

Epidemiologic Factors Affect Surgical Outcomes in Allergic Fungal Sinusitis

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Objectives: To evaluate discrepancies in presentation and postoperative outcomes in a population of allergic fungal sinusitis (AFS) patients.

Study Design: Prospective cohort study.

Methods: Clinical and demographic records of 48 patients (26 males, 22 females) who underwent endoscopic sinus surgery (ESS) for treatment of AFS were collected from 2003 to 2008. All patients completed pre- and postoperative Sinonasal Outcome Test (SNOT)-20 questionnaires. Patients also underwent objective grading via the Lund-Kennedy nasal endoscopy and the Lund-Mackay computed tomography (CT) scan scoring systems. This data was interrogated by means of both univariate and multivariate analysis through the use of Mann-Whitney and chi-square tests to calculate statistical significance.

Results: Preoperatively African-Americans had significantly higher Lund-Mackay and mean endoscopy scores ($P < .05$) than Caucasians. However, there was no significant difference among SNOT-20 scores. Postoperative symptom and endoscopy scores improved in all patient groups with significantly greater improvement in women (both $P < .05$) versus men at 12 months. Improvement ratio of preoperative versus postoperative endoscopy scores trended toward significance at 6 months ($P = .08$), with African-Americans improving more than Caucasians.

Conclusions: Epidemiologic factors may play an important role in the presentation and progression as well as in surgical outcomes of patients diagnosed with allergic fungal sinusitis.

Key Words: Epidemiologic, outcomes, allergic, fungal, sinusitis.

Level of Evidence: 2b.

Laryngoscope, 120:2322–2324, 2010

INTRODUCTION

Once described as allergic aspergillosis of the maxillary sinuses, the disease entity now known as allergic fungal sinusitis (AFS) continues to be a challenging process to manage. Over the past 3 decades, there have been several advancements in the understanding and description of AFS. The most widely accepted diagnostic criteria were set forth by Bent and Kuhn¹ in 1994. Both short-term follow-up studies such as that by Kupferburg et al.² and more long-term studies such as those by Marple et al.³ and Kuhn et al.⁴ have helped to shed light on the natural history of AFS. More recently, a small number of studies have evaluated epidemiologic factors that may play a role in the evolution and presentation of this disease. Wise et al.⁵ reported a higher incidence of AFS in African-American patients. In addition, several other AFS series have shown a greater male-to-female ratio.^{6–8} Furthermore, a number of investigations contain convincing evidence that suggests a link between socioeconomic status and the disease.^{5,7,9} However, to our knowledge none of these studies have evaluated surgical outcomes in relation to these demographic factors. The goal of the current study was to evaluate discrepancies in presentation and postoperative outcomes in a population of AFS patients.

MATERIALS AND METHODS

Approval for this prospective cohort study was obtained from the institutional review board at the Medical College of Georgia. All patients freely consented to participate and were treated between 2003 and 2008. Inclusion criteria included diagnosis of AFS by Bent and Kuhn criteria and subsequent endoscopic sinus surgery (ESS) with diagnosis confirmation by pathologic examination of sinus contents. Postoperatively all patients were treated with a regimen of nasal saline irrigations, topical nasal steroid spray, oral antibiotics course, and a standardized month-long steroid taper. Once oral antibiotics and the steroid taper were completed, the regimen consisted of nasal saline, intranasal steroid spray, and montelukast and budesonide nasal irrigations. Disease exacerbations were managed with an additional month-long oral steroid taper. Postoperative management included endoscopic debridements at 1, 3, and 7 weeks postoperatively as needed. Follow-up was then set at 3-month intervals from the date of surgery and as needed dependent on exacerbations. Patients were excluded if diagnosed with a fungal ball, benign or malignant neoplasm of the sinonasal cavity,

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Editor's Note: This Manuscript was accepted for publication June 16, 2010.

The authors have no financial disclosures to declare.

The authors have no conflicts of interest for this article.

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DOI: 10.1002/lary.21127

cystic fibrosis, immunodeficiency, were pregnant, or had prior history of radiation to the head or neck.

Each individual provided a complete medical history followed by a thorough head and neck exam, including sinonasal endoscopy. Diagnostic maxillofacial computed tomography (CT) was performed as well. Demographic data was collected including race, gender, and age at presentation to our office. All patients completed the subjective symptom questionnaire known as the Sinonasal Outcome Test 20 (SNOT-20), a validated health-related quality-of-life assessment tool. SNOT-20 was completed at their initial preoperative and subsequent postoperative visits at 6 and 12 months.

