Factors Related to Intraoperative Oxygen Desaturation in Geriatric Patients in a Thai University Hospital

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Background: *As a site of the Thai Anesthesia Incidents Study (THAI Study) of anesthetic adverse outcome, the authors continued the institutional data collection to determine the incidence of intraoperative oxygen desaturation of geriatric patients (age 65 years and over) and relative factors representing a Thai university hospital.*

Material and Method: *Between July 1, 2003 and March 31, 2007, an anesthesia registry was conducted at King Chulalongkorn Memorial Hospital. Anesthesiologists and anesthesia residents were requested to record perioperative variables and adverse outcomes including oxygen desaturation ($SpO_2 \leq 90\%$ for 3 minutes or $SpO_2 < 85\%$) on a structured data record form. Univariable analysis was used to identify factors related to intraoperative oxygen desaturation. Multivariable generalized linear regression for risk ratio was used to investigate independent factors with significant association to intraoperative oxygen desaturation. A forward stepwise algorithm was chosen. A p-value < 0.05 was considered as statistically significant.*

Results: *Among 54,419 cases in the registry, 8,905 geriatric patients underwent non-cardiac surgery receiving anesthesia. Among these, 21 patients developed intraoperative oxygen desaturation with an incidence of 23.6 (95% CI 10, 30):10000 anesthetics. Variables that predict intraoperative oxygen desaturation by multivariable analysis were ASA physical status 3 [RR 4.6 (95% CI 1.6, 13.6)], ASA physical status 4-5 [RR 29.8 (95% CI 8.7, 102.8)], history of difficult airway [RR 13.1 (95% CI 1.7, 102.2)], recent respiratory failure [RR 6.0 (95% CI 1.2, 29.3)], and anesthetic agents used such as: pethidine [RR 6.2 (95% CI 1.9, 19.9)], and ketamine [RR 5.6 (95% CI 1.2, 25.9)].*

Conclusion: *The incidence of intraoperative oxygen desaturation of geriatric patients who underwent non-cardiac surgery in a Thai university hospital was 23.6:10000 anesthetics, which was comparable to others. The higher ASA physical status, history of difficult intubation and recent respiratory failure were risk factors of intraoperative oxygen desaturation. Pre-anesthetic evaluation particularly airway evaluation and identification of high-risk patients are crucial for prevention of oxygen desaturation.*

Keywords: *Adverse effects, Aged, Anesthetics, Hypoxia, Geriatrics, Intraoperative complications, Oximetry, Oxygen desaturation, Patient safety*

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As a result of advances in hygiene, diet, medical care, health care systems, and improvements in public health, life expectancy has dramatically increased over the last hundred years in many regions of the world [1]. The elderly are the fastest growing segment of the world's population[1]. In Thailand, the proportion of older persons in total population was 10.3% in 2005, and will increase to 14% in 2015, 19.8% in 2025, and nearly 30% by 2050[2]. Due to health conditions associated with aging, this population

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requires substantial more medical and surgical care than a younger population(3-5). Therefore, surgeons and anesthesiologists are treating an ever-increasing proportion of elderly patients whose conditions can benefit with relatively low-risk from advances in surgical procedures and anesthetic management. Despite these advances, surgery in the elderly remains a higher risk than in younger age groups. Medicare data from the United States indicate that there is increasing post-operative complications associated with increasing age for major vascular and cancer surgery (6). However, there is a debate as to whether it is age or comorbidities that are responsible for these complications.

With the development of the pulse oximeter, it is possible to measure oxygen saturation continuously and non-invasively. Intraoperative desaturation in geriatric can lead to serious and important complications. The occurrence of intraoperative desaturation has been documented in several studies with the incidence vary from 16.7% to 71.8%(7-9) depending on the definition. The occurrence of intraoperative desaturation can be related to many factors, which can lead to serious adverse events or complications unless they are detected early and corrected promptly.

