11. Barrios-Alarcon J, Aldrete JA, Paragas-Tapia D: Relief of post-lumbar puncture headache with epidural dextran 40: A preliminary report. Reg Anesth 14:78–80, 1989

12. Seehzer PH, Abel L: Post-spinal anesthesia headache treated with caffeine: Evaluation with demand method, part 1. Curr Ther Res 24:307–312, 1978

13. Seehzer PH: Post-spinal anesthesia headache treated with caffeine: Intracranial vascular distention, a key factor, part 2. Curr Ther Res 26:440–448, 1979

14. Artuso JD, Stevens RA, Lineberry PJ: Post dural puncture headache after lumbar sympathetic block: A report of two cases. Reg Anesth 16:288–291, 1991

Anesthesiology
78:200–203, 1993

Inflammatory Cutaneous Reactions to Epidural Catheters

C. M. P. Mather, M.B.Ch.B., F.C.Anaes., L. B. Ready, M.D., F.R.C.P.(C.),† M. Newman, M.D.‡*

THE authors' Acute Pain Service, at a university medical center in Seattle, has treated more than 5,000 postoperative patients with epidural analgesia. Over a period of 8 weeks, six patients developed a cutaneous inflammatory reaction to nylon epidural catheters.

Case Reports

Case 1

A healthy 66-yr-old woman was admitted for total abdominal hysterectomy and bilateral salpingo-oophorectomy. She gave a history of allergy to rubber, horse serum, adhesive bandages, and several types of tapes.

Before induction of general anesthesia, an epidural catheter was inserted at the L3–4 interspace and established using 2% lidocaine with epinephrine (2%[w] lidocaine). Following the Acute Pain Service protocol, 5% povidone-iodine (Betadine®) spray was used prior to catheter placement. Thereafter, tincture of benzoin and a Tegaderm® dressing (10 × 30 cm) were used to secure and cover the catheter.

For postoperative analgesia she received an epidural dose of 2 mg morphine (1 h before the end of surgery) and was subsequently prescribed 2 mg epidural morphine every 6 h as needed. On the second morning after surgery (40 h after epidural catheter insertion) she complained of "soreness" only at the point of entry of the catheter, where there was also a "circle of inflammation and a small amount of swelling." It was decided that the best course of action would be to remove the catheter and extend the course of perioperative antibiotics (cephalexin). Upon removal there was a small amount of serous discharge, but it also became evident that there was an inflammatory "trail," which traced the exact course of the epidural catheter from her lower back, up to and over her shoulder (fig. 1). The "trail" was about 5–6 mm wide and persisted, albeit faded, until her discharge on postoperative day 6.

On examination, she has at all times had a normal range of back movement and has been neurologically intact.

Case 2

A 58-yr-old woman was admitted for a total abdominal hysterectomy and bilateral salpingo-oophorectomy. Her only relevant medical history was that she was allergic to "sulfa and Betadine®." She consented to a combined epidural and general anesthetic. An epidural catheter was inserted in the lumbar region, using chlorhexidine antiseptic. It was covered with Tegaderm® dressing, after a light spray of tincture of benzoin. She was given 2%[w] lidocaine and had a block to T8–9.

For postoperative analgesia she received 3 mg epidural morphine toward the end of surgery and was prescribed 3 mg epidural morphine every 6 h, as required. Apart from some mild nausea she had no complaints. The epidural catheter was removed 70 h after surgery. A red line was noted on her back, which was several millimeters wide and traced the course of the catheter (fig. 2). The rash faded over 1–2 days. Examination of her range of motion and nervous system were normal.

Case 3

A healthy 61-yr-old man was admitted for a radical cystectomy and urinary diversion procedure. His epidural catheter was inserted at the L3–4 interspace following Betadine® antiseptic spray. Tincture of benzoin and a Tegaderm® dressing were applied. He was given 2%[w] lidocaine for peroperative analgesia. Postoperatively 0.0625% bupivacaine with 2 μg/ml fentanyl was administered as an epidural infusion (8 ml/h).

* Acting Assistant Professor in Anesthesiology.

† Professor of Anesthesiology and Director of the Acute Pain Service.

‡ Resident in Anesthesiology.

Address reprint requests to Dr. Ready: Professor, Department Anesthesiology, RN-10, University of Washington, Seattle, Washington 98195. Accepted for publication September 15, 1992.

Key words: Anesthetic techniques: epidural. Complications.

