

Management of Rhinosinusitis

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ABSTRACT

Proper management of rhinosinusitis will remarkably reduce the health care burden in many countries and avert morbidities that result from poor or inadequate management. Rhinosinusitis management can be divided into specific (antimicrobial or surgical) and non-specific (adjuvant) therapies depending on the etiology and classification and this is usually based on patient history and a limited physical examination.

Several guidelines and recommendations have been published as to how best to manage rhinosinusitis in both adults and children. Antibiotic therapy, supplemented by hydration and decongestants, may be indicated for up to seven to 14 days in patients with acute, sub acute or recurrent bacterial rhinosinusitis. Longer duration of antibiotic therapy of up to 4 weeks is indicated in patients with the chronic form of the disease. Clear indications need to be present to resort to surgical management as in cases of fungal rhinosinusitis, extra nasal spread of infection, evidence of mucocele/pyocele, obstructive nasal polyposis or patients with recurrent/persistent infection not responding to antimicrobial therapy.

This chapter discusses the various management modalities currently in use in the management of rhinosinusitis.

Keywords: Rhinosinusitis; Acute; Chronic; Management; Antimicrobial; Surgical

Abbreviations: CRS- Chronic Rhinosinusitis; FESS- Functional Endoscopic Sinus Surgery; RCT- Randomized Controlled Trials

INTRODUCTION

Most people with acute rhinosinusitis recover with or without treatment within 10 days of seeing a general practitioner [1], but about 92% are still prescribed an antibacterial, though this may contribute little difference to outcome [2].

In management of rhinosininitis, the general goals of therapy are to control or eradicate infection where present, diminish mucosal tissue edema and reverse sinus ostial obstruction to promote sinus drainage [3]. The treatment for rhinosinusitis will therefore vary and often requires a combination of approaches. These are usually based on the clinical classification, duration and severity of symptoms. Allergic and non- allergic causes of rhinosinusitis for example may not be treated in same manner. Acute and chronic forms will also be managed differently. Severe forms of the disease with possible complications will be addressed more aggressively.

The management modality can be specific – addressing the aetiology e.g. where a nasal drainage culture is done to identify the etiological agent and bacterial cause is implicated, antibiotics should be prescribed. While the role of bacteria in the pathogenesis of chronic sinusitis remains debatable as most cases are viral in origin, an early diagnosis and intensive treatment with oral antibiotics, can lead to cure.

Management can also be non-specific where therapies that act as adjuvant are used in management e.g. maintaining patient hydration by adequate oral fluid intake, use of topical nasal steroids, decongestants, and saline nasal sprays. These result in symptom relief in a significant number of patients [4].

Antimicrobial Therapy

Antimicrobials when used in adequate doses for the appropriate antibacterial spectra, are highly effective in substantially reducing or totally eradicating bacteria in the sinus cavity of patients with bacterial rhinosinusitis [5,6]

Decision to use antimicrobial

Several factors are put into consideration in choosing the appropriate antibiotics. The Subcommittee on Management of Sinusitis and Committee on Quality Improvement of the American Academy of Pediatrics in their guideline[6], which was developed for children, as well as some other studies/guidelines [7-10], recommends that antimicrobial therapy be used in cases of uncomplicated acute, sub acute, and recurrent acute bacterial rhinosinusitis to achieve a more rapid clinical cure [6,9,10]. However, these patients should meet the defining clinical presentations for acute bacterial rhinosinusitis especially if facilities for nasopharyngeal culture are not available. Patients with complications or suspected complications of acute bacterial sinusitis should also be treated promptly and aggressively with antibiotics [6,9,10]. In one study where there was comparison between use of antimicrobial therapy vs. placebo, children receiving antimicrobial therapy recovered more quickly and more often than those receiving placebo [11]. It was observed that by the third day of antibiotic treatment, 83% of children receiving

an antimicrobial were cured or improved compared with 51% of the children in the placebo group. Even though it was observed that approximately 50% to 60% of children will improve gradually without the use of antimicrobials, the recovery of an additional 20% to 30% was delayed substantially in the “no antibiotic” group compared to children who received appropriate antibiotics.

Choice of antimicrobial

Antibiotics labeled by the U.S. Food and Drug Administration (**FDA**) for the treatment of patients with acute rhinosinusitis include amoxicillin-clavulanate potassium and most of the newer generation cephalosporins, macrolides and fluoroquinolones [12]. Current recommendations for which antibiotic to use in management of uncomplicated rhinosinusitis vary depending on presence or absence of risk factors such as a previous history of antibiotic exposure (in the previous 90 days), attendance at day care, and age less than 2 years old [6].

