Postoperative Sore Throat: Incidence, Risk Factors, and Outcome

Annop Piriyapatsom MD*,
Sukanya Dej-Arkom MD*, Thitima Chinachoti MD*,
Jarunee Rakkarnngan MD*, Pensiri Srishewachart MD*

** Department of Anesthesiology, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand*

Background: *Postoperative sore throat (POST) has been one of the most common complaints after anesthesia. In Siriraj Hospital, a high volume of general anesthesia is performed annually, but there was limited data regarding this complaint.*
Objective: *To describe the incidence of POST and to determine risk factors associated with the occurrence of POST.*
Material and Method: *Three hundred eighty seven patients were prospectively studied. Demographic data, airway management, and intra-operative data were recorded. Sore throat occurrence and its intensity at postoperative 24 hours as well as patient satisfaction were assessed.*
Results: *The overall incidence of POST was 35.7% (95% confidence interval [CI] 30.9-40.7%) with the mean intensity of 29.8±21.2. Operation of the neck was found to be an independent risk factor of 24-hour POST (odds ration [OR] 3.43, 95% confidence interval [CI] 1.88-6.25, p<0.001), whereas in gynecological surgery the occurrence was significantly attenuated (OR 0.49, 95% CI 0.26-0.95, p = 0.035).*
Conclusion: *POST was common after general anesthesia. Careful airway management might be the key to prevent this occurrence and to improve the quality of anesthetic care.*

Keywords: *Anesthesia, Postoperative sore throat, Risk factors, Satisfaction*

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Postoperative sore throat (POST) was one of the most common complaints following general anesthesia, ranking the second place after post-operative nausea and vomiting[1]. The reported incidence of POST varied from 12% to 65%[1-6]. The postulated mechanisms showed some degree of injuries to the airway such as epithelial loss, submucosal tears as well as pharyngeal, intralaryngeal, vocal cord and glottic congestion or even hematoma[7-10]. There were several factors that might increase the incidence of POST such as female sex, age, history of smoking or lung disease, neck or gynecologic surgery, difficult intubation, duration of anesthesia, patients' position, or administration of succinylcholine or nitrous oxide during anesthesia[1-5,11]. The consequences of POST were prolongation of post-anesthetic care[3] and poor patient satisfaction[1,12]. Therefore, numerous measures had to be proposed to attenuate this occurrence such as using a laryngeal mask airway (LMA) instead of endotracheal tube (ETT)[12-15], using a manometer to control intracuff pressure[16,17] or administration of some medication such as lidocaine[18] or dexamethasone[19,20].

In Siriraj Hospital, there were approximately 24,000 cases per year undergoing general anesthesia. However, there were limited data regarding the true incidence of POST and its risk factors. Therefore, the aims of the present study were (i) to determine the incidence of POST in patients undergoing general anesthesia at Siriraj Hospital, and (ii) to identify risk factors associated with POST and to find out patient satisfaction to anesthetic care.

Material and Method

After approval by Siriraj Institutional Review Board (Faculty of Medicine, Siriraj Hospital, Mahidol University, Thailand), patients with age of ≥18 years scheduled for general anesthesia were enrolled. Patients who were anticipated to require mechanical ventilation postoperatively or who had communication problems were excluded. Written informed consents were obtained. General anesthesia was conducted following standard anesthesia protocol. At the end of the operation, general anesthesia was discontinued

Correspondence to:
Piriyapatsom A, Department of Anesthesiology, Faculty of Medicine, Siriraj Hospital, Mahidol University, 2 Pran Nok Road, Bangkok Noi, Bangkok 10700, Thailand.
Phone: 0-2419-7995, fax: 0-2411-3256
E-mail: annop.pir@mahidol.ac.th

following by extubation or removal of LMA after appropriate. Patients were then transferred to the post-anesthetic care unit (PACU) before discharge to a general ward according to the Siriraj PACU discharge scoring criteria.

