INTRAVASATION OF OPAQUE MEDIA
DURING MYELOGRAPHY
A REPORT OF THREE CASES
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DURING the performance of myelography, the opaque medium has been
observed to enter the vascular system and disappear from the lumbar sub-
arachnoid space. The amount of material escaping was usually small and filled a few
veins of the paravertebral venous plexus. Review of the literature revealed only 7
previously reported cases.1-6,8 This is a report of 3 patients in whom during the course
of myelography relatively large quantities of the opaque medium were observed to enter
the venous system.

CASE REPORTS

Case 1. #11041. J.W.J., a 36-year-old white
male, was suspected of having a ruptured lumbar
disc. Lipiodol was injected into the lumbar sub-
arachnoid space and the needle was removed. By
the time the fluoroscopist began the myelographic
examination, the oil was observed to be disappear-
ing rapidly from the spinal canal into the para-
spinal area bilaterally. The needle had undoubt-
edly passed through one or more epidural veins,
permitting the oil to flow into the venous plexus.
The roentgenologic pattern was that of venous
filling rather than escape of the Lipiodol along
abnormally large root sleeves. With the exception
of a few droplets, all the oil had disappeared from
the spinal canal within 30 minutes. There were
no ill effects. Roentgenograms of the chest fol-
lowing myelography were normal.

Case 2. #77916. B.J.R., a 16-year-old girl, had
complained of low-back pain. Various types of
treatment had been tried without relief of pain.
Myelographic study was then performed utilizing
Pantopaque. On fluoroscopy and subsequent
roentgenograms it was thought the lumbar punc-
ture needle was in one of the epidural veins. The
point of the needle was at the 4th interspace and
Pantopaque was shown to fill the venous plexus.
Despite escape of much of the Pantopaque into
the venous system, no unusual symptoms oc-
curred. An operation was performed for removal
of a ruptured lumbar disc. Her hospital course
was uneventful.

Case 3. #86890. S.A.W., a 31-year-old colored
female, was admitted to the John Gaston Hospital
on April 20, 1959. The previous evening while
driving her automobile she reached across her
body with her left arm to close the right door. She
immediately experienced severe sharp low-back
pain. She was unable to straighten up. As the
patient alighted from the automobile, it was
noted that her pain was accentuated by each
step. There was no radiation of pain nor were
there any other symptoms. The past history and
systemic review were noncontributory.

On initial examination findings were limited to
the low-back region. While in the supine position
she was free of pain. On assuming the upright
position there was moderate straightening of the
lumbar spine. Considerable spasm of the lumbar
paravertebral muscles was present with marked
limitation of lumbar spinal motion. Extreme
tenderness was present in the paraspinous region
at L4 level bilaterally. There was no weakness or
sensory change. The reflexes of the lower extrem-
ity were hyperactive but equal. Straight-leg
raising produced pain in the low-lumbar region at
110° on the right and 140° on the left.

Roentgenograms of the lumbar spine appeared
normal except for straightening of the lumbar
curve. After 4 days of complete rest in bed with
the application of heat to the lower part of the
back and the use of analgesics, very little im-
provement occurred. On April 25, 1959, lumbar
myelography was attempted by our usual tech-
nique. With the patient in a left lateral decubitus
position and the spine flexed, a #18 gauge spinal
needle was inserted between L5 and S1 spinous
processes. The subarachnoid space was entered
without difficulty. The cerebrospinal fluid was
clear and colorless and the pressure was 140 mm.

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TABLE 1

<table>
<thead>
<tr>
<th>Author</th>
<th>Date</th>
<th>Opaque Medium</th>
<th>Spinal Tap</th>
<th>Evidence of Medium in Chest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reported cases</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. HinkeP</td>
<td>1945</td>
<td>Pantopaque</td>
<td>Not checked for blood after myelography</td>
<td>None</td>
</tr>
<tr>
<td>2. FullenloveÉ</td>
<td>1949</td>
<td>Pantopaque</td>
<td>Bloody tap, needle at level of defect, dye entered veins at level of tip of needle</td>
<td>None</td>
</tr>
<tr>
<td>3. Steinbach &amp; Hill™</td>
<td>1951</td>
<td>Pantopaque</td>
<td>Bloody tap</td>
<td>Radiologic evidence</td>
</tr>
<tr>
<td>4. Ginsburg &amp; Skorneck²</td>
<td>1955</td>
<td>Pantopaque</td>
<td>Bloody tap, needle anterior</td>
<td>Radiologic evidence</td>
</tr>
<tr>
<td>5. Keats³</td>
<td>1956</td>
<td>Pantopaque</td>
<td>Blood noted in spinal fluid</td>
<td>Radiologic evidence</td>
</tr>
<tr>
<td>6. Todd &amp; Gardner⁴</td>
<td>1957</td>
<td>Pantopaque</td>
<td>Not checked for blood after myelography, needle at defect, also needle anterior</td>
<td>Irritative cough developed</td>
</tr>
<tr>
<td>7. Steinbach⁶</td>
<td>1957</td>
<td>No details</td>
<td></td>
<td>Radiologic evidence</td>
</tr>
<tr>
<td>Present cases</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Schultz &amp; Miller Case 1*</td>
<td>1961</td>
<td>Lipiodol</td>
<td>Not checked for blood after myelography</td>
<td>None</td>
</tr>
<tr>
<td>9. Schultz &amp; Miller Case 2*</td>
<td>1961</td>
<td>Pantopaque</td>
<td>Needle noted to be in vein</td>
<td>None</td>
</tr>
<tr>
<td>10. Schultz &amp; Miller Case 3†</td>
<td>1961</td>
<td>Pantopaque</td>
<td>One drop of fluid with pink tinge. First and last fluid withdrawn was without blood</td>
<td>Radiologic evidence</td>
</tr>
</tbody>
</table>

