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Brief Communication

Opioid Use in the Post-Anesthesia Care Unit Increases the Risk of Urinary Retention after Endoscopic Sinus Surgery in Geriatric Men

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SUMMARY

This study aimed to determine the prevalence and risk factors of urinary retention after endoscopic sinus surgery performed under general anesthesia.

We retrospectively analyzed the records of patients who underwent endoscopic sinus surgery at our institute under general anesthesia between January 2018 and December 2019. Patients with prior diagnoses of urologic or gynecologic disease were excluded. We enrolled and categorized 294 patients based on the presence of urinary retention. Clinical characteristics, intraoperative findings, and postoperative medications were reviewed, and regression analyses were performed to identify risk factors associated with postoperative urinary retention after endoscopic sinus surgery.

The overall incidence of urinary retention was 18.02%. Univariate and multivariate regression analyses indicated that old age (odds ratio, 1.072; 95% confidence interval, 1.042–1.103), male sex (odds ratio, 12.293; 95% confidence interval, 3.849–39.262), and opioid use in the post-anesthesia care unit (odds ratio, 3.647; 95% confidence interval, 1.496–8.893) were associated with urinary retention after endoscopic sinus surgery.

Urinary retention may be common after endoscopic sinus surgery performed under general anesthesia. To reduce the prevalence of this condition, opioid use in the post-anesthesia care unit should be carefully considered, particularly in older male patients.

1. Introduction

Urinary retention is a condition in which impaired emptying of the bladder results in the retention of residual urine.[1] Chronic urinary retention develops over a relatively long duration, whereas acute urinary retention develops abruptly and is accompanied by the inability to micturate.[2] Postoperative urinary retention is classified as acute urinary retention. Various factors such as anorectal surgery, neuroaxis block, anticholinergic medication, opioid use, and advanced age are reportedly associated with acute urinary retention.[3]

Although often regarded as a minor complication in some surgical departments, urinary retention can be a significant source of patient anxiety and discomfort.[4] Even a single episode can result in collagen deposition in the smooth muscle fibers of the detrusor muscle and lead to a reduction in contractile function or chronic impairment in bladder function.[4,5]

Endoscopic sinus surgery (ESS) is performed for the treatment of chronic sinusitis. The overall complication rate of ESS is approximately 0.5%, and intraoperative bleeding, orbital injury, and cerebrospinal fluid leakage are the most commonly reported complications.[6] Postoperative urinary retention is not currently considered a serious complication of ESS. However, we recently encountered geriatric patients who experienced difficulty in self-voiding after ESS performed under general anesthesia, which necessitated treatment for urinary retention. The prevalence of our observed cases was higher than that previously reported in prior studies analyzing urinary retention prevalence following ear-nose-throat (ENT) surgery.[7] In these patients, urinary retention resulted in the need for medication, prolonged hospitalization, or discharge with catheter insertion. These are generally unexpected complications postoperatively. Therefore, in this study, we aimed to evaluate the prevalence of postoperative urinary retention and identify independent predictive risk factors for urinary retention in patients who underwent ESS under general anesthesia.

2. Materials and methods

This study was approved by the Institutional Review Board of Chung-Ang University Hospital (2101-006-19349), which waived the need for informed consent owing to our retrospective study design.

We reviewed the records of patients who underwent ESS at our institute under general anesthesia between January 2018 and December 2019. All surgical procedures were performed under general anesthesia by two experienced surgeons. Patients with a history of urologic/gynecologic diseases, such as benign prostatic hypertrophy, were excluded. Patients who used nasal decongestants (which contain sympathomimetic drugs) within two weeks before surgery were also excluded.

In all cases, glycopyrrolate was administered intramuscularly 20

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minutes before anesthesia induction. Fentanyl/remifentanil, propofol, and succinylcholine were administered intravenously before intubation. For anesthesia maintenance, desflurane or sevoflurane was administered. For muscle relaxation, rocuronium was administered intravenously. Before extubation, all patients received the same anticholinergic drugs in combination followed by a reverse agent. In the post-anesthesia care unit (PACU), opioids were selectively administered according to the degree of pain experienced by the patients. In the general ward, opioids were not administered for pain control — non-steroidal anti-inflammatory drugs (NSAIDs) and other types of analgesics were used instead.

