Extradural catheter-related infections in patients with infected cutaneous wounds

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Summary

We report three previously healthy individuals, aged 19–40 yr, with co-existing infected lower limb cutaneous wounds, who developed, in all probability, spinal space infections complicating continuous extradural analgesia. As the number of patients with extradural catheters and large cutaneous wounds represents a small fraction of the total number of patients with extradural catheters, three cases of presumed spinal space infection over a 4-yr period suggests that extradural analgesia with a catheter technique in this clinical situation is unsafe.

Key words


In a recent article by Jakobsen, Christensen and Carlsson, it was concluded that extradural analgesia with a catheter technique is “a relatively safe procedure” in the surgical treatment of abscesses or infected wounds. Our experience is different. Between 1991 to 1995 we encountered three trauma patients with large open cutaneous wounds who developed, in all probability, spinal space infections after extradural catheter analgesia. Taking into account the small referral area (approximately 1 million inhabitants), the risk of developing an extradural infection may be higher than anticipated previously. A summary of the data from these three cases is given in table 1. (Br. J. Anaesth. 1997; 79: 668–670).

Case reports

CASE NO. 1

A 20-yr old, previously healthy farmer sustained a traumatic amputation of his right leg at thigh level combined with major blood loss. After initial resuscitation at a nearby hospital an extradural catheter was inserted at the L3–4 interspace on the second day. At this time the large cutaneous wound in the thigh showed clinical signs of infection and he had an increased white blood cell count of 18.0 x 10^9 litre^-1 and a temperature of almost 39°C. Cefuroxime and clindamycin were commenced. In the skin area above the right hip another cutaneous wound, 3 x 7 cm, was found. At the time of the second wound revision, the second day after the trauma, the extradural catheter was changed and a new extradural catheter was inserted at the T12–L1 level. Bupivacaine 0.25% and adrenaline 1:200 000 with the addition of sufentanil were delivered via the catheter at a constant infusion rate. There were signs of an ongoing coagulopathy as platelets decreased to 100 x 10^9 litre^-1, activated partial thromboplastin time increased to 45 s (normal range 23–34 s) and prothrombin complex decreased spontaneously to 40% (normal range 70–180%). The wounds were revised a third time. As the status of the patient did not improve, he was transferred to the Department of Plastic Surgery, Linkoping University Hospital on the sixth day after injury. On arrival the patient had a temperature of 40 °C with pain at the site at which the second extradural catheter had been inserted and a stiff neck. The puncture site was found to be red. Antibiotic therapy was changed to cefotaxime. Computer tomography (CT) scan (without contrast medium) was normal, apart from gas bubbles in the spinal canal, but lumbar puncture and analysis of cerebrospinal fluid showed an increased lactate concentration of 4.6 mmol litre^-1 (reference value <2.1 mmol litre^-1). However, direct microscopy of cerebrospinal fluid did not reveal any bacteria or fungi but showed a significant amount of white cells. Simultaneous cultures from the tip of the extradural catheter, the large cutaneous hip wound and urinary tract yielded significant growth of Pseudomonas aeruginosa. After removal of the extradural catheter the patient’s status improved significantly and by the next day he had a normal temperature. Signs of meningism disappeared simultaneously.

CASE NO. 2

The right foot of a previously healthy 40-yr-old man was crushed in a log-splitter. He was treated initially at a local hospital. Twelve days after injury he was referred to the University Hospital for skin coverage
of the open wound at the site of the partially amputated fore foot. As he was developing phantom pains, an extradural catheter was inserted at the L3–4 interspace and continuous infusion of 0.25% bupivacaine given. Two days later a leak was observed around the catheter. At the same time the patient complained of pain radiating from the region in which the catheter was inserted through the skin. The pain increased the following day. At this point a major wound revision was performed and a split thickness skin graft was applied to the fore foot. The following day dicloxacillin was given as his temperature had increased to 39 °C and the pain from the back area had increased, radiating to the right thigh. The patient also complained of intense headache. The pain increased further, the next day magnetic resonance tomography (MRT) with contrast medium was performed. MRT (T1-weighted images) showed a process starting from the subcutaneous area extending intraspinally between the spinous processes of L3 and L4, measuring 15 × 30 × 25 mm and dislocating the dura in the right portion of the spinal canal. There was no contrast enhancement in the central part of the process, indicating pus. The neurosurgeon recommended conservative treatment. The status of the patient improved slowly over the following 3 or 4 days. However, during the postoperative period the patient complained of radiating pain in his lower back, still a complaint 2 yr after the injury.