* Baptist Memorial Hospital.
† City of Memphis Hospitals.

of water. The dynamics were found to be normal on jugular compression. The patient was then placed in a prone position, the flow of cerebrospinal fluid through the needle was checked again, and there was a free flow of clear, colorless spinal fluid. Six cc. of Pantopaque were then injected through the needle. After each 2 cc. the syringe was aspirated to check the return flow. This was normal on each occasion. Fluoroscopy was then begun immediately. The head of the table was raised and the Pantopaque migrated to the tip of the dural sac. Immediately upon observing the column of Pantopaque, it was noted that the Pantopaque was running caudally and laterally outside the spinal canal. It was first thought that the Pantopaque was leaving the spinal canal via the nerve roots, but then it became apparent that the column of Pantopaque was diminishing rapidly. Droplets of Pantopaque were seen floating cephalad, lateral to the spinal column. Four roentgenograms were made at approximately 13-second intervals (Figs. 1–4). The Pantopaque had completely disappeared within 2 seconds after the last roentgenograms were made. In 5 minutes roentgenograms of chest and abdomen were made. In films of the chest Pantopaque could be seen in very small quantities in the lung along the lower border of the 10th and 11th ribs. Roentgenograms of the chest 4 hours later appeared normal. The flow through the spinal needle was checked again. The spinal fluid was clear and colorless. The needle was rotated a half turn and aspiration of cerebrospinal fluid was repeated. The fluid was noted to be faintly blood-tinged in the 1st cc. aspirated, but then became clear and colorless. The cerebrospinal fluid contained 2 cells (lymphocytes) and 20 mg. per cent of protein.

On April 26, 1959, her pain had largely disappeared and 2 days later she was able to leave the hospital free of discomfort.

DISCUSSION

The pertinent details of the 7 cases reported in the literature and of our 3 cases are outlined in Table 1. The details of 1 case
Figs. 1 and 2. Case 3.

Figs. 3 and 4. Case 3.
have not been published.\(^5\) It is interesting that of the 9 remaining cases, there was radiologic evidence of pulmonary embolism in 5,\(^2,4,6\) including our Case 3.

It would seem that the most important factor in the intravasation of opaque medium during myelography is the relationship of the tip of the needle or its path to the epidural veins. In 6 instances,\(^1,2,4,6\) including our Case 3, bloody spinal fluid was encountered during the procedure. This would explain the route of entry of the contrast medium into the vascular system. In 1 additional case, our Case 2, the tip of the needle on roentgen-ray examination was believed to be in a vein. In the case of Todd and Gardner\(^4\) no blood was encountered upon lumbar puncture. The fluid was not checked for blood at the completion of the procedure. There would seem to be two factors that favor the needle being near a vein in this case; first, the tip of the needle was noted to be placed anteriorly and second, the needle was at the level of the myelographic defect. Anyone who has performed a number of myelograms has experienced the appearance of bloody fluid on attempted removal of the opaque medium when the needle is placed anteriorly or placed at the myelographic defect.

In Hinkel's case\(^3\) there was no blood in the spinal fluid initially, but it was not checked at the completion of the myelogram. Movement of the patient favored the needle entering a vein in this case. The movement associated with removing a pillow from under the abdomen may have displaced the needle enough to puncture a vein and also the movement associated with coughing may have initiated venous puncture. In our Case 1 the record does not have the details of the lumbar puncture.

When myelography is carried out in the presence of blood-tinged spinal fluid or when manipulation of the patient after insertion of the needle is found to be necessary, intravasation of the opaque medium may occur. It is the authors' opinion that a similar intravasation of anesthetic agent may account for some of the unexplained deaths of spinal anesthesia. The presence of blood in the spinal fluid that clears rapidly does not seem to be a contraindication to myelography, as there have been no recorded instances of permanent harmful effects of embolization of contrast medium. Strain\(^7\) noted that the rapid intravenous administration of 8 cc. of Pantopaque in dogs was fatal. The slow administration of 8 cc. produced no serious effects. This would suggest that in the presence of blood-tinged spinal fluid the use of smaller quantities of opaque medium may be indicated.

**CONCLUSION**

1. It seems in every reported case of intravasation of opaque medium into the venous system during myelography that the puncture of a vein was possible and not excluded definitely.

2. Intravasation of large amounts of opaque medium during myelography is probably uncommon. This had been observed only 3 times at the Baptist Memorial Hospital and City of Memphis Hospitals where approximately 5,756 myelograms have been performed since 1950.

3. The possibility that intravasation of small amounts of opaque medium is not uncommon has been entertained.

**REFERENCES**


5. Steinbach, H. L. Cited by Todd and Gardner.\(^8\)


7. Strain, W. H. Cited by Hinkel.\(^3\)