The prevalence of Samter’s triad in patients undergoing functional endoscopic sinus surgery

Ji-Eon Kim, MD; Stilianos E. Kountakis, MD, PhD

Abstract
We conducted a retrospective study to determine the prevalence of Samter’s triad (nasal polyps, asthma, and aspirin sensitivity) in 208 consecutively presenting patients who had undergone functional endoscopic sinus surgery (FESS) for chronic rhinosinusitis from September 2001 through August 2003. Overall, Samter’s triad was found in 10 patients (4.8%); subgroup analyses showed that the prevalence of Samter’s triad was 5.9% in adults, 9.4% in patients with nasal polyps alone, 16.9% in patients with asthma alone, and 25.6% among patients with both polyps and asthma. On average, patients with Samter’s triad had undergone approximately 10 times as many previous FESS procedures as had the patients without Samter’s triad (mean: 5.2 vs. 0.53; p < 0.001). In addition to Samter’s triad, four other factors were independently and significantly associated with a higher number of previous FESS procedures: nasal polyps alone, asthma alone, both polyps and asthma, and cystic fibrosis alone. Finally, at 6 months following their most recent surgery, patients with Samter’s triad had significantly higher rates of symptom recurrence (nasal obstruction, facial pain, postnasal drip, and anosmia) and a recurrence of nasal polyps.

Introduction
Samter’s triad—the combination of nasal polyps, asthma, and aspirin sensitivity—was first described by Samter and Beers in 1968. In affected patients, it is thought that aspirin and other nonsteroidal anti-inflammatory drugs (NSAIDs) inhibit the activity of the enzyme cyclo-oxygenase-1 (COX-1) in the arachidonic acid metabolism pathway, resulting in an increase in the activity of the enzyme 5-lipoxygenase. The products of the 5-lipoxygenase pathway include the leukotrienes LTC4, LTD4, and LTE4, which are potent inflammatory mediators that can act to (1) induce mucus secretion, bronchoconstriction of the airway, and edema of the nasal mucosa and (2) attract eosinophils into the airways. Indeed, patients who are aspirin-sensitive have been shown to have higher concentrations of leukotrienes than do nonsensitive patients. Understandably, patients with Samter’s triad generally tend to have more severe symptoms of nasal polyposis and asthma, as well as rhinosinusitis, than do patients without the triad.

Patients with Samter’s triad are frequently treated with functional endoscopic sinus surgery (FESS), but their postoperative course is often complicated by a recurrence of nasal polyps. Not much is known about the prevalence of Samter’s triad in the general population of patients undergoing FESS or about the postoperative symptomatic outcome of these patients compared with the outcomes of patients without the triad. The goal of our study was to assess the prevalence of Samter’s triad among patients undergoing FESS and to report on their surgical outcomes.

Patients and methods
We conducted a retrospective review of the charts of 208 consecutively presenting patients—107 males and 101 females, aged 2 to 80 years (mean: 33.3 ± 19.2; median: 33)—who had undergone FESS for chronic rhinosinusitis at the Medical College of Georgia from September 2001 through August 2003. The ratio of whites to blacks was almost 2:1 (62.0 and 34.1%, respectively), and the ratio of adults to children was roughly 3:1 (73.1 and 26%, respectively).

In addition to demographic data, we recorded the number of previous FESS procedures that each patient had undergone and information on each patient’s presenting complaints, diagnosis, type of most current surgery, and 6-week and 6-month postoperative complaints to assess the short-term effectiveness of FESS. The presence of Samter’s triad was based on information obtained from the history; the presence of nasal polyps was documented by nasal endoscopy.
All patients had been initially treated with medical therapy, which included intranasal steroid sprays, mucolytics, normal saline nasal washes, and antibiotics when indicated. Patients with nasal polyps were also treated with oral steroid tapers as needed, based on disease severity. Patients with objectively documented (by computed tomography and nasal endoscopy) chronic rhinosinusitis were offered FESS if medical management failed to control their symptoms.

The data were analyzed according to standard statistical methods. The Student’s t test was used to compare means between subgroups, and the chi-square test was used to analyze variables reported as frequencies. The threshold for statistical significance was \( p < 0.05 \). The study protocol was approved by our institutional review board.

Results

**Prevalence of Samter’s triad.** Ten of the 208 patients (4.8%) exhibited the three elements of Samter’s triad (figure 1). Subgroup analyses showed that the prevalence of Samter’s triad was relatively high in patients with nasal polyps (9.4%), asthma (16.9%), and both nasal polyps and asthma (25.6%).

**Demographic variables.** The prevalence of Samter’s triad was much higher among adults (9 of 152 [5.9%]) than children (1 of 56 [1.8%]). The mean age of patients with Samter’s triad was slightly higher than the mean age of the study population as a whole (37.6 vs. 33.3 years; \( p = 0.47 \)); while this difference was not statistically significant, it is consistent with the observation that aspirin sensitivity most commonly manifests when patients are in their 30s and 40s. Patients with Samter’s triad were disproportionately female (70% of all cases) and black (50%), but again, neither finding was statistically significant.

