TRANSCRANIAL DOPPLER IN TUBERCULOUS MENINGITIS: A CASE STUDY

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SUMMARY – Tuberculous meningitis has a highly variable presentation. Difficulties in establishing the diagnosis of tuberculous meningitis have been well recognized. Unusual manifestations of tuberculous meningitis are nowadays quite frequently seen, with an increasing incidence of the disease in the general neurology practice. A 44-year-old woman presented with progressive loss of vision on the left eye in the past two days and two episodes of seizures (partial and secondary generalized). One week before that, she had transient diplopia, blurred right vision, and gait unsteadiness. There was no past history of systemic tuberculosis. Transcranial Doppler findings first suggested that it was a basal pathologic process with vascular involvement, which was not clear from clinical history and examination. Computed tomography or angiography findings. Our opinion is therefore that every case of specific meningitis, infectious retrobulbar neuritis and opticocochlear arachnoiditis should be additionally examined with transcranial Doppler. Thus, more reliable information concerning complications due to specific arteritis could be obtained.

Keywords: Central nervous system diseases – ultrasonography; Bacterial infection – ultrasonography; Tuberculosis, meningitis – ultrasonography; Blood flow velocity; Case report

Introduction

Unusual manifestations of tuberculous meningitis (TM) are nowadays quite frequently seen, with an increasing incidence of the disease in the general neurology practice. The clinical picture may be non-specific, presenting as chronic meningitis, and may be modified by various complications without the evidence of meningeal irritation. Within the central nervous system (CNS), hydrocephalus, tuberculosis and tuberculous vasculitis are the most important complications. Proliferative changes with localized exudate are frequently seen in inflamed vessels of the meninges, that lead to panarteritis. Terminal segment of internal carotid artery (ICA) and proximal portions of middle (MCA) and anterior (ACA) cerebral arteries are most frequently involved with inflammatory exudate. Currently, transcranial Doppler (TCD) is used for non-invasive detection of changes in blood flow velocities of basal cerebral arteries involved in bacterial meningitis, cysticercotic arachnoiditis, and TM.

The purpose of the report is to discuss the role of early TCD in reaching definitive diagnosis, in addition to computed tomography (CT), cerebral angiography (CA), magnetic resonance imaging (MRI), and leptomeningeal biopsy.

Case Report

A 44-year-old woman presented with progressive loss of vision on the left eye in the past two days and two episodes of seizures (partial and secondary generalized). One week before that, she had transient diplopia, blurred right vision, and gait unsteadiness. There was no past history of systemic tuberculosis (TBC). On admission, the patient had unremarkable general examination. Neck stiffness, Kernig and Brudzinski signs were not found. Bilateral anosmia and amnusia on the left eye, slight horizontal nystagmus, and diminished left direct pupillary reaction were observed. Motor functions were intact. Tendon reflexes were normal and there were no sensory changes. Higher cortical functions, memory and judgment, were

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preserved. All laboratory tests were normal. Cerebrospinal fluid (CSF) examination showed cell count 120/mm³, protein content 92 mg/dL, and glucose 34 mg/dL. CSF microbiology tests were negative for common bacteria as well as for toxoplasmosis, echinococcosis, cryptococcosis, aspergillosis, candidiasis, VDRL and HIV Mantoux reaction was negative.

Doppler ultrasound of extracranial ICAs showed asymmetry in BFVs (2.5 kHz on the left side vs. 1.2 kHz on the right side). TCD revealed focal accelerated systolic, diastolic and mean BFV were recorded in the left MCA (mean 133 cm/s), along with a turbulent flow pattern vs. mean BFV of 97 cm/s in the right MCA (Fig. 1a). CT showed a small hypodense lesion in the right temporal region. On
contrast enhancement, a few aneurysm-like formations located at the circle of Willis were seen, mainly on the right posterior communicating artery (Fig. 1b). Angiography demonstrated a narrowed and dislocated left initial part of the MCA (M1 segment) (Fig. 1c). MRI showed many subependymal nodules in the chiasmal cistern with propagation along the course of both MCAs and basilar artery (Fig. 1d). There was obliteration and compression of the optic chiasm. The left carotid siphon was relatively stenotic. There were a few hypointensity T2 and hyperintensity T1 lesions in the subcortical left frontal basal and temporal polar areas, due to brain edema.

