Osteomyelitis and epidural abscess caused by Arachnia propionica

Case report

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A case of clival osteomyelitis and epidural abscess caused by Arachnia propionica is described. Primary clinical features included a 5-year illness, cervical fistulas, and episodes of meningitis that responded to penicillin. Treatment included peroral, transclival abscess removal, and prolonged antibiotic therapy. Bacteriologic features of the organism are reviewed.

KEY WORDS Arachnia propionica · clival osteomyelitis · epidural abscess · cervical fistula · meningitis

A REVIEW of the literature indicates that this is the first case reported of intracranial disease caused by Arachnia propionica.

Case Report

This 13-year-old boy from a rural Kansas farming family was first hospitalized elsewhere in November, 1971, because of headache, vomiting, diplopia, and low-grade fever. He had been well until 8 years of age, when he developed bilateral posterior cervical triangle abscesses. Routine culture of the abscess contents was sterile. Abscesses recurred in the next 2½ years, and drained spontaneously. Eventual healing produced skin dimpling. When he was 11 years old, he developed typical symptoms of meningitis; he was empirically treated with penicillin and recovered. From then on he experienced bifrontal and bitemporal headaches. The spinal fluid white blood cell (WBC) count was 4345/mm³, with a neutrophilic predominance. Gram stain showed unidentifiable yeast-like forms and a few gram-positive cocci. CSF glucose was 11 mg%, and routine culture was negative. Penicillin was begun. Skull films suggested the presence of a suprasellar mass, and the patient was transferred to a larger hospital where repeat examination of the lumbar CSF showed a white blood cell (WBC) count of 1500/mm³, all neutrophils, a protein content of 189 mg%, and a glucose content of 17 mg%. India ink preparations and acid-fast stains were negative, as was the intermediate strength tuberculin skin test. Pneumoencephalography suggested the presence of a perisellar mass, either chordoma or cranio-
Fig. 1. Skull films showing considerable destruction of the posterior clinoid and dorsum sella. The clivus appears sclerotic, with some erosion.

Fig. 2. Vertebral angiogram showing displacement of the basilar artery posteriorly.

Pharyngioma. The patient improved on continued penicillin therapy and was referred to the National Institutes of Health (NIH) for further evaluation. Symptomatology at that time included recurrent headaches, nausea, and mild polydipsia and polyuria for the week prior to admission. No other symptoms of hypothalamic or pituitary disease were elicited.

Examination. The patient was at the first percentile in height and weight, without pubertal changes. Detailed neurological examinations with particular emphasis on cranial nerves revealed no abnormality. Peripheral WBC was normal, with a mild normochromic, normocytic anemia. Erythrocyte sedimentation rate was 94 mm/hr. Radiographic evaluation (Figs. 1-3) suggested the presence of a retroclival, extraxial mass, extending from the posterior clinoids to the caudal margin of the clivus.

Mild diabetes insipidus developed and was treated with low doses of vasopressin. The headache rapidly became worse, and over a 24-hr period the patient developed anisocoria, dysconjugate gaze, extensor plantar responses, and sluggish mental reactions. Intravenous mannitol and dexamethasone failed to alter his condition.

Operation. Through a peroral approach, osteomyelitic portions of the clivus were removed. A 4 x 1 x 1 cm epidural abscess was found; its contents were aspirated and its wall excised except where densely adherent to the dura.

Postoperative Course. Gram stain of the aspirate showed gram-positive branching filamentous rods, compatible with Actinomyces or Nocardia, and many polymorphonuclear leukocytes. The patient was begun on intravenous penicillin, 12 million units a day, and sulfadiazine, 2 gm/day. A sulfur granule was observed in a hematoxylin and eosin stain of osteomyelitic clivus. The diagnosis of actinomycosis seemed most probable, and sulfadiazine was discontinued. The wound healed uneventfully, and the patient's neurological status gradually re-
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turned to normal. Intravenous penicillin was continued for 1 month; it was then given orally as phenoxymethyl penicillin 6 gm/day, for the following 6 months. The patient is asymptomatic 1 year following surgery.

