

Sinusitis and Asthma: Advances In Management

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Introduction

Chronic rhinosinusitis (CRS) is characterized by long-standing inflammation of the nose and paranasal sinuses. Chronic rhinosinusitis can be subdivided into CRS without nasal polyposis (CRSsNP) and CRS with nasal polyposis (CRSeNP). The prevalence of CRS in Canada is 5.7%, and ranges from 2% to 16% in the United States.(1-3) Asthma is a chronic inflammation of the lower airways involving episodic breathlessness and wheezing, with airway hyperresponsiveness to environmental stimuli, with a prevalence of 5%–10% in the general population.(4) Coexistence of asthma and rhinosinusitis has been noted in the medical literature for centuries. The current one-airway or united airway concept is supported by anatomical links and similarities in histology, pathophysiology, and immune mechanisms. Forty percent of CRS patients have been shown to have asthma, and sinus x-ray or computed tomography (CT) showed that 93% of those with asthma also had sinusitis (5, 6). A recent study examining the effect of CRS on development of Asthma over 12 years found that CRS patients were significantly more likely to develop asthma than non-CRS counterparts and one in 13 individuals with CRS will be subsequently diagnosed with asthma.(7)

Pathophysiology

Asthmatic patients often report the presence of upper airway disease and the frequency increases with severity of asthma. Eosinophilic inflammation is a common link between these 2 diseases, which is consistent with the theory of united airways. Studies have shown that increased eosinophils in blood and sputum, and elevated nitric oxide levels in asthmatics correlate with the severity of sinus CT abnormalities(8). It has been suggested that airway hyper-responsiveness in sinusitis triggers the pharyngobronchial reflexes by drainage of inflammatory mediators and material from infected sinuses into the pharynx.

Diagnosis and Management of CRS

Table 1 outlines the clinical criteria in the diagnosis of CRS. Endoscopic assessment allows for excellent visualization of the middle meatus and ostiomeatal complex, which may reveal the presence of polyposis or purulence from the middle meatus. Endoscopic-guided sinus cultures allows for accurate culture-directed antibiotic treatment. Microbes in CRS differ significantly from those found in the acute setting. Common pathogens in CRS include pseudomonas/gram negative enteric bacteria (17-22%), anaerobes (25%),

staphylococcus aureus (8-11.7%), and coagulase negative staphylococci (28-40%).

The goals in the management of chronic rhinosinusitis include: (1) maintenance of patency of sinus ostia, (2) prevention of chronic sinusitis/inflammation, and (3) prevention/reduction of lower airway reactivity.

Non-Surgical Management

Non-surgical management includes the use of topical and oral therapies aimed towards decreasing inflammation, encouraging drainage of the sinus ostia, and targeting the bacterial load. Options for non-medical management of CRS include the use of saline/manuka honey nasal irrigations and increased water intake/hydration. Topical and systemic decongestants will not affect the severity or duration of rhinosinusitis. Intranasal corticosteroids have limited usefulness in CRS. Culture-directed antibiotics are critical in the treatment of CRS, with the duration of treatment being no less than 4-6 weeks. Maximal medical management is required in all patients with CRS before resorting to surgical options. The likelihood of significant long-term improvement in chronic rhinosinusitis using medical management alone is less than 1%(9). A CT scan of the paranasal sinuses should be obtained in all patients failing maximal medical management.

Surgical Management

Surgical management (endoscopic sinus surgery (ESS)) is warranted for all patients who fail a course of maximal medical management. There is growing evidence supporting that meticulous surgical management of CRS_{NP} with close follow-up and long term post-operative care can consequently lead to a greater improvement of asthma severity. A recent systematic review of asthma outcomes following ESS for CRS found that surgical treatment leads to a subjective improvement of asthma symptoms and a decrease in hospital admissions, emergency department visits, asthma exacerbations, and the need of medication for disease control.(10)

Management of Recalcitrant Disease

Most CRS patients with adequate surgery will have significant clinical improvement (85-90%), however, 10-15% continue to have chronic inflammation and symptoms. Such patients may have more complex disease, particularly in the form of allergic fungal rhinosinusitis (AFRS), and require ongoing medical management. Advanced medical therapies include the use of high concentration intranasal topical Budesonide (Pulmicort) spray, long-term low-dose antibiotics (Clarithromycin/Doxycyline), oral antifungals itraconazol (Sporanox) in the case of AFRS, and Montelukast (Singular) in combination with topical Budesonide.

