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CASE REPORT

Tuberculosis meningitis resulting from chronic otitis in an eight-year-old boy – case report

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ABSTRACT

Introduction: Tuberculous meningitis (TBM) is a rare but devastating form of tuberculosis. Early diagnosis is difficult because patients tend to present a subacute course with nonspecific symptoms, but it is crucial for the outcome.

Material and methods: We report the case of an eight-year-old boy admitted to the Department of Infectious Disease and Child Neurology in Poznan, where a diagnosis of TBM was established. Treatment was initiated according to Polish Respiratory Society recommendations for TBM. Clinical improvement was achieved.

Results and conclusions: Provision of adequate treatment is likely to achieve a good prognosis in patients with TMB, so we should keep in mind this diagnosis when encountering patients with meningitis of unknown origin and uncertain history.

KEY WORDS:

tuberculosis, tuberculous meningitis, fever, children.

INTRODUCTION

Central nervous system (CNS) involvement is an uncommon yet potentially fatal manifestation of tuberculosis (TB). According to the WHO, there were approximately 9.6 million new TB cases in 2014 and 1.5 million deaths caused by *Mycobacterium tuberculosis* reported worldwide. In children, 1 million new cases and 140 thousand deaths were noticed mostly in developing countries [1]. The incidence of TB in Poland varies in particular regions and remains significant compared to other European Union countries [2].

Due to the variable nature of symptoms, CNS TB remains a diagnostic challenge – any delay in implementation of treatment may result in a weaker prognosis. Despite the availability of sufficient treatment, there are still numerous fatal cases as an effect of late diagnosis [3].

We present a case of an eight-year-old boy with TB meningitis (TBM) resulting from chronic otitis media that developed many years after contact with an infected parent.

CASE REPORT

An eight-year-old boy was admitted to the paediatric department in a peripheral community hospital because of fever up to 39°C lasting for six weeks. The boy had lived in foster care since the age of 2.5 years, occasionally visited by his biological mother. At the age of 3.5 years, the boy was adopted by his current caregivers. His biological mother died of TB two month later. His previous

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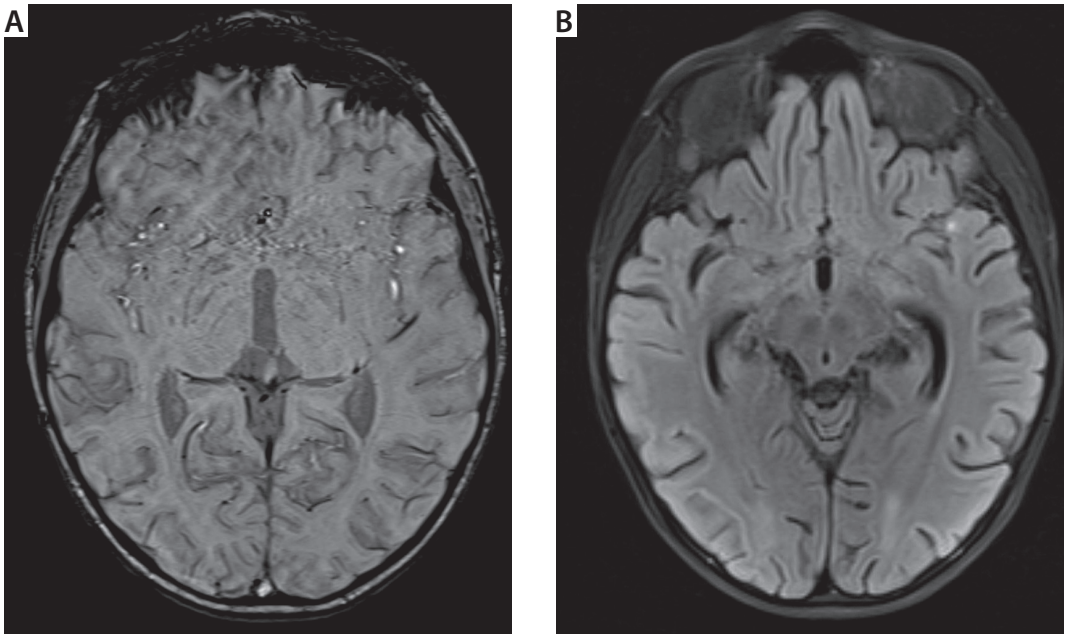

