



Review Article

Microbiology and choice of antimicrobial therapy for acute sinusitis complicated by subperiosteal abscess in children



Itzhak Brook*

Department of Pediatrics, Georgetown University School of Medicine, Washington, DC, USA

ARTICLE INFO

Article history:

Received 7 January 2016
 Received in revised form 17 February 2016
 Accepted 18 February 2016
 Available online 26 February 2016

Keywords:

Subperiosteal abscesses
 Acute sinusitis
 Microbiology
 Anaerobic bacteria
Staphylococcus aureus
 Sinusitis

ABSTRACT

Objectives: Review past studies of the microbiology of subperiosteal abscesses (SPOA) complicating sinusitis in children and their implications of the antimicrobials administered to treat the infection.

Methods: Literature search was conducted of the Cochrane Library, EMBASE, TRIP, EMBASE, and MEDLINE databases from their inception.

Results: The most common pathogens isolated from studies of SPOA complicating sinusitis are aerobic (*Streptococcus pneumoniae*, *Streptococcus* spp., *Haemophilus* spp., *Eikenella corrodens*), anaerobic (*Peptostreptococcus*, *Fusobacterium*, *Prevotella*, *Porphyromonas*, *Bacteroides*, and *Veillonella* spp.), and microaerophilic streptococci (*Streptococcus anginosus*/*Streptococcus milleri* group), all members of the oropharyngeal flora. *S. pneumoniae* and *S. aureus* were more frequently recovered in children >7 years old, while polymicrobial aerobic–anaerobic flora were more often isolated from those >15 years. The introduction of pneumococcal vaccine reduced the rate of isolation of *S. pneumoniae*, and correlated with increase of recovery of *S. aureus* including methicillin resistant strains, as well as *Streptococcus pyogenes* and *S. anginosus/milleri* group.

Conclusions: The microbiology and consequently the treatment of respiratory infections including sinusitis and its complications has evolved over the past decades. Establishing the microbiology of SPOA by obtaining appropriate cultures for both aerobic and anaerobic bacteria are essential for proper antimicrobial selection.

© 2016 Elsevier Ireland Ltd. All rights reserved.

Contents

1. Introduction	21
2. Materials and methods	22
3. Results	22
4. Discussion	25
5. Conclusions	25
References	25

1. Introduction

Sinusitis can cause local and systemic complications. Subperiosteal abscess (SPOA) is an uncommon complication of acute sinusitis in children. The majority of local complications including

SPOA are anatomically linked to the paranasal sinuses [1]. The rates of these complications are not known, but it is estimated that they occur in about 5% of patients hospitalized for sinusitis.

Numerous studies evaluated the microbiology of SPOA over the past 5 decades [2–27]. Establishing the bacterial etiology of SPOA is important in understanding the pathophysiology of the infection and enables the appropriate choice of antimicrobial therapy. The microbiology and consequently the treatment of respiratory infections including sinusitis and its complications have evolved over the past decades. The changes in microbiology were

* Correspondence to: 4431 Albemarle St. NW, Washington, DC 20016, USA.
 Tel.: +1 202 364 4253.
 E-mail address: ib6@georgetown.edu

associated with the introduction of vaccinations against *Haemophilus influenzae* and *Streptococcus pneumoniae*, and the growing resistance to antimicrobials [17,27].

This review presents past studies of the microbiology of SPOA complicating sinusitis in children and their implications of antimicrobials administered to treat the infection.

2. Materials and methods

A literature search was conducted of the Cochrane Library, EMBASE, TRIP, and MEDLINE databases from their inception (1993 for the Cochrane Library, 1980 for EMBASE, 1997 for TRIP, and 1966 for MEDLINE) through October 25, 2015. The following search terms were used: sinusitis, complications, SPOA, microbiology, *S. pneumoniae*, *H. influenzae*, *Staphylococcus aureus*, and anaerobic bacteria.

Results of these searches were closely evaluated, and articles and documents that were not pertinent or redundant were excluded. This review was focused on the microbiology of SPOA in children.

3. Results

Many studies have investigated the microbiology of SPOA [2–27]. Four studies also included adults [12,18,23,25] (Table 1).

Schramm et al., [2,3] evaluated 32 children and adults with SPOA. The predominate isolates were *Stapylococcus*, *Streptococcus* and *Bacteroides* spp. Brook et al. [4] studied 8 children with periorbital cellulitis and other complications of sinusitis. SPOA was present in two children who had ethmoiditis. Anaerobic bacteria were isolated from the infected sinuses in all the patients and no aerobic organisms were found. The isolates recovered from the sinuses of the two children with SPOA were *Fusobacterium nucleatum*, *Prevotella oralis*, *Prevotella melaninogenica*, *Peptostreptococcus* spp., *Veillonella parvula*, and microaerophilic streptococci.

Skau et al. [5] reported 12 children, 3 with intracranial and 9 with orbital complications of ethmoidal and frontal sinusitis. SPOA was found in 6 patients; two each had *Bacteroides* spp., and alpha streptococci, and one each had Peptostreptococci and beta-hemolytic streptococci.

Spires and Smith [6] studied 241 children with periorbital or orbital soft-tissue infections treated from 1962 to 1986. Two hundred twenty-six children (94%), half <1 year of age, had periorbital soft-tissue infections. Orbital infections occurred in 15 (6%) children, 11 (5%) had orbital cellulitis (9 associated with sinusitis), 3 (1.2%) had SPOA (2 associated with sinusitis), and one had cavernous sinus thrombosis. One child with SPOA developed brain abscess. The organisms recovered in those with a sinus etiology were *Staphylococcus* spp. (20 isolates), *Streptococcus* spp., and anaerobes (4 each), and *H. influenzae* [1].