Demographic data including age, sex, American Society of Anesthesiologists (ASA) physical status, weight, height, airway evaluation, diagnosis, underlying diseases, history of pre-operative respiratory symptoms, and history of tobacco used were recorded. Perioperative data, including type of operation, airway management, intra-operative agents used, duration of operation, time spent in PACU and adverse events, was also collected. Sore throat was assessed in each patient at approximately 24 hours postoperatively after they were discharged from the PACA to general ward by the trained research staffs. The specific definition of sore throat in this study was "constant pain or discomfort in the throat independent of swallowing[17]". Sore throat intensity was measured using visual numeric rating scale (VNRS) ranging from 0 as no pain to 100 as extreme pain. Patient satisfaction to anesthetic care at postoperative 24 hours was also recorded by VNRS ranging from 0 as no satisfaction to 100 as the greatest satisfaction. Each patient was then categorized to either "sore throat group" or "no sore throat group" according to the presence or absence of 24-hour POST, respectively.

The primary outcome was to determine the incidence of 24-hour POST. The secondary outcomes were to identify risk factors and adverse events associated with POST and to find out patient satisfaction to anesthetic care. Sample size was calculated estimating the incidence of POST equal to 50% and given the probability of Type I Error was 0.05 and the allowable error in estimating incidence (margin of error) was 0.05. As a result, the number of subjects needed was 385. Data analysis was performed by using SPSS Statistics 17.0 software (IBM Corporation, New York, United States). Categorical variables were presented as number with percentages and were compared between groups using Pearson's Chi-square test or Fisher's exact test when appropriated. Continuous variables were presented as mean with standard deviation (SD) and were compared using unpaired t-test or Mann-Whitney U test when appropriated. Binary logistic regression analysis was used to identify factors associated with the development of 24-hour POST. P-value of less than 0.05 was considered to indicate a statistically significant difference between groups.

Results

Three hundred eighty seven patients undergoing general anesthesia at Siriraj Hospital between January 2010 and June 2011 were included in this study. The overall incidence of 24-hour POST was 35.7% (95% confidence interval [CI] 30.9-40.7%) with the mean sore throat intensity of 29.8±21.2. Patients with and without sore throat were comparable with respect to demographic, underlying medical illnesses, and airway anatomy; except for weight and height in which patients with sore throat were heavier and taller than those without sore throat (62.9±12.7 kg versus 59.7±11.6 kg; $p = 0.010$ and 160.4±6.5 cm versus 158.6±8.0 cm; $p = 0.016$, respectively) (Table 1). Patients undergoing neck operation were mostly for thyroid surgery, and showed significantly higher rates of 24-hour POST (41, 65.1% with 24-hour POST versus 22, 34.9% without 24-hour POST, $p<0.001$). Meanwhile, patients receiving breast and gynecological surgery were significantly less likely to develop 24-hour POST (13, 23.2% with 24-hour POST versus 43, 76.8% without 24-hour POST; $p = 0.036$ and 15, 20.0% versus 60, 80.0%; $p = 0.002$, respectively).

Three hundred forty one patients (88.1%) and 46 patients (11.9%) underwent general anesthesia with ETT intubation and LMA insertion, respectively (Table 2). Neither airway technique, experience of airway performer, airway manipulation, intra-operative agents used, nor duration of operation was associated with the occurrence of 24-hour POST. The mean time spent in PACU was not significantly different between both groups. The rate of hoarseness and dysphagia was significantly raised with the occurrence of 24-hour POST (115, 56.9% versus 87, 43.1% without 24-hour POST, $p<0.001$). There was no report of adverse events or perioperative complications occurred in the present study. The mean VNRS of patient satisfaction to anesthetic care was significantly lower in patients with 24-hour POST when compared to those without 24-hour POST (89.8±12.2 versus 94.1±10.6, $p = 0.001$).

Table 3 represented the independent risk factors for development of 24-hour POST. Only operation at neck was significantly associated with an increased rate of POST (odds ration [OR] 3.43, 95% CI 1.88-6.25, $p<0.001$). Meanwhile, gynecologic surgery was related to an attenuated occurrence (OR 0.49, 95% CI 0.26-0.95, $p = 0.035$).

