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Prevention of intracranial problems in ear and sinus surgery: a possible role for cefotaxime

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Abstract
Cases of intracranial sepsis of otorhinogenic origin presenting to a regional neurosurgical centre from 1984 to 1992 were examined with regard to their microbiology and antibiotic sensitivities. The results lead us to believe that cefotaxime may have a role in the initial ENT management of the potentially complicated case of ear or sinus sepsis.

Key words: Abscess, cerebral, subdural empyema; Microbiology; Cefotaxime; Sinusitis; Otitis media

Introduction

The relationship between otorhinological sepsis and intracranial disease has long been established (Macewen, 1893). ENT surgeons and neurosurgeons have done much to lessen the morbidity and mortality of brain abscess and subdural empyema with computed tomography, improved surgical technique and antimicrobial therapy. Nonetheless ear and paranasal sinus surgery have not removed all risks (Williams, 1983; Browning, 1984) and continued vigilance is required to prevent and diagnose intracranial complications of ENT disease. In this paper the microbiology of ENT related intracranial sepsis is examined with regard to the possible use of more recent antibiotics in the treatment of potentially complicated ear and sinus disease.

Materials and methods

The records of 21 consecutive patients with cerebral abscess or subdural empyema of ear and sinus origin presenting to the Midland Centre for Neurosurgery and Neurology from 1984 to 1992 were examined. The microbiology and antibiotic sensitivities of the isolates from intracranial pus were detailed. No cases were excluded, thus in some patients preliminary sensitivities were available and in more than half antibiotic treatment for the primary source of sepsis had been started either with or without sensitivity testing results being available from bacteriology of extracranial sites.

Results

The primary pathology was sinus disease in 10 patients and ear disease in 11. Details are given in Table I. There was only one fatality (a patient with an ethmoid carcinoma). The organisms isolated from the intracranial pus and their sensitivities are shown in Tables II and III. A sterile culture was obtained in only two cases.

Discussion

The organisms found in this series are similar to those previously reported (Yoshikawa *et al.*, 1975). The low incidence of sterile cultures probably reflects an increased awareness of the role of anaerobes, coupled with the use of appropriate transport media and attention to prompt culturing. The patients in this series represent the most feared complications of otorhinological sepsis, and it is for the prevention of these complications that patients with sinusitis or middle ear cleft infections may be hospitalized.

TABLE I
SUMMARY OF CASES

Case	Pathology	Sepsis	No. of organisms
1	Cholesteatoma	Cerebellar abscess	3
2	Frontal sinusitis	Empyema	1
3	Frontal sinusitis	Empyema	3
4	Cholesteatoma	Temporal abscess	3
5	Mucosal disease	Temporal abscess	0
6	Ethmoid sinusitis	Empyema	1
7	Frontal sinusitis	Frontal abscess	4
8	Frontal sinusitis	Empyema	2
9	Cholesteatoma	Temporal abscess	2
10	Mucosal disease	Temporal abscess	3
11	Frontal sinusitis	Frontal abscess	1
12	Frontal sinusitis	Empyema	1
13	Mucosal disease	Temporal abscess	1
14	Pansinusitis	Empyema and frontal abscess	1
15	Mucosal disease	Temporal abscess	2
16	Mucosal disease	Parietal abscess	1
17	Acute mastoiditis	Cerebellar abscess	1
18	Mucosal disease	Temporal abscess	1
19	Frontal sinusitis	Frontal abscess	1
20	Cholesteatoma	Temporal abscess	0
21	Ethmoid carcinoma	Empyema and frontal abscess	1

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TABLE II
OTOGENIC ORGANISMS

Organism	No. of isolates	Sensitivity of organism			
		Penicillin	Chloramphenicol	Cefotaxime	Metronidazole
Proteus mirabilis	2	0	2	2	0
Diptheroid sp.	1	0	0	1	0
Peptostreptococcus sp.	3	1	2	3	1
Bacteroides sp.	3	0	2	2	3
Staphylococcus aureus	2	1	2	2	0
Streptococcus milleri	1	1	0	1	0
Peptococcus sp.	1	1	0	0	1
Streptococcus sanguis	1	0	1	1	0
Fusobacterium sp.	2	2	2	0	2
Total	16	6	11	12	7

TABLE III
SINOGENIC ORGANISMS

Organism	No. of isolates	Sensitivity of organism			
		Penicillin	Chloramphenicol	Cefotaxime	Metronidazole
Streptococcus milleri	6	4	6	6	1
Staphylococcus aureus	2	1	2	2	0
Bacteroides sp.	3	0	3	3	2
Peptostreptococcus sp.	1	0	1	1	0
Propionebacterium sp.	1	1	1	1	1
Streptococcus sanguis	1	0	1	1	0
Peptococcus sp.	1	0	1	1	1
Fusobacterium sp.	1	0	1	0	0
Haemophilus sp.	1	1	0	1	0
Total	17	7	16	16	5

Certain patients with immediately obvious complications such as post-aural or orbital abscesses will be managed primarily surgically, whilst all will require parenteral antibiotic therapy. The generally recognized antibiotic choices for potentially dangerous ENT infections are the penicillins, trimethoprim, chloramphenicol and metronidazole (Bluestone and Kenna, 1984; Grace and Drake-Lee, 1984). The antibiotic sensitivities in this series of complicated ENT sepsis show that organisms were frequently resistant to the penicillins. Those organisms not sensitive to either cefotaxime or chloramphenicol (only 12 per cent of otogenic and 0 per cent of sinogenic organisms) tended to be sensitive to metronidazole.

Chloramphenicol has previously been recommended as the drug of choice in intracranial sepsis before sensitivities are available because of the low incidence of resistant organisms and its excellent penetration of the blood–brain barrier (Williams, 1982). It was also felt that because of its potentially serious toxicity this drug was seldom used in the community and that the spread of resistance in the population acquiring infections outside hospital was therefore unlikely.

Cefotaxime is an extended spectrum cephalosporin with a low incidence of adverse reactions when compared to chloramphenicol and a spectrum of antibiotic therapy which is at least as good (*ABPI Data Sheet Compendium, 1991–1992*). It has already been suggested that cefotaxime may have advantages over more traditional antibiotic regimens in the therapy of otogenic brain abscesses (Donald *et al.*, 1990) and the evidence from our series suggests that it may be of value in the treatment of those ENT infections with the potential for intracranial complications.

Because cefotaxime is a relatively new antibiotic microbiologists tend to recommend it for use as a second line agent. We would recommend the use of cefotaxime in combination with metronidazole where an apparently appropriately treated ENT infection fails to respond quickly or in an emergency situation before sensitivities are available. An additional advantage of cefotaxime is that it allows consistency of treatment because chloramphenicol is commonly withdrawn early in management and replaced by a less toxic agent. Cefotaxime may also be of value as a prophylactic agent in procedures where the dura is breached such as in translabyrinthine surgery or cranio-facial approaches to the sinuses.

Conclusion

Intracranial complications of ENT sepsis are still an important cause of morbidity and mortality. Otorhinolaryngologists are primarily concerned with the prevention of these complications and, as such, should be aware not only of surgical approaches to disease but also of advances in antimicrobial treatment. We believe that cefotaxime may have a role in the treatment of the potentially complicated case of otorhinological sepsis.

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