In 2003, the Thai Anesthesia Incidents Study (THAI Study) was hosted by the Royal College of Anesthesiologists of Thailand for studying anesthesia related complications in 20 hospitals across Thailand during 2003 to 2004(10,11). As a site of this multi-centered study, the registry of anesthesia was continued at the Department of Anesthesiology, Faculty of Medicine, Chulalongkorn University. The incidence of 24-hour perioperative oxygen desaturation in the THAI Study was 31.9:10,000 anesthetics(11). Punjasawadwong et al reported 497 incidents of perioperative oxygen desaturation(9). In their descriptive study, 74.6% of oxygen desaturation incidents occurred during intraoperative period. Therefore, the present study aimed to investigate the incidence and risk factors of intraoperative desaturation in geriatric patients.

Material and Method

The present study has been approved by the ethics committee of the Faculty of Medicine, Chulalongkorn University. The basic design of the present study was a registry of anesthesia services, i.e. all consecutive patients who received anesthesia for non-cardiac surgery at King Chulalongkorn Memorial Hospital, a 1,500-bed university hospital located in Bangkok, Thailand.

For each surgical patient who received anesthesia, an anesthesiologists or anesthesia residents completed a preplanned structured case record form (Form 1) used in the THAI Study. The form including series of variables related to patient's profile, surgical procedure, and anesthesia. Anesthesiologists or anesthesia residents had to use Form1 in addition to their usual anesthetic record. Before starting the present study, meetings were organized to clarify the definitions of the variables. Workshop and internal audit were held to acquaint the anesthesia personnel with Form1. The attending anesthesia personnel were requested to fill in preoperative medical conditions, the American Society of Anesthesiologists physical status (ASA PS) scores, and demographic characteristics of the patients. The non-cardiac surgical procedures were recorded by converting written operative procedures into groups according to the operative site.

The anesthesia related factors comprised of monitoring, main anesthetic technique, and drugs utilized. For in-patients, within the first 24 hours after the surgical procedure, the anesthesia residents or nurse anesthetists visited the patients to complete their 24-hour anesthesia record and to record any adverse outcome. For the purpose of subsequent analysis, timing of adverse events was divided into three periods: intraoperative, postanesthesia care period (in the recovery room or Post Anesthesia Care Unit [PACU]) and 24-hour postoperative period (within 24-hour after the operation). The adverse outcomes of interest in this study was intraoperative oxygen desaturation ($SpO_2 < 85\%$ or $\leq 90\%$ for more than 3 minutes). The research question was the occurrence of intraoperative oxygen desaturation in patients aged 65 years and over. The present study analyzed the database of geriatric surgical patients receiving anesthesia care at King Chulalongkorn Memorial Hospital.

Data collection and analysis

The data was collected over a 45-month period, July 1, 2003 to March 31, 2007. The information was entered into the data management center using a double entry technique to ensure the reliability of the database. Among 54,419 cases of anesthesia for non-cardiac surgery in the registry, 8,905 cases were patients aged 65 years and over.

With this prospective data collection, a retrospective analysis was performed. Descriptive statistics were used for analysis of the demographic data. The dichotomous variables of intraoperative oxygen desaturation (yes/no) were used as target criterion. Exact probability test was used to compare categorical variable, t-test or Wilcoxon's rank-sum test was used to analyze continuous data. Univariable analysis was used to identify factors related to intraoperative oxygen desaturation. Multivariable generalized linear regression for risk ratio was used to investigate independent factors with significant association to intraoperative desaturation. A forward stepwise algorithm was chosen. At each step, independent variables not yet included in the equation were tested for possible inclusion. The variables with the significant contribution ($p < 0.05$) to improve the model were also included. The variables that were already included in the equation were tested for exclusion on the basis of the probability of a log likelihood test ratio. The analyses ended when no further variables for inclusion or exclusion were available. A p-value of less than 0.05 was considered as statistically significant.

Results

During the 45 months of the study data of 8,905 geriatric patients (16.4% of 54,419 patients who underwent non-cardiac surgery under anesthesia) at King Chulalongkorn Memorial Hospital were enrolled. Twent-one geriatric patients experienced intraoperative oxygen desaturation. The total incidence of intraoperative oxygen desaturation was 23.6 (95% CI 10, 30):10000 anesthetics occurring in 12 (57.1%) female and nine (42.9%) male patients. Mean (SD) and maximum age of these desaturated patients were 74.9 (6.9) and 87 years old, while mean (SD) and maximum age of non-desaturated patients were 73.2 (6.3) and 104 years old, respectively.

