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# Esotropia: Unusual Complication of Myelography and Pneumoencephalography

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Myelography and pneumoencephalography are invasive procedures with many complications. We report two cases of esotropia that developed 8 and 7 days after a Pantopaque myelogram and a pneumoencephalogram, respectively. Fortunately, the esotropia was temporary in both cases. This rare complication, of which very few radiologists are aware, was presumably secondary to the lumbar puncture performed for the procedure.

## Case Reports

### Case 1

A 27-year-old man had a lumbar myelogram for a suspected herniated nucleus pulposus at L5-S1 which caused right-sided leg pain. The lumbar puncture was performed with ease on the first attempt with an 18 gauge spinal needle. The cerebrospinal fluid was clear and the laboratory test results were normal except for a slight elevation of protein. The patient was extremely tense and a headache developed during the examination. Twelve milliliters of Pantopaque were used and all of the free contrast material was retrieved at the termination of the procedure. No contrast material entered the subarachnoid space of the head. The patient continued to have a severe headache and developed nausea and dizziness which slowly diminished over the following weeks. Diplopia developed 8 days after the examination, and esotropia was diagnosed that was extreme enough to be treated with an eye patch. Over the next month the diplopia and esotropia gradually decreased until they disappeared.

### Case 2

A 20-year-old woman had a pneumoencephalogram for vertigo and temporooccipital headaches. The examination was normal. Subsequently, diffuse headaches developed that lasted 7 days. Then, blurred vision developed and diplopia secondary to esotropia of the right eye was recognized. She was treated with alternating eye patches for 8 weeks. The patient believed she was normal after 9 weeks, but an examination 8 months later disclosed esotropia of the right eye when looking to the left. A neurologic examination 3

years later showed occasional diplopia on left gaze. The patient was asymptomatic 10 years later.

## Discussion

These cases are interesting in that they illustrate that esotropia can be a complication of myelography and pneumoencephalography, although it is extremely rare. It has been reported to be a complication in 0.25%–1.00% of lumbar punctures [1, 2], but we believe it is much rarer since none of us, or any of our colleagues, could recall a similar episode.

The probable pathogenesis is that cerebrospinal fluid leaks through the dura at the puncture site. The cerebrospinal fluid pressure is less in the lumbar region than in the intracranial area after this procedure. Subsequently the brain stem shifts caudally and the cranial nerves are slightly stretched. Since the abducent nerves have the longest intracranial course of the cranial nerves, they are the most susceptible and are usually the first to be affected. This explanation is analogous to the abducent nerve being injured in conditions of increased intracranial pressure, but in this situation the pressure is increased in the head as opposed to being decreased in the spine. Presumably, the larger the spinal needle used, the greater the risk of this complication.

Occasionally, other cranial nerves are involved. The olfactory, glossopharyngeal, and vagus nerves are the only cranial nerves not reported affected by a lumbar puncture [3–9]. In about 60% of cases, nerve VI is affected, and in about one-third, cranial nerve VII is affected.

Other theories as to the cause of diplopia include a subclinical cerebral infection or the introduction of a toxic substance into the subarachnoid space [1, 2]. However, in most reported cases, as well as our two, the examination was done under sterile conditions and the clinical course did not suggest arachnoiditis or meningitis. Most procedures are now done with disposable equipment so that there is a

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lesser chance of injecting unwanted foreign materials into the subarachnoid space. Another hypothesis is that a thrombus develops in the petrous or lateral sinus resulting in an increase in intracranial pressure [10]. Since trauma to the venous system would have to occur first and myelography is contraindicated in a bloody tap, this explanation is unlikely.

In reported cases, esotropia occurs within 1–23 days after the lumbar puncture and almost always disappears within 1–2 months. In 59% of the cases the paralysis lasts for 4 weeks, in 26% for 5–8 weeks, and in 10% for 9–12 weeks [3]. Treatment is symptomatic and surgery should be reserved only for those cases that have not improved within 18 months [9]. Eye muscle exercises and fusion training may be helpful in correcting the ocular deviation.

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