Case reports

Spinal epidural hematomas

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Summary

During the period 1943-1985 six patients were operated for spinal epidural hematomas at the department of neurosurgery of the University Hospital of Århus. It is essential to perform acute laminectomy in case of rapidly increasing neurological symptoms. In the case of slowly increasing symptoms operation may provide a good result even if it is performed a week after the onset of symptoms. It is important to watch patients with fracture/dislocations of the spine closely during the first weeks after a trauma. If they develop neurological symptoms the patients should immediately be transferred to the department of neurosurgery with a view of acute diagnosis and possibly acute surgery.

Key words: spinal epidural hematoma, close surveillance, acute diagnosis/surgery.

Introduction

Spinal epidural hematomas are rare. Until 1971 120 cases of spinal epidural hematomas were reported - most of them were traumatic[1]. After the diagnosis had become more commonly known, Foo et al were able in 1981 in a survey to collect a total of 158 patients with so-called spontaneous - *non-traumatic* spinal epidural hematomas[2].

During the period 1943-1985 six patients with spinal epidural hematomas were operated on at the department of neurosurgery of the University Hospital of Århus. All patients were men. They were between 18 and 43 years of age and the mean age was 32 years. Three of the patients had severe traumas with fractures/dislocations, whereas two had minor traumas without fractures/dislocations (spontaneous). One patient had been operated for a herniated lumbar disc one week prior to developing a large epidural hematoma in connection with a minor trauma.

Case reports

Case 1

A 19-year-old man who was walking in the street was knocked down by a motor-car. Immediately after suffering the truma the patient was admitted to the department of orthopedic surgery at the University Hospital of Århus in a state of commotio. There were extensive excoriations all over the body and as intra-abdominal lesions were suspected exploratory laparotomy was performed, but it revealed no abnormalities. Because of the commotio it was impossible to make an immediate sufficient neurological examination of the patient.

Three weeks after admission the patient was conscious and there was hypalgesia-hypoesthesia corresponding to the L5 and SI areas of both legs: Further there was severe paresis of the dorsiflexion of both feet, no

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Achilles tendon reflexes bilaterally and weak, uniform patellar reflexes.

Radiographs of the lumbar column and tomography showed a compression fracture of the 5th lumbar vertebra. Lumbar amipaque myelography showed a total stop at the 4th lumbar disc. The patient was transferred to the department of neurosurgery and laminectomy of the 4th and 5th lumbar vertebrae was performed. There was a 0.5 cm dislocation of the two vertebrae. A large, encapsulated epidural hematoma at the level of the 4th disc was removed.

An examination 14 months after surgery showed hypoesthesia/hypalgesia bilaterally in the L5 and SI areas and marked weakness in dorsiflexion of both feet. The gait was acceptable with the use of peroneal braces.

Case 2

An 18-year-old man was front-seat passenger in a motorcar which ran into a parked car at 70 km/h. after which it ran into a house. Immediately after the trauma the man suffered severe pain in the upper lumbar region.

Immediately after the accident the patient was admitted to the department of orthopedic surgery. At neurological examination no abnormalities were found. Radiographs of the lumbar column showed a compression fracture of the 2nd lumbar vertebra, fracture of both laminae and spinous process and moderate gibbus formation. Four days after the trauma the patient was cautiously mobilized and then he felt a click in the lumbar region. The patient soon experienced relief of the pain, but nine days after the accident there was renewed pain in the lumbar region and weakness of the legs. There were no sphincter symptoms. Neurological examination revealed hypoesthesia/hypalgesia from four cm above the patella and distally of both legs. There was paralysis above both knee and. ankle joints and there was moderate paresis of all hip movements. There were no patellar and Achilles tendon reflexes and plantar reflexes were of no-response type. Rectal examination showed flaccid anal sphincter without voluntary contraction. In the saddle area there was marked dysesthesia, notably of the scrotum.

