Quadriplegia Caused by Involvement of Cervical Spine with 
*Coccidioides immitis*

Symptomatic Cure after Operation and Amphotericin-B Treatment*

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The following case is presented to illustrate the clinical course and treatment of a young Negro Marine with quadriplegia caused by involvement of the cervical spine with *Coccidioides immitis*. A complicating meningitis was also present, manifested by pleocytosis of the spinal fluid, elevated protein in the spinal fluid, and a positive complement-fixation test of the spinal fluid. There was growth of *Coccidioides immitis* on culture of the spinal fluid. Although hopes for success were not high (*Coccidioides immitis* meningitis itself, without the added complication of quadriplegia had, until 1961, been reported to be 100 per cent fatal,') an aggressive plan of surgical decompression and debridement, combined with local, intravenous, and intrathecal amphotericin-B was implemented. The patient is today able to walk unaided with an apparent complete arrest of his disease. This case is therefore presented in this more favorable prognostic light.

**Case Report**

A 22-year-old Negro Corporal in the U. S. Marine Corps was admitted to the U. S. Naval Hospital, San Diego, California, on Nov. 18, 1962 with the diagnosis of epidural abscess caused by *Coccidioides immitis* with neurologic involvement.

A review of the patient's history and health record indicated that he had been in good health until the middle of September 1962, when he noted tenderness and swelling of the left knee. He was seen in the outpatient department of the U. S. Naval Hospital, Camp Pendleton, Calif., where the swelling of the left knee was aspirated and purulent material was obtained. Several days later he complained of numbness and tingling in the upper extremities, particularly in the thumbs and both index fingers, and severe pain in both shoulders and the back of his neck. Cervical roentgenograms revealed possible early compression of the 6th cervical vertebra.

A bone survey demonstrated a lytic area over the left tibial tuberosity. He was admitted to the hospital at Camp Pendleton on Oct. 31, 1962, with the diagnosis of abscess of the left knee, etiology undetermined. Past history revealed the patient to have been stationed for 3 years at Camp Pendleton.

Physical examination revealed a fluctuant, hot, swollen and tender area over the left knee. There was tenderness to palpation over the cervical spine with pain on cervical rotational movements. Laboratory tests revealed a hematocrit of 45 and count of white blood cells was 7,800 with a normal differential. Urinalysis was normal. Roentgenograms of the chest revealed an equivocal, diffuse, parenchymal infiltrate in the apex of the right upper lobe. The remainder of the lung fields were clear. Cervical roentgenograms revealed the lytic lesion with secondary compression of the body of C5. The patient had a persistently febrile course and skin tests for both tuberculosis and coccidioidomycosis were "slightly positive." After the first few hospital days a progressively increasing sensory loss developed and by Nov. 16, 1962 there was anesthesia from the level of T1 inferiorly. There also developed progressive quadriplegia to the level of C6. The cranial nerves remained intact. Culture of the aspirate from the knee revealed *Coccidioides immitis* and intravenous amphotericin-B therapy was initiated, consisting of 10 mg. of amphotericin-B intravenously the first 2 days, increasing to 55 mg., then progressing until a daily dose of 60 mg. had been achieved. Skeletal traction was initiated with Crutchfield tongs and a tracheotomy was performed. On Nov. 9, 1962, because of the development of fluctuance in the left anterior area of the neck, the patient was operated upon. Under general anesthesia, an abscess presenting anteriorly in the left paratracheal area was incised and drained. There was progressive deterioration of his neurological status in spite of skeletal traction, and he was transferred to the U. S. Naval Hospital, San Diego, Calif., on Nov. 16, 1962.