The presence of urinary retention was diagnosed based on the level of patients' discomfort combined with the inability to void, a palpably distended bladder, and the presence of residual urine identified via bladder catheterization postoperatively.[3] We divided the patients into two groups based on whether or not they had urinary retention.

Clinical characteristics and preoperative medication use were reviewed. Intraoperative characteristics, such as operative time and blood loss, were reviewed. Postoperatively, the use of opioids in the PACU, presence of urinary retention symptoms, and the time to onset of urinary retention symptoms were reviewed.

Statistical analyses were performed using SPSS 22.0 (IBM Corp., Armonk, NY, USA). Descriptive data are expressed as the mean ± standard deviation. In the univariate analysis, the intraoperative characteristics were compared between patients with and without urinary retention symptoms using an independent *t*-test or a chi-square test. A stepwise multivariate logistic regression analysis was performed to identify the independent risk factors for postoperative urinary retention. Variables with *p*-values < 0.05 in the univariate analysis were candidates for entry into the multivariate analysis model. Independent risk factors are presented as odds ratios (ORs) with 95% confidence intervals (CIs). *p*-values < 0.05 were considered statistically significant.

3. Results

A total of 294 patients were included in this study; 53 (18.02%) had urinary retention and 241 (81.98%) had no urinary retention. The mean age was 50.28 ± 17.43 years, and 64.28% (189 of 294) of the patients were male. Furthermore, 39.80% (117 of 294) and 46.60% (137 of 294) had a history of smoking and alcohol use, respectively. In addition, 23.80% (70 of 294) were diagnosed with hypertension, and 14.28% (42 of 294) were diagnosed with diabetes. Moreover, 21.08% (62 of 294) had a history of antihistamine medication use within the two weeks before undergoing surgery. The mean operative time was 56.49 ± 37.09 mins, and the mean blood loss was 85.05 ± 162.62 mL. The mean duration between the end of surgery and occurrence of symptoms was 13.93 ± 8.18 hours (Supplementary Table 1).

In the univariate analysis, male sex, old age, hypertension, smoking history, and use of opioids in the PACU were found to be associated with postoperative urinary retention ($p < 0.05$, Table 1). Alcohol intake had a near significant *p*-value in the univariate analysis.

In the multivariate analysis, male sex (OR: 12.293, 95% CI: 3.849–39.262, $p < 0.001$), old age (OR: 1.072, 95% CI: 1.042–1.103, $p < 0.001$), and use of opioids in the PACU (OR: 3.647, 95% CI: 1.496–8.893, $p = 0.004$) were found to be significant risk factors for urinary retention after ESS (Table 2). When alcohol intake was analyzed in the multiple logistic regression model, it did not affect the final result (data not shown), despite its near significance in the univariate analysis.

4. Discussion

To the best of our knowledge, the present study is the first to evaluate the prevalence of postoperative urinary retention and to identify independent predictive risk factors for urinary retention in patients who underwent ESS. Our findings demonstrated that urinary retention occurred in 18.02% (53 of 294) of patients who underwent ESS under general anesthesia.

This prevalence is higher compared to that in a previous study which reported that less than 4% of patients developed urinary retention after surgery for obstructive sleep apnea.[7]

All patients with urinary retention required medication to relieve their symptoms during the admission period. Male sex, old age, and the use of opioids in the PACU were significantly associated with postoperative urinary retention.

The reported overall proportion of complications after ESS was 0.50–7.39%.[8,9] When comparing the occurrence of urinary retention

Table 2
Multivariate logistic regression analysis: independent risk factors for postoperative urinary retention.

Variables	OR (95% CI)	*p*-value
Sex	12.293 (3.849–39.262)	< 0.001
Age	1.072 (1.042–1.103)	< 0.001
Hypertension	1.117 (0.500–2.496)	0.788
Smoking history	1.191 (0.544–2.606)	0.662
Opioid use for immediate postoperative pain	3.647 (1.496–8.893)	0.004

CI: confidence interval; OR: odds ratio.

Table 1
Risk factors for postoperative urinary retention.