The demographic, surgical, and anesthetic characteristics of geriatric patients with and without intraoperative oxygen desaturation are demonstrated in Table 1, and Table 2. All oxygen desaturated patients in the present study received general anesthesia. From univariate analysis, the present study revealed that age group, ASA physical status, surgical condition, history of respiratory disease, history of hematological disease, history of miscellaneous disease, history of recent lower respiratory tract infection, history of difficulty airway, recent respiratory failure, congestive heart failure, shock/impending shock, anemia, coagulopathy, patients with electrolyte acid-base imbalance, sepsis, renal insufficiency, site of surgery, anesthetic technique, and duration of anesthesia were significantly related to intraoperative oxygen desaturation ($p < 0.05$). The medication used during anesthesia which significantly related to intraoperative oxygen desaturation were ketamine, midazolam, vecuronium, rocuronium, and pethidine ($p < 0.05$).

When applying the multivariate analyses, the following risk factors of intraoperative oxygen desaturation were identified: ASA physical status 3 ($p = 0.005$), ASA physical status 4-5 ($p < 0.001$), history of difficult airway ($p = 0.014$), recent respiratory failure ($p = 0.027$), and anesthetic agents used such as pethidine, and ketamine (p-value = 0.002, and 0.025 respectively) as shown in Table 3. Among four cases of intraoperative oxygen desaturation who received pethidine, three were ASA physical status 2 and one was physical status 3. Two cases of patients with desaturation who received ketamine were ASA physical status $\geq$ 3.

Discussion

The result of the present study clearly demonstrated that the geriatric surgical population undergoing anesthesia at King Chulalongkorn Memorial Hospital equaled 16.4% which was higher than the proportion of overall elderly resident population of Thailand (10.3%)[2]. This was comparable to the THAI Study[10] that university hospitals provided anesthesia for geriatric patients in a higher proportion. The incidence of intraoperative oxygen desaturation in our study was 23.6:10,000 anesthetics (21 out of 8,905 cases). This incidence of intraoperative oxygen desaturation was similar to previous studies[9,12,13] but higher than that of Raksakietisak et al[14].

The association between aging and post-anesthetic oxygen desaturation was demonstrated in previous studies[15,16]. Physiologic changes in elderly patients such as increased ventilation-perfusion mismatching, increased closing volume[17] and reduced functional residual capacity result in a normal decrease in PaO_2 with age[18]. Therefore, the authors aimed to investigate factors related to intraoperative oxygen desaturation in aging patients. Regarding gender of geriatric patients who were experienced intraoperative oxygen desaturation, female (57.1%) outnumber males (42.9%) mostly likely because of the higher life expectancy of women. However, this difference was not statistically significant ($p = 0.594$) and agreed with other studies[12,13,19].

All patients with desaturation received general anesthesia, which was consistent with other reports that the incidence of desaturation during anesthetics induction, maintenance and emergence was significantly higher in the patients receiving

Table 1. Demographic and anesthetic characteristics of geriatric patients with intraoperative oxygen desaturation (univariate analysis)