**Examination.** On admission, the patient was completely quadriplegic with a motor and sensory level to C6. Deep tendon reflexes were absent but Babinski's sign was present bilaterally. Hematocrit was 37 and count of white blood cells was 10,550 with 67 per cent neutrophils and 37 per cent lymphocytes. Blood urea nitrogen was 65 mg. per cent. Roentgenograms of the chest no longer revealed evidence of a right apical infiltrate. Films of the cervical spine, however, showed almost total destruction of the body of C5 with gross malalignment. The bodies of C6 and C7 were dislocated 100 per cent anteriorly in relation to C4. Roentgenograms of the left knee (Fig. 1) revealed multiple, discrete

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* The opinions expressed in this article are those of the authors and not necessarily those of the U. S. Navy Department.
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punched-out lytic areas in the region of the left tibial tuberosity with contiguous soft-tissue swelling. Because of the complete destruction of the body of C5, and continuing presence of a fluctuant mass in the left anterior part of the neck, it was felt that decompression would be performed more safely and adequately by the anterior route as it would preserve the integrity of any remaining posterior elements of the cervical vertebrae.

Operation. The anterior surface of the cervical vertebra was exposed. Much granulomatous material anterior to the 5th cervical vertebra was removed together with the necrotic remnants of the body of C5. A portion of the necrotic body of C4 was also debrided. Intravenous amphotericin-B was reinstituted with an initial dose of 5 mg., and a gradual increase to 60 mg. daily. In addition, 50 mg. of Benadryl and 10 mg. of heparin were given in the intravenous solution containing the amphotericin-B. The anterior cervical incision, which had been packed open, was irrigated with a solution of hydrogen peroxide.

Course. Several days after operation, the patient began to notice return of volitional motion in the upper extremities. On the 10th postoperative day a spinal tap revealed lymphocytic pleocytosis and protein in the spinal fluid was elevated to 355 mg. per cent. Culture of the spinal fluid revealed *Coccidioides immitis*. Subsequent complement-fixation analysis of the spinal fluid indicated a 2+ reactivity in a dilution of 1:4. Because of this, intrathecal administration (1 mg. every other day) and local irrigation of amphotericin-B into the anterior cervical abscess (10 mg. daily) were initiated. During the first 10 days of this combined treatment (60 mg. of intravenous amphotericin-B daily, 10 mg. locally in the anterior cervical area, 1 mg. intrathecally every other day) the patient had a gradual rise in blood urea nitrogen to 65 mg. per cent and the level of creatinine increased to 3.8 mg. per cent, indicating progressive nephrotoxicity. The rate of administration of amphotericin-B intravenously therefore was decreased to 50 mg. every other day but intrathecal and local amphotericin-B were continued in the original doses and Prednisone, 30 mg. daily, was initiated. Because of persistent anemia, the patient received a total of 5 units of blood throughout his hospitalization.

Over the next 2 weeks, the patient made a dramatic improvement. By December 11 the creatinine level had dropped to 0.5 mg. per cent and the blood urea nitrogen had decreased to 36 mg. per cent. By Jan. 13, 1963, the complement fixation in the blood dropped from 1:64 to 1:32 and the complement fixation in the spinal fluid had reverted from 2+ to negative, indicating that the dissemination and progression of the process had been stopped and appeared to have been reversed. Cervical traction with Crutchfield tongs was continued and serial roentgenograms (Fig. 2) revealed complete destruction of the body of C5 and partial involvement of the body of C4. On January 13 the instillation of local amphotericin-B into the neck was discontinued and the wound in the neck granulated well. By February 40 the blood urea nitrogen was 25 mg. per cent and the creatinine was 1.0 mg. per cent. The patient ran an occasional pyuria of 10-18 white blood cells per high-powered field. At this time, he had received a total of 3,100 mg. of amphotericin-B intravenously with only minimal evidence of nephrotoxicity. The serology of the serum at this juncture progressively decreased to 2+ in a 1:2 dilution.

Fig. 1. Lateral view of left knee illustrating lytic lesion caused by *Coccidioides immitis* in region of tibial tuberosity.

Fig. 2. Roentgenogram of lateral cervical spine demonstrating complete destruction of body of C5 from involvement with *Coccidioides immitis*. There is also involvement of posterior portion of the body of C6 and a fracture through pedicle of C6.