Variables	Urinary retention (n = 53)	No urinary retention (n = 241)	*p*-value
Sex, male/female, n	48/5	141/100	< 0.001
Age (years), mean ± SD	60.64 ± 12.65	48 ± 17.53	< 0.001
Hypertension, yes/no, n	21/32	49/192	0.003
Diabetes mellitus, yes/no, n	9/44	33/208	0.537
Smoking history, yes/no, n	31/22	86/155	0.003
Alcohol intake, yes/no	31/22	106/135	0.057
Body mass index (kg/m^2), mean ± SD	24.34 ± 3.55	25.55 ± 15.62	0.617
Use of antihistamines, yes/no, n	7/46	55/186	0.126
Amount of bleeding (mL), mean ± SD	96.22 ± 104.00	82.58 ± 172.98	0.591
Duration of surgery (min), mean ± SD	61.57 ± 27.01	68.68 ± 29.17	0.968
Type of inhalant, sevoflurane/desflurane, n	29/24	120/121	0.253
Opioid for immediate postoperative pain, yes/no, n	15/38	29/212	0.004

SD: standard deviation.

to that of other complications, our findings suggest that urinary retention should be regarded as a potential postoperative complication of ESS if it is performed under general anesthesia despite the duration of the operation being relatively short. The risk factors for this condition need to be considered preoperatively to avoid further unnecessary treatment postoperatively.

Old age, male sex, and the use of opioids in the PACU were identified as significant risk factors for postoperative urinary retention following ESS in this study. We hypothesized that although none of the enrolled patients had known cases of benign prostatic hypertrophy, a proportion of older male patients may have actually had such a condition but had not been diagnosed. Furthermore, the use of opioids in the PACU increased the risk of urinary retention by approximately 3.5-fold, which was markedly higher than the effect of old age. Additionally, when we divided our enrolled patients into two groups according to age (age $\leq$ 59 years and age $\geq$ 60 years), gender and opioid usage were still significant factors contributing to the development of postoperative urinary retention in the older group, but not in the younger group (data not shown). Therefore, we suggest that in older patients, the use of opioids in the PACU should be avoided to reduce the risk of postoperative urinary retention after ESS.

With regards to postoperative bleeding, NSAIDs are generally avoided in the otolaryngology department, particularly after ESS, because of the risk of epistaxis. However, several studies have suggested that postoperative pain after ESS is typically mild, reporting a mean overall pain score of 3.12 ± 1.95 on a visual analog scale of 1–10.[10] In addition, recent studies have demonstrated that the use of NSAIDs does not increase the risk of bleeding, suggesting that NSAIDs are safe and effective for the treatment of pain after ESS.[11,12] Other drugs used to treat neuropathic pain and neurologic disorders were also reported to be effective in the treatment of postoperative pain after ESS.[13] Considering our current findings, we believe that the use of opioids in the PACU should not be considered as the first choice after ESS, particularly in geriatric male patients, because it increases the risk of postoperative urinary retention in this population.

Interestingly, preoperative antihistamine intake was not associated with postoperative urinary retention. Many observational studies reported that up to 10% of urinary retention cases might be due to the concomitant use of medications.[2] Various types of medications such as drugs with anticholinergic activity, analgesic drugs, calcium channel antagonists, and antidepressants were reported to be associated with acute urinary retention. Antihistamines are generally prescribed in patients with chronic sinusitis combined with allergic rhinitis. Histamine H1 receptor antagonists are also reportedly associated with urinary retention.[2] Although some types of antihistamines do not have anticholinergic effects, cases of antihistamine-induced urinary retention have been reported.[14] In our study, antihistamine use within two weeks before surgery was reported in 24.89% (62 of 249) of patients and was not associated with postoperative urinary retention. As we could not evaluate the effect of each individual antihistamine drug, a large population study may be needed to further confirm the effects of antihistamines on the development of postoperative urinary retention.

As this study was only a single-center study and the number of enrolled subjects was relatively small, there may be other potential contributory variables that we failed to evaluate. In particular, the effect of preoperative disease severity and other concurrent medical conditions which might be associated with inclusion variables such as blood loss, need to be studied further.

In conclusion, the findings from this study suggest that urinary retention in male geriatric patients should be considered as a possible complication after ESS if it is performed under general anesthesia. Hence, the choice of opioids for pain control in the PACU should be reconsidered in older male patients.

Conflicts of interest

No potential conflict of interest relevant to this article was reported.

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Supplementary materials

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