PANTOPAQUE MYELOGRAPHY: RESULTS, COMPARISON OF CONTRAST MEDIA, AND SPINAL FLUID REACTION

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Recently a new contrast material, pantopaque, has been developed for myelography. Few detailed clinical reports are available. Spurling and Thompson used it in 200 cases and found that it possessed the qualities of lipiodol and thorotrast, but, in contrast, small amounts were readily absorbed and it was easily removed. When removal was complete there were no sequelae. Partial withdrawal, however, was followed by about the same degree of irritation as after lipiodol. Ramsey, French and Strain employed pantopaque in a series of 150 patients, 97 of which were operated upon. Diagnostic accuracy was found to be 95 per cent. The average estimated rate of absorption was 1 cc. per year. Copleman also used this medium satisfactorily in 150 patients, and of these, 86 were explored; detailed results are not given. We have used pantopaque since September 1942. The first 300 cases form the basis of this report.

The chemistry, experimental findings, technic and methods for withdrawal have been adequately described elsewhere. Check films are made following each myelogram and the amount of pantopaque retained estimated. It is usually possible to remove all but a few tenths of a cc. Probable factors accounting for incomplete removal are:

1. Inability of the patient to tolerate sufficient manipulation to remove the pantopaque. Discomfort is due to root pain produced by aspiration, etc.

2. Difficulty in adequately pooling the oil due to technical problems: tilting table, impingement of the arachnoid or nerve roots against the tip of the needle, etc. A small needle will add to the difficulty of aspiration.

3. Type of pathology present: arachnoiditis, diffuse tumor, or any lesion with partial obstruction, and consequent difficulty in movement of pantopaque with collection of it beneath the needle.


In sixty-five cases, follow-up films were studied to determine the amount of absorption. This was done by measuring the quantity of oil originally removed. The size of the shadow of pantopaque (in subsequent x-rays), representing various amounts of remaining material, is quickly learned by experience. In seventeen cases, the average estimated absorption in one month was 0.2 cc.; in ten it was 0.4 cc. in two months; and in sixteen cases it was 0.5 cc. in three months. In the twenty-two remaining cases followed up to one year, the rate varied from 0.03 to 1 cc. Nine have shown absorption of from 1 to 1.5 cc. up to ten months. Maximum absorption of 1.5 cc. in two months was seen in a case in which 3 cc. were retained. From a detailed
study of our results it would appear that the largest amounts are absorbed in those in which the retention is the greatest, and vice versa, but the latter appears to vary from patient to patient.

Successive films show gradual fragmentation, movement and disappearance. In some cases the oil leaked through the puncture site into the subdural and even into extradural spaces. It has also extended some distance along the nerve roots. These situations in no way hinder the usual absorptive process and have caused no symptoms.

Encystment has not been seen. Experimental studies by Steinhausen et al.32 have shown, however, that encystment may occur, particularly in the region of the cauda equina of dogs six weeks after injection. The reaction is considerably less than that noted after lipiodol and consists in a foreign-body response. Two clinico-pathological cases are included in their report. The spinal cord of one patient was examined seventeen days after injection. The pantopaque was still mobile and there were only a few polymorphonuclear leukocytes around the nerve roots. No encystment was noted. The second observation was made at laminectomy in the vicinity of extradural injection of the radiopaque substance nine days earlier. A degenerative reaction had occurred with infiltration by polymorphonuclear leukocytes, round cells and large monocytes.

In forty-eight cases of the present series, postoperative skull films were available to determine the incidence and effects of retained intracranial pantopaque (the longest time interval was one year). Thirty-four were negative and fourteen showed small amounts of oil in the basal cisterns. Only one of the latter resulted in symptoms and signs of meningeal irritation.

A 25-year-old pilot had a negative diagnostic spinogram on 6 September 1943 with incomplete removal of the oil. He was discharged on 9 September 1943, and almost immediately resumed flying. On 15 September 1943, following rather violent aerial maneuvers, he noted the onset of severe frontal headaches, nausea and vomiting, but continued on duty until hospitalized on 20 September 1943. Lumbar puncture relieved his symptoms and the cerebrospinal fluid showed 670 lymphocytes. X-rays disclosed small amounts of pantopaque in the basal cisterns. On 21 September 1943 blood studies revealed a leukocytosis of 14,750 with 73 per cent polymorphonuclear leukocytes, 16 per cent lymphocytes, 11 per cent monocytes; temperature was 100°F. Remaining and subsequent laboratory studies and vital signs were negative. Electroencephalogram on 29 September 1943 showed an abnormally patterned record with irregular wave forms consisting of mixed frequencies. Less synchronization was noted over the occipital regions. Overventilation increased the amount of interfering activity in all leads and caused slow wave formation. Repeat tracing on 7 December 1943 showed no essential change. Final examination on 5 May 1944 showed no neurological symptoms or signs, and all laboratory studies including electroencephalogram and lumbar puncture were negative.

Copleman's mentions nausea and vomiting in one case in which 1 cc. of pantopaque entered the cranial cavity following examination of the dorsal spine.

One other unexplained complication occurred in this series. Following routine removal of a typical “disc,” bladder retention developed without other neurological findings. Subsequent pantopaque studies and operation revealed