**Number of previous FESS procedures.** Patients with Samter’s triad were far more likely to have undergone previous FESS than were those without the triad (80 vs. 28.8%; \( p < 0.001 \)). On average, patients with Samter’s triad had undergone approximately 10 times as many previous FESS procedures (mean: 5.2 vs. 0.53; \( p < 0.001 \)) (figure 2). Independent factors significantly associated with an average of more than 1 previous FESS procedure were the presence of nasal polyps alone (mean: 1.19 previous procedures; \( p < 0.01 \)), asthma alone (mean: 1.54; \( p < 0.01 \)), both polyps and asthma (mean: 1.93; \( p < 0.001 \)), and cystic fibrosis alone (mean: 2.35; \( p < 0.01 \)).

**Preoperative findings.** Preoperative symptoms are summarized in the table. Notably, all 10 patients with Samter’s triad complained of nasal obstruction, and 4 complained of anosmia.

The two most common concomitant diagnoses in the study population were allergic fungal sinusitis (13.5% of patients) and cystic fibrosis (8.9%).

**Postoperative findings.** As expected, patients with...
Samter’s triad had a significantly higher rate of symptomatic recurrence of nasal polyps 6 months after FESS than did patients without the triad (50.0 vs. 8.5%; \( p < 0.001 \)). Also at 6 months, patients with Samter’s triad had significantly higher rates of recurrence of nasal obstruction (17.5 vs. 7.9%; \( p < 0.005 \)), facial pain (28.1 vs. 6.9%; \( p < 0.05 \)), postnasal drip (40 vs. 4.5%; \( p < 0.05 \)), and anosmia (20.1 vs. 3.9%; \( p < 0.05 \)).

Discussion

No in vitro tests are available to diagnose aspirin sensitivity. In the United States, the condition is primarily diagnosed on the basis of the patient’s history. Elsewhere, oral or bronchial provocation with different doses of aspirin is common.

Some authors believe that aspirin sensitivity is underdiagnosed for various reasons, including a failure on the part of patients to associate aspirin ingestion with symptoms and a failure on the part of physicians to inquire about aspirin and NSAID use. Proponents of this theory therefore advocate greater use of provocation testing for patients with suspicious symptoms. But widespread provocation testing is currently unrealistic for several reasons. For example, protocols indicating when provocation testing should be administered have been published in Europe, but no widely practiced protocols exist in the United States. Other limiting factors are the risk of overprovocation and time and cost constraints. One possibly fruitful area of future study in the United States might involve the development of a new provocation testing protocol or a wider implementation of a previously published protocol that is safe, inexpensive, and efficient.

Finally, the diagnosis of aspirin sensitivity is further complicated by the fact that many patients do not exhibit its effects until they reach middle age. In our study, we encountered the case of a man in his mid-40s who, despite having used NSAIDs throughout his entire life, had never experienced any symptoms of aspirin sensitivity until a few months before he presented to the clinic. Other authors have examined the prevalence of aspirin sensitivity in select patient populations, including patients with asthma (range: 5 to 19%).\(^8\)\(^-\)\(^11\) The percentage of asthma patients in our study who were aspirin-sensitive fell within this range (16.9%).

As mentioned, little has been reported in the literature about the prevalence of Samter’s triad among patients who are treated with FESS. Therefore, when evaluating a patient for FESS, it may be helpful to remember the prevalence of Samter’s triad in our study: 4.8% among all patients undergoing FESS, 9.4% for patients with nasal polyps, 16.9% for patients with asthma, and 25.6% for patients with both nasal polyps and asthma. With that in mind, physicians should ask all FESS candidates about aspirin and NSAID use. When aspirin sensitivity is diagnosed, additional effort should be made to educate patients about nonsurgical management options and the long-term postoperative prognosis.

Surgery is indicated only after medical therapy has failed. Although surgery may not cure the underlying mucosal disease, it may significantly alleviate nasal obstruction. Still, we found that patients with Samter’s triad had higher rates of symptom recurrence and nasal polyp recurrence resulting in nasal obstruction within 6 months after FESS. In addition, they were significantly more likely to require multiple FESS procedures.

Postoperatively, aggressive medical management is necessary to control the mucosal disease in an attempt to prevent or delay polyp recurrence. The gold standard for medical therapy is the use of intranasal and/or oral corticosteroids. Patients can also use mucolytics and perform nasal saline douches to remove the thick eosinophilic debris from the sinonasal cavities.

Our findings indicate that patients with Samter’s triad can be difficult to manage, both medically and surgically. Treatment requires some extra effort on the part of physicians, particularly with regard to modifying the management strategy as circumstances warrant. All possible methods of medical management should be pursued.
• First, patients should be taught to avoid the use of aspirin and other NSAIDs. In most cases, low-dose acetaminophen can be taken as a substitute.\textsuperscript{12} There is abundant cross-sensitivity in the entire family of NSAIDs, but recent studies have shown that several of the COX-2 inhibitors are safe for patients with aspirin sensitivity.\textsuperscript{13-17} Another management option is desensitization to aspirin or NSAIDs, especially for refractory patients.\textsuperscript{18}

• Second, consider prescribing an antileukotriene medication. These agents were shown to be beneficial in a randomized, double-blind, placebo-controlled trial.\textsuperscript{19} Since these medications have been approved by the U.S. Food and Drug Administration for the management of asthma, they can provide symptom relief in patients with Samter’s triad.

• Third, regardless of the management method chosen, patient education is needed to maximize results. This includes thorough instruction about the recalcitrant nature of their disease.

References

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