Background

There are case reports of CSF leaks and symptomatic pneumocephalus after resumption of CPAP postoperatively, but these appear to be rare although serious events1-3. There are no current guidelines on the timing of resuming nocturnal non-invasive positive pressure ventilatory therapy after skull base surgery. In patients with obstructive sleep apnea (OSA) undergoing endoscopic skull base surgery, an analysis of risk factors and timing of postoperative cerebrospinal fluid (CSF) leak would provide important prognostic information and may help clinicians determine when to restart continuous positive airway pressure (CPAP) therapy.

Methods

Retrospective cohort of adult patients at Mayo Clinic Rochester between 11/1/2002 and 12/31/2015 with OSA (n=25) and without OSA (n=87) undergoing endoscopic transnasal skull base surgery who experienced a symptomatic postoperative CSF leak. Patients with a leak prior to admission and CSF leaks greater than 30 days following surgery were excluded (n=69).

Presence of OSA was compared across levels of clinical characteristics using the Chi-square/Fisher test (where appropriate) for categorical covariates and Wilcoxon rank-sum test for continuous covariates. The presence of iatrogenic leak across clinical characteristics was investigated using similar methods. Multivariate Cox regression (additionally adjusted for age and BMI) was used to examine associations between presence of OSA and timing of leak. Kaplan-Meier curves were estimated for visual comparisons, p < 0.05 was determined to be significant, and all tests were 2-sided. All analyses were completed using SAS version 9.4.

Results

No patients were restarted on CPAP during the inpatient postoperative period. Forty-three patients met study inclusion criteria, of which 14 (33%) were diagnosed with OSA. OSA patients were significantly older (median 54.2 vs. 48.2, p=0.05) and had higher BMI (median 39.4 vs. 31.7, p<0.01) than non-OSA patients (Table 1). Non-OSA patients tended to have a higher proportion of iatrogenic leaks (90% vs. 72%), but this comparison was not significant (p=0.19). There was no difference in lumbar drain placement at time of surgery in OSA (14%) and non-OSA (24%) patients (p=0.69, data not shown).

Compared to non-OSA patients, OSA patients had shorter time to leak (median 3 days vs. 5 days, log-rank p=0.33, Figure 1). After adjustment for age and BMI, the hazard ratio (1.33) was non-significant (p=0.387, Table 2). There was no evidence for associations between gender, type of repair, or type of leak and timing of leak (Figures 2-4). Thirty-six patients experienced iatrogenic leaks (84%, Table 1). Recurrence of leak occurred more frequently in patients with non-iatrogenic leaks (20% vs. 19%, p=0.91). Patients with iatrogenic leaks had a higher proportion of sellar leaks (58% vs. 14%, p=0.06) than other types of leaks. The locations of the leaks were most commonly located in the sellar region or sphenoïd sinuses in both groups. Finally, iatrogenic leaks tended to have fewer post-operative systemic complications than non-iatrogenic leaks (11% vs. 43%), but this comparison was only marginally significant (p=0.07).

Discussion

Between 2002 and 2015 there were 280 adult patients with OSA that underwent endoscopic skull base surgery. Of these 280 patients, 14 had CSF leaks that met criteria for our study. The incidence of post-operative CSF leak (5%) in our OSAG group falls within the expected 0.5-14% published rate4. BMI and age were significantly higher in the OSA group. There was a non-significant trend towards early onset of CSF leak in patients with OSA compared to patients without OSA. As CPAP was not utilized during this period, this difference cannot be attributed to its use. Furthermore, there were no other significant differences between the OSA and non-OSA groups. Importantly, none of the patients who had closure of their defect with a nasoseptal flap experienced a leak after 5 days postoperatively (median time 3 days). For OSA patients that were reconstructed with a nasoseptal flap, consideration should be given to resuming postoperative CPAP as early as one week postoperatively. Ultimately, a larger case-control study would be beneficial to determine if there is a definitive relationship between OSA and postoperative skull base CSF leaks, and the optimal time for restarting CPAP.

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References