CASE REPORTS

OSTEOMYELITIS OF CERVICAL VERTEBRAE (AND QUADRIPARESIS) SECONDARY TO URINARY TRACT INFECTION

CASE REPORT AND REVIEW OF LITERATURE

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Metastatic osteomyelitis of the vertebral column secondary to infection of the urinary tract has been recorded in the literature since 1925 in a total of 19 cases. Bacteriologic proof of the same organism in both the urine and the bony lesion has been demonstrated in only 5 cases. The present report describes an additional case with bacteriologic proof.

The first mention of the relation between vertebral osteomyelitis and infection of the urinary tract apparently was made by Goldschmidt8 in 1925 (reported by De FeoS). He felt, however, that the infection of the bone preceded the urinary infection. A causal relationship between urinary infection and spinal osteomyelitis was first given serious consideration by Carson4 in 1931, who recorded 4 cases, in 2 of which he obtained cultures of Staphylococcus aureus from both the urine and osseous infections. The cases recorded in the literature since Carson’s report are listed in Table 1.

<table>
<thead>
<tr>
<th>Name of Authors</th>
<th>Year</th>
<th>Number</th>
<th>With Bacteriologic Proof</th>
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<tr>
<td>Carson4</td>
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<td>Schein14</td>
<td>1940</td>
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<td>Deming &amp; Zaffs8</td>
<td>1943</td>
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<td>Donahue7</td>
<td>1949</td>
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<td>Hurwitz &amp; Albertson9</td>
<td>1950</td>
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<td>Adleman &amp; Duff10</td>
<td>1952</td>
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<tr>
<td>De FeoS</td>
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<td>Ablin &amp; Erickson</td>
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CASE REPORT

#295011. H.W., a 61-year-old white male, was re-admitted to University Hospitals on May 5, 1954. Previously a transurethral resection for benign prostatic hypertrophy had been performed on March 31, 1954. The patient’s postoperative course had been relatively uneventful except in retrospect. On the day of surgery and the 1st and 2nd postoperative days he had had a fever up to 101°F., and a white blood count of 10,400/ml with 88 per cent polymorphonuclear cells. On the 3rd day he had a chill with a temperature of 104°F. He had been on 300,000 units of procaine penicillin (Duracillin) and 0.5 gm. streptomycin twice daily. This was stopped on the 3rd day and he was started on 250 mg. oxytetracycline hydrochloride (Terramycin) and 0.5 gm. sulfisoxazole (Gantrisin) every 6 hours. On the 4th day the temperature came down to as low as 99.8°F. The 5th day was uneventful and without fever. However, on the 6th postoperative day for the first time the patient complained of pain in the back of his neck. He was unable to sleep that night. The pain in the neck persisted for 3 more days. On the 10th postoperative day he was apparently more comfortable and was discharged. It is interesting to note that the pain was so severe the day before discharge that the nurses recorded that he was pacing the floor because of the discomfort in his neck. He had been completely afebrile for the last 5 days of his hospitalization.

The remainder of the past history, systemic review and physical examination were non-contributory. Microscopic study of the prostatic tissue removed during surgery revealed adenomatous hyperplasia with patchy prostatitis. Acini in some fields had collars of inflammatory cells. Roentgenograms of the cervical spine on April 8, 1954 were reported to show quite marked osteoarthritis of the cervical spine with slight scoliosis. He was discharged on April 10, 1954.

On about April 25, 1954 he noted hematuria and was admitted to a local hospital. He was re-hospitalized there on May 3, 1954 because of difficulty in walking. From May 3 through May 5, 1954 he had progressive symptoms of motor and sensory loss in his upper and lower extremities. The patient had noted progressive increase of pain in his neck and in the right shoulder from April 6 through May 5, 1954.

Examination on readmission to the University Hospitals, May 5, 1954. There were no significant changes in general physical findings. His temperature was 101.2°F. Neurological examination revealed an asymmetric quadriparesis with a sensory deficit for light touch and pinpoint at about the C8 dermatome and extending across the chest just below the clavicles bilaterally. The superficial reflexes were lost; deep tendon reflexes were present symmetrically and within normal limits. There was pain in moving the right shoulder girdle and marked tenderness over the lower cervical spines. There was a level of anhidrosis quite evident below the clavicles. No anisocoria was noted.

Roentgenograms of the spine showed erosion of the 6th cervical vertebral body. Lumbar puncture and Pantopaque myelography revealed a complete block at the C6 level (Fig. 1). Routine laboratory studies revealed a marked pyuria. He had a hemoglobin of 11.6 gm. and 11,300 white blood cells/ml. with 67 per cent polymorphonuclear cells. Cultures of the urine now yielded *Streptococcus fecalis* and *Pseudomonas aeruginosa*.

Course. The patient showed further evidence of progressive paresis. On May 6, 1954 cervical traction with the use of Crutchfield tongs was instituted.

1st Operation. On May 10, 1954 a decompressive laminectomy of C3 through C7 was performed (Fig. 3). An epidural granulomatous lesion producing complete block at C5 with dorsal displacement of the dura mater and its contents was disclosed. After this the dura mater was noted to pulsate well.

