Conservative Treatment of an Epidural Abscess After Thoracic Epidural Catheterization

Patricia Hernández-Puiggròs, MD, DESA,* Antonio Montes, MD, PhD,† Alberto Solano, MD,‡ José L. Aguilar, MD, PhD, DESA,§ Gerardo Conesa, MD, PhD,‖ and Juan Pablo Horcajada, MD, PhD¶

We describe a case of a thoracic epidural abscess after epidural catheter insertion in a patient undergoing lobar segmentectomy. The patient described a "pulsatile" back pain the sixth day after surgery, and purulent material at the entry site of the catheter was observed. The image of the nuclear magnetic resonance confirmed an epidural abscess that was treated conservatively with antibiotics after a consensus decision among neurosurgery, infectious diseases an anesthesia services. The abscess was reabsorbed completely with no sequelae. (A&A Case Reports. 2014;3:162–5.)

The first reports of epidural abscess after insertion of an epidural catheter were published by Ferguson and Kirsch[1] in 1974 and Saady[2] in 1976. The incidence of epidural abscess associated with epidural analgesia and anesthesia is estimated between 1 per 1000 and 1 per 10,000 procedures.[3] In their meta-analysis, Reihsaus et al.[4] analyzed 915 cases of spinal epidural abscess between 1954 and 1977 and reported an incidence of 0.2 to 2 patients per 10,000 hospital admissions in whom epidural anesthesia or analgesia had been performed in 5.5%. The therapeutic method of choice was laminectomy combined with antibiotics and conservative treatment alone was justifiable only for specific indications.[4] Although it is a rare complication, delays in diagnosis and treatment can lead to serious neurological sequelae and even death.[5] We report the case of a patient who presented with an epidural abscess without accompanying neurological deficit after the placement of a thoracic epidural catheter. The abscess resolved with conservative treatment.

Written informed consent for publication of this report was obtained from the patient.

CASE DESCRIPTION

The patient was a 71-year-old woman scheduled for segmentectomy of the right medial lobe due to a stage I (T1N0M0) carcinoid tumor.

In the operating room, and before induction of anesthesia, the epidural space was located with a 18G Tuohy needle. A 19G epidural catheter (Smiths Medical®, Saint Paul, MN) was inserted at the T5-T6 level under standard aseptic conditions (preprocedural hand washing; use of sterile gloves, mask, and cap; and disinfection of the skin with 10% single-patient-use povidone-iodine solution, waiting until it dried completely). Once the catheter was in place (10-cm mark on the hub of the Tuohy needle), a bacterial filter was attached and the epidural catheter was secured with an Epi-fix sterile dressing (Unomedical®, Mona Vale, New South Wales, Australia) covering the puncture site and the length of the epidural catheter. Cefazoline 2 g was given 30 minutes before surgery as a prophylactic antibiotic and was repeated every 2 hours during the 4-hour otherwise uneventful surgical procedure. After emergence from anesthesia and in the recovery room, an epidural infusion of 0.125% levobupivacaine + 2 mcg/mL fentanyl at the rate of 3 mL/h was started, together with IV analgesia with 1 G/8 h paracetamol + 50 mg/12 h dexketoprofen. After 24 hours, the patient was transferred to the ward.

During her stay on the ward, the efficacy of analgesic treatment was evaluated and the condition of the dressing checked daily, with no indication that the dressing was in poor condition or had come loose. The epidural infusion was maintained until the sixth day after surgery (in accordance with the thoracotomy protocol). On removal of the epidural catheter, purulent material was seen emerging from the entry orifice.

When questioned, the patient reported mild back pain on the sixth postoperative day, which she defined as "pulsatile"; a neurologic examination showed no focal findings. A spinal epidural infection was suspected and the purulent exudate and tip of the catheter were cultured. The head of the infectious disease department and the head of the neurosurgery department were consulted. Several hours after the removal of the epidural catheter, she had a fever of 38.9 °C. Blood cultures and blood analysis showed leukocytosis 20×10^9/L ($4.5–11.5 \times 10^9$/L), C-reactive protein concentration 43 (0–5 mg/L), and lactate level 2.4 (0.5–1.5 mEq/L). Nuclear magnetic resonance imaging (MRI) (Fig. 1, A and B) confirmed an epidural abscess at level T4-T6, 6 cm long and 1.5 × 1 cm in diameter, with well-defined edges, occupying the posterior surface of the spinal canal with no evidence of spinal cord compression. The abscess communicated through the T5-T6 interspinous space to the subcutaneous space with fistula formation to the skin.

