

## Case Report

## Meningeal Disease Masquerading as Transient Ischemic Attack

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*Background:* Cortical subarachnoid hemorrhage and meningitis sometimes present as episodes of transient neurologic dysfunction mimicking transient ischemic attack (TIA). In the present study, we sought to determine the frequency of meningeal disease among patients treated in a TIA clinic. *Methods:* Data from patients consecutively admitted to a TIA clinic were retrospectively analyzed. Patients were classified as ischemic events (TIA or minor stroke) or nonischemic events using clinical data and findings from brain imaging and ultrasound studies. *Results:* Of 529 patients (mean age 63.5 years), 134 (25.3%) were classified as nonischemic events. Meningeal disease was the likely cause of clinical symptoms in 9 patients (1.7%; 95% confidence interval, .6%-2.8%) including 5 patients with meningitis (1 meningeal sarcoidosis, 1 rheumatoid meningitis, 1 myelomatous meningitis, 1 lymphomatous meningitis, and 1 herpes simplex virus 1 meningoencephalitis) and 4 patients with cortical subarachnoid hemorrhage (probably or possibly related to cerebral amyloid angiopathy in 3 patients). Clinical symptoms comprised motor deficit, sensory deficit, aphasia, and dysarthria. Transient neurologic dysfunction was recurrent in 7 of 9 patients. Duration of transient episodes ranged from 5-30 minutes. No patient suffered headache. No patient had nuchal rigidity. Magnetic resonance imaging (MRI) showed evidence of meningeal or meningocerebral disease in all 9 patients. *Conclusions:* Our study confirmed that serious meningeal disease could present as TIA, but this disease was relatively uncommon among patients treated in a TIA clinic. The findings highlight the diagnostic value of MRI in patients with suspected TIA. **Key Words:** Transient ischemic attack—meningeal or meningocerebral disease—cortical subarachnoid hemorrhage—cerebral amyloid angiopathy—meningitis—MRI.

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## Introduction

Rapid recognition of transient ischemic attack (TIA) is important because patients with TIA may be at immediate risk of stroke.<sup>1</sup> The sooner the patients with TIA are assessed and treated, the better the outcome.<sup>2</sup> However, a substantial number of patients referred to TIA services are found to have experienced nonischemic events.<sup>3-8</sup> A wide variety of diseases can cause transient focal neurologic symptoms mimicking TIA.<sup>4,9</sup> Isolated cortical subarachnoid hemorrhage probably related to cerebral amyloid angiopathy has been increasingly reported as a cause of recurrent neurologic spells in recent years.<sup>10-12</sup>

There are also reports of meningitis revealed by transient focal neurologic symptoms.<sup>13-17</sup> Yet, the frequency of these diseases among patients with suspected TIA is unknown. The primary objective of the present study was to determine the rate of meningeal disease in patients referred to a TIA clinic. A secondary objective was to describe clinical and radiologic findings of these patients.

## Methods

Data from patients consecutively referred to the outpatient TIA clinic between August 2010 and March 2012 were retrospectively analyzed using the electronic database of our institution. Patients with transient focal neurologic symptoms were admitted to the clinic after a phone call to the vascular neurologist who estimated the likelihood of TIA. Patients with symptoms unlikely to be related to TIA, such as syncope, were reoriented to the emergency department. The initial workup in patients admitted to the clinic was performed on the day of admission. This workup included clinical assessment by a vascular neurologist, calculation of the ABCD2 (age, blood pressure, clinical deficit, duration, diabetes) score, electrocardiogram, routine blood studies (complete blood cell count, prothrombin time, activated partial thromboplastin time, C-reactive protein, fibrinogen, D-dimer, serum electrolytes, and creatinine and glucose concentrations), brain magnetic resonance imaging (MRI), transcranial color-coded sonography, and cervical duplex. Final classification of a patient as ischemic event (probable or possible TIA, or minor stroke) or nonischemic event was made by the vascular neurologist based on the findings of the initial workup. A minor stroke was defined by the presence of an acute ischemic lesion on brain imaging, whatever the duration of clinical symptoms.

MRI was performed with two 1.5-T MRI systems (Philips Gyroscan NT Intera [Amsterdam, The Netherlands] and Siemens Magnetom Avanto [Erlangen, Germany]). A fast imaging protocol including axial fluid-attenuated inversion recovery (FLAIR) sequence, diffusion-weighted images (DWIs) ( $b = 0-1000 \text{ mm}^2/\text{second}$ ), and 3-dimensional time-of-flight MR angiogram of the circle of Willis was performed in all patients. T2\* gradient echo and contrast-enhanced T1-weighted images were subsequently acquired in selected patients with abnormal findings on the initial fast imaging protocol. A computed tomography (CT) scan with CT angiography was performed if MRI was unavailable and in patients with contraindication to MRI such as a pacemaker. All MRI and CT scans were analyzed by a senior neuroradiologist.

The study was approved by our Institutional Review Board. Because the study was retrospective and data had been acquired as part of routine patient care, no informed consent was required.

## Results

A total of 529 patients were admitted to the TIA clinic during the study period. There were 273 men and 256 women with a mean age of 63.5 years (range, 16-98 years). MRI was performed in 457 patients (85.8%). The final diagnosis was as follows: minor stroke, 102 patients (19.2 %); probable TIA, 227 patients (42.9%); possible TIA, 66 patients (12.4%); and nonischemic event, 134 patients (25.3%).

Causes of nonischemic events are listed in [Table 1](#). Migraine with aura was the most common cause, followed by peripheral vestibular disorders, epilepsy, and functional disorders. Meningeal disease was found in 9 of 529 patients (1.7%; 95% confidence interval, .6%-2.8%) and ranked fifth as a cause of nonischemic event. Causes of meningeal disease and patient characteristics are detailed in [Table 2](#). There were 4 patients with cortical subarachnoid hemorrhage of whom 3 had probable or possible cerebral amyloid angiopathy according to the Boston diagnostic criteria<sup>18</sup> ([Fig 1](#)). The cause of cortical subarachnoid hemorrhage was undetermined in the remaining patient. Five patients had meningitis including 1 meningeal sarcoidosis ([Fig 2](#)), 1 herpes simplex virus 1 (HSV1) meningoencephalitis, 1 rheumatoid meningitis, 1 myelomatous meningitis ([Fig 3](#)), and 1 lymphomatous meningitis. All cases of meningitis were suspected based on the findings of the fast protocol MRI and confirmed by cerebrospinal fluid analysis or meningeal biopsy. Patients with meningeal disease included 8 women and 1 man. Their mean age was 75.5 years (range, 59-88 years). Clinical symptoms comprised motor deficit,<sup>4</sup> sensory deficit,<sup>4</sup> aphasia,<sup>3</sup> and dysarthria.<sup>2</sup> Clinical symptoms were transient and recurrent in 7 of 9 patients. Duration of transient

**Table 1.** Final diagnosis in 134 patients with TIA mimic

Causes of TIA mimics	N (%)
Migraine with aura	30 (22.3)
Peripheral vestibular disease	19 (14.1)
Epilepsy	17 (12.7)
Functional disorder, anxiety	13 (9.7)
Meningeal disease	9 (6.7)
Transient global amnesia	6 (4.5)
Vagal syncope	6 (4.5)
Ocular disease	4 (3)
Metabolic disorder, overmedication, and alcohol abuse	4 (3)
Peripheral neuropathy	3 (2.2)
Cardiac syncope	3 (2.2)
Orthostatic hypotension	2 (1.5)
Confusion	2 (1.5)
Other	16 (11.9)

Abbreviation: TIA, transient ischemic attack.

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