INTERVERTEBRAL DISK DISEASE CAUSED BY THE BRUCELLA ORGANISM

J. A. AGUILAR, M.D.,* AND A. R. ELVIDGE, M.D.

Department of Neurology and Neurosurgery, Montreal Neurological Institute and McGill University, Montreal, Canada

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BRUCELLOSIS can produce changes in the spine simulating hypertrophic osteoarthritis and the syndrome of pain in the back and sciatica. The condition has been neglected in the differential diagnosis of disk disease and may have gone unrecognized in many obscure cases of pain in the back. The purpose of this paper is to show that spondylitis caused by Brucella infection in man has its origin in a destructive granulomatosis of the intervertebral disk. This theory opposes the belief that involvement of the disk spreads from the bony matrix. The fact that in most cases the pathology in the vertebral body is fully developed together with the disk lesions has precluded the recognition of this alternative explanation, the more so because early localization in the bone marrow is characteristic of the Brucella organism. A recently studied case demonstrates the presence of granulomatous destruction limited to the interbody joint. Radiographic and pathologic evidence from other cases also implicates the disk in the pathogenesis of brucellar spondylitis.

BRUCELLA ORGANISMS AND BRUCELLOSIS

Evans,6 recognizing the similarities in the organisms discovered by Bruce (Malta, 1887) and by Bang (Denmark, 1897), suggested the generic name to honor Bruce, who led the investigation that determined the cause of undulant fever in man. Subsequently the organism recovered from aborting sows by Traum (United States, 1914) was added to the genus. Br. melitensis, Br. abortus and Br. suis share serologic and pathogenic properties, but each has distinct cultural characteristics. All are pathogenic for man as well as dogs, horses, wild animals and fowl. Brucellosis is the most common disease transmitted from animal to man.

The disease is widespread in the United States and Canada, but most cases occur in livestock regions. The acute illness, commonly a mild and vague febrile disturbance, usually is neglected. Only 1,300 of an estimated 30,000 to 40,000 cases22 were reported to the U.S. Public Health Service (1956).26 Serologic evidence of infection in animals, the reservoir for human infections, was found in 3 per cent of 5 million cows in 1951.10

The protean manifestations of the acute illness are ill-defined and include fever, malaise, weakness, pain in the joints, headache and loss of weight. Most infections occur in males; children are resistant to the organism. It is an occupational disease of farmers, meat handlers and slaughter-house workers. The diagnosis is confirmed if serum agglutinates Brucella antigen in a dilution of 1:80 or higher.

The most important route of infection is through the skin;15 the respiratory route is involved in certain instances. Regional lymphadenopathy and a transient bacteremia ensue, the organism eventually assuming an intracellular position in the reticuloendothelial system from which an outpouring of bacteria may persist for years.19 The histopathology of the infection has been thoroughly studied by standard infection of the guinea pig7 and confirmed by bone-marrow studies in humans.14 Characteristic granulomatous lesions in liver, spleen, testi-
cle and bone marrow reach full development in 3 to 4 months.

**BRUCELLA SPONDYLITIS**

Involvement in the spine is characterized by a proliferative sclerotic reaction together with a destructive process involving the articulation of the intervertebral body, distinct in its slow progress, and culminating over months and years in ankylosis of the involved region. Lowbeer\(^1\) has made the most extensive review of the subject of brucellar osteomyelitis and spondylitis in his analysis of the pathology in this complication. Mantle\(^2\) found a paucity of reports in the North American literature dealing singly with brucellar spondylitis and implied that bony complications in England and America are rare. Spink\(^3\) has included the problem of spondylitis in his numerous monographs on brucellosis in America and stated that it occurs in more than 10 per cent of cases.\(^4\)

In the cases of brucellosis admitted to the Royal Victoria Hospital in Montreal the incidence of the complication of spondylitis was only slightly higher than in Spink's experience. Four of 26 patients with serologically proven infections were admitted because of spondylitis. Nine of the 26 had pain in the neck and back as a part of the other symptoms, but no special investigations attended these complaints.

Brucellar spondylitis is a well-recognized entity in areas where the more invasive *Brucella melitensis* is endemic. Zammit,\(^5\) reviewing 62 cases from Malta, and Granjon and Mouren,\(^6\) reporting on 24 cases from France, have recently given emphasis to the important clinical and radiographic features.

**Clinical Picture.** The constant feature is pain relieved by rest, localized to the affected region of the spine, occurring late in the convalescent period. Commonly occurring before radiographic signs have appeared, this stage is usually unidentified as being brucellosis, the nature of the initial infection having been neglected. Radiating pain of girdle and extremities is present in more than one-half of the cases.\(^6\) Restriction of motion, muscle spasm, tenderness and signs of nerve-root involvement are common. In severe infections paravertebral abscess may also develop, usually in association with the acute disease (Fig. 1). Extradural compression also occurs.\(^6\)

**Radiological Appearance.** The common feature in numerous illustrations from foreign case reports is participation of the articulation of the intervertebral body. The first conspicuous sign is a step-like erosion of the margin of the vertebral body opposing the disk (Fig. 2, middle). Invariably there is already thinning of the disk and faint osteophytic bridging. Abnormality in the disk is emphasized by Zammit\(^5\) in his analysis of 62 cases of which only 3 failed to show a narrow disk space. The areas of rarefaction in the corners of the opposing vertebral bodies mold themselves by a proliferative sclerotic process into characteristic spurs (Figs. 1 and 2). These assume the form of curved beaks bridging the borders of the interspace and are indistinguishable from hypertrophic arthritis. Brucellar spondylitis, however, is usually limited to only one level. In the majority of cases the lumbar region is affected, the next most common site being the thoracic region. Frequent involvement occurs in the cervical vertebrae where the changes are of a similar nature.\(^1,6,26\)

**Pathology.** The most important contribution to the understanding of the pathogenesis of brucellar spondylitis has been made recently by Villafane Lastra and Griggs.\(^7\) They obtained specimens of spinal columns from fatal human cases in Argentina and correlated the gross pathological changes seen in full sagittal sections with the radiographic appearance. Although they concluded that the infection probably starts in the vertebral body, their specimens show distinct participation of the intervertebral disk in initiating osteomyelitis (Fig. 3). Their photomicrograph illustrates the implantation of infected necrotic disk tissue into the cancellous portion of the vertebral body.

To this pathological study can be added the present case, a patient with pain in the