In view of the absence of neurologic signs, conservative treatment was decided on and the patient was transferred to

From the *Department of Anesthesiology, ICU and Pain Clinic, Hospital Son Llàtzer, Palma de Mallorca, Spain; †Major Outpatient Surgery Department and Pain Unit, Hospital del Mar-Parc de Salut Mar, Barcelona, Spain; ‡Department of Radiology and Image Diagnostics, Hospital del Mar-Parc de Salut Mar, Barcelona, Spain; §Department of Anesthesiology, Reanimation and Pain Relief, IdISPa Hospital Son Llàtzer, Palma de Mallorca, Spain; ‖Neurosurgery Department, Hospital del Mar-Parc de Salut Mar, Barcelona, Spain; and ¶Infectious Diseases Department, Hospital del Mar-Parc de Salut Mar, Barcelona, Spain.

Accepted for publication June 16, 2014.

Funding: None.

The authors declare no conflicts of interest.

Address correspondence to Patricia Hernández-Puiggròs, MD, DESA, Department of Anesthesiology, ICU and Pain Clinic, Hospital Son Llàtzer, Palma de Mallorca, Spain. Address e-mail to patmansup@gmail.com.

DOI: 10.1213/XAA.0000000000000099

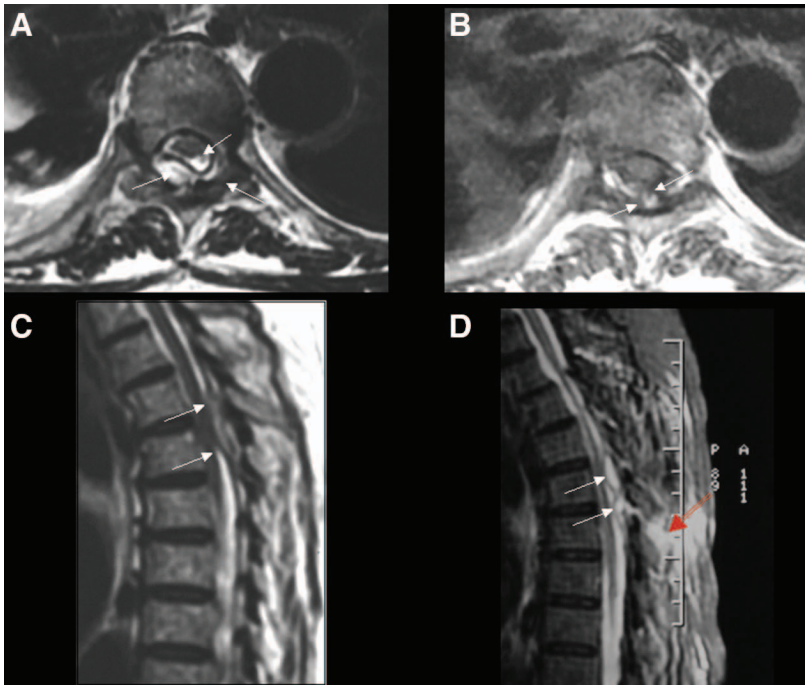

Figure 1. T2- (A) and T1- (B) weighted axial and sagittal T2WI magnetic resonance imaging (C) showing an epidural abscess (white arrows) from the 4th to 6th thoracic vertebral levels with no evidence of spinal cord compression. Linear hyperintense signal in short T1 inversion recovery (STIR) sagittal image compatible with fistulous tract (D) in 5th to 6th interspinous space (red arrow).