FIGURE 1. Head MRI – FLAIR sequence, transverse cut; (**A**) hyperintense foci in the basal ganglia – in claustrum on the right side, in the globus pallidus on the left side. Image suggestive of early ischaemia of basal ganglia. Regression of lesion (**B**)

medical history was unknown except for a complete vaccination list (including BCG vaccine). Since adoption, the boy required repetitive treatment for right otitis media. Head computed tomography (CT) performed in 2013 revealed cholesteatoma of the right middle ear. Surgical treatment was performed, and the boy developed fever in the post-operation period. Consequently, cefuroxime treatment was started. Right ear cultures identified pan-sensitive *Escherichia coli*. The patient was ultimately discharged seven days after the surgery on four weeks of follow-up treatment with cefuroxime axetil. The fever reappeared after discontinuation of antibiotic treatment. Despite the implementation of oral azithromycin, no improvement was achieved, and the patient was referred to hospital.

On admission, fever, malaise, nausea, and emesis were present. No significant abnormalities were observed in standard laboratory tests. Cefuroxime, metronidazole, and antipyretic treatment were initiated with no effect – the fever persisted.

Considering the patient history, interferon gamma release assay (QuantiFERON®TB Gold) serum test combined with gastric aspirates for *Mycobacterium tuberculosis* were performed. Chest X-rays showed two 3–4 mm nodular masses in the upper and middle right lobe, interpreted as probable calcifications after primary TB. Abdominal ultrasound proved not to be relevant. Head CT revealed an arachnoid cyst between the cerebellar hemispheres and mastoiditis related to recent surgery. Thus, the patient was transferred to the otolaryngology department.

At the time of admission, the patient presented with fatigue and a fever of 38°C. No relevant abnormalities in general laboratory tests were detected. Head MRI revealed numerous hyperintense foci in T2 and FLAIR with areas of cerebral oedema in the occipital lobes and generalised leptomeningeal enhancement suggestive of the initial phase of the inflammatory process (Fig. 1A and 2A). Therefore, the patient with suspected encephalitis was transferred to our department. At the same time, a positive result of the QuantiFERON test was obtained.

Physical examination revealed a weakened child with full logic contact, positive Kernig sign, and diminished patellar reflex on the right side. The overnight patient condition was deteriorating with 4 cm nuchal rigidity, bradycardia, and generalised seizures, Glasgow Coma Scale (GCS) 10. A lumbar puncture was performed, and the cerebrospinal fluid (CSF) showed pleocytosis of 330 cells/μl with 65% lymphocytes (result corrected – traumatic tap), lowered glucose and chloride level, and increased protein level (Table 1). Additionally, histopathological assessment of cholesteatoma revealed chronic granulomatous inflammation. Considering the patient's clinical condition, test results, and history, anti-TB treatment was initiated comprising a four-drug regimen – rifampin (15 mg/kg), isoniazid (10 mg/kg), pyrazinamide (35 mg/kg), and streptomycin (20 mg/kg). After two weeks the therapeutic regimen was changed to rifampin, isoniazid, pyrazinamide, and ethambutol (20 mg/kg). Anti-HIV antibodies test was negative. Throughout the initial two months of therapy, dexamethasone was given, tapering after the first month. In the third week of hospitalisation, positive cultures for *Mycobacterium tuberculosis* complex both in gastric aspirates (community hospital, positive after 18 days of culture) and CSF (positive after 17 days of culture) were obtained. The patient's

