

THE EFFICACY OF ANTIBIOTIC THERAPY IN THE TREATMENT OF COMPLICATED ACUTE SINUSITIS IN CHILDREN – THE INITIAL REPORT

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Summary

Introduction. Acute ethmoid sinusitis in children can result in severe complications. The treatment consists of antibiotic therapy and in certain cases surgery is mandatory.

Material and methods. We analyzed the clinical data of 45 children who were treated in the Department of Pediatric Otolaryngology of Medical University of Warsaw from January 2005 to January 2011 due to acute complicated ethmoiditis. We analyzed demographic characteristics, clinical signs and symptoms, applied treatment and duration of hospital stay. The presenting complications of acute sinusitis were also taken into account.

Conclusions. The first-line treatment of acute complicated sinusitis in children is intravenous antibiotic therapy. The decision whether the surgery should be performed is made in relation to the clinical condition of the patient. The findings of radiological examinations have also to be taken under consideration. There is a need of multidisciplinary medical care in patients with severe intraorbital and intracranial complications. Ethmoidectomy and maxillary sinus puncture have been the main surgical approaches. Beck puncture was done in 2 cases.

Key words: acute sinusitis, complications, treatment, antibiotics, ethmoidectomy

INTRODUCTION

Acute sinusitis is a common disease in children and adolescents (2).

Sinusitis is classified according to the affected sinus. In children the most frequent site of infection is the maxillary sinus, followed by the ethmoidal sinuses (1). However, patients, that are the most likely to develop complications, are those with the frontal, ethmoid, or sphenoid sinusitis (5, 8). The diagnose of acute sinusitis is formed by means of medical history, ENT and pediatric examination and the results of laboratory tests. When there is suspicion of complications of acute sinusitis, the computed tomography should be considered. Also, the ophthalmology, neurology and neurosurgery consultations have to be taken under consideration when there are intraorbital or intracranial complications or if there is a suspicion of any complications.

The diagnosis of acute sinusitis can be formed if signs and symptoms of upper respiratory tract infection are persistent and/or not improving after 7 days from the onset, or they are worsening after 5 days from the onset (5). The most common signs and symptoms of acute sinusitis are nasal obstruction, nasal discharge (the most frequent is purulent, but can be also mucoid or clear), postnasal drip, cough, fever, headache and facial pain. Alterations in the sense of smell, dental pain, and halitosis can be also the symptoms of acute sinusitis (1, 5). Young children

may present non specific symptoms such as irritability or poor appetite (1).

The etiology of acute sinusitis is viral or bacterial. Among bacterial pathogens the most common are *Streptococcus pneumonia*, *Haemophilus influenza* and *Moraxella catarrhalis*, which should be considered, particularly in children (2, 5).

Acute bacterial sinusitis can lead to severe and sometimes life-threatening complications. The possibility of developing serious complications by patients with acute bacterial sinusitis should always be considered during therapeutic process. Complications of acute sinusitis are divided into orbital, soft tissue, osteomyelitis of the frontal bone (Pott's puffy tumor) and intracranial (5, 6). Intracranial complications are meningitis, subdural empyema, epidural abscess, brain abscess, and cavernous sinus thrombosis.

MATERIAL AND METHODS

We did retrospective study. The clinical data of 45 patients with acute complicated ethmoiditis, who were treated in the Department of Pediatric Otolaryngology from January 2005 to January 2011, were analyzed.

RESULTS

In the group there were 45 patients with acute ethmoid sinusitis. The median age was 4 years old and 3 months. The youngest patient was 7 weeks old, the

oldest one 13, 5 years old. There was male predominance (M: 64%, n = 29; F: 36%, n = 16).

The presenting signs were fever and signs of upper respiratory tract infection. All of the patients had orbital cellulitis, that was present more commonly on the right side - 64% (n = 29). In some patients narrowed or closed palpebral fissure, proptosis, impaired extraocular mobility, impaired visual acuity or slow papillary response to light was observed.

31% of the patients (n = 14) has received oral antibiotic treatment prior to admission to our ward. The most commonly prescribed antibiotic was amoxicillin with clavulanic acid (n = 6) and cefuroxime axetil (n = 5). Other antibiotics were amoxicillin (n = 2) and azithromycin (n = 1). One patient was treated intravenously with ceftriaxone in the other hospital and then admitted to the ENT ward where the treatment was continued. On admission to hospital in all patients intravenous antibiotic therapy was administered immediately. 93% (n = 42) of the patients were treated with second generation cephalosporin (cefuroxime) and clindamicin. In 4% of the patients third generation cephalosporin (ceftriaxon) was administered because of the lack of clinical improvement or the deteriorating clinical condition. The intravenous therapy lasted from 3 to 15 days, with the mean period of 7 days, whereas the oral antibiotics were subsequently ordered for maximally 16 days (the mean period: 9 days).

The stay in the hospital lasted from 3 to 15 days (the average time were 8 days). 18% of the patients had tissue infiltration reported intraoperatively, whereas 20% subperiosteal abscess.