Patients also underwent objective grading at both their preoperative and postoperative evaluations. Preoperative grading was performed via the Lund-Kennedy nasal endoscopy and Lund-Mackay CT scoring systems. At their postoperative visits, patients were graded only by the Lund-Kennedy scale. The Lund-Kennedy nasal endoscopy scoring system measures sinonasal disease by assigning a numerical value to the presence of polyps, discharge, scarring, edema, and crusting. Each sinonasal cavity is graded separately and then combined to obtain an overall endoscopy score. With the Lund-Mackay CT scoring system, numerical values are assigned to the presence of partial or complete disease involvement of each of the four paired sinuses plus the osteomeatal complex within each nasal cavity. Scores are then added together resulting in a single value.

All gathered data was then interrogated using the SPSS 13.0 software (SPSS Inc., Chicago, IL). Statistical analysis was performed through both univariate and multivariate means by use of the Mann-Whitney and chi-square tests to calculate for significance. A P -value $< .05$ was then set as the standard for statistical significance.

RESULTS

A total of 48 patients met criteria for inclusion in this study. The mean age at presentation to our office was 32 years, ranging from 12 to 68 years. There were 26 males (54.2%) and 22 females (45.8%). African Americans made up 54.2% of the group, whereas Caucasians represented 45.8%.

Scores (SNOT-20, CT stage, and endoscopy) were then examined in relation to gender and race. The mean SNOT-20 and endoscopy score was compared at initial office visit, as well as 6- and 12-month time intervals postoperatively with respect to the initial preoperative scores. At each time interval, comparisons were made between gender as well as between race. SNOT-20 score for the entire cohort was 23.73 initially with improvement to 12.59 at 6 months and 6.19 at 12 months.

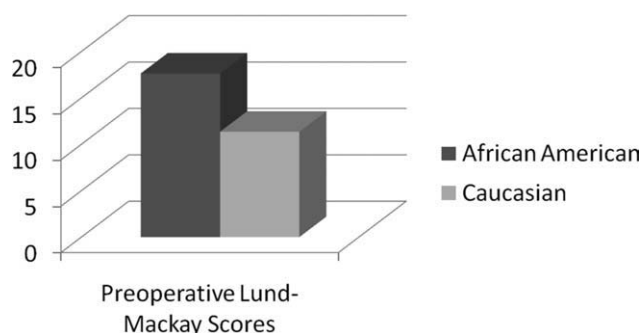


Fig. 1. Preoperative Lund-Mackay scores in relation to race.

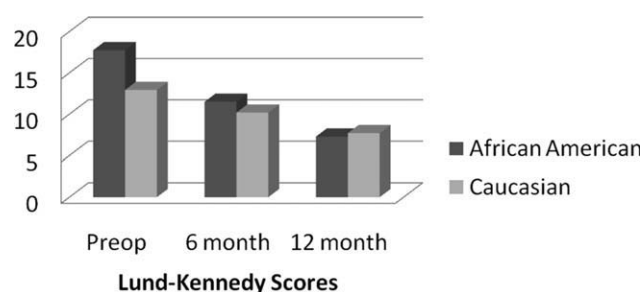


Fig. 2. Lund-Kennedy scores in relation to race.

When examining scores compared to race, African-Americans had significantly higher mean CT stage and mean preoperative endoscopy scores compared to Caucasians. The mean preoperative Lund-Mackay score for African-Americans was 17.64 compared to 11.36 for Caucasians ($P < .05$) (Fig. 1), and the mean preoperative endoscopy score was 17.75 for African-Americans, whereas Caucasians averaged 12.93 ($P < .05$) (Fig. 2). Although the mean preoperative endoscopy score was significantly worse for African-Americans, the 6 month postoperative improvement ratio for endoscopy only trended toward significance ($P = .08$) with Lund-Kennedy means of 11.50 and 10.19 for African-Americans and Caucasians, respectively (Fig. 2). There was no significant difference between SNOT-20 scores when compared to race.

With respect to gender, significant differences were noted on postoperative SNOT-20 scores as well as in endoscopy scores at postoperative month 12. Both male and female groups showed improvement in subjective symptom scores at postoperative months 6 and 12, but women showed significantly greater improvement one year postoperatively ($P < .05$). Women were found to have a mean preoperative SNOT-20 score of 18.77 with men scoring a mean of 13.00. These scores improved to 12.13 and 10.75 but were not significant at postoperative month 6 and were significant at 8.85 and 7.92 at month 12 ($P < .05$) for women and men, respectively, when compared to preoperative scores (Fig. 3). Similarly, there was a significantly greater improvement ($P < .05$) in endoscopy scores for females compared to males 12 months postoperatively. The mean preoperative Lund-Kennedy score for females was 15.31 and was 17.18 for males. At postoperative month 6, women improved to 10.21 and men to 12.06, and at 12 months postoperatively the mean score was 6.75