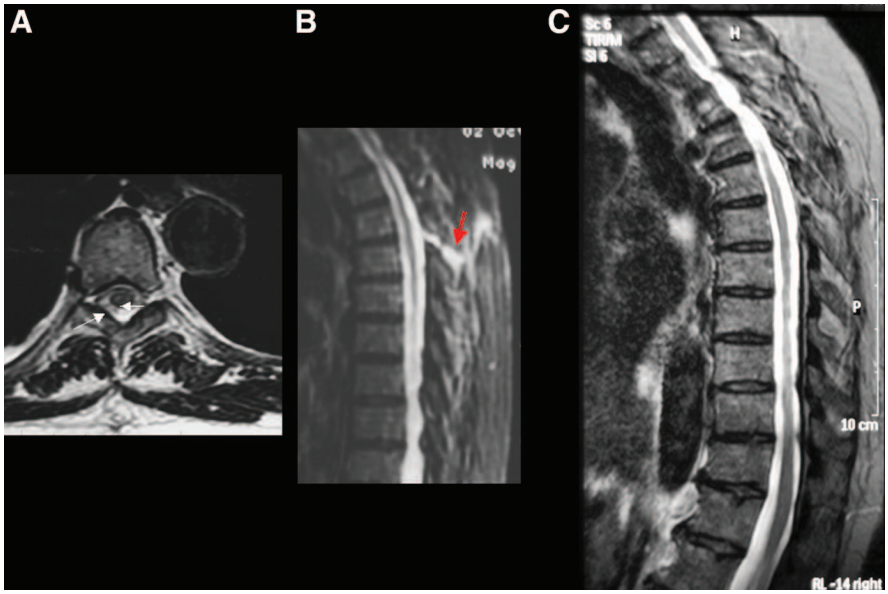

Figure 2. Significant reduction in the posterior thoracic epidural abscess in axial T2-weighted image (A) and persistence of the linear hyperintense signal in the posterior paravertebral soft tissues in sagittal short T1 inversion recovery (STIR) (B) (red arrow). Complete disappearance of the abscess and fistula tract in the final study (C).

the recovery room for monitoring and initiation of empiric antibiotic therapy with IV vancomycin and ceftazidime, given the presence of gram-positive staphylococci in the Gram stain of the exudate. The infectious disease specialist directed the antibiotic coverage changes in accordance with the antibiograms of the exudate culture.

In addition, therapy for spinal cord edema was initiated with 4 mg/6 h IV dexamethasone. The patient remained conscious and oriented (Glasgow Coma Scale score of 15), with no focal findings. She remained in the recovery room for 7 days, with satisfactory clinical, laboratory, and radiologic results. The patient was subsequently admitted to the ward, and the MRI performed 2 weeks after diagnosis showed a significant reduction in the posterior thoracic epidural abscess, with a maximum cephalo-caudal length of 2 cm. There was no dural sac deformity, but the fistulous tract previously identified was still present. *Staphylococcus schleiferi* (coagulase-negative *Staphylococcus*) was found in the exudate culture, and consequently, antibiotic therapy was changed to IV cefazolin for 28 days. In view of the excellent clinical and laboratory results, therapy was changed to oral rifampin-cotrimoxazole until hospital discharge and was continued for 22 days thereafter. Before discharge, another MRI (Fig. 2, A and B) revealed an absence of the abscess in the posterior epidural space, while the hyperintense signal in the paravertebral soft tissues, corresponding to the fistulous tract to the skin, persisted. The final MRI (Fig. 2C) 1 month after discharge showed disappearance of the fistula and the abscess.

The patient remained asymptomatic at follow-up evaluation 1, 6, and 12 months after discharge.

DISCUSSION

Among the proposed mechanisms of infection in epidural abscesses associated with the insertion of an epidural catheter are contamination of the skin and iatrogenic passage of microorganisms (through the Tuohy needle) with the use of contaminated syringes and medication or infusion systems and hematogenous dissemination from a local or systemic infection, as occurs in spontaneous epidural abscesses.[6–8] The migration of bacteria along the epidural catheter is the most common route of bacterial colonization.[6] Therefore, it is important to follow strict hygienic measures when inserting the catheter, with correct preparation of the skin and the infusion system, the latter of which should be prepared in the pharmacy department under strict aseptic conditions. The catheter should be checked regularly (condition of the dressing, appearance of the insertion site), and it is important to be alert to possible warning signs (motor block, back pain, purulent drainage, etc.).[9]

In our patient, the initial aseptic measures in both epidural catheter insertion and the preparation of the infusion systems were supervised, and pain intensity as well as the possibility of complications was evaluated daily. Our current protocol also includes checking the condition of the dressing. The dressing is lifted only if there are signs that it is not in good condition or that it has come partially loose. The dressing was checked daily and it was in perfect condition; therefore, it was not removed until the sixth day after surgery following the analgesia protocol. This explains why the fistulous tract that communicated with the deep infection was not detected earlier.