Future Therpaies

Currently at our centre we are investigating the use of antimicrobial photodynamic therapy (aPDT), Poloxamer-407 topical gel, medication impregnated spacers, and manuka honey nasal rinse. Such complex patients should be under the regular care of an advanced sinus centre with multidisciplinary approach

Summary

There is a significant correlation between CRS and asthma. Recent evidence suggests surgical management of CRS can subsequently lead to a greater improvement of asthma severity.

Table 1: Symptoms, endoscopic findings, and CT scan findings in CRS with and without nasal polyposis

| |
|---|
| Symptoms |
| Facial Congestion/fullness |
| Facial Pressure/fullness |
| Nasal Obstruction/blockage |
| Purulent anterior/posterior nasal Discharge |
| Hyposmia/anosmia (Smell) |
| A diagnosis requires at least 2 of the above symptoms, present for 8-12 weeks, plus documented inflammation of the paranasal sinuses or nasal mucosa |
| CRS (with/without nasal polyposis) is diagnosed on clinical grounds but must be confirmed with at least 1 objective finding on endoscopy or CT scan. |
| Endoscopic Findings May Include: 1) Inflammation (eg. Discoloured mucus, edema of the middle meatus or ethmoid area) 2) Absence or presence of bilateral nasal polyposis in the middle meatus 3) Purulence originating from the ostiomeatal complex. |
| CT Scan – bilateral mucosal disease +/- nasal polyposis |

Case Study - Carolyn

Carolyn is a 51-year-old asthmatic who presented with longstanding symptoms of facial congestion, post-nasal drip, nasal obstruction, and hyposmia. She had also

noted exacerbation of her underlying asthma. Endoscopic assessment revealed severe nasal polyposis extending beyond the middle meatus into the nasal cavity bilaterally. CT scan of the sinuses revealed severe bilateral chronic rhinosinusitis with complete opacification of all sinuses. Carolyn subsequently underwent meticulous computer assisted functional endoscopic sinus surgery. Carolyn was followed post-operatively with regular routine visits. She was placed on intranasal topical Pulmicort therapy on a daily basis. Infections and exacerbations when they occurred were treated immediately with lavage and culture directed topical/oral antibiotics as needed. With ongoing maintenance, her sinuses have remained perfectly clear without any evidence of polypoid regrowth. Her asthma is now under excellent control.

Figure 1: Pre-ESS and Post-ESS Images Case Study

A – CT scan pre-ESS; B – MRI scan post-ESS showing complete resolution of disease.

