INTRODUCTION

Chronic Rhinosinusitis (CRS) is an inflammatory process associated with several different pathogenic aerobic and anaerobic organisms. The microbiology of CRS has been studied extensively. As a result, probability guided antibiotics have been used. Endoscopic cultures of the middle meatus and sinususes have assisted in directing the choice of antibiotics and overall treatment. Reports of cultured organisms in medically treated patients as well as those treated surgically by functional endoscopic sinus surgery (FESS) have demonstrated differences in the isolates. (1-6) Many patients who undergo FESS, however, often have recurrent and persistent CRS that requires additional surgical intervention after appropriate medical treatment. Studying the endoscopically guided cultures intraoperatively may demonstrate those microorganisms that persist in the nasal cavity and sinuses despite aggressive treatment. In this article, we describe the microbiology of patients undergoing primary FESS and those requiring revision FESS.

METHODS

All patients undergoing FESS from January 2005 to January 2008 who fulfilled the diagnostic criteria for CRS set forth by the American Academy of Otolaryngology and had failed maximal medical management including topical nasal steroids, decongestants, and multiple, extended course of antibiotics were cultured endoscopically at the time of the primary and/or revision surgery. Cultures of the middle meatus were taken at the start of all operations. Care was taken to avoid contamination from the anterior nasal cavity. Cultures were taken directly to the laboratory for gram stain, aerobic/anaerobic/fungal culture, antibiotic resistance and the presence of polyps intraoperatively.

RESULTS

Ninety eight patients received 100 surgeries. There were 50 men and 48 women with a mean age of 45.01 years (range 18-81 years). 72 primary FESS and 28 revision FESS were performed.

The revision FESS cultures demonstrated a statistically higher percentage of positive cultures for Pseudomonas (8.33% vs. 0.08%) and statistically lower percentage of Streplococcus Viridans (0.0% vs. 7.6%). Coagulase negative Staphylococcus (CNS) was cultured most commonly in both groups, 39.4% vs. 35.4%. Polymicrobial culture were present in 65.3% of the primary FESS and 64.3% of the revision FESS (p=0.926). The revision FESS cultures demonstrated a non-significant higher percentage of positive cultures for anaerobes (39.6% vs. 30.3%, p=0.241), fungi (4.2% vs. 2.2%, p=0.494), MRSA (4.2% vs. 0.8%, p=0.114). The percentage of patients with polyps was similar in both groups (54.2% vs. 57.1%) and polyp cases did not show any predominant organisms.

71 of the 80 cultures were evaluated for antibiotic resistance and sensitivities. A total of 88.7% cultures showed some level of antibiotic resistance with a significant difference between primary FESS and revision FESS (84.8% of primary FESS vs. 96.0% of revision FESS, p=0.011). 39.4% of the overall cultures were resistance to more than 2 antibiotics. There was a significant higher rate of single antibiotic resistance in the revision FESS than the primary FESS (58.0 vs. 30.4%).

DISCUSSION

Previous studies have addressed the microbiology at the time of diagnosis, after medical treatment, after medical and surgical treatment, and at the time of recurrent infection after surgical treatment. This study examines cultures taken at the time of initial surgery and at the time of revision surgery after further medical treatment. It reports on the next step in the evolution of the microbiology and treatment of CRS.

The majority of previous bacteriologic studies demonstrate that CNS is the most common organism cultured in CRS whether cultures were taken after only medical treatment, during the initial surgery, or in the postoperative period (5, 8-11). A mixture of Staphylococcus aureus, Streplococcus pneumoniae, Enterobacter, and anaerobic bacteria comprise the next most common isolates, especially in medically treated patients. In patients who were treated surgically, Brook found that Pseudomonas and gram negative aerobic bacilli were more common postoperatively. Bhattacharya, however, found in a prospective study of patients six weeks postoperatively that the most common isolates were gram positive cocci and the most common gram bacteria were Staphylococcus epidermidis (4). Bhattacharya cultured those with recurrent infections and Staphylococcus aureus and CNS were the most common cultured pathogens. (2)

The current study of intraoperative cultures of revision FESS corroborates the findings of Brook and Bhattacharyya with regard to an increase in pseudomons cultures in post op FESS patients and the predominance of coagulase negative staphylococci. Similar to Brook, anaerobes were more common in the primary FESS group vs. the revision FESS group. Brook’s theory of the evolution of the organism in CRS from aerobic and facultative species to anaerobes secondary to multiple courses of medical is not contradicted by the current study’s findings. (12)

Controversy with regard to the predominance of CNS in the majority of bacteriologic studies on CRS forces us to address its significance as a pathogen or contaminant in CRS. Several studies have demonstrated that CNS is also present in normal subjects.(13,14) Kremm, in fact, identified CNS in all nasal and paranasal cultures in both normal patients and those with CRS.(15) Aral addressed the pathogenicity of coagulase negative staphylococcus demonstrated the reduction in positive cultures when the nose was prepared with betadine solution from 62% to 12.9% (16). These studies therefore suggest that CNS is truly pathogenic in only a percentage of the cases in which it is cultured. This reduced role in CRS may also imply the necessity of performing further studies in other areas that contribute to the pathophysiology of CRS.

CONCLUSIONS

The revision FESS cultures demonstrated a statistically higher percentage of positive cultures for Pseudomonas and coagulase negative staphylococcus compared to the primary FESS cultures in the treatment of CRS. Coagulase negative staphylococcus was the predominant organism in both groups but its pathogenicity is questionable. The revision FESS group demonstrated a non-significant but higher percentage of anaerobic microorganisms, MRSA, and fungus than the primary FESS group.

The revision FESS group noted a significantly higher rate of antibiotic resistance versus primary FESS. 39.4% of the overall cultures were resistance to more than 2 antibiotics.

REFERENCES