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The Official Journal of the American Academy of Neurology

AMERICAN ACADEMY OF NEUROLOGY®

Neurology Publish Ahead of Print
DOI: 10.1212/WNL.0000000000010756

Teaching NeuroImages: Tuberculous meningitis: Remembering the Rich focus

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Word Count
Title: 73 characters
Case: 103 word; Figure legend: 50 words
Figure: 1; Table: 1
References: 2

Study Funding: No targeted funding reported.

Disclosure: The authors report no disclosure relevant to the manuscript.

Case description:

Tuberculosis (TB) infection can seed in the meninges or cortex as silent caseous foci. TB meningitis occurs when one of these foci - the Rich focus[1] - ruptures and releases *Mycobacterium tuberculosis* bacilli into the subarachnoid space.[2] This natural history has rarely been confirmed *in-vivo*.

A 40-year-old female with a history of latent TB infection treated in childhood presented with acute fever and headache, and was diagnosed with TB meningitis. Three years before, an incidental leptomeningeal abnormality was identified during evaluation for concussion (figure 1) but investigations yielded no etiology (table 1). In retrospect, we concluded that it represented a longstanding Rich focus.

Teaching Slides-http://links.lww.com/WNL/B203

References

1. Rich AR, McCordock HA. The pathogenesis of tuberculous meningitis. Bull Johns Hopkins Hosp 1933:2-37.

2. Donald PR, Schaaf HS, Schoeman JF. Tuberculous meningitis and miliary tuberculosis: The rich focus revisited. J Infect 2005;50:193-195. doi: 10.1016/j.jinf.2004.02.010.

Figure 1. Evolution of leptomeningeal abnormality over three years leading up to the clinical presentation with tuberculous meningitis

Images from MRI brain acquired three years prior to presentation with meningitis (A: axial T1 post-contrast, B: sagittal T1 post-contrast) and on the day of presentation with meningitis (C: axial T1 post-contrast, D: sagittal T1 post-contrast). Arrows indicate the areas of nodular leptomeningeal enhancement which expanded over the three-year interval.

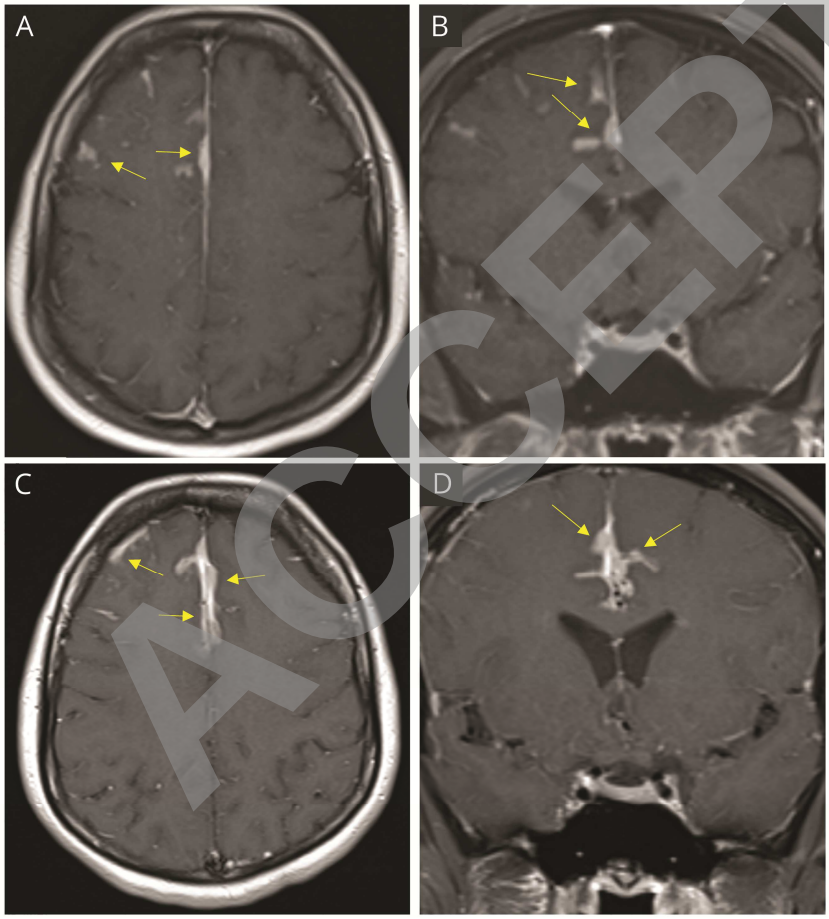

Table 1. Results of cerebrospinal fluid studies and other relevant investigations

	3 years prior to meningitis	At presentation with meningitis
CSF white cell count (tube 4)	1 per mm^3	213 per mm^3
Lymphocytes	100%	56%
Neutrophils	0%	42%
CSF red cell count (tube 4)	0 per mm^3	8 per mm^3
CSF protein (normal 15.0-45.0)	47.7 mg/dL	114.5 mg/dL
CSF glucose	57 mg/dL	38 mg/dL
CSF oligoclonal bands	Not tested	Negative
CSF IgG index (normal 0.2-0.8)	Not tested	0.52
Serum glucose	91 mg/dL	105 mg/dL
Glucose CSF:serum ratio	0.63	0.36
CSF bacterial, mycobacterial and fungal cultures	No growth	Positive for mycobacterium tuberculosis
CT chest, abdomen, pelvis	A single 0.4 cm calcified granuloma in the right lung and a few small calcified lymph nodes in the mediastinum	No change to previous findings
FDG-PET body	No areas of abnormal metabolic activity. No evidence of sarcoidosis or malignancy.	-

CSF=cerebrospinal fluid, CT=computed tomography, FDG=fluorodeoxyglucose, PET=positron emission tomography.

Appendix 1: Authors

Name	Location	Contribution
Olwen C. Murphy MBBCh MRCPI	Johns Hopkins Hospital and Johns Hopkins School of Medicine	Analyzed the data; drafted the manuscript for intellectual content
Carlos A. Pardo, MD	Johns Hopkins Hospital and Johns Hopkins School of Medicine	Design and conceptualized study; analyzed the data; reviewed the report for intellectual content