Variables	Intraoperative oxygen desaturation		Crude RR	95% CI	p-value
	Yes (n = 21) n (%)	No (n = 8,884) n (%)			
Gender					
Male	9 (42.9)	4,325 (48.7)	1.0		
Female	12 (57.1)	4,559 (51.3)	1.1	0.8-1.7	0.594
Age (years)					
65-75	12 (57.1)	6,109 (68.8)	1.0		
76-85	6 (28.6)	2,374 (26.7)	1.2	0.6-2.4	0.614
$\geq$ 86	3 (14.3)	401 (4.5)	3.2	1.1-9.2	0.026
BMI (kg/m^2)					
$\leq$ 18.49	2 (9.5)	965 (10.9)	0.8	0.2-3.0	0.788
18.50-24.99	14 (66.7)	5,515 (62.1)	1.0		
25.00-29.99	2 (9.5)	1,935 (21.7)	0.5	0.1-1.5	0.219
$\geq$ 30.00	3 (14.3)	469 (5.3)	2.3	0.8-6.5	0.134
History of smoking	2 (9.5)	665 (7.5)	1.3	0.3-4.8	0.723
Comorbidity					
Cardiovascular disease	15 (71.4)	5,094 (57.3)	1.3	0.9-1.7	0.192
Respiratory disease	4 (19.5)	600 (6.8)	2.2	1.2-7.0	0.025
Neuromuscular disease	2 (9.5)	761 (8.6)	1.1	0.3-4.2	0.876
Hematological disease	8 (38.1)	839 (9.4)	4.0	2.2-7.4	<0.001
Endocrine disease	8 (38.1)	2,339 (26.3)	1.5	0.8-2.6	0.222
Miscellaneous	6 (28.6)	942 (10.6)	2.7	1.3-5.6	0.008
Respiratory disease					
Recent lower respiratory infection	1 (4.8)	83 (0.9)	5.1	0.9-29.7	0.070
History of difficult airway	1 (4.8)	41 (0.5)	10.3	2.1-50.7	0.004
Recent respiratory failure	2 (9.5)	23 (0.3)	36.8	15.2-88.8	<0.001
Cardiovascular disease					
Hypertension	10 (47.1)	3,307 (48.5)	1.0	0.6-1.5	0.937
Congestive heart failure	2 (9.5)	173 (2.0)	4.9	1.4-17.0	0.013
Ischemic heart disease	2 (9.5)	1,211 (13.6)	0.7	0.2-2.5	0.584
Shock/impending shock	4 (19.1)	104 (1.2)	16.3	7.8-33.8	<0.001
Vascular disease	1 (4.8)	193 (2.17)	2.2	0.3-14.6	0.417
Arrhythmia	1 (4.8)	327 (3.7)	1.3	0.2-8.8	0.793
Hematological disease					
Anemia	8 (38.1)	681 (7.7)	5.0	2.7-9.1	<0.001
Coagulopathy	2 (9.5)	146 (1.6)	5.8	1.7-19.6	0.005
Endocrine disease					
Diabetes mellitus	8 (38.1)	2,164 (24.4)	1.6	0.9-2.9	0.143
Electrolyte imbalance	2 (9.5)	141 (1.6)	6.0	1.8-20.2	0.004
Neuromuscular disease					
Alteration of conscious	1 (4.8)	265 (3.0)	1.6	0.2-10.9	0.632
CVA / TIA	1 (4.8)	468 (5.3)	0.9	0.1-6.1	0.917
Miscellaneous					
Sepsis	3 (14.3)	173 (2.0)	7.3	2.8-19.	<0.001
Renal insufficiency	5 (23.8)	663 (7.5)	3.2	21.4-7.1	0.005
ASA Physical status					
2	6 (28.6)	6,364 (71.6)	1.0		
3	8 (38.1)	2,252 (25.4)	2.2	1.2-3.9	0.008
4-5	7 (33.3)	268 (3.0)	13.3	7.6-23.4	<0.001
Thyromental distance score (n = 1,370)					
$\geq$ 5	4 (57.1)	754 (55.3)	1.0		
< 5	3 (42.9)	609 (44.7)	0.99	0.4-2.2	0.923

Table 1. (Cont.)

Variables	Intraoperative oxygen desaturation		Crude RR	95% CI	p-value
	Yes (n = 21) n (%)	No (n = 8,884) n (%)			
Mallampati's classification (n = 7,209)					
1	4 (36.4)	3,676 (51.1)	1.0		
2	7 (63.6)	3,076 (42.7)	1.4	0.8-2.4	0.518
3	0	401 (5.6)	-	-	
4	0	45 (0.7)	-	-	
Surgical condition					
Elective	12 (57.1)	7,683 (86.5)	1.0		
Emergency	9 (42.9)	1,201 (13.5)	3.2	1.8-5.6	<0.001
Site of surgery					
Intracranial	1 (4.8)	385 (4.3)	1.1	0.2-7.5	0.923
Neck resection	1 (4.8)	100 (1.3)	4.2	0.7-25.6	0.116
Intrathoracic	1 (4.8)	271 (3.1)	1.6	0.2-10.6	0.649
Upper abdominal	6 (28.6)	1,011 (11.4)	2.5	1.2-5.2	0.013
Lower abdominal	4 (19.1)	1,606 (18.1)	1.1	0.4-2.6	0.908
Anesthetic technique					
Other anesthesia	1 (4.8)	2,348 (26.4)	1.0		
General anesthesia	20 (95.2)	6,536 (73.6)	1.3	1.0-1.6	0.024
Duration of anesthesia					
< 30 minutes	3 (14.3)	655 (7.4)	1.0		
31-59 minutes	3 (14.3)	1,890 (21.3)	0.7	0.4-1.2	0.175
1-3 hours	13 (61.9)	4,163 (46.9)	0.9	0.8-1.2	0.548
> 3 hours	2 (9.5)	2,176 (24.5)	0.5	0.3-1.0	0.051

