

## CASE REPORT

## Neurobrucellosis in Children

by

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## Abstract

Although the neurological symptoms in brucellosis are frequent, nervous system involvement is uncommon. In addition, blood and cerebrospinal fluid may not show growth of *Brucella* in culture. For these reasons brucellosis may not be considered; hence correct diagnosis of the disease may be delayed. We have presented three cases of leptomeningitis due to brucellosis where diagnosis was delayed one to two months and was correctly made in two cases only after bone marrow aspiration culture.

## Introduction

Brucellosis is a zoonosis produced by microorganisms of *Brucella* genus. Although they are widely distributed over the world, *B. abortus* is more prevalent in North America and Europe (Spink et al., 1951), whereas *B. melitensis* is more common in developing countries (Pfishner et al., 1957; Young and Suvannoparrat, 1975).

The clinical picture is characterized by weakness, fatigue, anorexia, headache,

myalgia, high fever, chills, and splenomegaly. In some, the neurological symptoms may be most prominent (Boughton, 1966; Buades et al., 1981; Desai, 1977; Finchom et al., 1963; Nichols, 1951; Pathania, 1966). We would like to present three cases of brucellosis with neurological complications stressing on the importance of bone marrow aspiration culture in diagnosis.

## Case Reports

*Case 1.* A 12-year-old girl from a nomadic family was admitted to the hospital with the complaints of headache, fatigue, weakness, dizziness, nervousness and restlessness of 6 weeks duration. Physical examination revealed a murmur on the left temporal region, bilateral papiledema with hemorrhage at the left, submandibular microlymphadenopathy and hepatosplenomegaly. The rest of the physical examination was normal.

Laboratory investigations, including complete blood count, urinalysis, tuberculin test, throat, urine, blood and cerebrospinal fluid cultures, chest and skull x-rays, CAT scanning of the brain, erythrocyte sedimentation rate, ASO, CRP, ANA and examination of bone marrow aspiration, were negative or within normal limits. *Brucella melitensis* was isolated from bone marrow aspiration culture and *Brucella* agglutination was 1/160. Lumbar puncture revealed a pressure of 230 mm H<sub>2</sub>O, no cells, protein 96 mg/dl, sugar 20 mg/dl with simultaneous blood sugar of 116 mg/dl.

All symptoms including cranial bruit subsided with tetracycline treatment (40 mg/kg/day) and she was discharged in good health.

*Case 2.* A 7-year-old boy was admitted to the hospital with the complaints of diplopia, fever and headache of 10 days duration. Physical examination revealed bilateral axillary microlymphadenopathy, hepatosplenomegaly, bilateral papiledema and right abducens paralysis.

Laboratory investigations, including complete blood count, urinalysis, liver function tests, tuberculin test, chest and skull x-rays were all normal or within

normal limits. Liver and spleen scintigraphy showed no abnormality except non-specific hepatosplenomegaly. Cerebrospinal cortical atrophy and hydrocephalus were detected by CAT. Lumbar puncture revealed a pressure of 160 mm H<sub>2</sub>O, protein 42 mg/dl, sugar 50 mg/dl with simultaneous blood sugar of 98 mg/dl and no cells. Cisternography showed bilateral blockage at the level of sylvian cistern and hydrocephalus. *Brucella melitensis* was isolated from the blood culture. One month after the onset of the disease, clinical improvement was obtained by streptomycin (40 mg/kg/day) treatment.

*Case 3.* A 14-year-old girl was admitted to the hospital with the complaints of fever and headache of one month duration. Submandibular lymphadenopathy, hepatosplenomegaly and bilateral papiledema were detected on physical examination.

Laboratory investigations, including complete blood count, urinalysis, liver and kidney function tests, serum electrolytes; urine, blood and cerebrospinal fluid cultures; electrocardiogram, examination of bone marrow aspiration smear, Paul-Bunnell test, tuberculin test, ANA, serum complement, ASO, CRP and Latex were negative or within normal limits. Lumbar puncture revealed a pressure of 280 mm H<sub>2</sub>O, protein 108 mg/dl, sugar 33 mg/dl with simultaneous blood sugar 132 mg/dl and 132 lymphocytes/mm<sup>3</sup>. Cisternography was reported to be normal. CAT revealed dilatation of the fourth ventricle. *Brucella abortus* was isolated from the bone marrow aspiration culture.

She was treated with tetracycline (40 mg/kg/day) and discharged in good health.

Table 1 : Clinical features of patients

Case	Age	Symptom	Duration of the symptoms before admittance	Clinical findings
1	12	Headache Weakness Nervousness Irritability	6 weeks	Papiledema, cranial bruit at the left temporal area, hepatosplenomegaly, lymphadenomegaly.
2	7	Diplopia Fever Headache	10 days	Papiledema, left abducens paralysis, hepatosplenomegaly, lymphadenomegaly.
3	14	Fever Headache	1 month	Papiledema, Hepatosplenomegaly, Lymphadenomegaly.

