

Original Research

# Fasted or Not: Anesthesia-Related Pulmonary Complications in Pediatric Orthopaedic Emergencies Are Rare: A Pilot Study

Austin Sturdivant, BS<sup>1</sup>; Christian Roberts, BS, MBA<sup>1</sup>; Andrew Nahr, MD<sup>2</sup>; Kayla G. Bryan, MD<sup>3</sup>; Benjamin W. Sheffer, MD<sup>2</sup>; David D. Spence, MD<sup>2</sup>; Jeffrey R. Sawyer, MD<sup>2</sup>; Derek M. Kelly, MD<sup>2</sup>

<sup>1</sup>University of Tennessee Health Science Center, Memphis, TN; <sup>2</sup>University of Tennessee Health Science Center-Campbell Clinic Department of Orthopaedic Surgery and Biomedical Engineering, Memphis, TN; <sup>3</sup>Department of Anesthesiology and Neurosurgery, University of Tennessee Health Science Center, Memphis, TN

Correspondence: Derek M. Kelly, MD, University of Tennessee Health Science Center-Campbell Clinic Department of Orthopaedic Surgery and Biomedical Engineering, 1211 Union Ave., Suite 510, Memphis, TN, 38104.  
E-mail: dkelly@campbellclinic.com

Received: June 22, 2023; Accepted: September 15, 2023; Published: November 15, 2023

DOI: 10.55275/JPOSNA-2023-751

## Abstract

**Background:** The American Society of Anesthesiologists (ASA) recommends fasting before surgery: clear liquids (2 hrs), breast milk (4 hrs), light meal (6 hrs), and fried foods/fatty foods/meat (> 8 hrs). In emergencies, guidelines are bypassed for timely surgical intervention. Pediatric post-anesthesia complications caused by violating fasting guidelines remain controversial. The aim of this study was to compare the risk of post-anesthetic complications in patients who met and did not meet ASA fasting guidelines for pediatric orthopaedic emergency procedures.

**Methods:** Patients were retrospectively identified who had emergent procedures at a level 1 pediatric trauma center from 2010 to 2020. Patients were divided into two groups: those meeting current ASA fasting criteria of fasting and those who did not. Charts were reviewed for complications of gastric content aspiration during or following anesthesia.

**Results:** There were 321 patients who met inclusion criteria for emergency orthopaedic surgeries. Of these, 264 (82%) met fasting guidelines, and 57 (18%) did not. One patient who met preoperative fasting status needed postoperative supplemental oxygen and met criteria to be reported as an adverse event. Of the 57 patients not meeting fasting guidelines, there were no anesthesia-reported adverse events.

**Conclusions:** No increased risk was found with anesthesia in nonfasted patients with orthopaedic emergencies undergoing general anesthesia during the perioperative period in this underpowered, pilot study. No respiratory

complications (pulmonary aspiration, intraoperative or postoperative emesis, or postoperative respiratory support) were reported in patients who did not meet fasting guidelines. The authors believe this is a valuable starting point for further research into fasting criteria in pediatric trauma patients.

**Level of Evidence: III**

**Key Concepts**

- No increased risk was found with anesthesia in nonfasted patients with orthopaedic emergencies undergoing general anesthesia during the perioperative period.
- Modern anesthesia techniques are tailored to minimize risk of pulmonary aspiration in patients with unknown fasting status.
- The rate of pulmonary complications following modern anesthesia in children remains so small as to suggest that additional research is needed to determine if fasting guidelines are truly necessary in the majority of cases or if other factors beyond the time since last oral intake should be more carefully considered.

**Introduction**

There are several classic risk factors for aspiration during anesthesia, including induction technique, posture of the patient on the operating table (supine vs. prone), procedure type (upper airway surgery), emergent case classification, American Society of Anesthesiologists (ASA) classification, and fasting status.<sup>1,2</sup> The most recent ASA practice guidelines for preoperative fasting recommend abstaining from clear liquids (2 hours), breast milk (4 hours), light meal (6 hours), and fried and fatty foods and meat (8 hours or more) before surgery.<sup>3</sup> The purpose of these guidelines is to reduce the risk of pulmonary gastric content aspiration, a rare but historically significant complication of general anesthesia and procedural sedation. In adult literature, the incidence of aspiration varies but is thought to be between one in 3,200 and one in 7,100 anesthetics.<sup>4,5</sup> Historically, the published risk of aspiration for pediatric patients has been even higher, ranging from two to 10 events per 10,000 anesthetics.<sup>6-8</sup>