The Subcommittee on Management of Sinusitis and Committee on Quality Improvement of the American Academy of Pediatrics in their report [6] noted from the studies that up to 15% of children with acute bacterial rhinosinusitis caused by *S pneumonia* will recover spontaneously, half of the children with acute bacterial sinusitis caused by *H influenza* and half to three-quarters of the children infected with *M catarrhal* is also will recover spontaneously [13-15]. Furthermore, only *S pneumonia* that are highly resistant to penicillin will not respond to conventional doses of amoxicillin [15].

Although trimethoprim-sulfamethoxazole and erythromycin-sulfisoxazole have traditionally been useful in the past as first- and second-line therapy for patients with acute bacterial sinusitis, recent pneumococcal surveillance studies indicate that resistance to these 2 combination agents is substantial and thus not recommended [6]. The current guidelines of the Sinus and Allergy Health Partnership also do not support the use of doxycycline and trimethoprim-sulfamethoxazole as reasonable first-line options [13].

Dose of antimicrobial

In the absence of risk factors (antibiotic exposure in previous 1–3 months, attendance at day care, age less than 2 years), approximately 80% of children with acute bacterial sinusitis will respond to treatment with amoxicillin at either a usual dose of 45 mg/kg/d in 2 divided doses or a high dose of 90 mg/kg/d in 2 divided doses [6]. If allergic to amoxicillin, options include cefdinir (14 mg/kg/d in 1 or 2 doses), cefuroxime (30 mg/kg/d in 2 divided doses), or cefpodoxime (10 mg/kg/d once daily). In cases of serious type 1 hypersensitivity reactions, clarithromycin (15 mg/kg/d in 2 divided doses) or azithromycin (10 mg/kg/d on day 1, 5 mg/kg/d × 4 days as a single daily dose) or clindamycin at 30 to 40 mg/kg/d in 3 divided doses can be used [6,13-15].

(Note: Up-to-date information about the most recent antibiotic releases and their indications can also be viewed on the FDA Center for Drug Evaluation and Research Web site at <http://www.fda.gov/cder/>).

How long to treat

The optimal duration of therapy for patients with acute bacterial sinusitis has not received systematic study. Often empiric recommendations are made for 10, 14, 21, or 28 days of therapy [6]. Oral antibiotics are usually recommended for seven to 14 days in patients with acute, recurrent acute or sub acute bacterial rhinosinusitis [12,14-16]. An alternative suggestion has been made that antibiotic therapy be continued until the patient becomes free of symptoms and then for an additional 7 days [6,17]. This strategy, which individualizes treatment for each patient, results in a minimum course of 10 days and avoids prolonged courses of antibiotics in patients who are asymptomatic and thereby unlikely to be adherent [6].

Longer duration of antibiotic treatment is required in chronic cases of rhinosinusitis. A 2015 study indicates that there is little difference in clinical outcomes between 3 weeks versus 6 weeks of antibiotic therapy for CRS [18]. This conclusion is contrary to the experience of many practitioners. At minimum, 3 weeks of antibiotic therapy could be used as a benchmark to reevaluate whether the patient has adequately responded. If not, a surgical approach may be considered [19].

When clinical response is not as expected

While receiving the usual dose of amoxicillin (45 mg/kg/d), Symptoms should be noted to be subsiding within 48 hours of treatment. If there is presence of risk factors, therapy should be initiated with high-dose amoxicillin-clavulanate (80–90 mg/kg/d of amoxicillin component, with 6.4 mg/kg/d of clavulanate in 2 divided doses. Alternatively a single dose of parenteral cefotaxime or ceftriaxone (at 50 mg/kg/d), and changed back to oral therapy if child improves by the next 24 hours [6,19-22]. For patients who do not improve with a second course of antibiotics or who are acutely ill, further evaluation by an otolaryngologist should be considered [19].

At this stage in management the attending physician must then reassess the patient to confirm the diagnosis of bacterial rhinosinusitis and exclude other causes of illness. He should also assess for complications and make efforts to distinguish chronic/recurrent acute rhinosinusitis from isolated episodes of acute bacterial rhinosinusitis and other causes of sinonasal symptoms. The need to assess for multiple chronic conditions that would modify management (eg, asthma, cystic fibrosis, immunodeficiency, ciliary dyskinesia) must be emphasized [20].

SURGICAL THERAPY

Surgery strives to restore the functional integrity of the inflamed mucosal lining. Approximately 175,000 persons undergo sinus surgery in the United States each year [21]. Surgical management is required when rhinosinusitis especially the chronic forms, have responded poorly to medical management. This is commonly seen in cases involving the maxillary sinus. It is also useful where there is proven anatomic obstruction. Surgical approach is also used in some cases as adjunct to medical management as seen in allergic fungal sinusitis.

Endoscopic sinus surgery has been proven very successful in treating chronic rhinosinusitis. Recent advances in endoscopic technology and a better understanding of the importance of the ostiomeatal complex in the pathophysiology of sinusitis have led to the establishment of Functional Endoscopic Sinus Surgery (**FESS**) as the surgical procedure of choice for the treatment of chronic rhinosinusitis especially in the adult population [19].

