Subacute subdural haematoma complicating lumbar microdiscectomy

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There have been no previous reports of a spinal subdural haematoma occurring as a complication of spinal surgery. We highlight the pitfalls in the diagnosis and management of a subacute subdural haematoma resulting from a dural tear which occurred as a surgical complication of microdiscectomy.

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A spinal subdural haematoma is a very rare cause of a spinal compression syndrome and only a few cases have been reported. Its development has been related to different factors such as vascular malformation, tumours, bleeding disorders, anticoagulant therapy, trauma and infection. It has occasionally been seen after diagnostic lumbar puncture or spinal anaesthesia.

We describe the pitfalls in the diagnosis and management of a subacute subdural haematoma resulting from a dural tear which occurred as a complication of microdiscectomy.

Case report

A 77-year-old healthy woman presented with severe radicular pain in the left leg with an accompanying sensory and motor deficit (MRC grade 4). MRI of the lumbar spine showed two sequestrated disc herniations at L5/S1 with cranial and caudal displacement, respectively (Fig. 1). After failure of an adequate trial of non-operative treatment, a microdiscectomy was carried out. The two free fragments were extracted and the nerve roots were decompressed. During the operation the dura below the lamina of L5 was incidentally opened over a length of 2 mm with protrusion of the intact arachnoid and sutured with one stitch (Prolene 5-0). The area was covered with a large piece of gelfoam. No leak of CSF was observed. The patient immediately lost her pain and the sensory and motor deficits improved. Six days later, severe radicular pain reappeared in the left leg accompanied by progressive numbness and weakness in the foot. A further MR scan demonstrated a large collection of fluid at the site of the operation. This was thought to be due to a subacute epidural haematoma in the presence of blood-soaked gelfoam covering the thecal sac (Fig. 2). At a second operation, clotted epidural blood and blood-soaked gelfoam were removed. The thecal sac was of normal colour and pulsating. There was no evidence of a CSF fistula, recurrent herniation of the disc or infection. A subdural haematoma was not considered at this time. The patient recovered uneventfully with improvement of her leg pain and motor deficit. One week after discharge, however, she again experienced severe left-sided leg pain and an incomplete, but progressive, cauda equina syndrome with decreased sensation below the L5 level on the left, bladder dysfunction, and moderate motor weakness in the distribution of L5 and S1. Further MRI showed a large lumbar subdural haematoma at the site of the previous operations.
which was compressing the cauda equina (Fig. 3). A review of the initial postoperative MR scan (Fig. 2) indicated that the subdural haematoma was already present then. A further operation was undertaken. There was no evidence of extradural compression of the nerve roots, but the thecal sac was tensely expanded. Partial laminotomy of L5 and S1 was carried out for better exposure. The dura was carefully incised for 5 cm under microscopic magnification and 10 ml of xanthochromic fluid and some dark organised blood clots were evacuated. A subdural space had developed and the arachnoid was visible in the depth. The arachnoid was opened and the cauda equina explored. No other abnormality was seen apart from the previous dural suture, where the haematoma appeared to have started. The dura was sutured with Prolene 5-0 and covered with fibrin glue. The postoperative course was uneventful. One year later, the patient had almost completely recovered, but still had some decreased sensation in the L5 and S1 dermatomes and occasional mild back pain.

Discussion
This is the first report of a lumbar subacute subdural haematoma subsequent to the repair of a dural tear during microdiscectomy. A subdural haematoma must be considered when severe leg and back pain with neurological symptoms persist.
deterioration occur after the operation. To date, only one case of a similar postoperative course has been reported, but this was attributed to inadvertent trauma during preoperative myelography.\(^6\)

A subdural haematoma was not considered at the initial revision procedure. The haematoma demonstrated on MRI posterior to the cauda equina was misinterpreted as being epidural in the presence of a large blood-soaked piece of gelfoam. At operation the dura appeared normal and there was no evidence to suggest a subdural haematoma. A retrospective analysis of the first repeat MR scan, however, indicated unequivocal signs of its presence.

The characteristic MRI findings of a subdural haematoma are areas of abnormal signal intensity within the dural sac. The signal intensity depends on the time since the development of the haematoma. Within the first few days, there is a higher signal intensity on T1-weighted images compared with the CSF.\(^7\) Later, the change in signal intensity is more variable.\(^7\) In our case, two weeks after the bleeding the subdural haematoma appeared more like fluid, with low signal intensity on T1-weighted images and high intensity on T2-weighted images. By contrast, Post et al\(^8\) found a striking low signal intensity on T2-weighted images in their follow-up. It is possible that the decrease in intensity on these images was caused by the process of formalin fixation in their postmortem study.

The axial scan is usually helpful in differentiating subdural and epidural haematoma. The subdural location is clear when the haematoma extends within the border of the dura mater. Since spinal epidural haematomas spread widely in the epidural space, the shape of the dura mater is often irregular.\(^7\) With a subdural haematoma the dura appears smooth. The lack of direct continuity with the adjacent bony structures points to a subdural location.\(^8\) The low signal intensity of the dura may be obscured by the haematoma itself.

The shape of the haematoma can sometimes be diagnostic. A subdural haematoma has a semicircular appearance on axial scans (Fig. 2c) whereas an epidural haematoma is more convex. The differentiation between a subdural and epidural haematoma will remain difficult and at times only surgical exploration will prove the exact location of the haematoma.

Debate continues as to the presence of a subdural space. Haines\(^10\) stated that a subdural haematoma is most frequently found within the layer formed by ‘dural border cells’ and that there is no evidence of a subdural space in the region of the dura-arachnoid junction. When a space does appear at this site, it is the result of pathological or traumatic processes which have resulted in tissue damage. In our case, the onset of the subdural haematoma was related to a tiny dural tear. The repair of the tear under the lamina L5 was technically difficult because of the limited exposure without laminectomy. The dura was sutured superficially in order to avoid entrapment of the roots of the cauda equina. We assume that an injury to a dural capillary occurred at the time of the repair of the thecal sac. Subsequent bleeding may have developed and caused the formation of a haematoma between the dura and the intact arachnoid. A subdural haematoma has not been described previously as resulting from unintended durotomy.\(^11\) This complication could have been avoided if the arachnoid had been opened and both the dura and the arachnoid correctly sutured after an adequate exposure.

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References