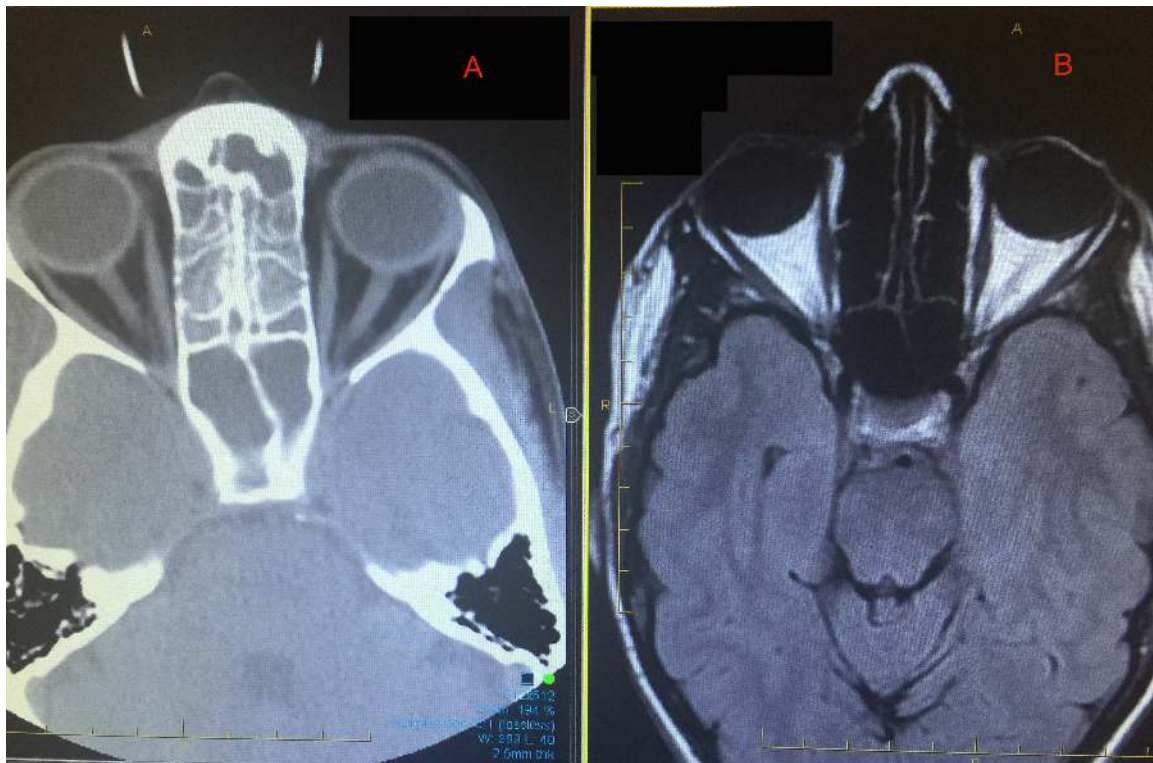


Figure 2: Pre-ESS and Post-ESS Endoscopic Images – Middle Meatus

A – Pre-ESS; B – Post-ESS demonstrating complete resolution of polypoid disease and patency of the middle meatus

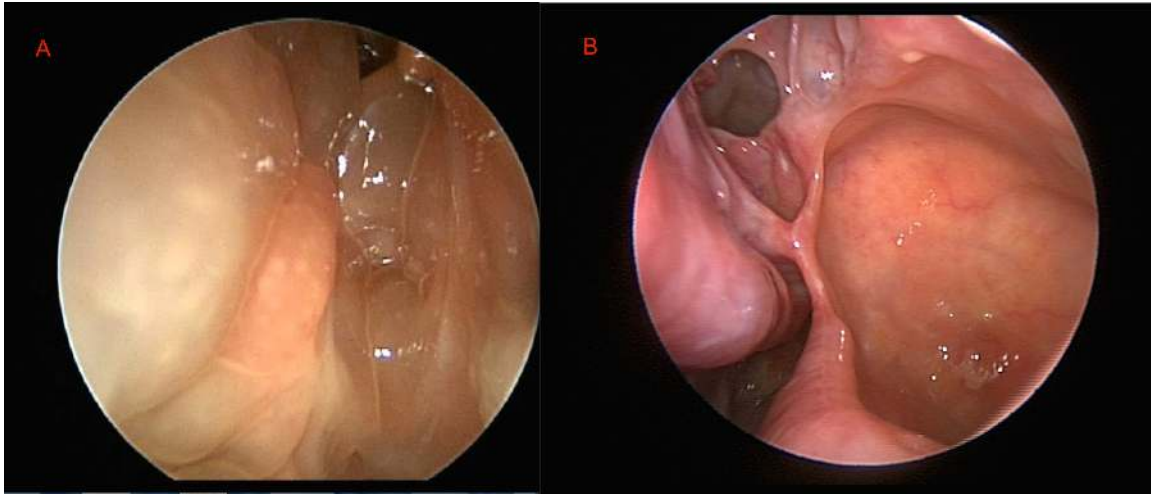


Table 2: Questions and Answers

What is the recommended treatment for CRS in patients with asthma?

- Maximal medical management including 4-6 weeks of culture-directed antibiotics, nasal saline/manuka honey irrigations (BID), nasal steroid sprays (BID), and mucolytic agents (Guafenesine 1200 mg bid).

Should a CT scan be ordered on all patients diagnosed with late-onset asthma?

- CT scan is warranted in patients with late-onset asthma in the presence of persistent sinonasal symptoms as outlined in table 1.

When should a patient with CRS and asthma be referred for otolaryngologic assessment?

- Patients with symptoms of CRS persisting beyond 8-12 weeks, those that have failed maximal medical management, and those with CT scan findings of chronic mucosal inflammation should be referred.

Take Home Messages

- There is a strong relationship between CRS and asthma.
- CRS patients have been found to be significantly more likely to develop asthma than non-CRS counterparts.
- Patients presenting with adult onset asthma should be investigated for CRS.
- Early diagnosis and treatment can improve outcomes.
- Most patients with longstanding chronic sinus disease and asthma will benefit from ESS.
- Ongoing regular post-operative care is critical for overall success of the surgery.

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