2nd Operation. The next day, on May 11, 1954, because of the opinion that the myelogram suggested an intradural lesion, the wound was opened and the dura mater was incised. The cord appeared to be displaced backwards in the mid-cervical region. No intradural, extramedullary mass was observed either dorsally or ventrally after thorough exploration. Aspiration with a No. 20 hypodermic needle in the dorsal midline of the cord revealed no intramedullary abnormality. The dentate ligaments on both sides were sectioned to facilitate decompression.
Studies of Surgical Specimens. Cultures and sensitivity studies of tissue removed at the time of the laminectomy revealed the presence of *Pseudomonas aeruginosa* sensitive to polymyxin. Biopsies of the vertebrae taken at the time of the laminectomy showed a destructive inflammatory process and chronic osteomyelitis.

Postoperative Course. After a short course of procaine penicillin and streptomycin, the patient received 3.3 gm. of polymyxin\textsuperscript{B} over a period of 22 days until June 11, 1954, at a rate of about 150 mg. per day (2-3 mg./kg.). Emergency tracheotomy was necessary on May 21, 1954.

Because of progression of the osteomyelitis upward to C3 and the radiological finding of a retropharyngeal prevertebral soft-tissue swelling, exploration of the retropharyngeal space and the upper and mid-cervical vertebrae was performed on July 9, 1954. No abscess was encountered but biopsy of these abnormal vertebrae was done and culture yielded the pyocyanus organism again. He received another short course of polymyxin\textsuperscript{B} and his temperature gradually came down to normal by about the 15th postoperative day. The operative wounds all healed well. Periodic roentgenograms of the cervical spine showed cessation of the progressive osteomyelitis, regression of the prevertebral swelling and, finally, recalcification of the destroyed vertebrae with bony proliferation. The soft-tissue space between the pharynx and cervical spine decreased and was thought to be normal on Aug. 10, 1954.

Following this last operative procedure, the patient showed signs of some sensory and motor improvement. There was a residual dissociated loss of pinpoint and light-touch sensation. The almost complete paraplegia improved to a point where he could flex the left knee and wiggle the toes. He was able to lift the left leg off the Stryker frame against gravity while
lying on his abdomen. The knee and ankle jerks were present bilaterally; the biceps reflexes improved to almost normal while the triceps remained hypoactive. Crutchfield traction was removed on Aug. 14, 1954, 3 months after placement. He was discharged on Oct. 29, 1954. When last heard from on April 1, 1955 there had been no significant change except slight further motor improvement.

DISCUSSION

It was felt that this patient's illness represented a metastatic, septic osteomyelitis of the cervical spine, probably occurring at the time of or shortly after his transurethral resection through one of the open, enlarged prostatic sinuses, with septic urinary and prostatic contents traveling by way of the vertebral venous system. Undoubtedly the first symptom of this was the pain in his neck, 6 days after his transurethral resection, with progression described above. It should be noted that the same organism (Pseudomonas aeruginosa) was cultured repeatedly from the pathological lesions in the cervical spine and from the urine.

Crevey and Feeny, in an excellent study of 94 patients immediately following transurethral resection of the prostate, demonstrated positive blood cultures in 45.6 per cent (43 patients) who had not received antibiotics prior to the surgical opening of the large prostatic venous sinuses in the presence of infected urine.

Batson in a classic paper demonstrated the existence of a pathway for the spread of possible infection or neoplastic cells from the dorsal vein of the penis and pelvic veins via the bone-protected vertebral venous system of the spinal column, along the entire spinal column up to the skull, and completely by-passing the lungs and inferior vena cava. With increased intra-abdominal or intrathoracic pressure he proved that return of blood can occur via the vertebral system rather than the inferior vena cava. (It is to be noted that of the 20 patients mentioned, at least one-half of them had known abdominal distension, hiccoughs, coughing, straining, or wore abdominal binders.)

The work of these investigators, when coupled, might account for the spread of infection of the urinary tract following instrumentation via the vertebral venous system to the vertebral column. It would also explain the occurrence of spinal osteomyelitis following urinary infection in decreasing order of frequency in lumbar, dorsal, cervical, and sacral areas. Further this review suggests that the frequency of relationship between vertebral osteomyelitis and antecedent urinary infection following instrumentation may not have been sufficiently recognized in the past; one may anticipate finding a greater number of such cases with the awareness of such a probability. In many cases it is not practical to demonstrate the organism in the spinal lesion and this consideration, too, leads one to suspect its occurrence more frequently than demonstrated so far.

SUMMARY

1. A review of the literature of metastatic, vertebral osteomyelitis following instrumentation of an infected urinary tract (19 cases) has revealed a total of only 5 such cases with bacteriologic proof of the same causative organism in both the urine and osseous lesions.

2. In the present case, cervical vertebral osteomyelitis with resultant quadriparesis followed transurethral resection of the prostate, and Pseudomonas aeruginosa was cultured repeatedly from both the urine and the osseous lesions.

3. The mechanism of the spread of infection (pyocyaneus) from the surgically
traumatized (transurethral resection) urinary tract via the prostatic venous sinuses to the vertebral venous system (by-passing the inferior vena cava with increased intra-abdominal pressure) seems to be substantiated by this case.

4. The relatively large total dose of polymyxin B without complication is to be noted (150 mg. per day for 22 days or a total of 3.3 gm.).

REFERENCES