In contrast to adults, however, pediatric patients are at much lower risk of developing pneumonitis, aspiration pneumonia, or requiring prolonged respiratory support following aspiration events.<sup>8,9</sup> Fasting status as an independent risk factor for aspiration has suffered

from inconsistent evidence in the literature.<sup>10-15</sup> In the nonsurgical literature, a recent retrospective review of 2,674 patients undergoing procedural sedation (not general anesthesia) in a large pediatric emergency department by Stewart et al.<sup>16</sup> found that 555 patients (21%) not meeting ASA periprocedural fasting criteria had no significant difference in rates of complications compared with the fasted cohort. Modern anesthesia techniques, such as rapid sequence induction (RSI), and airway protection methods, such as cricoid pressure, can further improve the safety of anesthesia for pediatric patients when fasting status is unknown or in doubt. Okubo et al.<sup>17</sup> found that RSI was associated with a higher success rate on first intubation attempts and did not have an increased risk of complications in the emergency department. However, the evidence for the risk of aspiration with RSI in general anesthesia is mixed.<sup>18,19</sup>

This study specifically investigated the risk for anesthesia-related respiratory complications during and following emergency orthopaedic procedures in the operating room. The authors hypothesized that patients who did not meet ASA fasting guidelines would not have a significantly increased risk of anesthesia-related

pulmonary complications. Emergency orthopaedic procedures were chosen because they would have occurred regardless of the patient's fasting status and would therefore provide two groups for comparison without having to design and execute a study that would violate current ASA guidelines for elective surgery. If the aspiration risks were found to be high by this study, or by future work in this area, then the risk-benefit analysis of some emergent or urgent surgery may need to be altered in favor of waiting for gastric contents to empty. However, if the results of this study or future work indicated that fasting times have little bearing on the risk of gastric content aspiration in children, then the risk-benefit analysis of even elective procedures might need to be reconsidered.

## Materials and Methods

Patients were selected via hospital electronic medical records data query at a high volume, level 1 pediatric trauma center after institutional review board approval. Patients included in the study underwent operative intervention and were scheduled as emergent by the attending orthopaedic surgeon. The included procedures were closed reduction and percutaneous pinning versus open reduction and internal fixation for type III supracondylar humeral fractures, percutaneous pinning of acute/unstable slipped capital femoral epiphyses (SCFE), debridement of open fractures, incision and drainage of septic arthritis, fasciotomy for compartment syndromes, and surgical stabilization of femoral neck fractures. There were no exclusions. All patients who had any of the above-listed procedures and who were scheduled as emergent by the attending orthopaedic surgeon were included. The final cohort included 321 pediatric emergency orthopaedic surgical patient cases performed between 2010 and 2020. Patients were divided into two groups: those who met fasting guidelines and those who did not. By policy, the hospital simplifies ASA guidelines to 2 hours for clear liquids, 4 hours for breast milk, and 8 hours fasting for non-clear liquids and solid food.<sup>1</sup> The following variables were collected: patient height and weight, operating room position (supine vs. prone), airway

type, procedure type, induction methods, maintenance agents, and ASA classification. All charts were then reviewed for the following complications: unplanned intensive care unit (ICU) admission, postoperative respiratory distress, intra- and postoperative vomiting, intra- and postoperative aspiration, postoperative cough, postoperative pneumonia, prolonged supplemental oxygen requirement, and death.

Demographic and clinical variables of interest were compared between patients meeting and violating fasting guidelines. For continuous variables, *t*-tests were used when parametric assumptions were met; Wilcoxon-Mann-Whitney was applied to nonparametric data. For categorical variables, chi-squared and Fisher's exact tests (where expected cell count of  $N < 5$ ) were used. All analyses were conducted using SAS (version 9.4, SAS Institute Inc., NC, USA) and applying  $\alpha = 0.05$  for statistical significance. A power analysis was conducted. Due to an extremely low risk of these complications, the minimum necessary sample size would need to be 2,067 per group at a  $P < 0.05$  significance level.

