

Stroke In Paediatric Pneumococcal Meningitis

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Introduction

Central nervous system infection is an important cause of childhood stroke, although there are relatively few large series. Before routine infant pneumococcal immunization (introduced in the UK in 2006), and improved access to neuro-imaging, reported figures suggest 8% of children¹ and 25% of adults² with pneumococcal meningitis suffered stroke.

Methods

- Retrospective review of all paediatric cases of pneumococcal meningitis treated within the Wessex region
- 24 months April 2007 to March 2009 inclusive
- Case notes, laboratory results and imaging review

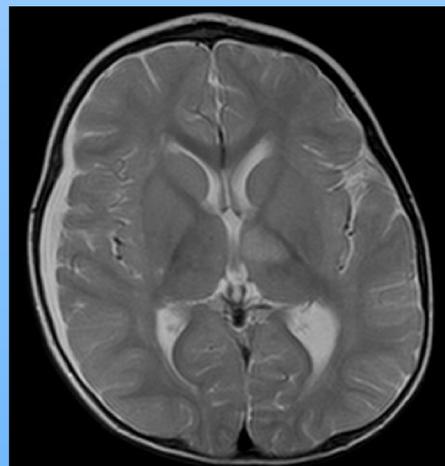
Results

- Total of 20 patients treated for pneumococcal meningitis
- 8 cases of stroke and/or cerebrovascular disease (see table) identified
- 40% (8/20) children with pneumococcal meningitis suffered stroke and/or cerebrovascular disease

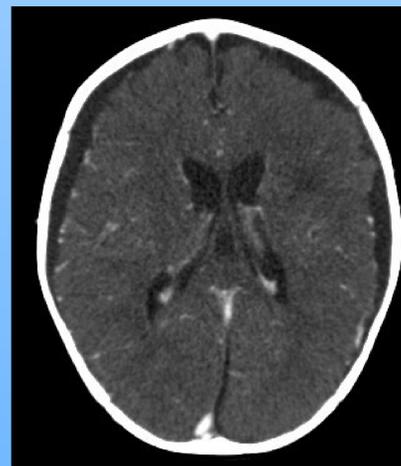
Age (months)	Sex	Clinical manifestations and timing of onset (0 = day antibiotics started)				Infarct Location	Imaging: Other	Outcome
		Vomiting	Fever	Seizures	Hemiparesis			
2	M	-2	-3	0	-	R. transverse sinus thrombosis	L>R subdural effusions	Mild hearing impairment
2	M	-1	-4	0 focal	-	Bilateral transverse sinus thrombosis L. parietal infarct	Patchy bilateral white matter low attenuation	Mild developmental delay
11	M	-4	-4	0 focal	+1	Hypoperfusion injury affecting cortex in cerebellar watershed zones & L. cerebral hemisphere. Later entire cerebral hemisphere volume loss	MRA L. posterior cerebral artery (P1) anomaly Normal MRV	R. hemiparesis, bilateral hearing loss, renal failure (haemodialysis dependant)
12	M	-	-1	0	-	Multiple infarcts consistent with occlusion of basal perforators and superficial branch vessels	Ventricular dilatation (periventricular white matter loss), effusion	Blind, deaf, spastic quadraparesis hydrocephalus, seizures
14	M	-3	-3	-	+10	L. thalamic infarct	Some areas of white matter signal abnormality on delayed MRI	R. weakness Deaf
46	M	-1	-4	0 focal	-	L. parietal region infarct	Effusion	R. weakness Visual impairment
82	F	0	0	0	-	L. basal ganglia, thalamus & hypothalamus and bilateral inferior cerebellar infarcts	Ventricular dilatation and cerebellar tonsil descent	Mild R. hemiplegia Focal seizures
86	F	-2	-2	0 focal	-	Widespread cortical laminar necrosis Cervical cord and cerebellar tonsil ischaemia	Effusion	R>L weakness Deaf



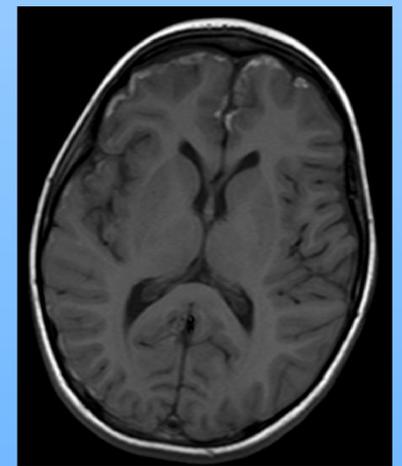
Venous Infarct



Left Thalamic Infarct



Lacunar Infarct and Subdural Effusions



Cortical Laminar Necrosis

Laboratory Findings:

- Initial CSF in 3 patients: WCC 2, 626, 992 /mm³
Protein 2394, 1754, 1371 mg/L
Glucose ≤ 1 mmol/L in all
- Pneumococcal serotype isolated in 5:
1, 7F, 7F, 15C, 19A
- Both patients with venous sinus thrombosis had haematological indices consistent with iron deficiency

Treatment:

- 7/8 patients treated with dexamethasone
- All 3 patients with focal stroke in an arterial distribution were treated with aspirin
- Both patients with venous sinus thrombosis were anticoagulated with heparin and subsequently clexane

Outcome:

- All survived with varying degrees of impairment (see table)

Conclusions

- Although the incidence of pneumococcal meningitis has reduced since the introduction of routine infant immunization, 40% of paediatric patients within Wessex in the last 2 years with pneumococcal meningitis had stroke/cerebrovascular disease
- Improved access to modern emergency imaging may have increased stroke recognition
- Further research is required to establish the current incidence, the relative importance of host and organism in stroke aetiology, and the effect of advanced imaging on treatment strategies and outcome.

References:

1. Chang et al QJ Med 2003;96:755-62
2. Kastenbauer et al. Brain 2003;126:1015-1025