The patient was transferred to the department of neurosurgery immediately after the onset of the neurological symptoms. Lumbar amipaque myelography showed a complete block at L2 level (Fig. 1), and during acute surgery a large epidural hematoma in the dorsal spinal canal at the Ll-LJI level was removed. A follow-up 15 months after surgery showed no neurological abnormalities. The patient had fully resumed his work as an enlisted telegraph operator.

Case 3

Immediately after a fall resulting in a lesion of the back a 38-year-old man developed severe lumbar pain, weakness of the left leg and urinary retention. Seven days prior to the trauma the patient had been operated at (he department of neurosurgery for a herniated L5-SI disc via a left partial L5-hemilaminectomy and, during rehabilitation at a local hospital, he fell and hit a bed. Immediately after the fall he was transferred to the department of neurosurgery where an examination revealed severe paresis of the plantar flexion of the left foot and less severe paresis of the dorsal flexion. There was hypoesthesia/hypalgesia of the inside of the left thigh. It was not possible to provoke the left Achilles tendon reflex whereas the other reflexes of the lower extremities were normal. Rectal exploration showed normal sphincter tone and good voluntary sphincter contraction. There was hypoesthesia/hypalgesia of the left side of the saddle area. Lumbar omnipaque myelography showed a large notching of the column of contrast medium at the level of the 5th lumbar disc on the left side. During acute surgery a large epidural hematoma was removed and there was no recurrence of the herniation.

Three days after surgery a neurological examination showed no abnormalities. In particular there were no pareses and the left Achilles tendon reflex was normal.

Case 4

Following a very slight indirect trauma of the back a 43-year-old man developed a partial cauda equina syndrome. The day before admission to the hospital and in connection with lifting the patient experienced a click in the lumbar region, accompanied by paresthesia of both