## Results

### *Study Population*

A total of 321 emergent procedures from 2010 to 2020 were analyzed. Table 1 summarizes the characteristics of patients included in the study. Of the 321 procedures analyzed, 57 patients (17.8%) were classified as not meeting the hospital's fasting guidelines. The majority of patients were ASA I ( $N = 217$ ; 67%). Table 2 lists ASA classification definitions.<sup>3</sup>

All 321 procedures were regarded as pediatric orthopaedic emergencies by the attending orthopaedic surgeons at the time the case was booked. Regarding type of anesthesia, 276 patients (86%) received general endotracheal anesthesia (GETA), and 45 patients (14%) were treated using supraglottic airways devices (laryngeal mask airway [LMA]). Of those receiving GETA, 47 patients (17%) did not meet fasting guidelines, and 10 patients (22%) receiving LMA did not meet fasting guidelines. The majority ( $N = 319$ ; 99.4%) of patients were positioned supine on the operating table.

**Table 1. Analysis of Fasted vs. Nonfasted**

Covariate	Statistics	Category	Fasted?		P
			No N=57	Yes N = 254	
Solid Food Fast	N (%)	No	55 (96.49)	8 (3.03)	<b>&lt; 0.01</b>
	N (%)	Yes	2 (3.51)	256 (96.97)	
Liquid Fast	N (%)	No	5 (8.77)	5 (1.89)	<b>0.02</b>
	N (%)	Yes	52 (91.23)	259 (98.11)	
Position on Table	N (%)	Supine	56 (98.25)	263 (99.62)	0.32
	N (%)	Lateral	1 (1.75)	1 (0.38)	
Anesthesia Complications	N (%)	No	57 (100)	263 (99.62)	1
	N (%)	Yes	0 (0)	1 (0.38)	
Airway	N (%)	GETA	52 (91.23)	224 (84.85)	0.21
	N (%)	Oral	5 (8.77)	40 (15.15)	
Age (years)	N		57	264	<b>&lt; 0.01</b>
	Mean		6.32	8.81	
	Median		6	8	
	Min		1	0	
	Max		15	17	
	SD		3.27	4.18	
Height (cm)	N		57	264	<b>&lt; 0.01</b>
	Mean		121.89	135.72	
	Median		120	131.5	
	Min		81	67	
	Max		188	188	
	SD		23.43	26.3	
Weight (kg)	N		57	264	<b>&lt; 0.01</b>
	Mean		27.79	43.32	
	Median		23	31	
	Min		11	9	
	Max		82	165	
	SD		15.67	27.92	

*Bolded print denotes statistical significance.*

*GETA, general endotracheal anesthesia; max, maximum; min, minimum; N, number; SD, standard deviation.*

**Table 2. American Society of Anesthesiologists Classifications**

ASA PS Classification	Definition
ASA I	A normal healthy patient
ASA II	A patient with mild systemic disease
ASA III	A patient with severe systemic disease
ASA IV	A patient with severe systemic disease that is a constant threat to life

ASA, American Society of Anesthesiologists; PS, physical status.

### ***Fasting Guidelines and Complications***

Out of the 321 emergent procedures, 57 patients (17.8%) did not meet fasting guidelines. Fifty-five of the patients did not meet fasting for solid food, and five did not meet fasting liquid guidelines (three violated both liquid and solid food fasting criteria).

### ***Age, Height, and Weight***

There was a statistically significant difference ( $P < 0.01$ ) between the average age of pediatric patients in the fasted and nonfasted groups. The average age of those meeting fasting guidelines was 8.81 years and 6.32 years for those not meeting fasting guidelines (Table 1). This is further emphasized by the statistical significance of the height and weight categories ( $P < 0.01$ ) with taller and heavier patients meeting guidelines more commonly than their smaller counterparts.

### ***Induction Techniques***

In our study population, there were 31 total patients out of 321 who underwent rapid sequence induction (9.7%). Out of the fasted cohort, 8.7% underwent RSI, and out of the nonfasted cohort, 14% underwent RSI.

### ***Adverse Events***

There was only one adverse event identified in the patient group meeting fasting criteria, and none were identified in the nonfasting group. For the one patient who did experience a possible adverse event, anesthesia documentation in the post-anesthesia care unit briefly stated that the patient was thought to be overly sedated

and required prolonged supplemental oxygen via nasal cannula in the immediate postoperative period (one of the results focused on in this study). This patient then went on to have an uneventful recovery. There were no statistically significant differences in anesthesia-related complications between those meeting and those not meeting fasting guidelines ( $P = 1.00$ ). Aside from the one patient who received prolonged supplemental oxygen, no patient experienced any of the other studied complications.