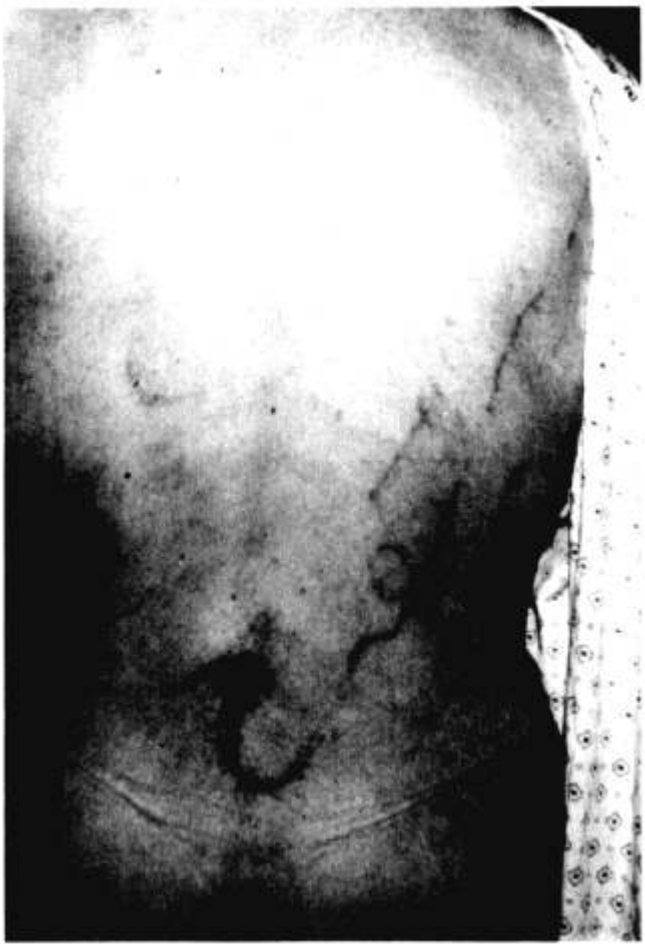

Fig. 1. This is a photograph of case report 1. This clearly demonstrates the inflammatory "trail", tracing the exact course of the epidural catheter along the back. Epidural catheters are secured in this convoluted course to allow some "give" and to lessen the risk of being dislodged.

The patient was interviewed twice daily and admitted to no side effects. On postoperative day 6, the catheter entry point was reddened and indurated, but it was also noted that an inflammatory trail extended the length of his back following the catheter's course (fig. 3). The epidural was discontinued. The inflammation resolved over 2–3 days and the patient made a complete recovery without sequelae.

Case 4

A 69-yr-old man was admitted for a radical prostatectomy and consented to a combined epidural and general anesthetic. He had no allergies. A lumbar epidural block was established using 2%[w] lidocaine, and postoperatively analgesia was maintained with a 0.0625% bupivacaine infusion (8 ml/h). The epidural was discontinued on postoperative day 5 and on removal there was noted to be a "serosanguinous" discharge and a "reddened trail with occasional small blisters" following the course of the catheter along the back. All changes resolved over the next 36 h and there were no sequelae.

Case 5

A 55-yr-old woman was admitted for surgery for an ovarian carcinoma. She had no allergies. She received a combined epidural and general anesthetic. Her lumbar epidural was established with 2%[w] lidocaine and was used postoperatively to administer 3 mg morphine every 6 h. On the second postoperative morning the catheter was removed after a reddened "trail" was noted, beginning at the site of skin entry and tracing the path of the epidural catheter along the back. There were no sequelae and the skin reaction had almost resolved by the following day.

Case 6

A 73-yr-old diabetic woman was admitted for a total abdominal hysterectomy and bilateral salpingo-oophorectomy. She was given a combined epidural and general anesthetic using 2%[w] lidocaine perioperatively and 2 mg epidural morphine every 6 h for postoperative analgesia. On postoperative day 3, the skin at all points of contact with the epidural catheter was reddened. The catheter was removed