Table 2. Anesthetic agents of geriatric patients with intra-operative oxygen desaturation (univariate analysis)

Anesthetic agents	Intraoperative oxygen desaturation		Crude RR	95% CI	p-value
	Yes (n = 21) n (%)	No (n = 8,884) n (%)			
Pentothal	8 (38.1)	3,155 (35.5)	1.1	0.6-1.9	0.805
Propofol	2 (9.5)	2,216 (24.9)	0.4	0.1-1.2	0.103
Ketamine	2 (9.5)	78 (0.8)	11.6	3.9-34.9	<0.001
Midazolam	6 (28.6)	1,221 (13.7)	2.1	1.0-4.3	0.049
Succinylcholine	6 (28.6)	2,159 (24.3)	1.2	0.6-2.4	0.649
Pancuronium	2 (9.5)	1,707 (19.2)	0.5	0.1-1.7	0.260
Atracurium	4 (19.1)	1,933 (21.8)	0.9	0.4-2.1	0.764
Cistracurium	4 (19.1)	943 (10.6)	1.8	0.7-4.5	0.211
Vecuronium	5 (23.8)	638 (7.2)	3.3	1.5-7.4	0.003
Mivacurium	1 (4.8)	264 (3.0)	1.6	0.2-10.9	0.630
Rocuronium	2 (9.5)	178 (2.0)	4.8	1.4-16.6	0.014
Nitrous oxide	8 (38.1)	4,994 (56.2)	0.7	0.4-1.1	0.095
Isoflurane	10 (47.6)	4,358 (49.1)	1.0	0.6-1.5	0.895
Sevoflurane	5 (23.8)	1,736 (19.5)	1.2	0.6-2.7	0.622
Desflurane	2 (9.5)	426 (4.8)	2.0	0.5-7.5	0.312
Morphine	5 (23.8)	2,195 (24.7)	1.0	0.5-2.1	0.924
Fentanyl	7 (33.3)	4,211 (47.4)	0.7	0.4-1.2	0.197
Pethidine	4 (19.1)	470 (5.3)	3.6	1.5-8.8	0.005
Prostigmine	4 (19.1)	2,012 (22.7)	0.8	0.4-2.0	0.694

Table 3. Factors related to intraoperative oxygen desaturation in geriatric patients (multivariate analysis)

Factors	Adjusted RR	95% confident interval	p-value
ASA Physical status			
2	1.0		
3	4.6	1.6-13.6	0.005
4-5	29.8	8.7-102.8	<0.001
History of difficult airway	13.1	1.7-102.2	0.014
Recent respiratory failure	6.0	1.2-29.3	0.027
Pethidine	6.2	1.9-19.9	0.002
Ketamine	5.6	1.2-25.9	0.025

general anesthesia[18,20]. This can be explained by the effects of general anesthesia on pulmonary function such as reduction of functional residual capacity[21,22], diminished cardiac output resulting from anesthetic agent effect, disproportionately increased P(A-a) O_2, or alveolar collapse[18].

The analyses demonstrated that factors not associated with intraoperative oxygen desaturation were history of smoking, diabetes mellitus, and body mass index. Russell et al[23] found that the occurrence of desaturation in post-anesthetic care unit (PACU) was more likely in patients of greater body mass index (BMI) by multivariate analysis. On the other hand, Moller et al[19] reported obesity (body weight > 120% of normal) was not significantly associated with hypoxia in PACU from both univariate and multivariate analysis[19] which was similar to studies of Canet et al[24] and Rose et al[25].

