PYOGENIC SPINAL EPIDURAL ABSCESS

WITH NOTES ON 5 CASES

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This communication deals with one form of pyogenic spinal epidural inflammation, 5 cases of which have been encountered since 1958. The syndrome is not very common and has received somewhat scanty attention even in specialized journals; the diagnosis is usually made late because practitioners do not think of it. Delay in recognition tends to be followed by permanent, serious, crippling disability, which could have been avoided if surgical drainage had been instituted at an earlier stage in the progress of the disease. An analysis of the findings and results in the 5 cases to be reported is given in Table I.

CASE REPORTS

Case 1 (1958)

A White male, aged 22 years, began to complain of pain over the back and loin 2 days after a rugby match. Ten days later he was unable to move his lower limbs. Mild pyrexia was noted. Lumbar puncture was now performed. The fluid contained 300 mg. of protein per 100 ml. Culture of the fluid yielded no growth of micro-organisms. After another 2 days, i.e. 14 days after the onset of pain, the patient was referred for neurosurgical opinion. He looked desperately ill, with mental confusion and a temperature of 104° F. There was flaccid paralysis of both lower limbs and loss of sensory discrimination below the level of T2. He was sweating profusely and erythema was noted from the level of T2 down. Continuous bladder drainage had been instituted.

Cisternal myelography revealed a complete obstruction at the T2 level. Laminectomy was performed and pus was encountered over 3 vertebral segments. The pathologist reported growth of *Staphylococcus pyogenes* from the pus.

Progress. Despite drainage and antibiotic treatment, there was no improvement of his paralysis or sensation. The patient died of ascending urinary infection 11 months after the onset of his illness.

Case 2 (1959)

A White male, aged 49 years, experienced backache after lifting a heavy weight. A few days later pain radiated down the legs. He was admitted to hospital 7 days after the onset of his illness. Pyrexia was recorded. Lumbar puncture showed no abnormality in hydrodynamics. Examination of the fluid showed no abnormality. Five days later the patient was unable to move his legs or pass urine. Two days after this, lumbar puncture was repeated, with the intention of performing myelography. Pus was encountered and the examination was suspended.

He was now, 14 days after the onset of his illness and 2 days after the appearance of paralysis, referred for neurosurgical opinion. There was high fever and profuse sweating. The patient looked desperately ill. Immediate operation was performed and pus was evacuated at the levels L 3 - 5. The pathologist reported *Staphylococcus pyogenes* in the pus.

Progress. The operation wound broke down and had to be opened widely to permit free drainage of pus. Power returned to the lower limbs; 1 year later there was mild residual bladder weakness, slight weakness in dorsiflexion of both feet and depressed sensation over the sacral saddle area.

Case 3 (1959)

A White male, aged 41 years, had complained of severe backache and crural pain for 2 weeks, which failed to respond to bed rest and traction. Exploration for prolapsed intervertebral disc protrusion was carried out by an orthopaedic surgeon, who found no such lesion. Twelve days after the operation the wound discharged serous fluid, from which *Staphylococcus pyogenes* was isolated. Treatment by repeated aspiration and 'chloromycetin' was instituted.

The patient's condition deteriorated and 5 weeks after his operation he was referred for neurosurgical opinion. Examination showed marked weakness of both lower limbs and straight-leg raising was limited to 25° on both sides. There was patchy depression of sensory discrimination on both sides in dermatomes from L4 down. The wound had healed, but pressure elicited tenderness deep to it, with an impression of underlying oedema.

Cisternal myelography showed a complete hold-up of the opaque column at L4. At operation a large epidural abscess was evacuated.

Progress. The wound was closed and healed by primary union. Power slowly returned to the lower limbs, but 1 year later the patient still used a stick when walking to assist weakness of the right foot. He still suffered a great deal of pain.

Case 4 (1961)

A White male, aged 29 years, was stung by a bee on the left index finger, which became septic. He was given a course of penicillin and the inflammation in the finger subsided. Two weeks later he developed backache, headache, and pain in both legs. He was admitted to hospital and a lumbar puncture was performed. Analysis of the cerebrospinal fluid showed 300 mg. of protein per 100 ml., and 80 cells per c.mm., predominantly polymorphs.

Neurosurgical opinion was then sought. The temperature was 103·6° F., and he was sweating profusely, with a generalized flush over the body, more marked over the lower half. There was tenderness over the upper lumbar spine. The erector spini muscles were in spasm. There was weakness of the legs and patchy depression of sensation below L2 on both sides. Tendon reflexes were depressed in the lower limbs and absent at the right knee, and there was slight difficulty in micturition. A cisternal myelogram demonstrated a block at L2 (Fig. 1). An emergency operation was carried out and pus was evacuated from this site. *Staphylococcus pyogenes* was reported in the pus.

Progress. Complete neurological recovery, but his wound broke down and required wide open drainage.