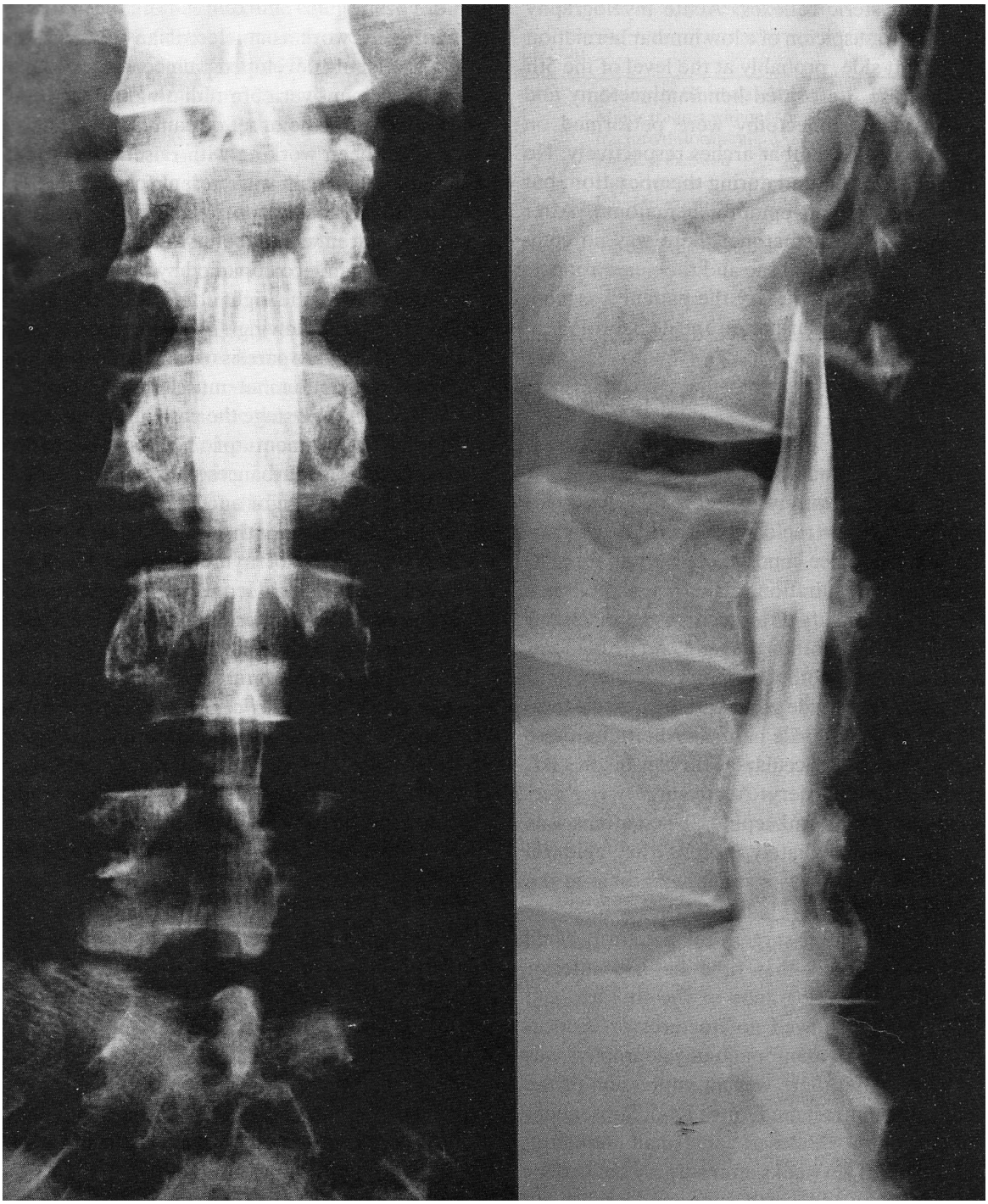

Fig. 1: Myelograms (Case 2) showing a complete block at L2 level.
A: Anteroposterior
B: Lateral

legs. Imediately after the onset of symptoms he was admitted to the local hospital where examination showed no neurological abnormalities.

The following day the patient developed urinary retention and was transferred to the department of neurosurgery. Apart from slight impairment of sensation medially on the left femur the lower extremities were normal. Rectal examination showed absence of voluntary sphincter contraction and hypoesthesia/hypalgesia on the left side of the saddle area. There were normal anal

and cremasteric reflexes. Acute myelography gave rise to suspicion of a low lumbar herniation on the left side, probably at the level of the 5th lumbar disc. Left-sided hemilaminectomy and partial hemilaminectomy were performed on the 5th and 4th lumbar arches respectively. No herniation was found during the operation, but there was a small epidural hematoma. After removal of the hematoma there was no compression of the dural sac and the nerve roots.

Two days after surgery the patient was well. There was normal urination and no neurological deficit.

Case 5

A 43-year-old man who was walking in the street was knocked down by a motorcar. He was admitted directly to the department of neurosurgery, in a comatose condition and without reaction to pain. Respiration was sufficient. Within a few hours pupillary difference was seen, the left pupil being bigger than the right. Acute bilateral arteriography of the common carotid artery showed a 1 cm wide zone without vessels temporally at the left side base. Furthermore there was a 5 mm Ø saccular aneurysm on the left medial cerebral artery. Acute surgery was performed and a 40 ml. epidural hematoma was removed. Immediately below the epidural hematoma there was a small hematoma in the left temporal lobe.

Two weeks after surgery the patient became conscious and at that time he had inferior paraparesis. Radiographs of the thoracic and lumbar spine showed no fractures or dislocations. Lumbar pantopaquemyelography was performed and there was an impression of the column of contrast medium at L4-5. Subsequent laminectomy disclosed a small epidural hematoma. Two weeks after surgery the patient was able to walk when supported and in an ambulatory examination 2½ months later he showed no neurological abnormalities apart from a slight drag of the left leg when walking and very slight ataxia of both legs.

Surgery had been planned for the clipping of the aneurysm on the left medial cerebral artery, but the patient moved to Finland and his further course of life is unknown.