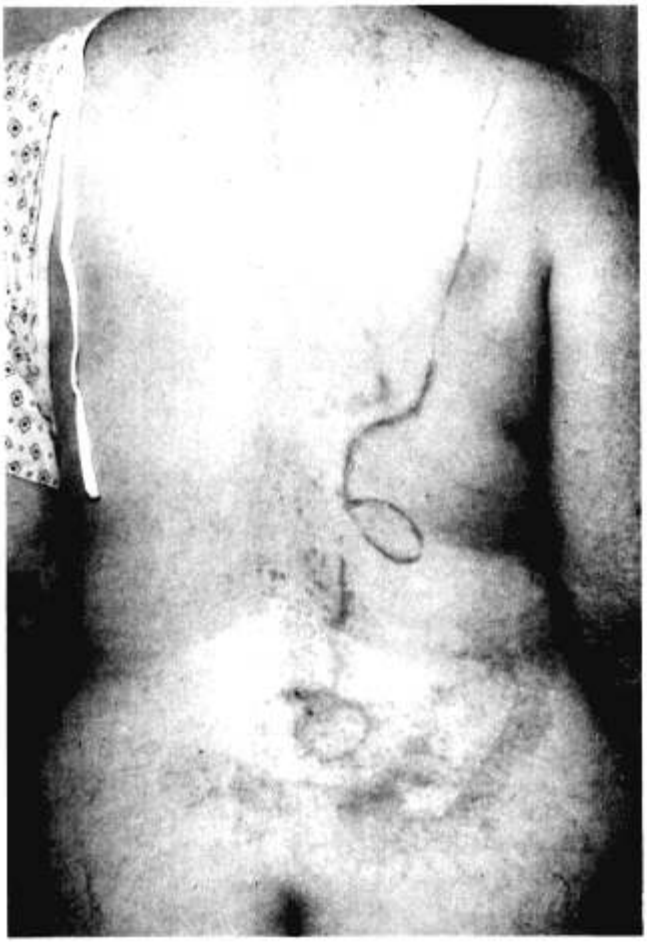

Fig. 2. This is a photograph of case report 2. This demonstrates the "reddened, inflammatory trail" which traces the course of the epidural catheter.

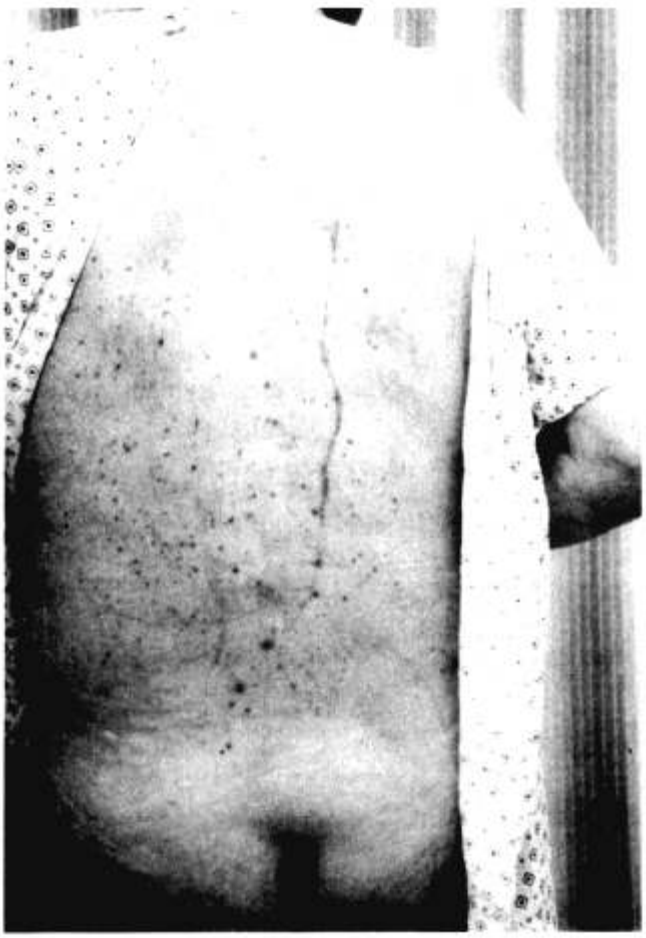

Fig. 3. This is a photograph of case report 3. This demonstrates the inflammatory "trail", following the course of the epidural catheter along the back.

and the skin reaction disappeared after 2–3 days. There were no sequelae.

Discussion

Epidural catheters are manufactured from hypoallergenic materials, such as nylon, Teflon®, and various polymer blends, to reduce the risks of an inflammatory response in tissues lying in close proximity. Correctly placed epidural catheters may be juxtaposed to sensitive neuronal tissues, such as nerve roots. Such catheters undergo rigorous testing, which includes systemic injection, intramuscular and subcutaneous implantation (for up to 1 yr) and drug compatibility (with the commonly used drugs and diluents). There have been no reports of allergic responses to the Burron epidural catheters, which are made of an inert nylon or polyamide (Burron Medical, Bethlehem, PA; product number CE-18TIN H8021-332201). After computer searches and direct inquiries to 11 manufacturers, we can find no reports of any similar reaction to any epidural catheter.