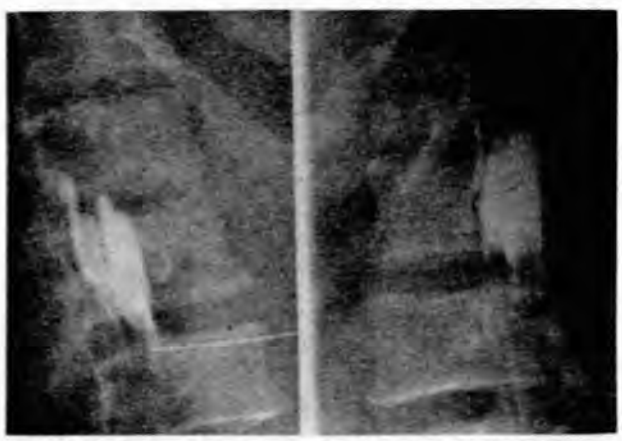

Fig. 1. Myelogram in case 4, showing obstruction at about the level of the third lumbar vertebra. The 'bundle of faggots' appearance is striking. It will be noted that the examination was carried out *via* the cisternal route.

Case 5 (1961)

A White male, aged 48 years, complained of backache for 2 weeks. During this time he was febrile, became constipated and had difficulty in micturition. He had been given a course of penicillin for furunculosis immediately before the onset. He became paralysed 2 weeks after the backache began, and developed acute retention of urine.

Cerebrospinal fluid: Queckenstedt's test showed obstruction; protein — 537 mg. per 100 ml., with globulin in excess; 1 lymphocyte per c.mm.

Myelogram — Block at T7. Neurosurgical opinion was requested at this stage and an emergency laminectomy was performed on the 17th day after onset of symptoms and 3 days after paralysis had set in.

At operation epidural pus was evacuated at T7. *Staphylococcus pyogenes* was reported in the pus.

Progress. The wound broke down and had to be laid open. Marked residual weakness of legs 4 months after admission to hospital, but the patient could walk with assistance. His bladder recovered completely.

SOME OTHER SERIES

In 1926, Dandy[1] redirected attention to non-tuberculous inflammatory lesions in the spinal epidural space, then collectively named peri-pachymeningitis after the suggestion made by Ducheck in 1853, or pachymeningitis externa, a term introduced at a later date. It appears that Albers, in Germany, had first reported an acute infection of the epidural space in 1833. Dandy quoted from a bibliography on this subject assembled by Kaminski in 1917. From the aetiological viewpoint, 2 sets of cases had been described — those in which the epidural spinal space had been involved by extension from infection in adjacent areas; and those arising from known, apparent or inferred infections at a distance. Cases fell into 2 categories — acute infections (abscesses), primary or metastatic; and inflammatory tumours (no abscess). Furthermore, a number of chronic inflammatory infections of the spinal dura and epidural tissues had been described.[1]

Since Dandy's article, a number of other authors have dealt more specifically with spinal epidural pyogenic infections. A few readily available references provide a key to the literature concerning these lesions. The most important facts emerging from these various studies are best emphasized by quoting from Heusner,[2] who added 20 cases to the 225 reviewed by Rankin and Flothow in 1946:

'Non-tuberculous spinal epidural infections are infrequent disorders that merit periodic reconsideration by the profession at large because of the heavy responsibility accruing to the practitioner who first visits a patient thus afflicted. Final diagnosis and definitive treatment of these infections are now regarded as functions of specialists, but the decisive factor in the outcome of most cases is the celerity with which the first attending physician suspects the probable nature of the ailment and summons expert aid. Thus, early diagnosis leading to prompt surgical intervention is regularly rewarded by total recovery. On the other hand, even brief delay of operation can vitiate all subsequent efforts to avert permanent paraplegia or quadriplegia with an attending loss of control over bladder and bowel . . .'[2]

In 1954, Hulme and Dott[3] mentioned 25 patients with spinal epidural suppuration treated in the neurosurgical departments at Edinburgh and Bristol between 1933 and 1954. Over the last 4 years of this period 6 such patients had been treated in Bristol, where, during the same time, 21 patients with spinal tumour had been treated. These authors found that the introduction of the sulphonamide drugs and antibiotics had dramatically influenced the earlier frequent fatal outcome of acute and subacute cases, whether treated by surgical operation or not, but the urgent need for operation to prevent serious disabling effects had not been reduced.

