Is hearing assessed after bacterial meningitis?

H M Fortnum, D Hull

Abstract

A questionnaire was sent to 686 paediatricians in the UK to discover whether or not they referred children for hearing assessment after bacterial meningitis and if not, why not; 90% replied. Of these, 10% did not refer all children. The reasons given were based on misunderstandings of the aetiology and not on a lack of provision.

(*Arch Dis Child* 1992;**67**:1111–2)

Bacterial meningitis is still a serious and not uncommon infection in childhood. The mortality rate has fallen to below 10%[1 2] but is still significant and is higher in neonates.[3] The prevalence of neurological sequelae is also high.[4] The incidence of hearing impairment after bacterial meningitis has been reported to be anything from 6 to 31% depending on the type of meningitis studied and the type and severity of hearing impairment included.[5]

Total hearing loss is devastating to the development of speech, particularly in very young children when its presence may go undetected. Partial or unilateral hearing impairment in children of all ages likewise may go undetected as the child unknowingly compensates and vital stimulation may be missed, particularly in the early years at school.[5]

This study was designed to discover what provision is routinely made for hearing assessment after treatment for bacterial meningitis in the UK.

Methods

A questionnaire was sent to each of the 686 members of the British Paediatric Association practising in the UK. A reminder was sent to non-respondents four weeks later.

The questionnaire was short. The key question was 'Do you routinely refer *all* children recovering from bacterial meningitis for formal hearing assessment?' If the answer was 'No' the respondent was asked to give his or her reasons with three closed choice suggestions and two open ended ones. If the answer was 'Yes' the respondent was asked to indicate how long after discharge from hospital the child would routinely be referred. Finally, there was an opportunity to make additional comments on postmeningitic hearing problems.

Results

The response rate to the first mailing was 75·4% (n=518). One reminder boosted this to 90·1% (n=619). This exceptionally high response for a survey of practice means that the results are highly representative.

Of the 613 replies to the first and main question about routine referral, 504 said that they did refer all children recovering from bacterial meningitis for formal hearing assessment, 60 that they did not, and 49 stated that they never saw children with acute meningitis (six replies missing). Thus, 504 of the 564 (89·4%) paediatricians who routinely see children with bacterial meningitis claim to refer all for formal hearing assessment.

The 60 (10·6%) who answered that they did not routinely refer all children recovering from bacterial meningitis for formal hearing assessment gave reasons as shown in the table. There was no case where the reason for non-referral was a cited lack of available relevant skills for hearing testing in young children. The 32

Reasons given for non-referral by 60 respondents answering that they did not routinely refer all children recovering from bacterial meningitis for formal hearing assessment (total more than 60 as more than one reason could be given)

Reason for non-referral	*No (% of 60 responses)*
(a) Feel it is generally unnecessary to do formal hearing tests following bacterial meningitis	8 (13·3)
(b) Only refer children where there is already some concern over their hearing	38 (63·3)
(c) Only refer for hearing tests those children who meet some other criterion	27 (45·0)*
(d) The relevant skills for hearing testing in young children are not available	0
(e) Other reason	5 (8·3)*

*Other reasons given:

Age	*No*	*Severity*	*No*	*Bacterium*	*No*
<10 years	1	More seriously ill	10	Severe meningococcal	1
<5 years	5	Complications	3	*Haemophilus influenzae*	1
<3 years	2	Purulent discharge	1	Pneumococcus	2
<2 years	2	Impaired speech	1	*Haemophilus influenzae* and pneumococcus	3
<1 year	1	Raised intracranial pressure	1		
<6 months	1				

MRC Institute of Hearing Research, Nottingham University, University Park, Nottingham NG7 2RD
H M Fortnum

Department of Child Health, University Hospital, Queen's Medical Centre, Nottingham
D Hull

Correspondence and requests for reprints and copies of the questionnaire to: Dr Fortnum.

Accepted 11 May 1992

respondents who answered positively to parts (c) and (e) based their decision on age, severity of the illness, and/or the infecting organism.

Of the 504 positive reports of routine referral, 271 (53·8%) claimed to refer children immediately on discharge, 230 (45·6%) at the first outpatient appointment, and three (0·6%) at some later time. The responses indicate that about 60% of children are referred within three months and all within a year of discharge.

