of communicating syringomyelia

Case report

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Several investigative procedures are currently used to diagnose communicating syringomyelia. The combination of isotope ventriculography and lumbar myelocisternography has never been proposed nor carried out to verify this condition. We feel that this is a safe and valuable procedure to identify a patent central canal communicating with the fourth ventricle and is worth considering when diagnosing communicating syringomyelia.

Key Words • syringomyelia • Arnold-Chiari deformity • isotope ventriculography • isotope myelocisternography

Several diagnostic procedures have been adopted to provide an accurate diagnosis of communicating syringomyelia in order to consider the Gardner operation at the craniovertebral junction. These procedures include oil myelography in the supine position,1 gas myelography,2 isotope myelocisternography,3,4 and Pantopaque ventriculography. Combined isotope ventriculography and lumbar myelocisternography, however, has never been proposed nor has it been carried out to the best of our knowledge. The purpose of this report is to briefly present and discuss the results obtained with this method in a patient with communicating syringomyelia.

Case Report

A 27-year-old woman was admitted in August, 1975, to the Neurological Division of the University of Modena. Ten months previously, she had begun to complain of right-hand weakness, followed by weakness in the left hand, and then by wasting of the muscles of both hands. Subsequently she also noticed mild weakness in both legs.

Examination. The patient's general physical examination was essentially normal. Neurological examination revealed some atrophy and weakness in both hands with hypotonia of the upper extremities and absent deep tendon reflex. A dissociated sensory loss
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Fig. 1. Oil myelogram shows anteroposterior (left) and lateral (right) views with the patient in the supine position. Filling defects are produced by mild tonsillar descent. In the lateral view, there is a narrow line of oil extending from C-1 to C-3, suggesting an open central canal.

(pain and temperature hypesthesia) extended bilaterally and symmetrically from C-3 to T-4. Vibration sense was defective over the left leg. X-ray films of the spine revealed some widening of the cervical canal; skull films and cerebrospinal fluid (CSF) examination were normal.

Diagnostic Procedures. An oil lumbar myelography carried out with the patient in the supine position showed a Chiari Type I deformity with descent of the cerebellar tonsils, below the foramen magnum and a narrow line of oil extending from C-1 to C-3, suggesting an open central canal (Fig. 1). This myelogram also showed a marked widening of the spinal cord extending from T-9 to the cervical region (Fig. 2). At this level, however, gas myelography performed later with the patient in the sitting position, after replacement of CSF with air, showed a collapse of the cord (Fig. 3). A diagnosis of syringomyelia was made.

Ventriculography with In$^{111}$ DTPA (250 µc) was performed in an attempt to demonstrate a direct communication between the fourth ventricle and the central canal. The examination showed a narrow line of uptake along the spinal cord down to the lower dorsal region; this line was slightly wider at the cervicothoracic level (Fig. 4).

Next, lumbar isotopic myelocisternography with In$^{111}$ DTPA (900 µc) was performed to verify whether the area of uptake corresponding to the subarachnoid spaces was larger than that seen along the spinal...
FIG. 3. Gas myelography after exchange of CSF with air; lateral view demonstrates collapse of the cervical cord.

cord in the previous examination. Seven hours after injection the myelocisternogram demonstrated a slow passage of the isotope toward the cranial region and a lesser uptake at the cervicothoracic level (Fig. 5 left) than that demonstrated by isotope ventriculography. It is important to stress that in the course of this recording, the patient's cervical region was positioned at nearly the same level as the occipital bone and the thorax. Twelve hours after injection the myelocisternogram showed a normal morphological isotope uptake at the cranial region and an increased uptake at the cervicothoracic level as compared with other regions. After 72 hours, the cervicothoracic uptake was about the same as in the cranial region. This finding was similar to that of Greitz and Ellertsson. Elimination of the isotope from the lower thoracic and lumbar regions was delayed; it had not totally disappeared until approximately 72 hours after the injection. The area of uptake along the spinal cord was significantly wider (Fig. 5 right) than that noted previously during isotope ventriculography, with a wider area in the cervicothoracic region.

Subsequently, 2 cc of Myodil were injected into the right ventricle and directed toward the fourth ventricle. Figure 6 shows a drop of dye at the level of T-4, in the middle of the spinal cord, suggesting once again a patent communication between the fourth ventricle and the central canal.

Operation. A small suboccipital craniectomy and a laminectomy of C-1 and C-2 were
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FIG. 5. Lumbar myelocisternography with In\textsuperscript{111} DTPA. Left: At 7 hours after injection there is diminished uptake at the cervicothoracic level. Right: At 12 hours after injection the area of uptake along the spinal cord is significantly wider than that noted during isotope ventriculography (see Fig. 4). There is increased uptake at the cervicothoracic level.

FIG. 6. After Myodil ventriculography a drop of dye at the T-4 level appears to be in the center of the cord in both the anteroposterior (left) and lateral (right) views.

performed. After the dura was opened, the tonsils were seen to be slightly enlarged and protruding below the foramen magnum, occluding the exit of the fourth ventricle. On separation of the tonsils, the origin of the central canal was demonstrated in the floor of the fourth ventricle. This was occluded with a small piece of muscle and the wound was closed in layers.

Postoperative Course. The postoperative course was uneventful. One month after surgery the patient was doing well. Her neurological condition is slowly but steadily improving.

Discussion

This patient presented with a clinical syndrome of syringomyelia. An oil myelogram suggested an Arnold-Chiari Type I deformity and cervicothoracic widening of the spinal cord. Air myelography showed a narrowing of the cervical cord due to collapse of the syrinx because of replacement of CSF with air.

Indium\textsuperscript{111} DTPA ventriculography showed a narrow line of uptake along the spinal cord, slightly larger at the cervicothoracic level, suggesting a communication between the fourth ventricle and an open central canal that was larger at the cervicothoracic level. This interpretation was supported by a myelocisternogram that demonstrated a significantly wider area of uptake along the spinal cord than that documented by ventriculography. In addition to this, it was noted that the flow of the isotope toward the cranial region was slower than normal possibly because of the swollen cervicothoracic syrinx and that initially the uptake at this level was
low. Subsequently, however, the uptake over this region was greater than elsewhere, and after 72 hours it was about the same as in the cranial region, which suggested a concentration of the isotope in the syrinx as reported by Greitz and Ellertsson. 4

A communication between the fourth ventricle and the patent central canal was finally proved by the presence of a drop of oil in the middle of the spinal cord at the level of T-4 in the course of Myodil ventriculography. At surgery, a communication was found between the fourth ventricle and an open central canal. Two enlarged and protruding tonsils impinged upon the exit of the fourth ventricle.

We feel that a combined isotope ventriculography and lumbar myelocisternography is a safe and valuable procedure to identify a patent central canal communicating with the fourth ventricle and should be considered when diagnosing communicating syringomyelia.

References

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