By multivariate analysis, ASA physical status of 4-5 was the strongest predictor of intraoperative oxygen desaturation (adjusted risk ratio (RR) 31.4 with 95% CI: 9.2, 107.6) while ASA physical status 3 correlated with desaturation with adjusted RR of 4.8 (95% CI: 1.6, 14.1). Several studies have demonstrated a correlation between ASA physical status and peri-operative mortality, and have suggested its usefulness as a predictor of patients' outcome[26-28]. The present study confirms the findings in previous studies in which ASA physical status 3 and higher is associated with oxygen desaturation [10,19]. However, Uakridathikarn et al[29] recently revealed that perioperative oxygen desaturation correlated with ASA physical status in univariate analysis but not in multivariate analyses. History of difficult airway was also a strong predictor with adjusted risk ratio of 13.1 (95% CI: 1.7, 102.2).

The present study failed to demonstrate the Mallampati's classification and thyromental distance to be relating factors of intraoperative desaturation in both univariate and multivariate analysis. The possible explanations are that Mallampati's classification or thyromental distance is not solely sensitive to predict difficult intubation. The attending anesthesiologists might be preoperatively aware that the patients were at high-risk for difficult intubation and managed them properly to avoid oxygen desaturation.

Oxygen desaturation especially during induction phase is expected. Chanchayanon et al[30] revealed that 23% of patients who experienced difficult intubations developed oxygen desaturation. In the present study, patients who had recent respiratory failure were a high-risk group as shown by the adjusted risk ratio of 6.0 (95% CI: 1.2, 29.3). This factor has the biological plausibility to be correlated with desaturation because excessive secretion or bronchial plugs could produce shunt hyper-reactive airway and bronchospasm. However, Pereira et al[31] reported that patients with respiratory symptoms such as cough or sputum were at risk of pulmonary complication by univariate analysis but not by multivariate analysis. A similar result was shown in the study of Brooks Brunn[32].

Other significant factors related to intra-operative oxygen desaturation were pethidine with adjusted risk ratio of 6.2 (95% CI: 1.9, 19.9). The authors' observation was that pethidine was given in patients with lower ASA physical status. Theoretically, pethidine poses negative inotropic effect, caused histamine releasing and may cause hypotension and poor perfusion[33]. However, the intraoperative oxygen desaturation in these four patients may have occured randomly. Ketamine had also shown to be significant factors related to desaturation in geriatric patients receiving general anesthesia. The two patients with desaturation were patients with higher ASA physical status (classification 3 and 4). Ketamine was recommended in some situations because of its advantages of cardiovascular stimulation and preservation of breathing [34,35]. However, ketamine can cause negative inotropic effect leading to hypotension and poor perfusion in debilitating or high ASA physical status patients[36].

The design of the present study used a registry in which the measurement of incidences was planned for collection before the outcome occurred, resulting in minimal effect of measurement bias. Moreover, the present study included a heterogeneous sample of geriatric patients in order to enable us to analyze the factor associated with intraoperative oxygen desaturation. Nevertheless, there were limitations that necessitate caution in interpreting the results. First, this is a non-randomized, non-blinded study and as such may be subject to some selection or observers bias. However, the authors believe that the anesthesia personnel had no vested interest in the several outcomes of the THAI Study's data collection form. The second concern is that the retrospective analysis of prospective collected database may have missing data. Third, the low frequency of some potential factors results in a loss of power for analysis.

Conclusion

The incidence of intraoperative oxygen desaturation of geriatric patients in a Thai university hospital was 23.6:10,000 anesthetics. This incidence is comparable to other investigations. The higher ASA physical status, history of difficult intubation, and recent respiratory failure were risk factors of intraoperative oxygen desaturation. Preanesthetic evaluation particularly airway evaluation and identification of high risk patients are crucial for prevention of oxygen desaturation.

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ปัจจัยที่เกี่ยวข้องกับการเกิดภาวะระดับความอิ่มตัวของออกซิเจนในเลือดต่ำระหว่างผ่าตัดในผู้สูงอายุที่ได้รับยาระงับความรู้สึกในโรงพยาบาลมหาวิทยาลัยไทย