Discussion

The present study demonstrated that the occurrence of 24-hour POST in patients undergoing

Table 1. Demographic Data

	Total (n = 387)	POST at 24 hours		p-value
		No (n = 249)	Yes (n = 138)	
Age (year)	48.9±14.1	49.3±14.7	48.2±13.0	0.473
Sex - female	271 (70.0%)	180 (66.4%)	91 (33.6%)	0.192
Weight (kilogram)	60.8±12.1	59.7±11.9	62.9±12.7	0.010*
Height (centimeter)	159.2±7.6	158.6±8.0	160.4±6.5	0.016*
BMI (kilogram per square meter)	24.0±4.4	23.7±4.2	24.4±4.6	0.115
ASA of 3 or more	25 (6.5%)	14 (56.0%)	11 (44.0%)	0.368
History of tobacco used	43 (11.1%)	29 (67.4%)	14 (32.6%)	0.653
History of preoperative respiratory symptoms	10 (2.6%)	7 (70.0%)	3 (30.0%)	0.495
Expected difficult airway	27 (7.0%)	14 (51.9%)	13 (48.1%)	0.160
Site of surgery				
Head	42 (10.9%)	25 (59.5%)	17 (40.5%)	0.490
Neck	63 (16.3%)	22 (34.9%)	41 (65.1%)	<0.001*
Breast	56 (14.5%)	43 (76.8%)	13 (23.2%)	0.036*
Abdominal	90 (23.3%)	55 (61.1%)	35 (38.9%)	0.465
Gynecologic	75 (19.4%)	60 (80.0%)	15 (20.0%)	0.002*
Orthopedic	32 (8.3%)	23 (71.9%)	9 (28.1%)	0.353
Other	29 (7.5%)	21 (72.4%)	8 (27.6%)	0.345
Emergency surgery	4 (1.0%)	2 (50.0%)	2 (50.0%)	0.449

ASA = American Society of Anesthesiologists physical status; BMI = body mass index; POST = post-operative sore throat
Data are presented as mean ± standard deviation.
* Significant difference between groups; $p<0.05$

general anesthesia was common. Biro et al[2] reported an average duration of POST of 16±11 hours, even though it could be lasting for 96 hours postoperatively[21]. The occurrence of hoarseness and dysphagia was also significantly raised with the development of sore throat. The higher intensity and longer time of sore throat than usual was seen especially when it coincided with other symptoms such as hoarseness or dysphagia and should warrant the suspicion of airway trauma and subsequent further evaluation[7-10].

Patients undergoing neck operations, which were mostly thyroid surgery in this study, had significantly higher incidence of POST and it was also an independent risk factor of 24-hour POST. This was comparable to the study by Hisham et al[6] in which they reported 68.4% of incidence of POST after thyroidectomy. It might be resulted from irritation and trauma to tracheal mucosa by ETT during positioning or by surgical procedure itself[6]. In this study, patients undergoing gynecological surgery had significantly lower incidence of 24-hour POST. It was contradictory to the result by Higgins et al[3] in which gynecological surgery was found to be one of predictors of POST in ambulatory surgical patients. It might be, in part, explained by the fact that, in the present study, patients undergoing gynecological surgery had some differences in airway management and intra-operative drugs used from those undergoing other types of surgery. They were less likely to have airway manipulation such as cricoid pressure or insertion of oral devices and to receive succinylcholine and nitrous oxide intra-operatively. Meanwhile, there was no significant difference in the demographic data, total operation time, or experience of airway performer.

When comparing patients undergoing general anesthesia with ETT intubation and those with LMA insertion, there was no significant difference in the occurrence or the intensity of POST. In many randomized trials that compared the influence of ETT intubation with LMA insertion on the incidence and severity of POST reported the appreciated results with the use of LMA[12-15]. On the other hand, the study by Mizutamari et al[22] found no difference in degree of POST immediately after anesthesia between patients anesthetized with ETT intubation, and those with LMA insertion. It was hypothesized that with the use of LMA, which was the supraglottic airway device,