Williams and Harrison [7] reports 16 children with SPOA associated with acute sinusitis. The recovered organisms were *Streptococcus milleri* (6 isolates); *H. influenzae*, anaerobic cocci, and *S. aureus* (2 each); and *Streptococcus* group F, *Streptococcus pyogenes*, and *S. pneumoniae* (one each). Williams and Carruth [8] described 18 children with orbital infections secondary to sinusitis. Two had intracranial complications and 9 had SPOA. No organisms were isolated from 5 of the 15 patients, *S. aureus*, *H. influenzae* and *S. milleri* were identified in 3 each, and *Bacteroides* spp. in one.

Skedros et al. [9] reviewed 21 children seen from 1983 to 1990 who had surgical intervention for SPOA. The organisms recovered included: 8 (38% of abscesses) *S. pneumoniae*, 7 (33%) *S. pyogenes*, and 3 (14%) *H. influenzae*. Anaerobes (*Fusobacterium*, *Bacteroides*, and *Peptostreptococcus* spp., mixed with *Eikenella* and *Actinobacter* spp.) were isolated from a single patient. However,

adequate methodologies for transportation and cultivation of anaerobes were not employed in this study.

Arjmand et al. [10] reported on 18 children with SPOA complicating sinusitis treated from 1983 to 1992. Organisms were isolated from 13 (72%) of the patients; eight of them had polymicrobial flora including four with aerobic and anaerobic bacteria. *Staphylococcus* or *Streptococcus* spp. accounted for all single organism infections. The predominate aerobic isolates were *Streptococcus* and *Staphylococcus* spp., *S. pneumoniae* and *H. influenzae*. The most common anaerobes were *Fusobacterium* and *Bacteroides* spp.

Harris [11] reviewed the records of 37 patients with SPOA admitted between 1977 and 1992. Variations in the microbiology of SPOA appear to be age-associated. Among 12 patients <9 years, two had bacterial growth of *S. pneumoniae* and *S. aureus*. The organisms found in 12 of 16 of 9–14 years old patients where *Streptococcus* spp. (alpha and beta hemolytic groups A, C and D), *Stapylococcus* spp., *H. influenzae*, *M. catarrhalis*, *Eikenella corrodens*, *Klebsiella pneumoniae*, *Prevotella intermedia* and *V. parvula*. Polymicrobial aerobic–anaerobic infection occurred in all of individuals >15 years. The organism recovered were *Streptococcus* spp. (alpha and beta hemolytic groups A, B and D), *Stapylococcus* spp., *E. corrodens*; microaerophilic streptococci, *V. parvula*, *Bacteroides fragilis*, and *Prevotella*, *Porphyromonas*, *Fusobacterium*, and *Peptostreptococcus* spp.

Brook and Frazier [12] using strict methodology for identification of aerobic and anaerobic bacteria studied the microbiology of pus aspirates from eight adults with SPOA and their corresponding infected sinuses. Polymicrobial flora was found in all instances, and the number of isolates varied from two to five. Anaerobes were recovered from all specimens. The predominant isolates were *Peptostreptococcus*, *Prevotella*, and *Fusobacterium* spp, *S. aureus*, and microaerophilic streptococci. Concordance in the microbiological findings between SPOA and the corresponding infected sinus was found in all instances. However, certain organisms were only present at one site and not the other. Fourteen beta-lactamase-producing organisms were present in nine specimens. Even though no children were included in this study, it illustrates that utilization of appropriate methodology for the recovery of anaerobes can lead to their recovery.

Herrmann and Forsen [13] evaluated 74 children seen from 1990 to 2002 with orbital complications of acute sinusitis. There were no intracranial complications in children admitted for orbital complications of acute sinusitis that were <7 years, in contrast to 4 of 43 (9.3%) of patients >7 years had such a complication. All intraoperative cultures obtained from the 4 patients (two had SPOA) with intracranial extension were polymicrobial. The isolates included group C streptococci, *E. corrodens*, *Haemophilus parainfluenzae*, *Streptococcus viridans*, *Staphylococcus epidermidis*, *Fusobacterium necrophorum*, *B. fragilis*, and *S. milleri*.

Nageswaran et al. [14] studied 41 children with orbital cellulitis seen from 1992 to 2002, 34 (83%) of whom had SPOA and/or orbital abscess. The predominate aerobes were *Streptococcus* spp. (alpha and groups A and C beta-hemolytic, and non-hemolytic), *S. aureus*, *H. influenzae*, *E. corrodens*, and *M. catarrhalis*. The commonest anaerobes were *Peptostreptococcus* and *Bacteroides* spp.

Oxford and McClay [15] evaluated the microbiology of 21 children with SPOA complicating acute sinusitis seen between 1995 and 2002. The predominate isolates were 7 (33%) *S. milleri* group, 6 (29%) *S. aureus*, 3 (14%) *S. pneumoniae*, 2 (9.5%) each of alpha hemolytic streptococci and *Eikenella* spp., and *H. influenzae*, and one (5%) each of *Bacteroides*, *Propionibacterium*, *Porphyromonas*, and *Peptostreptococcus* spp. Sinclair et al. [16] reviewed 39 children seen between 1996 to 2005 that had surgical drainage of a SPOA complicating acute sinusitis. The predominate isolates were *Streptococcus* spp. (20 isolates, including 6 *Streptococcus*

Download English Version:

<https://daneshyari.com/en/article/4111478>

Download Persian Version:

<https://daneshyari.com/article/4111478>

[Daneshyari.com](https://daneshyari.com)