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ภูมิหลัง: *โรงพยาบาลจุฬาลงกรณ์เป็นหนึ่งในโรงพยาบาลที่เข้าร่วมโครงการศึกษาอุบัติการณ์เกิดภาวะแทรกซ้อนทางวิสัญญีในประเทศไทย (THAI Study) ภาควิชาวิสัญญีวิทยา คณะแพทยศาสตร์จุฬาลงกรณ์มหาวิทยาลัย ได้ดำเนินการเก็บข้อมูลต่อเนื่องเพื่อศึกษาอุบัติการณ์และปัจจัยที่เกี่ยวข้องกับการเกิดภาวะระดับความอิ่มตัวของออกซิเจนในเลือดต่ำระหว่างผ่าตัดในผู้ป่วยสูงอายุ (อายุ 65 ปีขึ้นไป)*

วัสดุและวิธีการ: *ระหว่างวันที่ 1 กรกฎาคม พ.ศ. 2546 - วันที่ 31 มีนาคม พ.ศ. 2550 มีการเก็บข้อมูลแบบทะเบียนโรคของการให้ยาระงับความรู้สึกสำหรับการผ่าตัดในโรงพยาบาลจุฬาลงกรณ์ วิสัญญีแพทย์และแพทย์ประจำบ้านวิสัญญีทำการบันทึกข้อมูลเกี่ยวกับลักษณะทั่วไปของผู้ป่วย ข้อมูลด้านวิสัญญีและภาวะแทรกซ้อนต่าง ๆ ที่เกิดขึ้น รวมทั้งภาวะระดับความอิ่มตัวของออกซิเจนในเลือดต่ำลงในแบบบันทึกข้อมูลเชิงโครงสร้าง ทำการวิเคราะห์ ข้อมูลแบบ univariate และ multivariate เพื่อหาปัจจัยที่เกี่ยวข้องกับการเกิดอุบัติการณ์ โดย ค่า $p < 0.05$ ถือว่ามีนัยสำคัญทางสถิติ*

ผลการศึกษา: *จากจำนวนผู้ที่ได้รับยาระงับความรู้สึกสำหรับการผ่าตัดที่ไม่ใช่การผ่าตัดหัวใจทั้งหมด 54,419 ราย มีผู้ป่วยอายุตั้งแต่ 65 ปีขึ้นไปจำนวน 8,905 ราย และผู้ป่วย 21 รายเกิดภาวะระดับความอิ่มตัวของออกซิเจนในเลือดต่ำระหว่างการผ่าตัด อุบัติการณ์เท่ากับ 23.6 (95% CI 10, 30):10,000 ของการให้ยาระงับความรู้สึก โดยพบว่าปัจจัยที่เกี่ยวข้องกับการเกิด ภาวะระดับความอิ่มตัวของออกซิเจนในเลือดต่ำ ได้แก่ ASA physical status 3 [RR 4.6 (95% CI: 1.6, 13.6)], ASA physical status 4-5 [RR 29.8 (95% CI: 8.7, 102.8)], มีประวัติใส่ท่อช่วยหายใจยาก [RR 13.1 (95% CI: 1.7, 102.2)], มีภาวะระบบหายใจล้มเหลวก่อนผ่าตัด [RR 6.0 (95% CI: 1.2, 29.3)], ได้รับยา pethidine [RR 6.2 (95% CI: 1.9, 19.9)], และได้รับยา ketamine [RR 5.6 (95% CI: 1.2, 5.9)]*

สรุป: *อุบัติการณ์ของภาวะระดับความอิ่มตัวของออกซิเจนในเลือดต่ำระหว่างการผ่าตัดในผู้สูงอายุในการศึกษานี้เท่ากับ 23.6:10,000 การให้ยาระงับความรู้สึก ซึ่งไม่แตกต่างจากการศึกษาในผู้ป่วยกลุ่มอายุอื่น ปัจจัยเสี่ยงต่อการเกิดภาวะระดับความอิ่มตัวของออกซิเจนในเลือดต่ำระหว่างผ่าตัดได้แก่ การมี ASA Physical status สูงขึ้น มีประวัติใส่ท่อ หายใจยาก และมีภาวะระบบหายใจล้มเหลวก่อนผ่าตัด การประเมินผู้ป่วยก่อนให้ยาระงับความรู้สึกโดยเฉพาะอย่างยิ่งการประเมินทางเดินหายใจร่วมกับการหาปัจจัยเสี่ยงของผู้ป่วยมีความสำคัญในการช่วยป้องกันภาวะระดับความอิ่มตัวของออกซิเจนในเลือดต่ำ*