Table 2. Intraoperative management

	Total (n = 387)	POST at 24 hours		p-value
		No (n = 249)	Yes (n = 138)	
Airway technique				
GA with ETT	341 (88.1%)	215 (63.0%)	126 (37.0%)	0.149
GA with LMA	46 (11.9%)	34 (73.9%)	12 (26.1%)	
Experience of airway performer <1 year	227 (58.7%)	149 (65.6%)	78 (34.4%)	0.526
Endotracheal tube size				
ETT No.7.0	167 (49.1%)	106 (63.5%)	61 (36.5%)	0.929
ETT No.7.5	90 (26.5%)	61 (67.8%)	29 (32.2%)	0.297
ETT No.8.0	66 (19.4%)	38 (57.6%)	28 (42.4%)	0.288
DL >1 attempt	24 (7.1%)	11 (45.8%)	13 (54.2%)	0.069
LV Grade 3-4	11 (3.3%)	8 (72.7%)	3 (27.3%)	0.381
Rapid sequence induction	16 (4.1%)	10 (62.5%)	6 (37.5%)	0.875
Cricoid pressure	27 (7.0%)	18 (66.7%)	9 (33.3%)	0.794
Stylet use	200 (51.7%)	121 (60.5%)	79 (39.5%)	0.103
Other devices[+]	178 (46.0%)	113 (63.5%)	65 (36.5%)	0.745
Intraoperative agents				
Thiopental	105 (27.1%)	69 (65.7%)	36 (34.3%)	0.731
Propofol	284 (73.4%)	180 (63.4%)	104 (36.6%)	0.512
Nitrous oxide	185 (47.8%)	118 (63.8%)	67 (36.2%)	0.827
Inhalations	382 (98.7%)	244 (63.9%)	138 (36.1%)	0.109
Opioids	380 (98.2%)	244 (64.2%)	136 (35.8%)	0.517
Succinylcholine	36 (9.3%)	19 (52.8%)	17 (47.2%)	0.128
NDMBs	355 (91.7%)	225 (63.4%)	130 (36.6%)	0.189
Lidocaine	17 (4.4%)	14 (82.4%)	3 (17.6%)	0.113
Dexamethasone	24 (6.2%)	14 (58.3%)	10 (41.7%)	0.526
Total operation time (minute)	124.0±75.5	121.3±72.7	129.1±80.3	0.331
Time spent in PACU (minute)	89.1±28.8	90.1±28.7	87.2±29.1	0.338
Hoarseness and dysphagia	202 (52.2%)	87 (43.1%)	115 (56.9%)	<0.001*
Patient satisfaction	92.5±11.4	94.1±10.6	89.8±12.2	0.001*

DL = conventional direct laryngoscopy; ETT = endotracheal tube; GA = general anesthesia; LMA = laryngeal mask airway; LV = laryngoscopic view; NDMBs = non-depolarizing neuromuscular blocking agents; PACU = post-anesthetic care unit; POST = post-operative sore throat

Data are presented as mean ± standard deviation.

[+] Other device i.e. oropharyngeal airway, temperature probe, or orogastric tube

* Significant difference between groups; p<0.05

Table 3. Independent risk factors for development of 24-hour postoperative sore throat

	Adjusted odds ratio	95% confidence interval	p-value
Weight	1.02	1.00-1.04	0.074
Height	1.01	0.98-1.04	0.652
Operation at neck	3.43	1.88-6.25	<0.001*
Breast surgery	0.59	0.29-1.20	0.145
Gynecologic surgery	0.49	0.26-0.95	0.035*

* Significant difference between groups; p<0.05

a lesser degree of airway injuries than that of ETT should be expected. Actually, both airway devices could cause some degree of airway injuries but at the different sites and thus, the use of LMA might not be advantageous over of ETT with regard to the lesser incidence of POST[7-9]. In addition, the difference in insertion techniques as well as cuff volume of LMA was associated with various degrees of airway irritation and POST development[23,24].

Regarding the association between intra-operative agents used and occurrence of POST, the administration of lidocaine, mean dose of

1.0±0.5 mg/kg intravenously, had no effect on the occurrence of 24-hour POST. The efficacy of lidocaine to alleviate POST was controversial. However, a recent systematic review[18] by Tanaka el al found that an intravenous lidocaine dose of 1.0-1.5 mg/kg could decrease the development of POST. The administration of dexamethasone was not shown to decrease the incidence of POST as well. It might be, in part, due to that the mean dose of dexamethasone given (6.7±2.4 mg or 0.12±0.05 mg/kg) was seemingly lower than that used for prevention of POST[19,20].