CASE NO. 3

A few days after arthroscopy of her left knee a 19-yr-old woman developed significant iatrogenic lymphoedema. Four months after operation she developed painful opioid-resistant infected ulcers on her left foot requiring vancomycin treatment. Seven months after arthroscopy, a tunnulated extradural catheter was inserted at the L3–4 interspace through which 0.25% bupivacaine and morphine were given. Eleven days after insertion of the catheter the patient had a pyrexia (39.7 °C). On day 14 after catheter insertion the patient had increasing pain radiating out from the back. A culture from the tip of the now withdrawn extradural catheter revealed Staphylococcus aureus, the same strain that had been cultured from the ulcer on the foot. A CT scan (using contrast medium) showed increased contrast accumulation at the L3–4 intraspinal level extending to the intervertebral holes at the L3–4 level on the right side and a large abscess in the psoas musculature at the L2–5 level. In relation to the paravertebral musculature of the spinal process of the L3 vertebra, cone-shaped contrast enhancement of the extradural catheter track was seen. The next day, under x-ray guidance, this abscess was punctured transcutaneously and drained. Low back pain and septic fever decreased rapidly. The increased white blood cell count and C-reactive protein concentration normalized within 1 week. Unfortunately, the pain problem (in the foot) and the open ulcers continued for another year leading eventually to amputation.

Discussion

We believe that these three cases demonstrate the potentially higher risk of a serious infectious complication after extradural catheter analgesia in patients with infected wounds, in comparison with what has been stated previously or been found in a general intensive care unit population with the well known risk of nosocomial infections. As bacterial cultures showed growth of the same bacterial strains from both the infected wounds and the catheter tips, the likelihood of haematogenous spread between the two sites as a cause of the infectious complication must be regarded as high. None of the cases had open wounds in the immediate vicinity of the puncture site of the extradural catheter, and the catheter was tunnelled in one case. The extradural catheters were inserted by three different anaesthetists, making substandard aseptic technique an unlikely culprit. For these reasons haematogenous spread seems more likely and direct contamination at the puncture site less likely to have been the process responsible. None of the patients was known to have reduced immunocompetence, diabetes mellitus or any other concomitant disease.

Among several reasons for the low incidence of spinal space infections after extradural catheterization one might be antimicrobial activity of the local anaesthetics used. The bactericidal effect is concentration-related and has been shown to be most marked with 0.5% bupivacaine, and less with lower concentrations. Of interest is a study by James and colleagues showing that 0.25% bupivacaine was 5–25 times as potent at 37 °C compared with at room temperature in decreasing the colony count of different bacterial isolates. All of our patients received bupivacaine in a concentration of 0.25% or slightly less (because of dilution by addition of opioid). The extradural solutions were made up by a
ward nurse under aseptic conditions using 50-ml syringes that were used immediately and changed in less than 12 h.

The medical management strategy pursued in case No. 2 has been described previously. The incidence of this type of infectious complication is difficult to evaluate from our material. Whether the previous retrospective investigation of 120 extradurals is to be regarded as too small to determine the true rate of a rare complication is debatable. Our intention is to highlight the fact that these infections do occur and should prompt a high degree of clinical suspicion in any physician responsible for the care of patients with painful open wounds and an extradural catheter. These three cases have also prompted us to restrict the practice of using extradurals in this type of patient.

References