Pathological Examination. Osteomyelitic bone and surrounding soft tissues showed acute and chronic inflammatory cells. A 2 to 3 mm colony of irregular gram-positive branching filaments was noted (Fig. 4). All filaments were confined to the colony; none was scattered among the fibrous tissue. The pathological diagnosis was actinomycosis of the clivus.

Gram stains of abscess material showed rare gram-positive, beaded, filamentous rods with possible branching, and many polymorphonuclear leukocytes. Sufficient material was not available for acid-fast stains or an adequate search for classical sulfur granules. Culture of the abscess contents quickly grew Hemophilus aphrophilus, an organism frequently associated with Actinomyces israelii. No filamentous organisms could be demonstrated for the first 8 weeks; at that time, the thioglycollate broth, containing a specimen of mucosa overlying osteomyelitic bone, was noted to contain discrete puff balls. Wet mount and gram-stain preparations of this material showed a combination of tightly clumped short filamentous forms with branching, interspersed with gram-positive diptheroidal forms.

Fig. 3. Pneumoencephalogram showing posterior displacement of the brain stem, preoptic and interpeduncular cisterns.

Fig. 4. Photomicrograph of a section of a surgical specimen showing an edge of granule with tightly-packed gram-positive branching filaments. Brown and Brenn, X 200.
The organism was found to grow both anaerobically and under 5% CO₂, and its branching filamentous nature was confirmed by wet mount preparations of early growth in liquid media. Biochemical evaluation of the organism identified it as *Actinomyces propionicus* (now *Arachnia propionica*) on the basis of the following reactions: reduction of nitrate to nitrite, lack of catalase production, inability to hydrolyze gelatin, esculin and starch, failure to produce indol, and production of acid from glucose, mannotol, lactose, sucrose, and maltose, but no acid from salicin, glycerol, xylose, and arabinoise. Further substantiation of this identification was obtained from end-product gas liquid chromatography which showed propionic acid as the major product from utilization of glucose. The isolate was subsequently confirmed as *Arachnia propionica* by the Mycology Unit of the National Center for Disease Control.

**Discussion**

Diagnostic contrast studies in this patient demonstrated the presence of an extraaxial, retroclival mass. The four diseases that most frequently cause such a mass are meningioma, chordoma, epidermoid tumors, and aneurysms of the basilar artery. Less frequent causes are cholesteatomas, dermoid and subarachnoid cysts.

Several preoperative features suggested that the lesion might be an abscess, particularly an actinomycotic abscess. These features included the 5-year duration of symptoms, recurrent cervical fistulas, two episodes of "sterile" meningitis which responded to penicillin, and, finally, rapid clinical deterioration. A meningioma was considered unlikely with preservation of the medial tips of the petrous pyramids. A chordoma would have been expected to cause more extensive clival destruction than was present. It was felt that if abscess was present, extradural drainage would be advisable. The operative approach was therefore peroral.

*Arachnia propionica* was first described as the causative agent of a case of lacrimal caniliculitis by Pine and Hardin in 1959. At that time the organism was thought to be a strain of *Actinomyces israelii*, but in subsequent work by Buchanan and Pine, the organism was reevaluated as being a new species, *Actinomyces propionicus*, on the basis of differences in metabolism, physiology, and cell wall composition. The organism was later reclassified and placed in a new genus, *Arachnia*, under the name of *Arachnia propionica*.

The key features of the organism are: 1) gram-positive branching filaments with a tendency to form "spheroplasts" with age, 2) the presence of diamino pimelic acid in the cell wall, and 3) the presence of propionic acid as the major end product from glucose. To date, the organism has been isolated from two cases of lacrimal caniliculitis and five cases of localized and disseminated actinomycosis.

Since *Arachnia* may be a normal intraoral organism, it is possible that this organism was a contaminant. However, the presence of branching gram-positive filaments admixed with the polymorphonuclear leukocytes from the original smear of abscess material and the histological demonstration of sulfur granules in the osteomyelitic bone would support the contention that this organism was present in the abscess cavity.

The patient was treated as if he had an actinomycotic epidural abscess and clival osteomyelitis. The correct diagnosis was not finally known until 2 months following discharge from the hospital. The success of his therapy suggests that *Arachnia* abscesses respond to the same therapy proposed by Harvey, et al., for actinomycosis, namely, optimal surgical excision and prolonged high doses of penicillin.

**References**


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