The patient underwent surgical decompression of the opticocochlear space. A parachiasmal abscess (tuberculum) was evacuated. Macroscopically, the lesions were nodular, encapsulated and granulomatous. Leptomeningeal biopsy showed a histopathologic picture of TM: lymphocyte infiltrates around the blood vessels, connective tissue with formation of caseous granuloma – areas of caseous necrosis surrounded by epithelioid cells, lymphocytes and Langhans’ type of giant cells. On fluorescent microscopy, there was no evidence of TBC bacteria. Biopsy result and positive polymerase chain reaction pointed to the diagnosis of TM.

Upon histologic verification, three tuberculostatic medications (isoniazid, ethambutol and rifampicin) and corticosteroids were started with remarkable clinical improvement. Vision impairment on the left eye regressed spontaneously (up to 20/100 with residual parafoveal scotoma and nasal visual loss) within six months. On 9-month follow-up, the MCA BFVs were within the same range.

Discussion

Tuberculous meningitis has a highly variable presentation. Difficulties in establishing the diagnosis of TM have been well recognized. The absence of predisposing factors, i.e. immunosuppression from a known disease or drug therapy, medical history or evidence for extra- meningeal tuberculosis, was not suggestive of TM in our patient. The prodromal period of nonspecific symptoms, elevated temperature, malaise, headache, vomiting, mental and behavioral alterations were also absent. The lack of meningeal symptoms and focal neurologic deficits delayed the diagnosis at presentation. The only typical symptoms of TM were vision impairment and cranial neuropathy involving the first and third cranial nerves. CSF findings were suggestive of TM (lymphocyte predominance with raised protein and modestly lowered glucose level). The definitive diagnosis was based on the typical histology result and CSF positive PCR for TBC.

CT and MRI are rarely specifically diagnostic but are very suggestive of CNS tuberculosis, describing the evidence of hydrocephalus, basal meningeal thickening, infarcts, edema and tuberculomas. These methods are useful in identifying complications and in follow-up [9]. In the present case, CT imaging did not reveal basal meningeal enhancement but erroneously indicated aneu-
zygms on contrast application, as previously reported. The enhanced CT lesions in fact were small tuberculomas in the subarachnoid space, later confirmed on neurosurgery.

TCD findings first suggested that it was a basal pathologic process with vascular involvement. It was not clear from the clinical history and examination, CT or angiography. The TCD stenotic pattern of MCA and ICA as well as the MRI picture of chronic basal meningitis were the first noninvasive methods to suggest an inflammatory process.

The present case raises some important questions, such as whether it is necessary to examine every case of TM and meningocoelephalitis with TCD. Also, whether TCD detection of cerebral arteries in TM could be used in evaluating the effect of treatment.

Despite all methods conventionally used in the diagnosis and management of TM patients, our opinion is that every case of specific meningitis, infectious retrobulbar neuritis and optoacoustic arachnoiditis should be additionally examined with TCD. Thus, more reliable information concerning complications due to specific arteries will be obtained.

References
Sažetak

TRANSKRANIJSKI DOPPLER KOD TUBERKULOZNOG MENINGITISA: PRIKAZ SLUČAJA

E. Vasileva, M. Klisađević i M. Đorđević

Tuberkulozni meningitis pokazuje velike razlike u manifestaciji. Dobro su poznate teškoće u postavljanju dijagnoze tuberkuloznog meningitisa. Današ se vrlo često bilježe neusmiljene manifestacije tuberkuloznog meningitisa, uza sve veću incidenziju sve bolesti u općoj sanitetskoj praksi. Žena u dobi od 44 godine primljena je s progresivnim gubitkom vid na lijevonjoku kroz prethodna dvu dana i dvjema epidemolama konvulsija (sjelomične i sekundarne generalizirane). Tijekom dana prije toga imala je prolarne dvusliku, zamagljen vid i nesiguran hod. Nije imala anamnezu sistemskog tuberkuloze. Nalaz transkranijskog Dopplera je bio prvi koji je ukazao na to da se radi o bazálnom pancitokrom procesu sa zahvaćenim krvnim žilama, što nije bilo jasno iz kliničke anamneze i pregleda, kao ni iz nalaza komputertomografije i angio gramije. Stoga je našo mišljenje da pregled transkranijskim Dopplrom treba provestiti u svakom slučaju specifičnog meningitisa, infektnog retrombokarnog neuritis i otrivokazarnskog arahnoiditisa. Time bi se dobili pouzdaniji podaci o komplikacijama uzrokovanim specifičnim arteritisom.

Ključne riječi: Bolovi sredinični trigemin,であった - adstronomografija, Rukotvrdanja infekcija - adstronomografija, Tuberkuloza, meningitis - adstronomografija, Brzina protoka krvci, Prikaz slučaja