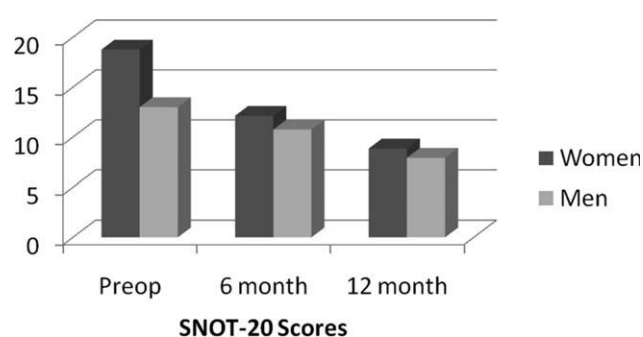


Fig. 3. Snot-20 scores in relation to gender.

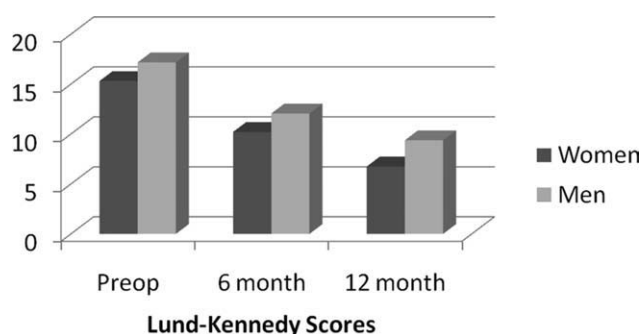


Fig. 4. Lund-Kennedy scores in relation to gender.

and 9.38 ($P < 0.05$) for females and males, respectively, when compared to preoperative Lund-Kennedy scores (Fig. 4). Gender was not found to play a significant role in objective Lund-Mackay findings.

DISCUSSION

Few studies have delved into the intertwining relationships of epidemiology with respect to the presentation and evolution of allergic fungal sinusitis, and none have assessed demographic data and postoperative outcomes. Knowledge of how this disease process affects individuals of a certain gender or race can be of extreme importance in tailoring consultation as well as treatment regimens.

In the current study, we addressed the role of epidemiologic factors in the outcomes of surgical treatment for AFS. Our results show that objective preoperative findings are worse in African-Americans than in Caucasians, but overall, African-Americans have a greater improvement ratio postoperatively. This could be explained by the fact that the goal of surgical intervention is clearance of disease. Although African-Americans present with more advanced disease, we were able to show that at 12 months postoperatively, with appropriate surgical and medical management, objective findings approximate similar stages of the disease.

When examining our results more closely, it is interesting to discover that African-Americans present at a later point in the progression of disease as evidenced by objective findings but at very similar subjective symptom scores as Caucasians. One potential explanation for this is that an individual's insight into overall health may be affected by his or her socioeconomic status, leading to a later presentation in the course of disease. A second possibility is a difference in symptom perception among races. More intriguing is the notion of the existence of a genetic predisposition for faster initial progression of AFS within the African-American population.

In respect to gender, it is also interesting to note that both preoperatively and postoperatively, compared to men, women have less disease by objective rigid endoscopy but report worse symptoms as revealed by SNOT-20 scores. This finding lends itself to the postulation that females may be more sensitive to nasal symptoms than males, or the explanation may be as simple as women seek medical care sooner than men. We were also able to show that women have better endos-

copy scores as well as a greater improvement in SNOT-20 scores 12 months postoperatively. It was not addressed in our study, but this could indicate that women in our patient population were more compliant with their postoperative medical regimen or that gender plays some inherent role in allergic inflammation.

One drawback to our study is that we did not include insurance status as one of our variables. In their analysis, Wise et al.⁵ were able to show that within their patient population, individuals diagnosed with AFS were more likely to be uninsured or covered by Medicaid. This suggests "a potential for decreased access to health care." Inclusion of insurance status as a variable in our data may have also allowed us insight into a possible connection between time of presentation and access to care. Second, as stated previously, compliance with postoperative medical therapy was also not included as a data point for interrogation and addition of this information could have proven useful in support of our results. Finally, the data for our investigation was obtained at a single tertiary otolaryngology practice in the southeastern United States. It is possible that our data could be skewed by the demographics of this region and may not be an accurate representation of the rest of the country and other nations. Additional studies are indicated prior to the application of any of our results to the general population.

CONCLUSIONS

Allergic fungal sinusitis is now a well-known entity but remains a challenge to effectively treat. Understanding variations of disease presentation and progression between different patient groups can assist in counseling patients as well as tailoring their treatment regimens. African-American patients tend to present at a higher stage but respond well to treatment. Women are likely to improve more objectively but rate their subjective symptoms the same as men.

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