In most patients that were qualified to the surgery ethmoidectomy was performed - 42% (n = 19) and the maxillary sinus puncture 40% (n = 18). In 2 (4%) cases Beck puncture was done. Ethmoidectomy in all cases was done unilaterally: in 25% (n = 11) left-sided, in 18% (n = 8) right-sided. Maxillary sinus puncture was done bilaterally in 22% cases (n = 10), whereas unilaterally in 18%: left-sided in 11% (n = 5), right-sided in 7% (n = 3).

None of the patients developed intracranial complications.

DISCUSSION

The peak age for acute bacterial sinusitis is in children 6 years of age or younger (2).

Periorbital and intraorbital inflammation are the most common complications of acute sinusitis and most often they are caused by acute ethmoiditis (2). Orbital cellulitis is present mainly in children and its main cause is acute ethmoiditis and frontal sinusitis (8).

The medical conservative therapy is accepted for patients with acute uncomplicated sinusitis and those with developed complications who do not require surgical treatment. The present management of acute sinusitis in children indicate antibiotic therapy (2, 3, 5). Garbutt et al (2001) in a randomized, placebo-controlled trial compared amoxicillin and amoxicillin-clavulanate with placebo and denied clinical benefits of antibiotics in the treatment of acute sinusitis in children. However, this

study was criticized because of low antibiotic dose, exclusion of more severely ill children and larger cohort of older children. Antibiotics should be given in adequate dosage and for a sufficient period of time. With appropriate antibiotic therapy, clinical improvement should be expected within 48 to 72 hours (1).

Antibiotics recommended by American Academy of Pediatrics for uncomplicated acute sinusitis are amoxicillin, amoxicillin-clavulanate, cefprozil, cefuroxime, cefdinir, and cefpodoxime. Clindamycin and previously mentioned cephalosporins, apart from cefpodoxime (cefpodoxime cannot be used in patients with type 1 hypersensitivity reaction), can be used in penicillin-allergic patients. Clindamicin is susceptible for *S. pneumonia*, but is ineffective against *H. influenzae* or *M. catarrhalis* (2).

Complications of acute sinusitis in children may develop if the decision of antibiotic therapy is withheld or if it is started too late (4). Patients with severe complicated acute sinusitis or with a suspected complication of acute sinusitis should be treated aggressively and promptly. If central nervous system complications are present or suspected, antibiotics such as cefotaxime or ceftriaxone should be given parenterally, vancomycin can be added depending on the results of culture and susceptibility testing (2). In the study of Sinclair and all (4) the patients with acute complicated sinusitis who developed subperiosteal orbital abscess obtained the intravenous treatment consisted of cephalosporin and flucloxacillin, in some cases also metronidazole was added, and subsequently, the majority of the patients underwent surgical treatment (4).

The optimal duration of antibiotic therapy of acute sinusitis has not been studied prospectively. The present consensus is that antibiotic therapy should be continued until the patient becomes free of symptoms and then for additional 7 days, what result in a minimum course of 10 days (1, 2). Taking the clinical assessment into account, the antibiotic therapy can last up to 21 days and more. This way of management avoids prolonged courses of antibiotics.

While most cases of preseptal and orbital cellulitis may be effectively managed with intravenous antibiotics, abscesses within the orbit usually require prompt surgical drainage (9). There are several surgical approaches used in the management of complicated sinusitis such as frontoethmoidectomy, frontal sinus trephination, maxillary sinus irrigation and FESS. Maxillary sinuses puncture and drainage has remained the mainstay medical treatment of acute maxillary sinusitis (6). The traditional approach in patients with acute complicated ethmoiditis has been frontoethmoidectomy (3, 6). According to Mortimore and all (6) frontal sinus trephine (Beck trephine) is an acceptable management for the patients with acute complicated sinusitis. External frontoethmoidectomy and FESS can be the second treatment option for those patients who does not resolve after the initial frontal trephine.

The radiological examinations should be reserved for the patients who do not recover or worsens during the

course of appropriate antimicrobial therapy. The images (radiographs, CT, MRI) should be used as a confirmatory measure of diagnosis based on patient's clinical history and condition (2). Computed tomography should be reserved for children with complications of acute sinusitis or with suspected complications, and should be performed before the planned surgical management (2, 8). MRI in addition to CT scan is recommended when intracranial findings on CT are reported (9).

CONCLUSIONS

Acute ethmoid sinusitis can result in severe orbital and intracranial complications. Therefore, the careful diagnosis of acute sinusitis and accurate treatment are of such importance. Acute maxillary sinusitis is present in most children with acute ethmoid sinusitis. The first-line treatment of acute complicated sinusitis in children is intravenous antibiotic therapy. The sequence antibiotic therapy is held subsequently. The decision about the surgery is made due to the assessment of clinical condition. The findings of radiological examinations have to be taken under consideration. In the pediatric material ethmoidectomy and maxillary sinus puncture have been the main surgical approaches. Beck puncture was done in 2 cases. □

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