

6. Cossum PA, Galbraith AJ, Roberts MS, et al: Loss of nitroglycerin from intravenous infusion sets. *Lancet* 2:349-350, 1978
7. Sturek JK, Sokoloski TD, Winsley WT, et al: Stability of nitroglycerin injection determined by gas chromatography. *Am J Hosp Pharm* 35:537-541, 1978
8. Ritschel WA: *Handbook of Basic Pharmacokinetics*. Hamilton, Illinois, Drug Intelligence Publications, 1976, p 177
9. Armstrong PW, Armstrong JA, Marks GS: Blood levels after sublingual nitroglycerin. *Circulation* 59:585-588, 1979
10. Wei JY, Reid PR: Quantitative determination of trinitroglycerin in human plasma. *Circulation* 59:588-591, 1979

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Cutaneous Cerebrospinal Fluid Leakage Following Attempted Extradural Block

S. R. JAWALEKAR, M.B.,* AND GERTIE F. MARX, M.D.†

Prolonged, post-lumbar puncture, cerebrospinal fluid (CSF) leakage through an arachnodural rent has been observed by radioisotope myelography,¹ by direct vision during laminectomy,² as well as during postmortem examination.³ Development of a subarachnoid-cutaneous fistula has also been reported after inadvertent dural penetration during extradural steroid injection in two patients who previously had lumbar laminectomies.^{4,5} In this study, we report a case of cutaneous CSF leakage following attempted lumbar extradural block in a healthy patient.

REPORT OF A CASE

A 30-year-old, female physician required emergency cesarean section because of cephalopelvic disproportion. To initiate epidural anesthesia, identification of the extradural space was attempted first at the L 2-3 and then at the L 3-4 interspace. Both were unsuccessful; there was some bleeding but no indication of a "wet" tap. A third attempt at the L 4-5 interspace led to positive identification of the extradural space, and an uneventful extradural block was achieved with 3 per cent 2-chloroprocaine, 18 ml. On the following day, the patient felt "wetness" on her back which she believed to be sweat. However, in the evening, her husband, also a physician, diagnosed cerebrospinal liquorrhea. Our advice was then sought.

Examination of the patient's back revealed three puncture marks between L 2 and L 5, the upper and lower were closed and healing, the middle had reddened borders. This mark had a distinct tract from which a clear colorless fluid exuded at a rate of approximately 6 drops/min at rest; the rate of flow increased when the patient was in the sitting position and even more so when she coughed. A sample of the fluid showed a pH of 7.3, glucose 2.5 mmol/l, two white and no red blood cells. The puncture wound was cleaned and covered with sterile gauze. The patient was then instructed to lie, with thighs flexed, on either side but *not* on her

back. A neurologic consultant advised against prophylactic antibiotic administration since temperature and white blood cell count were within normal limits. However, because of the potential for infection, an epidural blood patch was not administered.

The patient related that the "dripping" decreased notably after she abandoned the supine position. Forty-eight hours later, leakage had stopped completely, and the puncture track was almost closed. The moderate postural headache which had accompanied the leak abated at the same time.

Discussion of the extradural block technique with the anesthesiologist disclosed the following: 1) the non-healing puncture site was that of the second attempt; 2) a sharp needle had been used to pierce the skin at all three interspaces; and 3) the same Tuohy needle had been employed throughout, but had been cleared by flushing with local anesthetic between the second and third attempts only.

DISCUSSION

Subarachnoid-cutaneous fistulas have been associated with incapacitating headaches,^{1,2} and have led to the development of meningitis.⁴ Attempts to hasten closure of the fistula are therefore indicated. In one of the reported cases, surgical intervention was undertaken; two Cushing clips were applied to close the dural defect.² Another patient was treated with bed-rest in a slight Trendelenburg position to relieve CSF pressure on the rent, reduce the leakage, and thus promote spontaneous healing.¹ Brocker⁶ advocated the prone position for prevention and treatment of post-lumbar puncture headache. He proposed that "assumption of the prone position staggers the punctures in the dura and arachnoid, decreases the potential epidural space, and releases the tension of the dural and arachnoid tears; this would reduce the loss of spinal fluid."⁶ In his series of 894 patients lying on their abdomen for three hours following lumbar puncture, the incidence of postspinal headache was 0.45 per cent, whereas in 200 comparable patients kept supine after the puncture, the incidence was 36.5 per cent. Ash⁷ also reported a reduction in incidence and severity of postspinal headache when the block had been administered in the prone position. He postulated that this resulted from decreased tearing

* Assistant Professor of Anesthesiology.

† Professor of Anesthesiology.

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Address reprint requests to Dr. Marx.

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of a more relaxed dura. Since postpartum women are uncomfortable lying prone, we have advocated for many years that after intentional or accidental dural puncture, they assume a lateral position with thighs flexed on the abdomen. We believe that the lateral position reduces the volume of CSF leakage, because the CSF pressure is lower in the lateral than in the supine position,⁸ and because flexion of the thighs decreases lumbar lordosis⁹ and, thus, dural tension. The prompt improvement in our patient tends to confirm this concept.

A second clinically important factor may relate to the technique of extradural and spinal blockade. The development of an arachnodural-cutaneous fistula may be aggravated by the intradural deposition of foreign material such as tissue or blood clot. Therefore, spinal and extradural needles and stylets probably should be thoroughly cleansed of any blood or tissue before further use. Also, the skin probably should be pierced by an introducer or other sharp needle rather than by the spinal or extradural needle itself. Whether these factors had any role in our case is difficult to assess.

REFERENCES

1. Lieberman LM, Tourtellotte WW, Newkirk TA: Prolonged post-lumbar puncture cerebrospinal fluid leakage from lumbar subarachnoid space demonstrated by radioisotope myelography. *Neurology* 21:925-929, 1971
2. Brown BA, Jones OW Jr: Prolonged headache following spinal puncture—response to surgical treatment. *J Neurosurg* 19: 349-350, 1962
3. Thorsen G: Neurological complications after spinal anesthesia. *Acta Chir Scand (Suppl)* 121:1-272, 1947
4. Dougherty JH, Fraser RAR: Complications following intraspinal injections of steroids. Report of two cases. *J Neurosurg* 48:1023-1025, 1978
5. Delaney TJ, Rowlingson JC, Carron H, Butler A: Epidural steroid effects on nerves and meninges. *Anesth Analg (Cleve)* 59:610-614, 1980
6. Brocker RJ: Technique to avoid spinal-tap headache. *JAMA* 168:261-263, 1958
7. Ash WH: The lateral approach for spinal anesthesia: A modification of the Taylor subarachnoid tap for surgery in the prone position. *ANESTHESIOLOGY* 16:445-453, 1955
8. Dripps RD, Eckenhoff JE, Vandam LD: Spinal anesthesia, Introduction to Anesthesia. 5th ed. Philadelphia, WB Saunders Company, 1977, pp 260-277
9. Marx GF, Zemaitis MT, Orkin LR: Cerebrospinal fluid pressures during labor and obstetrical anesthesia. *ANESTHESIOLOGY* 22:348-354, 1961