The majority of the additional comments about postmeningitic hearing impairment (n=62) indicated that cases of hearing impairment were seen very infrequently, eight respondents having never seen a case. Other comments concerned factors possibly associated with hearing impairment (n=28). Some of these were based on misunderstandings of the aetiology. Thirteen respondents stated that hearing impairment *only* followed infection with *Streptococcus pneumoniae* or *Haemophilus influenzae*. At least three doctors thought that the referral was not urgent and one thought that the routine distraction test of hearing at 8 months was a sufficient safety net for children younger than this age.

Comments in 25 cases concerned problems with assessing the children including long waiting lists for audiology, lack of direct access to the audiology service, and the lack of age appropriate testing skills.

Discussion

The results of this survey are very encouraging. They indicate that, in general, paediatricians are aware of the need for formal hearing assessment and are including this as part of their routine management. It is to be hoped that these good intentions are always translated into good practice.

The results indicate that doctors who say that they do not always refer are basing their decisions most often on a clinical concern over the child's hearing. This implies that paediatricians are acting as the first screen of hearing ability after bacterial meningitis. The accurate bilateral testing of young children is difficult even in the best surroundings and impossible in a busy ward or outpatient clinic. A child who appears to hear in such circumstances may none the less have a mild to moderate bilateral or a unilateral impairment.

Whether age is an appropriate referral criterion must be determined from good quality epidemiological data, but no satisfactory study so far supports the restriction to those under 3 years. This cut off would not reduce the workload of the audiological services by an appreciable amount as the majority of cases occur under this age, but it would mean that some children with damage to their hearing would be missed.[6]

Referral based on the bacterium responsible would also miss some children with hearing impairment as hearing impairments have been found after meningitis due to each of the major infective organisms.[6]

In our view, when to refer postmeningitic children should not be in question. Referral should be made while the child is still in hospital and the importance of the assessment stressed to the parents. The assessment should ideally take place four to six weeks after discharge to allow for resolution of any associated conductive impairment and to ensure that profound hearing impairments are detected early enough to enable a cochlear implant to be a viable option.

Our thanks go to the paediatricians who took the time to answer and return the questionnaire and to Professor Mark Haggard and Dr Adrian Davis for helpful comments.

1 Salwen KM, Viskerfors T, Olcen P. Increased incidence of childhood bacterial meningitis. A 25-year study in a defined population in Sweden. *Scand J Infect Dis* 1987;**19**:1–11.
2 Carter PE, Barclay SM, Galloway WH, Cole GF. Changes in bacterial meningitis. *Arch Dis Child* 1990;**65**:495–8.
3 de Louvois J, Blackbourn J, Hurley R, Harvey D. Infantile meningitis in England and Wales: a two year study. *Arch Dis Child* 1991;**66**:603–7.
4 Brookhouser PE, Auslander MC. Aided auditory thresholds in children with postmeningitic deafness. *Laryngoscope* 1989;**99**:800–8.
5 Brookhouser PE, Auslander MC, Meskan ME. The pattern and stability of postmeningitis hearing loss in children. *Laryngoscope* 1988;**98**:940–8.
6 Finitzo-Hieber Y, Simhadri R, Hieber JP. Abnormalities of the auditory brainstem response in post-meningitis infants and children. *Int J Pediatr Otorhinolaryngol* 1981;**3**:275–86.

Toxic shock-like syndrome caused by adenovirus infection

K Bojang, M D S Walters

Infectious Disease Unit, Hospitals for Sick Children, London
K Bojang
M D S Walters

Correspondence to:
Dr MDS Walters, Infectious Disease Unit, Department of Paediatrics, St Mary's Hospital, Praed Street, London W2 1NY.

Accepted 6 May 1992

Abstract

Adenovirus infections commonly occur in childhood and produce a wide range of clinical disease. The most common sites of infection are the respiratory and gastrointestinal tracts but involvement of cardiovascular, neurological, cutaneous, ophthalmic, renal, and hepatic systems can also occur. A case of toxic shock-like syndrome with symptoms of multiorgan involvement resulting from adenovirus infection is reported.

(*Arch Dis Child* 1992;**67**:1112–4)

Case report

Four weeks after returning from a two month holiday in the Philippines and Australia a 5 year old girl developed abdominal pain, fever, and vomiting. Over the subsequent four days she developed an erythematous maculopapular rash on her abdomen, profuse watery diarrhoea, and was admitted to the referring hospital. At the initial examination she had fever, cervical lymphadenopathy, and was dehydrated. She was rehydrated with normal saline and started on flucloxacillin and cefuroxime. Over the next 24 hours her serum sodium concentration