### Discussion

In general, nervous system involvement in brucellosis, so called "neurobrucellosis", is uncommon but symptoms related with the nervous system such as headache, weakness, musculoskeletal pains may frequently be present (Pfishner et al., 1957). Neurobrucellosis is usually caused by bacterial toxins. In some, the invasion of microorganism is responsible for the development of encephalitis, meningitis or myelitis (Dejong, 1936). Pathological studies have demonstrated that the involvement of cortical and subcortical tissues are relatively limited and less intense whereas the infectious process are severe in meninx. It has been suggested that leptomenigitis is an early feature and may lead to adhesive arachnoiditis in the cranium and the spinal canal (Sahadevaz et al., 1968). However, when neurological manifestations are prominent, the diagnosis of brucellosis may not occur to the physician, hence, causing a delay in diagnosis. In our cases, for example, the diagnosis of brucellosis was established only after approximately one to two months.

The clinical investigations and cerebrospinal examinations in the first and

third case suggested that the increased intracranial pressure was most probably due to arachnoiditis. Isotopic cisternography and CAT in the second case and CAT in the third case were compatible with this diagnosis.

In our three cases, the cerebrospinal fluid did not show a growth of brucella in culture, but bone marrow aspiration cultures were positive in two eventhough the blood cultures were negative. These findings suggested that bone marrow aspiration culture may be required in addition to blood and cerebrospinal cultures in the diagnosis of brucellosis. In conclusion, the possibility of neurobrucellosis should be considered in a patient with leptomenigitis and systemic manifestations especially in differential diagnosis of tuberculous meningitis which has similiar clinical findings and abnormal cerebrospinal fluid flow pattern in isotopic cisternography (Ozdirim et al., 1980). Bone marrow aspiration culture should be performed particularly when blood and cerebrospinal fluid cultures are negative to definitely rule out neurobrucellosis.

Table 2 : Laboratory findings in patients with neurobrucellosis

CASE	CEREBROSPINAL FLUID					MICROBIOLOGY			NEURO RADIOLOGY	
	Pressure mm H <sub>2</sub> O	Protein mg/dl	Sugar mg/dl	Simultaneous blood sugar mg/dl	Cell /mm <sup>3</sup>	Culture		Agglutination	CAT	Cisternography
						Blood	Bone marrow			
1.	230	96	20	116	NO	NG	<i>Brucella melitensis</i>	1 / 160	Normal	ND
2.	160	42	50	96	NO	<i>Brucella melitensis</i>	ND	-	Cerebrocortical atrophy and hydrocephalus	Bilateral blockage at cisterna Sylvii
3.	280	108	33	132	132 (lymphocyte)	NG	<i>Brucella abortus</i>	-	Dilatation of fourth ventricle	Normal

ND : Not done

CSF : Cerebrospinal fluid

NG : No growth

CAT : Computerized axial tomography

- : Negative

## REFERENCES

1. BOUGHTON, C.R.: Brucella meningo-encephalitis. *Med.J.Aust.* 2 : 993 (1966).
2. BUADES, J.; OBRADOR, A.; MASSOT B., Meningite brucellienne et test au rose Bengale. *Nouve.Presse med.* 10 : 335 (1981).
3. DEJONG, R.W.: Central nervous system involvement in undulant fever. *J.nerv.ment.Dis.* 83 : 430 (1936).
4. DESAI, B.T.; TOOLE, J.F.: Polyneuropathy as a feature of brucellosis. *South.Med.J.* 70 : 259 (1977).
5. FINCHOM, R.W.; SAHS, A.L.; JOYNT, R.J.: Protean manifestations of nervous system brucellosis, case histories of a wide variety of clinical forms. *J.Am.med.Ass.* 184 : 269 (1963).
6. NICHOLS, E.: Meningoencephalitis due to brucellosis. *Ann.intern.Med.* 35 : 673 (1951).
7. OZDIRIM, E.; YALAZ, K.; ERBENGI, G.: Isotopic cisternography in tuberculous meningitis of children. *Am.J.Dis.Child.* 134 : 572 (1980).
8. PATHANIA, M.S.; SACHDERA, J.R.; CHOPRA, J.S.: Brucella meningitis and spondylitis. *J.Indian,med.Ass.* 47 : 290 (1966).
9. PFISHNER, W.C.E.; ISHAK, K.G.; NEPTUNE EM.: Brucellosis in Egypt: A review of experience with 228 patients. *Am.J.Med.* 22 : 915 (1957).
10. SAHADEVVAZ, M.G.; SINGH, M.; JOSEPH PP.: Meningomyelitis due to brucellosis. *Br. med.J.* 4 : 432 (1968).
11. SPINK, W.W.; HALL, W.H.; MAGOFFIN, R.: Follow-up study of therapy in forty-eight culturally proved cases of brucellosis. *Archs int. Med.* 88 : 419 (1951).
12. YOUNG, E.J.; SUVANNOPARRAT, V.: Brucellosis outbreak attributed to ingestion of unpasteurized goat cheese. *Archs int. Med.* 135 : 240 (1975).