The present study had clearly demonstrated that POST occurrence had an impact on patient satisfaction to anesthetic care. This was also emphasized by the result in the large study by Lehmann et al[1]. Even though it was seemingly only a minor complaint, POST might indirectly indicate that some degree of airway injuries had occurred and should warrant the anesthesiologists to pay attention to this.

There were some limitations in the present study. Firstly, sore throat was an apparently subjective complaint and was actually various among the perception of individuals. Although, a specific definition of sore throat was defined, some patients may not have been able to respond accurately. Secondly, some importantly confounding factors had to be considered. The manometry was not routinely used to monitor intracuff pressure. Therefore, it could not be denied that in case of such unbeknownst, high pressure, this could certainly cause some degree of airway injuries and thus the POST development. In addition, the presence or absence of bloodstain on laryngoscopic blade, ETT, LMA, or suction tube that indirectly indicated whether airway trauma had occurred was not recorded. Lastly, a larger sample size might be required to determine all potential risk factors of POST.

Conclusion

POST was a common complaint after general anesthesia. In neck operations, it was an independent risk factor of POST. However, the incidence of POST was significantly low in patients undergoing gynecologic surgery. It was clearly demonstrated that the development of POST significantly affected patient satisfaction to anesthetic care. Attention to airway management with all of the efforts to minimize airway trauma was apparently the major key to prevent and/or to reduce this 'minor' complaint as well as to improve the quality of anesthetic care.

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Potential conflicts of interest

None.

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อาการเจ็บคอภายหลังการให้การระงับความรู้สึก: อุบัติการณ์, ปัจจัยเสี่ยง และผลลัพธ์

อรรณพ พิริยะแพทย์สม, สุกัญญา เดชอาคม, ฐิติมา ชินะโชติ, จารุณี รักการงาน, เพ็ญศิริ ศรีชีวะชาติ

ภูมิหลัง: *อาการเจ็บคอภายหลังการให้การระงับความรู้สึกเป็นภาวะไม่พึงประสงค์ที่พบได้บ่อย สำหรับโรงพยาบาลศิริราชซึ่งเป็นโรงพยาบาลที่มีการให้บริการระงับความรู้สึกสำหรับการผ่าตัดเป็นปริมาณมากต่อปี แต่ข้อมูลเกี่ยวกับอาการไม่พึงประสงค์นี้ยังมีจำกัด*

วัตถุประสงค์: *เพื่อศึกษาถึงอุบัติการณ์อาการเจ็บคอภายหลังการให้การระงับความรู้สึก และเพื่อหาปัจจัยที่สัมพันธ์กับการเกิดภาวะไม่พึงประสงค์นี้*

วัสดุและวิธีการ: *การศึกษาแบบไปข้างหน้าในผู้ป่วย 387 ราย ที่เข้ารับการผ่าตัดภายใต้การระงับความรู้สึก ข้อมูลประชากร ข้อมูลการจัดการทางเดินหายใจ และข้อมูลระหว่างการผ่าตัดจะถูกจดบันทึก อาการเจ็บคอ และระดับความรุนแรง รวมถึงความพึงพอใจต่อการให้การระงับความรู้สึกจะถูกประเมินที่ 24 ชั่วโมง ภายหลังการระงับความรู้สึก*

ผลการศึกษา: *อุบัติการณ์อาการเจ็บคอภายหลังการให้การระงับความรู้สึกเท่ากับร้อยละ 35.7 (95% CI; 30.9-40.7) โดยมีความรุนแรงเฉลี่ยเท่ากับ 29.8±21.2 การผ่าตัดบริเวณคอเป็นปัจจัยที่สัมพันธ์กับอาการเจ็บคอภายหลังการให้การระงับความรู้สึกที่ 24 ชั่วโมง อย่างมีนัยสำคัญ ในขณะที่อุบัติการณ์นี้ลดลงในผู้ป่วยที่รับการผ่าตัดทางนรีเวชอย่างมีนัยสำคัญ*

สรุป: *อาการเจ็บคอภายหลังการให้การระงับความรู้สึกเป็นภาวะไม่พึงประสงค์ที่พบได้บ่อย การจัดการทางเดินหายใจด้วยความระมัดระวังอาจมีส่วนช่วยลดการเกิดอุบัติการณ์นี้*