

INTRODUCTION

- Endoscopic endonasal surgery (EES) is an innovative surgical technique to remove skull base and brain tumors.
- Consensus guidelines for selection and duration of antibiotic prophylaxis in EES have not been developed.
- The objective of this study was to define the microbiologic and clinical characteristics of post-EES CNS infections.

METHODS

- Single center, retrospective study of patients >18 years of age who underwent EES between 1/2010 and 7/2021 and developed a CNS infection within 30 days following the procedure
- Inclusion and Exclusion Criteria
 - CNS Infection: positive cerebrospinal fluid (CSF) culture or Gram-stain, a negative CSF culture with CSF glucose <15 mg/dL and WBC >150 WBC/ μ L in the presence of tissue cultures growing pathogenic bacteria, evidence of a CNS abscess with debrided tissue cultures or drainage growing pathogenic bacteria.
 - Patients with an active CNS or maxillofacial infection prior to EES, negative CSF and negative tissue cultures, those initially admitted to an outside hospital and those with ventricular or lumbar drain bacterial colonization were excluded.
- Microbiology
 - A polymicrobial case was defined as >1 pathogen isolated from CSF.
 - In cases where a pathogen was not recovered from the CSF, cases were considered polymicrobial if >1 pathogen was isolated from debrided rhinocerebral or maxillofacial cultures.
- Antibiotic Regimen
 - During the study period, the standard prophylaxis regimen was ceftriaxone 2g every 12 hours for 48 hours. For patients with a documented penicillin allergy, vancomycin plus aztreonam was recommended.
 - Subsequently, oral cefuroxime was given while nasal packing was in place for 5-7 days. In patients with a penicillin allergy, oral cefuroxime was substituted with oral doxycycline while nasal packing was in place

RESULTS

- 2,440 EES procedures were performed on 2,005 patients.
- The CNS infection rate was 1.8% (37/2005).
- CNS infections were more common among patients with a history of prior EES (6.5% [20/307]) compared to those who did not (1% [17/1698]; $P < 0.001$).
- The median [IQR] time from EES to diagnosis of CNS infection was 12 [6-19] days.
- The underlying pathology for those patients with CNS infection that underwent tumor resection included pituitary adenoma (n=6), chordoma (n=6), meningioma (n=5), craniopharyngioma (n=2), dermoid tumor, glioblastoma, leiomyosarcoma, nasal adenocarcinoma, olfactory neuroblastoma, and sinonasal carcinoma (n=1 each)

