Case Report

A rare complication of accidental dural puncture during epidural insertion for labour analgesia

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Summary

A 33-year-old multiparous term parturient requested an epidural for labour analgesia. An accidental dural puncture was noted at the time of epidural needle insertion and an intrathecal catheter was placed. The intrathecal catheter was removed 10 h later and was noted to be intact. The following day, there was a significant leak of clear fluid from the catheter insertion site. Cerebrospinal fluid was detected using beta-trace protein testing. The patient remained asymptomatic and we deduced the cause could be a cutaneous fistula. Similar published reports have suggested the causes of similar presentations could include leakage of interstitial oedema, local anaesthetic or cerebrospinal fluid. It is important to consider the diagnosis of clear fluid leakage following an accidental dural puncture and the management of a cerebrospinal fluid-cutaneous fistula in the absence of neurological symptoms.

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Introduction

Elucidating the cause of clear fluid leakage following insertion of an epidural catheter is challenging. Biochemical markers such as glucose and protein are useful for the detection of cerebrospinal fluid (CSF), but they are of low sensitivity. Quantitative measurement of beta-trace protein (beta-TP) and beta 2-transferrin is highly sensitive, quick and inexpensive. Despite these advantages, such tests are not readily available in all hospitals.

In the asymptomatic patient, there is no guideline or consensus for the management of a CSF-cutaneous fistula. For example, it is difficult to justify an epidural blood patch procedure as the risks may outweigh the benefits. That said, a fistula between the skin and subarachnoid space has the risk of serious infection and the leakage of fluid poses a risk of a headache and subdural haematoma.

The management of an asymptomatic CSF-cutaneous fistula following accidental dural puncture has not been sufficiently addressed in the literature. We discuss the successful management of a patient through recognition of the problem, diagnosis and strategies for its resolution.

Report

A 33-year-old multiparous term parturient was admitted to the labour ward in spontaneous labour for vaginal birth after previous caesarean section. She was 41 + 1 weeks and deemed high risk due to a previous caesarean section for placenta praevia. She had a past medical history of anaemia, eczema and depression. Her booking body mass index was 21.9 m.kg⁻². She requested an epidural for labour analgesia, which was performed with a 16-G Touhy needle when she was 4 cm dilated. The epidural space was located at 5.5 cm at the first attempt by a loss of resistance to saline technique. An accidental dural puncture

was noted and accompanied by temporary paraesthesia in the right lower calf. Six centimetres of a catheter was threaded intrathecally. To maintain analgesia, eight spinal doses of 1–2 ml bupivacaine 0.1% and fentanyl 2 µg.ml⁻¹ were administered by an anaesthetist with careful observation. The patient reported no headache and was comfortable. The spinal catheter was removed 1 h after delivery with the tip intact, having been in situ for a total of 10 h.

The following day, the patient reported a mild fronto-occipital headache which was not postural, with no photophobia or focal neurology. She received one unit of packed red blood cells for anaemia and her headache improved. In the evening, the midwives noted clear fluid leaking from the epidural site, which was visible on her clothes and bedding. The anaesthetist assessed the patient and she was noted to be otherwise asymptomatic. The fluid leak continued on the second day following delivery and she remained asymptomatic.

A volume of approximately 4 ml of the clear fluid from the catheter insertion site was collected. A bed-side glucose test (Freestyle Optium Neo, Abbott, UK) found a glucose concentration of 3.9 mmol.l⁻¹ raising suspicion of CSF. A laboratory sample for beta-TP confirmed that it was CSF. A skin suture was performed under aseptic conditions, however, CSF continued to leak. The case was discussed with the tertiary neurosurgical unit, who advised further suturing, antibiotic cover, magnetic resonance imaging (MRI) of the lumbar spine and that a blood patch was not indicated. The microbiology consultant advised withholding antibiotic treatment unless clinically indicated. A mattress suture was performed with the aim of creating a watertight seal. The MRI scan showed a collection of fluid from L1–5 between the paraspinal muscle and subcutaneous fat, consistent with CSF. Eight days following delivery, the dressing was dry and the patient was discharged. She had remained symptom-free with no fluid leak four days following discharge.

