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Intracranial complications of sinusitis: the need for aggressive management

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Abstract

Sinus-induced intracranial sepsis can represent a genuine medical and surgical emergency. We review 12 cases presenting to our hospitals over a five-year period. Nine were male and three were female with an age range of 16 to 74 years (mean 35.5 years). Four patients had their sinusitis diagnosed prior to admission and eight did not. Nine patients had bilateral sinus disease, the most common sinus involved was the frontal followed by the ethmoid, maxillary and sphenoid. Neurosurgical drainage was via a craniotomy in seven cases and burr hole in three. Nine patients underwent sinus surgery and three did not. Of the nine who had sinus surgery three had frontal drainage, four fronto-ethmoidal and two trans-sphenoidal drainage. The most common organism was *Streptococcus milleri*. Our series confirms that sinus-induced intracranial sepsis is a serious problem needing early diagnosis and aggressive treatment. We would recommend a high index of suspicion of sinusitis in patients with intracranial infection.

Key words: Paranasal sinus diseases, complications; Infection, intracranial ; Surgery

Introduction

Sinusitis is one of the commonest group of diseases affecting the nose and paranasal sinuses. Sinusitis, particularly involving the frontal and ethmoid sinuses, can result in intracranial complications which constitute a genuine medical and surgical emergency. The clinical presentation of sinusitis-induced intracranial empyema may not be recognized and the diagnosis is often delayed. We report a review of cases presenting to our hospitals over a five-year period.

Method

The records of 12 patients with intracranial complications secondary to sinusitis seen at our hospitals between 1989 and 1994 were reviewed. The clinical presentation, bacteriology and antibiotic treatment, involved sinuses, intracranial complications, surgical procedures and outcome were noted.

Results

Twelve patients were admitted over a five-year period. Their age range was 16–74 years: mean 35.5 years. There were nine males and three females. All patients presented with neurological symptoms or signs (see Table I). Four patients had the underlying sinusitis diagnosed, prior to admission, at the neurosurgical unit. Three of these had undergone surgical drainage for their sinusitis.

All patients had CT scans performed which diagnosed sinusitis and intracranial complications. Nine patients had bilateral sinus disease. The frontal sinus was most commonly involved (11) followed by the ethmoidal sinus (10) maxillary sinus (nine) and sphenoidal sinus (two). The intracranial complications are shown in Table II.

Nine patients underwent sinus surgery and three did not. Of the nine who had sinus surgery three had drainage of their frontal sinuses, four had fronto-ethmoidal drainage and two underwent trans-sphenoidal drainage (see Table III).

Neurosurgical drainage was via a craniotomy in seven cases and burr hole in three cases. Three patients required further burr hole aspiration of reaccumulations, one at two weeks and two at three weeks after the original operation.

In 10 patients an organism was isolated. Six had

TABLE I

Clinical presentation	
Confusion	3
Meningism	6
Papilloedema	4
Fits	2
Focal CNS deficit	5
Coma	3

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TABLE II

Neurosurgical findings	
Extradural empyema	3
Subdural empyema	4
Intracerebral abscess	2
Combination of above	1
Cavernous sinus thrombosis (sphenoid mucocoele)	1
Optic nerve compression (sphenoethmoid mucocoele)	1

Streptococcus milleri, one had *Streptoccus salivarus*, two had *Bacteroides* sp., one had β-haemolytic *Streptococcus* spp. and two had no growth. Patients received a variety of antibiotics.

Follow-up on these patients ranged from six months to four years. Three patients suffered epileptic fits, one had a persistent expressive dysphasia (left fronto-parietal abscess) and one had reduced visual acuity in one eye (spheno-ethmoidal mucocoele). One patient died during the study: he had undergone sinus drainage at another hospital and had suffered aspiration pneumonia post-operatively. On transfer to the neurosurgical centre he was comatose and despite successful drainage of a right subdural empyema he died three weeks post-operatively.

Discussion

Our series confirms that intracranial infection related to acute sinusitis is mainly a disease affecting young men (Kaufman *et al.*, 1983). Making the diagnosis can be difficult and before antibiotic therapy the mortality rate was very high.

Eight of our patients did not have their sinusitis diagnosed prior to admission. Four patients had symptoms of sinusitis apparent before the onset of their neurosurgical complications. One man had undergone successful drainage of the frontal sinuses but presented one week later with a frontal abscess.

In our series *Streptococcus milleri* was the commonest organism responsible. One other series also found this (Skelton *et al.*, 1992) but in others *Staphylococcus* spp. and *Bacteroides* sp. were more common (Johnson *et al.*, 1988; Maniglia *et al.*, 1989; Clayman *et al.*, 1991). Broad spectrum antibiotics should be started as soon as the diagnosis of sinus-induced empyema is raised (Kaufman *et al.*, 1975). Most of our patients received metronidazole, chloramphenicol and a penicillin.

It has been suggested that the third generation cephalosporins may be of use (Clayman *et al.*, 1991) and cefotaxime has recently been studied with promising results (Weiner and Williams, 1993). Only one of our patients received cefotaxime.

Frontal sinusitis is usually the underlying site of infection (Clayman *et al.*, 1991). Nine of our patients had bilateral sinus disease, which is similar to the series of Johnson *et al.* (1988) nine out of 13, and more common than in other series, seven out of 24 (Hoyt and Fisher, 1991) and five out of 17 (Kaufman *et al.*, 1983).

Out of the six patients undergoing sinus drainage

TABLE III

Sinus surgery	
Trans-sphenoidal drainage	2
Frontal sinus drainage	3
External fronto-ethmoidectomy	4
None	3

after presentation, three had separate operations by ENT surgeons requiring a further anaesthetic at a later date. A combined approach would be more satisfactory but may have practical difficulties. Three patients had no sinus surgery and were treated with triple antibiotic therapy with satisfactory resolution of the disease as shown on follow-up CT scans.

Our series compares favourably with other published ones (Kaufman *et al.*, 1983; Maniglia *et al.*, 1989; Hoyt and Fisher, 1991). We only had one death (eight per cent) compared to higher figures in earlier studies i.e. 18 per cent (Kaufman *et al.*, 1983) and 16 per cent (Maniglia *et al.*, 1989). However, our study confirms that sinus-induced intracranial sepsis is a very serious problem reaffirming the need for early diagnosis and treatment. We would recommend a high index of suspicion of sinusitis in patients with intracranial infection and also that sinusitis particularly affecting the frontal and ethmoidal sinuses needs aggressive surgical and medical treatment.

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