In 1960, Dus[4] once again reiterated the main lesson. Successful treatment depends on early diagnosis of a process usually seen by the surgeon as a complication of suppuration in another part of the body, or by the internist as causing vague abdominal or thoracic pain. Extensive laminectomy performed early in the course of the disease, with removal of pus and proliferated tissue, plus treatment with antibiotics, transforms an almost hopeless prognosis into a hopeful one.[4]

DISCUSSION

Pyogenic spinal epidural abscess follows infection and inflammation which may arise in several ways. It may come about from direct introduction of infection by surgical operation, as presumably occurred in case 3, or lumbar puncture (as previously encountered by one of us). As far as we have been able to find, it has not been specifically mentioned in connection with the penetrating wounds of accident or mayhem. It may arise from vertebral osteomyelitis, as reported and reviewed by Allbrook.[5] Lastly, the epidural space is one of a number of obscure places where blood-borne infection may settle.[6] In cases 1 and 2 in our series it would seem that a haematoma in this region had become infected, while in cases 4 and 5 there was a recognizable primary source of blood-borne infection.

From references mentioned, it appears that the lesion affects the sexes in similar proportions, and has been reported at ages from 4 years[6] to 86 years.[1]

It has been stated that, because the dorsal extradural space is only potential in the cervical and upper dorsal regions, spinal epidural abscess is especially rare in these parts.[5] In general terms, the lesion may be looked upon as an acute phlegmon in the epidural fat, which is abundant posteriorly, but practically non-existent anteriorly, since the dura mater is in contact with the posterior longitudinal ligament anteriorly. The accumulation of pus anteriorly may indicate that it is associated with acute osteitis of the body of the vertebra. The ligamentum flavum forms a limiting structure posteriorly and is responsible for ready spread of the infection up and down the spine.

The dura mater forms an effective barrier against spread to the leptomeninges, and therefore a septic meningitis is hardly ever seen. It follows that the cell count in the cerebrospinal fluid may be negligible or moderately raised. When a block develops the protein increases.

The inflammatory process in the epidural fat probably involves branches of blood vessels which are responsible for the segmental blood supply of the spinal cord (Adamkiewicz), and this may militate against complete recovery, even after timely drainage of pus. The fact does, nevertheless, remain that if the pus is evacuated before or soon after the onset of cord signs, the chances of recovery are greater. Myelograms, which for obvious

TABLE I. ANALYSIS OF CASES IN PRESENT SERIES

Case no.	Age (yrs.)	Sex	Trauma	Primary focus	Myelogram	Duration of symptoms before operation	Neurogical status at time of operation	CSF	Organism	End result
1	22	M	? Rugby	—	Positive T2	14 days	Paraplegia	Protein 300 mg. %. Cell count not done	*Staph. pyogenes*	Died 11 months later from ascending urinary infection
2	49	M	Acute back strain	—	Not done	14 days	Paraplegia	—	*Staph. pyogenes*	Recovered (95%); slight residual weakness of ankles
3	41	M	—	Introduced by previous operation	Positive L5, S1	35 days	Severe degree of paresis of muscles and bladder and depression of sensation in S3, 4 and 5	—	*Staph. pyogenes*	Slight degree of weakness of muscles and bladder
4	29	M	—	Septic finger	Positive L2	16 days	Root signs. Slight weakness of legs and depression of sensation	Protein 300 mg. %. 80 cells, P>L*	*Staph. pyogenes*	Recovered fully
5	48	M	—	Furuncu-losis	Positive T7	17 days	Paraplegia	Protein 537 mg. %. Globulin in excess. One lymphocyte	*Staph. pyogenes*	Partial recovery; walks with aid of stick

* Here P = polymorphs, L = lymphocytes

reasons should usually be carried out *via* the cisternal route, do show evidence of complete obstruction (Fig. 1).

The clinical syndrome in these cases tends to follow a pattern in which 4 phases can be recognized: that of spinal ache; that of root pain; that of weakness of voluntary muscles, sphincters and sensibility; and that of paralysis.[2] During the early phases there is some degree of pyrexia. We have noted erythema of the body below the level of obstruction in 4 of our 5 patients, most pronounced in case 1. There was none in case 5. It would appear that this erythema arises from an effect upon the sympathetic outflow along the nerve-roots.

For various reasons the epidural phlegmon may be confused with the Guillain-Barré syndrome, poliomyelitis, acute disc protrusion, acute back strain, ascending paralysis, meningitis, perinephric or subphrenic abscess, retrocaecal appendicitis, dissecting aortic aneurysm, or pulmonary lesions.

The earlier the diagnosis is made, the greater the chances of instituting drainage of the pus and consequently the more hopeful the chances of recovery of locomotion, sphincter control and sensation.

Appropriate antibiotic treatment must accompany, but cannot replace, adequate surgical drainage. Although primary closure of the surgical wound is sometimes followed by primary union, it is preferable to leave the wound open to permit continued drainage from its depths, thus avoiding break-down and the tedious drainage of pockets of pus under a re-entrant angle.

SUMMARY AND CONCLUSIONS

Five cases of pyogenic (staphylococcal) spinal epidural abscess have been briefly described. A few series reported by other authors and some views of these authors have been mentioned. The aetiology, pathology, clinical picture and treatment of the phlegmon have been commented upon.

Pyogenic spinal epidural abscess presents an urgent problem calling for speedy diagnosis and early surgical drainage.

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