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A case report of neurobrucellosis mimicking Guillain–Barré syndrome

1. Background

Brucellosis is an occupational disease mainly observed in farmers, veterinarians and abattoir workers. The infection can spread by either the contact of skin cracks (open cuts or sores) or the ingestion of unpasteurised dairy products transmitted from infected animals. Some regions in Iran are **Brucellosis-stricken**. The diagnosis of brucellosis was done based on the consistent clinical results and a serum agglutinin titer of more than 1:160 in serum tube agglutination (STA) (Park et al., 2012).

Although the incidence of neurological complications of brucellosis is infrequent (0–25%) in adult patients, they have marked clinical importance for their severity and important morbidity. *Brucella* may affect the nervous system directly or indirectly as a result of cytokine or endotoxin on the neural tissue (Bashir, Al-Kawi, Harder, & Jinkins, 1985). Cytotoxic T lymphocytes and microglia activation play an immunopathology role in incidence of this disease (Seidel, Pardo, Newman-Toker, Olivi, & Eberhart, 2003). Immunological mechanism is considered as a causative factor in demyelinating the central white matter (Young, 2010).

Neuro-brucellosis may develop widely at any stage of disease with variables including meningoencephalitis, radiculitis, myelitis, peripheral and cranial neuropathies, subarachnoid hemorrhage, and psychiatric symptoms (McLean, Russell, & Khan, 1992).

Guven et al. (2013) published an original article about the neurological involvement in brucellosis and revised diagnostic criteria for Neuro-brucellosis in laboratory-confirmed brucellosis patients by the presence of any one of the following criteria: 1) Symptoms compatible with neuro-brucellosis; 2) Isolation of *Brucella* species from cerebrospinal fluid (CSF) and/or the presence of anti-*Brucella* antibodies in CSF; 3) The presence of lymphocytosis, increased protein, and decreased glucose levels in CSF; or 4) Diagnostic results in cranial MRI or CT scan (Guven et al., 2013).

However, Ceran et al. (2011), added Standard tube agglutination (STA) titers in serum ($>$ 1/160 and 1/80 in CSF) to the above mentioned diagnostic criteria (Ceran et al., 2011).

Colmenero et al. (1996) reported four types of neuro-brucellosis imaging results such as normal, inflammation (abnormal enhancement), white matter changes, and vascular changes (Colmenero et al., 1996).

There have been a few case reports associated with brucellosis in the literature. One of the cases was a 14-year-old girl with Guillain–Barré syndrome (GBS) associated with *Brucella melitensis* infection (Al-Eissa & Al-Herbish, 1996) and the other was a 9-year-old girl with protracted paroxysms of severe hypertension before she developed the classical symptoms of Guillain–Barré syndrome.

High titres of Brucella antibody were found in the serum in both girls and complete recovery was observed after appropriate therapy (García et al., 1989).

Garcia et al., reported three patients with GBS, one of them was compatible with the axonal form and the others with the demyelinating form of the disease (Shakir et al., 1987).

Haghighi and Sabayan (2007) reported a case associated with partially- treated brucellosis that presented by quadriparesis, sixth and seventh cranial nerve palsy, and apnoea. The cross reactivity of immunological responses, due to the molecular mimicry between Brucella Lipooligosaccharides and GM1 ganglioside of peripheral nerves, may justify the development of acute axonal polyradiculoneuropathy after brucellosis (Haghighi & Sabayan, 2007).

This interaction between antigens was seen following the inflammatory and infectious disorder in Guillain–Barré syndrome (Ghabaee et al., 2010).

Sharafoddin zadeh et al., described a 28-year-old Iranian man with acute paralysis, areflexia, and ataxia-like GBS whose serology confirmed brucellosis (Sharaf & Keyhanifard, 2007).

Variable latency was reported to be caused by the presentation of neurologic complication, but in 29 of 48 (60%) neurobrucellosis cases, the symptoms were shown in over two months.

2. Case report

A 62-year-old man was admitted with progressive lower limb weakness, difficulty in walking and standing. He was a worker from a small city in the western part of Iran. He was diagnosed with brucellosis two months before the admission with symptoms of fever, headache, night sweats. He had taken doxycycline (100 mg BID) and Rifampin (300 mg OD) for two months.

The physical examination was normal except for the mild splenomegaly (palpable 2 cm below costal margin) confirmed by abdominal sonography. No fever was detected in time of admission. Ascending symmetrical flaccid quadriparesis with predominantly lower extremity, more distal than proximal, decrease in pin-prick sensation up to knees, impaired distal proprioception and vibratory sensation to the costal margin were the main neurological symptoms.

CSF analyses were abnormal in different samples. CSF in time of admission showed the following results: protein: 147 mg/dl, Glu: 51 mg/d without Leukocytosis. Further CSF analyses showed high protein with low glucose, too (Table 1). High antibodies against brucellosis (IgM: 5.0, 5.1 U/ml and IgG: 190, 129 U/ml) were reported in successive samples of CSF at two- week interval.

The haematology results showed WBC of 6500/mm^3 with 24% lymphocytes and the platelet of 332×10^9/L. High levels of inflammatory biomarkers (ESR: 101- mm/h and CRP 73 mg/liter) were seen.

EMG-NCS showed generalized axonal polyneuropathy with fasciculation of upper extremity muscles which was compatible with Radiculopolyneuropathy. No response was seen following the application of the standard protocol of plasmapheresis with impression of

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Table 1
CSF Findings.

Concomitant blood glucose mg/dl	Anti Bru.IgG U/ml	Anti Bru.IgM U/ml	WBC/ml	Glucose mg/dl	Protein mg/dl	
…	…	…	0–1	51	147	**Admission**
80	190	5.0	0–1	56	87	**2nd sample**
109	129	5.1	0–1	58	85	**3rd sample**

Guillain–Barré syndrome and the patient had post- intubation deterioration. Investigations showed further negative causes.

No pathology was seen in Cranial & spinal cord MRI, except for mildly enhancement of thoracic region. According to the results, coombs wright titration was 1/640 (normal value: 1/320) and 2-mercaptoethanol titre was 1/320 (normal value: ≥1/40). In accordance with criteria of neurobucellosis introduced by Guven et al. (2013), incomplete treatment in a patient from brucellosis-stricken area, high titer of standard serum tube agglutination, 2-mercaptoethanol, high protein, low glucose and positive antibodies against Brucella in CSF were supportive in the diagnosis of meningoradiculitis. The patient's state improved within a course of standard therapeutic regimen (doxycycline 100 mg/BID, Rifampin 600 mg/day, and Ciproploxacin 500 mg/BID) for 4 weeks during admission. At the last week, the patient was able to raise his lower extremity with effective respiration via tracheostomy. Following six months, the patient had normal walking without any help.

3. Conclusion

This case study suggests that high titres of standard tube agglutination, 2-Mercaptoethanol (2ME) in serum, high protein, low glucose and positive antibodies against Brucellosis in CSF in patients with acute areflexia quadriparesis mimicking Guillain–Barré syndrome with no reaction to IVIG or plasampheresis, could lead us to the directly involvement of meningo radicules by brucellosis.

Declaration of interest

All authors declare no conflict of interest.

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