Clinically, each of the cutaneous reactions appeared identical. All six patients had a reddened, non-raised trail, which began at the site of catheter insertion and coursed along the back. Each trail appeared simultaneously and faded simultaneously over the length of catheter-skin contact. The observed time to onset ranged from 40 h to several days with resolution over 1–3 days. Additionally only case 4 had associated blistering; only cases 1 and 3 had palpable swelling at the site of catheter entry; and only cases 1 and 3 complained of localized itching. Clinically, the course and dimensions of the inflammatory "trails" in our patients corresponded exactly with the epidural catheters. However, other local factors may have caused this reaction.

1. Drugs, such as bupivacaine (NDC 0024-1213-30; Winthrop Pharmaceuticals, New York, NY), lidocaine (NDC 0074-428102; Abbott Laboratories, Chicago, IL), fentanyl (NDC 50458-030-02; Janssen Pharmaceuticals, Piscataway, NJ), or morphine (NDC 0186-1151-02; Astra Pharmaceuticals Products, Westborough, MA) could have coursed down from a leaking connection and tracked under the Tegaderm® dressing. However, on examination, the dressings were dry and no leakage was apparent in any of the cases. Two-percent lidocaine was given to all these patients only at the time of surgery. Bupivacaine was given to only two patients postoperatively. All other patients received epidural morphine every 6 h.
2. The Tegaderm® dressings (No. 1627; 3M Medical-Surgical Division, St. Paul, MN) also are reported to be hypoallergenic. They are made of a polyurethane, with an acrylate (non-latex) adhesive. The manufacturers report very occasional sensitivity reactions, especially on repeated application, but indicate that the response involves the whole area of skin in contact. The nature and "area" of the reactions we observed do not show this pattern. The manufacturer also states that most claims of "allergic responses" have proved to be the consequence of shearing, stripping, or mechanical injury from applying the dressing under tension or following excessive movement. This would appear to be unlikely in our cases, since the dressings were ap-

plied to a flexed back. Even if applied with some tension, this would be eliminated on straightening of this posture.

3. The Betadine® (NDC 0034 2310 30 6505-01-189-3975; Purdue Frederick, Norwalk, CT) or 4% Chlorhexidine Gluconate (CAT 29900-401; Baxter Healthcare, Deerfield, IL) skin preparations also were applied to wide areas of skin, but limited to the lower back. Excess liquid would normally be dried before epidural insertion.
4. Tincture of benzoin (benzoin isopropyl alcohol, CAT No. MAB-101 (8); Professional Packaging, Aurora, IL) was applied to help maintain adherence of the Tegaderm® dressings. The distribution of a spray application does not correspond with the "trails" of inflammatory responses seen.

We considered whether an infective element might be present. None of the patients had any signs of infection, although in case 1 there was some swelling at the site of catheter entry, a serous discharge, and a pattern of temperature increase and decrease that began the day before surgery. The clinical course did not follow the onset or resolution of the cutaneous signs and could not explain the inflammatory trail on the back.

Since an allergic reaction to an epidural catheter has not been reported, it can be presumed to be a rare event. This makes the likelihood of six cases of allergy in a matter of weeks improbable. We therefore considered any other recent changes in our practice that might coincide with these occurrences. However, nothing has been changed in 6 yr. We are using the same antiseptic, catheters, dressings, and drugs. The manufacturer states that there have been no recent changes to the manufacturing process of their catheter. We have considered the possibility that the physical packaging of the catheter (a plastic bag), or the process of packaging or sterilizing, has been altered. Perhaps an "insignificant" change has been made and not documented. This also could be true for the aseptic solutions, adhesive spray, or dressing. It is conceivable that a contaminant was present in a batch of one (or more) products during that period of time, causing this series of cutaneous reactions.

In retrospect, from the outset it would have been wise to have involved a neurologist and dermatologist to perform the relevant examinations, and perhaps to have considered further tests such as a skin biopsy or magnetic resonance imaging of the epidural space. However, we did confer by telephone with a dermatologist who led us to believe that skin testing would be unlikely to clarify the causative agent.

We have not determined a cause, but believe others should be aware of our observations. There appear to be no common factors in these patients' histories; three of the six patients gave a history of allergy, but no two patients had the same allergies. Since we have had no adverse outcomes, our observations are of questionable clinical importance. However, should these catheters have been left *in situ* for longer periods, complications could perhaps have resulted. Our belief in the importance of regular inspection of *in situ* epidural catheters has been reinforced.