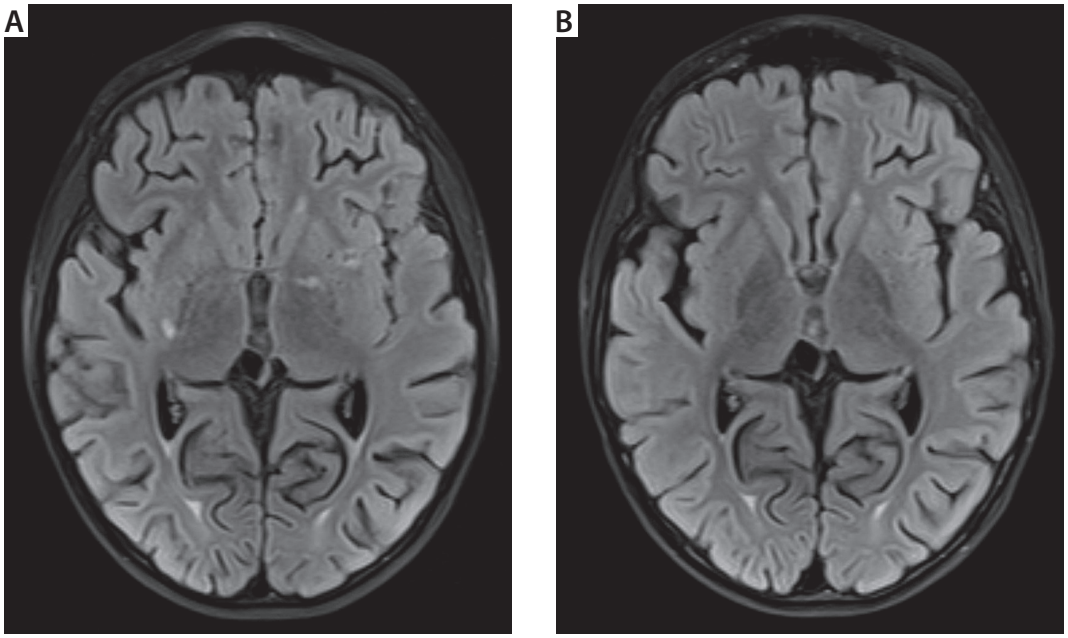

FIGURE 2. Head MRI – T1 weighing, transverse cut (**A**) hypertensive foci visible bilaterally in globus pallidus (SWI sequence with low signal foci – not presented); image suggestive for haemorrhage within ischaemic lesions and inflammation of the small vessels, (**B**) partial regression of lesions

TABLE 1. Results of cerebrospinal fluid general analysis in the reported patient

Cerebrospinal fluid	27.03.2015 (before therapy)	8.04.2015 (2 weeks of therapy)	28.05.2015 (2 months of therapy)	1.07.2015 (3 months of therapy)	30.09.2015 (6 months of therapy)
Appearance	Colourless, crystal clear	Colourless, crystal clear	Colourless, crystal clear	Colourless, crystal clear	Colourless, crystal clear
Erythrocytes	3000/µl	500/µl	15/µl	5/µl	10/µl
Leucocytes	350/µl	247/µl	10/µl	2/µl	3/µl
Protein	126 mg/dl	103 mg/dl	55 mg/dl	50 mg/dl	20 mg/dl
Glucose	37 mg/dl	23 mg/dl	37 mg/dl	40 mg/dl	44 mg/dl
Chloride	114.4 mmol/l	112 mmol/l	126 mmol/l	125 mmol/l	123 mmol/l
Differential	MNC – 65% PNC – 35%	MNC – 94% PNC – 6%	–	–	–

MNC – mononuclear cells, PNC – polymorphonuclear

condition was gradually improving; in the third week of treatment he was fully alert, physically active, with GCS 15. Therapy with the four-drug regimen was managed for three months and subsequently transitioned into isoniazid and rifampin, which was continued for the subsequent 10 months. The patient was repeatedly hospitalised for 12-month-long treatment. Subsequent MRI (Fig. 1B and 2B) and CSF general analysis (Table 1) showed gradual improvement. Successive CSF and gastric aspirates culture showed no growth for *Mycobacterium tuberculosis* complex.

WISC-R test was performed during the last hospital stay with a general result of 124 IQ score. One year after discharge from the hospital, the boy's symptoms resolved, leaving no neurological deficits.

DISCUSSION

Once TBM is suspected, early implementation of treatment dramatically improves the outcome; long-term sequelae or death are seen more frequently in patients in severe stage at the time of admission [4]. Diagnosis of otic TB should be considered in a patient not responding to standard antibiotic treatment [5]. According to case studies of TB published recently [6–10], a significant proportion of described cases had no apparent contact with an infected family member. Only one case was present in a child with a proven history of BCG vaccination. Our patient, however, was vaccinated and had contact with his biological mother. Moreover, no underlying conditions that could increase the risk of TB were detected. The de-

scribed children developed characteristic abnormalities in CSF and in brain imaging, which disappeared in control scans, thus hydrocephalus was developed in several cases.

CONCLUSIONS

Prompt diagnosis and adequate treatment are lifesaving. In the presented case, the disease proceeded in typical three phases. Although the therapy was implemented relatively late, the outcome was finally favourable for the patient. It is worth stressing the long interval between the boy's exposure to a probable source (biological mother) and the onset of the disease. The inverse relation between the delay in the start of adequate treatment and the clinical outcome makes early diagnosis of TBM essential.

DISCLOSURE

The authors declare no conflict of interest.

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