Discussion

There are several reported cases of CSF-cutaneous fistulae in non-obstetric practice. In the obstetric literature, we found seven articles [1–7] describing 11 cases of leaking CSF secondary to epidural or combined spinal-epidural (CSE) for labour analgesia or anaesthesia for obstetric intervention. There is no formally documented incidence of CSF leak after epidural or CSE. Plumb et al. [1] examined obstetric audit data and found 18 cases of postpartum fluid leak out of 7200 CSEs and 4200 epidurals (0.16% incidence). Two included cases had a persistent leak without post-dural puncture headache (PDPH). Seven cases from the literature search report a leak without symptoms [1–3]. Four describe an associated headache [4–7], although two were of mild severity. No other neurological symptoms were reported. The rate of PDPH is 1 in 100–200 in the obstetric population [8]. In our case, and in seven out of the 11 cases in the literature search, the patients who had persistent CSF leak were asymptomatic, particularly when the leak lasted for days. This raises the question of other factors, such as the possibility of raised intracranial pressure, which could plausibly explain the leakage of CSF in the absence of symptoms.

Risk factors such as multiple attempts, difficulty placing the needle or catheter and patient movement make dural puncture more likely. Four of the CSE cases from the literature search were uncomplicated [2] and two did not comment on the procedure [1, 2]. In four, a dural puncture was noted at the time [1, 5, 6] and one was a difficult procedure with multiple attempts [4]. It is not clear what makes a CSF-cutaneous fistula more likely. Jawalekar and Marx [4] suggest that intra-dural deposition of blood clots or tissue may increase the risk of development of CSF-cutaneous fistulae and so spinal and extradural needles should be thoroughly cleansed of blood before further use if multiple attempts are required.

The nature of the fluid leaking from an epidural site can be difficult to discern, especially in the absence of typical post-dural puncture symptoms, such as PDPH, neck stiffness and visual disturbance. It could be attributed to interstitial oedema or local anaesthetic leaking from the site which may lead to an underdiagnosis of CSF leak. CSF-cutaneous fistulae should be recognised early as there is potential for infection or neurological sequelae secondary to intracranial hypotension or subdural haematoma. We performed a glucose test on the leaking fluid and found the concentration to be 3.9 mmol.l⁻¹ which raised the suspicion that it was CSF. Two of the cases from the literature search used glucose only [3, 6], two cases used glucose, protein and pH testing [1, 4], two cases used clinical evidence [5, 7] two cases used beta 2-transferrin [1, 2] and one case used beta-TP [1]. The use of glucose and protein to aid diagnosis has low sensitivity. Our local biochemistry laboratory advised sending the CSF sample for beta-TP. Beta-TP is produced by the choroid plexus and CSF and has a concentration of approximately 35 times the plasma concentration. Beta 2-transferrin, which is produced by the neuraminidase activity in the brain, is an alternative marker. However, the test takes longer to perform and is less sensitive than beta-TP [9].

The treatment advised for our patient by the neurosurgical team was suturing to reduce the risk of infection and tamponade the tract. They also advised prophylactic antibiotics, although the local microbiologist advised against this unless she developed signs of infection. In the cases reviewed, four were managed by sutures [1, 2], however, one required further suturing due to

Figure 1 A proposed algorithm for an approach to suspected CSF-cutaneous fistulas [10]. CSF, cerebrospinal fluid.

persistent leak. Two cases were managed conservatively using a supine position and pressure dressings [3, 4]. Two of the symptomatic cases required blood patches [5, 6]. One spontaneously resolved by day seven [7].

There is no clear consensus on the treatment of an asymptomatic CSF leak. When a leak is associated with symptoms, a blood patch is indicated, but in an asymptomatic leak, the associated risks of performing a blood patch outweigh the potential benefits of stopping the leak. Tsai et al. [10] suggest an algorithm for the management of suspected CSF-cutaneous fistulas based on their literature review of fistulas from obstetric and non-obstetric practice (Fig. 1).

In conclusion, we report a case of persistent CSF leak following accidental dural puncture but with no associated symptoms. There is no current consensus regarding the optimal management of these cases and we hope the reporting of this case may guide others in the future.

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