The Use of Nasopharyngeal Airways to Prevent Tension Pneumocephalus after Anterior Skull Base Surgery

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INTRODUCTION

Although a relatively rare complication in anterior skull base (ASB) surgery (1%-12%)1-4, the development of tension pneumocephalus can quickly lead to permanent morbidity or mortality in this patient population. Because of this, the diversion of air after ASB surgery has been performed through different mechanisms, including prolonged intubation, tracheostomy, and nasopharyngeal airway placement. The success of nasopharyngeal airway placement has been scarcely reported in the literature in only a small number of patients.4 There is also variability in the timing of nasopharyngeal airway removal, and has ranged from 2 to as long as 11 days postoperatively.

It has been our practice to use nasopharyngeal airways in lieu of tracheostomy or prolonged intubation to prevent tension pneumocephalus. Patients are extubated immediately post-operatively and nasopharyngeal airways remained in place until postoperative day 3. The primary goal of this study is to assess the efficacy of using nasopharyngeal airways for diversion of airflow to prevent tension pneumocephalus after open resection of anterior skull base tumors.

METHODS AND MATERIALS

This study was a retrospective review of consecutive patients who underwent surgery for ASB tumors between 1996 and 2009. All patients underwent a transglabellar/subcranial approach that has been previously well-described.5 Patient information was collected through the electronic medical record (EMR). This study was approved by the Institutional Review Board at the University of Michigan.

After tumor resection, free flap reconstruction is based on the size and type of defect as well as patient parameters (revision surgery, previous radiation). The majority of patients were extubated and all patients are maintained in the neurosurgical intensive care unit overnight. Nasopharyngeal airways are placed before extubation (Figure 1), sutured into place, and then removed on postoperative day 3. Lumbar drain placement was performed at the discretion of the neurosurgical team. Tension pneumocephalus was defined as a change in neurologic status (altered mental status or focal neurologic deficit) with the evidence of intracranial air on postoperative CT scan.

RESULTS

There were 120 ASB resections (mean age, 48.7 years; M/F 74:46) performed between 1994-2009 with documented nasopharyngeal airway placement. All patients were extubated on the day of surgery and nasopharyngeal airways remained in place for 3 days. No complications from nasopharyngeal airways were seen (e.g. nasal septal pressure necrosis, displacement of the tubes, etc.). There is also variability in the timing of nasopharyngeal airway removal, and has ranged from 2 to as long as 11 days postoperatively.

There were a total of 23 intracranial complications in 18 patients, the most common being CSF leak in 14 patients (11.7%). There were 3 (2.5%) patients who developed tension pneumocephalus (Figure 2).

Overall, there were 33 (28%) lumbar drains placed and 14 (12%) CSF leaks. Although there were only 3 occurrences of tension pneumocephalus, there was a statistically significant difference in the rate of tension pneumocephalus stratified by lumbar drain placement (p=0.02), presence of CSF leak (p=0.04), and both together (p=0.004). Type of reconstruction did not affect rate of tension pneumocephalus (p=1.0).

CONCLUSIONS

Resection of anterior skull base tumors does not necessitate prophylactic tracheostomy or prolonged intubation, and use of nasopharyngeal airways to divert airflow is well tolerated and highly successful. Lumbar drainage, the presence of a CSF leak, or both together may increase the risk of tension pneumocephalus.

REFERENCES