FESS facilitates the removal of disease in key areas, restores adequate aeration and drainage of the sinuses by establishing patency of the ostiomeatal complex, debulks severe polyposis, and causes less damage to normal nasal functioning. FESS is successful in restoring sinus health, with complete or at least moderate relief of symptoms in 80-90% of patients [19].

In chronic maxillary sinusitis three main surgical options are available, namely the Caldwell-Luc operation, inferior anastomy and endoscopic uncinectomy with or without maxillary sinus involvement [18].

Another surgical option is the balloon dilation. Catalano et al [23] in their study, evaluated balloon dilation for the treatment of chronic frontal sinusitis in 20 patients with advanced sinus disease in whom medical therapy had failed and therefore required operative intervention. Preoperative and postoperative CT scans were compared. There were no significant complications from balloon dilation, and there was significant improvement in patients with certain subsets of CRS [23].

Surgical management of chronic fungal sinusitis as caused by mycetoma, is the preferred intervention option. Some literature may suggest that topical antifungal may have a role in its treatment [22]. This has however remained controversial at best. An assessment of six different studies showed no statistically significant benefit of topical or systemic antifungal over placebo for the treatment of chronic fungal sinusitis [23]. The presence of nasal polyps may suggest fungal aetiology as seen in allergic fungal sinusitis and will require surgery as an adjunct to medical therapy.

GENERAL THERAPY – (SYMPTOMATIC TREATMENT)

These are adjuvant therapies aimed at relieving some of the symptoms of rhinosinusitis. They include use of nasal saline drops or saline nasal irrigation (hypertonic or normal saline), use of topical intranasal steroids, antihistamines, mucolytic agents and nasal decongestants (topical or systemic) [19]. Although these are used to supplement the effect of antimicrobials, they have received relatively little systematic clinical trials [6].

Nasal saline drops help in liquefying secretions and in preventing crust formation. They also act as mild vasoconstrictors of nasal blood flow [19]. There are however very limited studies and thus no guideline recommendations on use of saline nasal drops in patients with acute bacterial sinusitis.

Steam inhalation and nasal saline irrigation may help by moistening dry secretions, reducing mucosal edema, and reducing mucous viscosity.

Topical steroids are also prescribed and noted to be sometimes useful [24,25]. In a multicenter trial evaluating intranasal steroid (flunisolide spray) as an adjunct to oral antibiotic therapy in patients 14 years of age and above with presumed acute bacterial sinusitis, the benefit was of minimal clinical importance. In another study where budesonide spray was used as the adjunct, modest effect on symptoms were noted in the second week of therapy [6].

In a single prospective study in which children with presumed acute bacterial sinusitis were randomized to receive either decongestant-antihistamine or placebo in addition to amoxicillin. The active treatment group received topical oxymetazoline and oral decongestant-antihistamine syrup (brompheniramine and phenylpropanolamine). There were no differences in clinical or radiographic resolution between groups [6].

In patients with severe nasal/sinus obstruction, findings from some studies [8,19,21,22] were suggestive of mild improvements in symptoms with the use of a mucolytic (supersaturated potassium iodide [SSKI] solution, guaifenesin), and a systemic decongestant (pseudoephedrine), or topical decongestant (e.g., phenylephrine, oxymetazoline) for three to five days [19].

Use of oral corticosteroids has also been studied. To determine the effectiveness of oral corticosteroids on acute uncomplicated rhinosinusitis researchers from the Netherlands conducted a randomized, double-blind controlled trial involving 174 adults with clinically diagnosed acute rhinosinusitis. Although there was a slight reduction of facial pain in the prednisolone group, the results were neither statistically nor clinically significant [26].

Initial oral steroid therapy followed by topical steroid therapy was found to be more effective than topical steroid therapy alone in decreasing polyp size and improving olfaction in patients with chronic rhinosinusitis as seen in patients with allergic fungal rhinosinusitis [25].

Another non-medical therapy tried in adults with chronic rhinosinusitis is acupuncture. In general, acupuncture is believed to stimulate the nervous system and cause the release of neuro chemical messenger molecules. The resulting biochemical changes influence the body's homeostatic mechanisms, thus promoting physical and emotional well-being. Evidence from randomized controlled trials in adults suggests that acupuncture may help relieve symptoms of sinusitis such as nasal congestion [27], though it may not be as effective as conventional medication [28,29] Stimulation of certain acupuncture points have also been shown to affect areas of the brain that are known to reduce sensitivity to pain and stress [30]. However, research is very limited and more high-quality randomized controlled trials are needed to assess the effectiveness of acupuncture for sinusitis

General management of rhinosinusitis would also include controlling predisposing factors which may include environmental manipulation and must be put into consideration in the holistic care of the patient with rhinosinusitis.

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