The microorganism identified in our patient was a coagulase-negative *Staphylococcus*, which was consistent with frequent findings described in the literature.[6] The symptoms were mild because the patient reported only mild back pain that started the sixth day after surgery, which she herself ascribed to incorrect posture. For this reason and because fever did not appear immediately, the presence of spinal abscess was not suspected until purulent matter was observed coming from the epidural catheter entry orifice.

One of the variables studied as a possible risk factor for catheter infection is the length of time the catheter remains in situ. Some studies have concluded that it is an independent risk factor,[7] while others have found no such association.[10] Thus, in the study of Yuan et al.,[6] no association was found between risk of catheter infection and duration of catheterization, but it should be noted that in no instance was the catheter removed before 5 days. On the other hand, Ruppen et al.[11] conducted a systematic review and meta-analysis of 257 infected catheters, 211 with superficial infection, and 57 with deep infection with a minimum duration of catheterization of 7 days (presumably both superficial and deep infections occurred in some patients). In the latter group, the larger proportion of patients with infection was in cancer patients and in those with longer duration of catheterization.

Our patient had been diagnosed with a lung carcinoid tumor, which by definition involves a certain degree of immunosuppression associated with a greater risk of infection.[12] Although we waited enough time after povidone-iodine application to disinfect the skin, the use of chlorhexidine would have been better to minimize the risk of infection according to the last American Society of Anesthesiologists, American Society of Regional Anesthesia and Pain Medicine, and Association of Anaesthetists of Great Britain and Ireland (in collaboration with the Royal College of Anaesthetists) recommendations.[13–15] On the other hand, the maintenance of catheterization for nearly a week added another risk factor, assuming that the migration of bacteria along the epidural catheter is the most common route of bacterial colonization.[6]

The most frequent initial signs and symptoms of an epidural abscess are back pain (71%), fever (66%), radicular pain (20%), muscle weakness (26%), sphincter incontinence (24%), and paraparesis/paraplegia (31%).[4,5] The most common location is at the thoracic level, followed by the cervical and lumbar levels. There are 4 clinical signs that influence prognosis: (1) back pain; (2) radicular pain; (3) motor, sensory, and autonomic deficits; and (4) paralysis.[4]

The time interval between epidural puncture and the appearance of symptoms varies considerably, between 72 hours and 5 months, with a mean interval of 5 days.[8]

Laboratory tests such as leukocyte count, erythrocyte sedimentation rate, and C-reactive protein usually show elevated levels but are not specific. With regard to imaging techniques, MRI, which has a specificity and sensitivity of 90%, is the diagnostic method of choice, and the results obtained correlate with evolving results.[8,9] Tung et al.[16] studied the correlation between MRI findings and clinical course in 18 patients with epidural abscess and concluded that those patients with a narrowing of the central spinal canal ≥50% and an abscess >3 cm in length had a poorer prognosis.

In order to minimize possible neurologic sequelae and to control sepsis, surgical decompression is the treatment of choice in the majority of cases, but surgery is not indicated in patients with paresis of more than 24 to 36 hours' duration. In high risk surgical patients, conservative treatment with antibiotic therapy is recommended. However, in cases of patients with no initial neurologic deficit, the question of what treatment to choose is still a matter of controversy because there have not been many cases and retrospective studies on conservative treatment are scant.[8,9]

Siddiq et al.[17] conducted a retrospective review of 57 epidural abscess patients in their hospital over a 14-year period and concluded that patients with spinal epidural abscess could be treated safely and effectively with prolonged IV antibiotic therapy either alone or in combination with percutaneous drainage, independent of age, previous comorbidity, the level of the abscess, or the presence or absence of mild neurologic deficit. Emergency decompression surgery is still indicated in cases of moderate to severe neurologic involvement.

In conclusion, important factors for managing epidural catheters include (1) proper skin preparation before needle insertion, (2) checking the epidural catheter daily not only for effectiveness but also to ensure that the dressing covers it properly and that the infusion system is not disconnected, (3) remaining alert to any warning signs indicating infection, and (4) individualizing treatment in patients without neurological deficit.

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