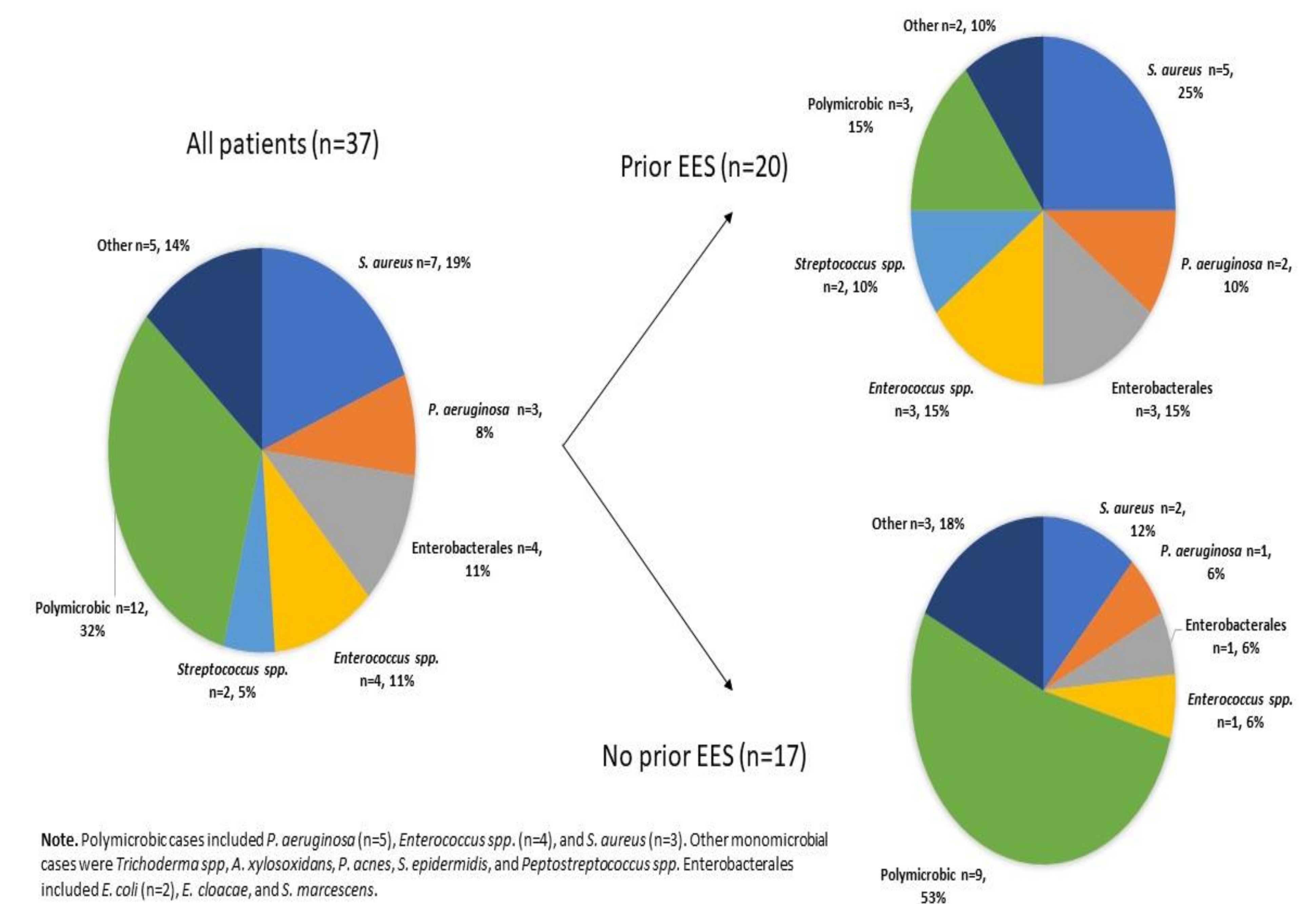
Table 1: Patient Demographics of Postop infections

| Variable | (n=37)* |
|--|------------|
| Median age in years (IQR) | 51 (42-60) |
| Female sex, n (%) | 12 (32.4) |
| Indication for Primary EEA | |
| Tumor Resection* | 25 (67.6) |
| CSF Leak Repair | 9 (24.3) |
| Other | 3 (8.1) |
| Post-operative CSF leak, n (%) | 26 (70.3) |
| External Ventricular Drain or CSF shunt in place > 48 hours, n (%) | 9 (24.3) |
| Lumbar drain in place > 48 hours, n (%) | 5 (13.5) |
| Prophylaxis regimens | |
| Ceftriaxone monotherapy | 24 (64.9) |
| Vancomycin + Ceftriaxone | 3 (8.1) |
| Vancomycin + Aztreonam | 4 (10.8) |
| Other | 6 (16.2) |

* Positive CSF cultures or Gram stain (n=25); Negative CSF cultures/ gram stain with a CSF glucose < 15 mg/dL and CSF WBC > 150 WBC/ μ L (n=8); CNS abscess (n=3); Infectious Diseases consultant diagnosis of CNS infection (n=1).

- Among patients who received active prophylaxis against the isolated pathogens, 30.7% (4/13) developed post-EES MSSA infections despite ceftriaxone monotherapy (n=2), vancomycin plus aztreonam, and vancomycin plus ceftriaxone prophylaxis
- Among those colonized with MRSA at time of EES, 75% (3/4) developed MRSA CNS infection compared to 6.1% (2/33) of non-colonized MRSA patients ($P=0.005$)
- The overall 30-day mortality rate was 2.7% (1/37)

Figure 1: Microbiology



CONCLUSIONS

- CNS infection post-EES is rare and causative pathogens vary
- Our findings support targeting *S. aureus* for antimicrobial prophylaxis and the use of cefazolin alone for first time surgeries
- A prophylactic regimen with adequate gram-negative coverage should be considered in patients who have previously undergone EES
- Further studies are needed to identify the impact of MRSA nares screening on antimicrobial prophylaxis prior to EES