Case 6

During his work as an electrician a 30-year-old man suddenly developed pain corresponding to the prominent vertebra radiating towards both shoulders. At the onset of pain he was walking and had been working with raised arms for 15 minutes. The pain was present for a little more than 30 minutes, then it passed for some 15 minutes after which there was an unprovoked return of pain, accompanied by throbbing ulnar paresthesia of the right forearm and left leg. During the following 12 hours the patient developed severe paresis of arms and legs, intercostal and abdominal muscles and sphincter paralysis. At this stage the patient was admitted to the department of neurosurgery. The neurological disturbances subsided almost entirely in the course of a few hours.

He was treated with bed rest; but 48 hours after the onset of symptoms he developed tetraplegia again in connection with turning over in bed. There were slight, uncharacteristic sensory disturbances, no intercostal respiration, but diaphragma respiration was present. At the suspicion of a low cervical disc herniation laminectomy was performed corresponding to the arcus of the 5th and 6th cervical vertebrae. A 10 x 10 x 5 mm coagulated hematoma was found on the back of dura corresponding to the arcus of the 5th cervical vertebra. There was no disc herniation. The patient was discharged 3 weeks after surgery and there were no neurological abnormalities.

Discussion

Spinal epidural hematomas are traditionally divided into traumatic and non-traumatic - the so-called spontaneous hematomas[1,2]. This division seems logically well-founded as in the case of traumatic hematomas it is more often than not a question of the combined effects on the spinal cord/filaments of fracture/dislocation and hematoma. In the case of spontaneous hematomas the effect on the spinal cord/filaments is caused solely by the epidural hematoma. The hemorrhage is usually venous in contrast to the hemorrhage in the case of intracranial, epidural hematoma[3-6].

On the basis of the literature available in 1981 Dominic Foo *el al.*[2] grouped spontaneous spinal

epidural hematomas into nine categories (Table 1). Category 2 (slight traumas without fracture or dislocation) among other things include patients with spinal epidural hematomas after lumbar puncture[7] and after treatment by manipulation[5].

Traumatic spinal epidural hematomas are localized anteriorly, laterally or dorsally in the spinal canal[1], whereas spontaneous hematomas are practically always localized dorsally extending over 2 or 3 vertebral bodies[1,2,6,8]. According to the height at which they are localized, spontaneous spinal epidural hematomas are divided into cervical (15.9%), cervicothoracic (15.3%), thoracic (36.3%), thoracolumbar (15.9%) and lumbar (16.6%)[2]. For purposes of differential diagnostics the following are considered: herniated disc, tumor (including intramedullary tumor), congenital cyst, hemangioma, epidural abscess, tuberculosis, arterial thrombus/embolus and transverse myelitis. In the vast majority of cases, however, a thorough anamnesis, objective examination, radiographs of the columna and myelography/CT-scarming will provide the diagnosis prior to a possible operation.

Table 1: Causes of spinal epidural hematomas

Group		%
1	Abnormal bleeding tendency	19,0
2	Minor trauma without spinal fracture/dislocation	12,0
3	Physical exertion	12,0
4	Hypertension	7,6
5	Physical exertion & hypertension	1,3
6	Vascular malformation	3,8
7	Pregnancy	2,5
8	Tumors	0,6
9	Unknown	41,1
Total		99,9

Grouping based on Dominic Foo et al.'s survey 1981.

The most important characteristics concerning the six patients which constitute our material will appear from Table 2. It is worth noting that good operative results may also be achieved even when more than six hours have passed between the onset of neurological symptoms and operation. Foo *et al.*[2] were not able to demonstrate any connection between the duration of symptoms prior to operation and postoperative remission. This is explained by

Table 2: The most important characteristics in the 6 patients operated for spinal epidural hematoma during the period from 1943-1985 at the Department of Neurosurgery of the University Hospital of Århus.

Pt.no	Sex	Age	Cause	Localization	Time from onset of pain to neurological symptoms	Time from onset of neurological symptoms to surgery	Clinic immediately prior to surgery	Post operative course
1	M	19	Traumatic	L4 Anteriorly	Estimate not possible as sufficient neurological examination could not be made the first weeks after the trauma		Slight inferior paraparesis	No change
2	M	18	Traumatic	LI Dorsally L2 Dorsally	9 days	6 hours	Cauda equina syndrome	Complete remission
3	M	38	Minor trauma (operated for L5-herniation 7 days prior to trauma)	L5 Anteriorly	6 hours Onset of pain concurrently with neurological symptoms in patient	6 hours	Slight paresis of the left leg	Complete remission
4	M	43	Minor trauma	L5 Antero-laterally	24 hours	7 hours	Partial cauda equina syndrome	Complete remission
5	M	43	Traumatic	L4 Anteriorly L5 Anteriorly	Estimate not possible as sufficient neurological examination could not be made the first weeks after the trauma		Inferior Paraparesis	Good remission
6	M	30	Minor trauma	C6 Dorsally	45 minutes	48 hours	Tetraplegia and sphincterparalysis	Complete remission

the presence of a chronic spinal epidural hematoma in the patients who underwent surgery after more than a week from the first signs of hemorrhage[2,4,5]. Chronic spinal epidural hematomas are more frequent in the lumbar region than in the cervicothoracic region[5,9]. The reason is that a hematoma which compresses the spinal medulla will rapidly give rise to symptoms and will only become organized if surgery is delayed whereas hematomas below the conus do not necessarily give rise to acute and alarming symptoms. This is due partly to the fact that there is more room in the lumbar region for an expanding epidural hematoma, partly to the fact that the spinal medulla is significantly more vulnerable than the cauda equina. Foo *el al.*[2] found a good remission of the motor symptoms in 80% of the patients with spontaneous cervical spinal epidural hematomas. They found good thoracic remission in 68% and good lumbar remission in 96%.

In several studies[2,6,10] it is concluded that the severity of preoperative symptoms are decisive of the degree of postoperative remission. Only 10% of the patients with complete transsection syndrome as a consequence of a spontaneous spinal epidural hematoma experience a significant postoperative recovery[3].

A spinal epidural hematoma is an extremely rare complication following the removal of a herniated lumbar disc, Di Lauro *et al.*[11] state a frequency of 0.21% (2 patients of a material comprising 950 patients). Patient no 3 (Table 2) in our material developed a spinal epidural hematoma 1 week after operation for a herniated lumbar disc. The hematoma was caused by a slight trauma. The traumatic spinal epidural hematomas are frequently caused by insignificant traumas[1], whereas severe traumas of the back surprisingly infrequently cause epidural hematomas. In 1971 Jellinger[12] cited a study (Wertheimer & Milleret) in which there was one case of spinal epidural hematoma in a material comprising 70 patients with post-traumatic paraplegia. It is remarkable that there are so few cases of spinal epidural hematomas among patients operated for a herniated lumbar disc and patients with severe traumas of the back. No doubt the reason is that not all hematomas are diagnosticated.

In the patients operated for herniated discs a small hematoma will not normally give rise to symptoms, partly because the lumbar region is relatively spacious, partly because' of the increased space achieved by the operation. Patients with severe traumas of the back and complete medullary transsection syndrome probably have spinal epidural hematomas; but myelography/CT-scanning are rarely performed of these patients as the examinations have no therapeutic consequences.

In our material there are no patients with spontaneous spinal epidural hematomas developed during contemporary anticoagulant therapy; but there is much casuistic information about it and in 1980 Zuccarello *et al.*[13] published a survey comprising 26 cases of spinal epidural hematomas developed during anticoagulant therapy. It is concluded that the diagnosis of spinal epidural hematoma should always be considered if elderly people who are on anticoagulative therapy develop rapidly increasing neurological symptoms compatible with a space filling intra-spinal process.

If the diagnosis spinal epidural hematoma has been made, the only relevant therapy is acute surgery (laminectomy with removal of the hematoma)[1,2,6,14]. In two cases spontaneous remission has been experienced, however. One patient had developed a spinal epidural hematoma during anticoagulative therapy[15] whereas the other patient had hemophilia[10]. In both patients there were very slight neurological symptoms.

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