### **Discussion**

In the adult literature, the incidence of aspiration varies from one in 2,131 to one in 3,216 patients, with mortality rates reported between one in 45 and one in 71 in some studies.<sup>20,21</sup> In another large retrospective study conducted from 2001 to 2004, over 99,000 anesthetics were analyzed with aspiration seen in 14 patients total, making the incidence overall to be one in 7,103 patients. Breaking this down further, the total incidence in all orthopaedic surgeries (both routine and emergent) was found to be even less at one in 8,288.<sup>5</sup> Aspiration in adults is linked to the development of inflammatory pneumonitis in around 47% of patients, with 17% requiring prolonged mechanical ventilation.<sup>20,22</sup>

In pediatric patients, a large study of 51,000 anesthetic events found the incidence of gastric pulmonary aspiration in children to be 4.9 in 10,000 with an overall incidence of 0.1%.<sup>1</sup> In contrast to adults, however, the 52 patients suffering from aspiration had relatively mild symptoms with adverse events being isolated

to unplanned hospital stay, surgical cancellation, and conversion from a supraglottic airway to endotracheal intubation with no attributable deaths reported.<sup>1</sup>

Out of the total 321 emergency orthopaedic surgeries analyzed in this study, and using the most strict criteria for anesthesia-related perioperative complications, only one (0.3%) patient experienced anything that could possibly be considered an aspiration-related event from anesthesia, a finding that is consistent with the literature.<sup>1</sup> As stated previously, the patient was a fasted, 11-year-old girl, ASA II, undergoing closed reduction percutaneous pinning (CRPP) of a supracondylar humeral fracture. She underwent uneventful endotracheal intubation without rapid sequence induction. In the immediate postoperative period, it was noted that she appeared over-sedated and did require prolonged oxygen supplementation (an endpoint in this study). There was no documentation reflecting any visualization of gastric contents in the oropharynx or airway intraoperatively. She went on to have a normal recovery and was later discharged from the hospital.

ASA classification is commonly believed to be associated with the risk for aspiration, with some evidence to suggest that ASA classifications of III and IV are at significantly increased risk of aspiration compared with classes I and II.<sup>1</sup> However, this is controversial, with Tan and Lee<sup>2</sup> reporting on 23 cases of aspiration at a Singapore hospital from 2000 to 2013 and finding no statistical relationship between ASA status and aspiration in pediatric patients. In this same cohort, Tan and Lee<sup>2</sup> did find a relationship between surgeries considered emergent and risk for aspiration but failed to classify these patients by fasting status, surgical location, or type of airway used (endotracheal tube vs. laryngeal mask). In their review of 22 events of pulmonary aspiration, it was found that 10 (45%) occurred in emergent procedures.<sup>2</sup> Out of those 10 patients, aspiration still occurred despite six patients meeting fasting guidelines, but no further analysis was conducted regarding fasting status correlation. Additionally, all cases of aspiration were selected utilizing an adverse event reporting form, likely

underrepresenting the actual numbers of aspiration events occurring in other pediatric studies (0.02% vs. 0.1%).<sup>1</sup>

In regard to fasting, there are a number of studies that do not support fasting status as a risk factor for respiratory complications and aspiration perioperatively.<sup>10-12</sup> Andersson et al.<sup>23</sup> found no significant increase in complications with shortening fasting times and even suggested that shortened fasting times may improve patient experience due to less dehydration and hypoglycemia.<sup>11</sup> In a different study of pediatric patients undergoing endoscopic foreign body removal, it was found that fasting guidelines had no actual impact on the amount of gastric contents visualized during the procedure.<sup>14,24</sup> Not surprisingly, fasting for prolonged periods of time has been shown to lead to increased irritability, negative psychological effects, and a negative impact on metabolic activity in children.<sup>15,25,26</sup> This is historically a controversial topic with multiple sources either opposing or supporting strict adherence to fasting guidelines, necessitating a need for further work in this area.

Modern anesthesia techniques are tailored to minimize the risk of pulmonary aspiration in patients with unknown fasting status.<sup>11</sup> RSI, the most commonly used method in this setting that reduces the risk of aspiration,<sup>11</sup> employs extra induction maneuvers in an attempt to prevent reflux. In this type of induction, the patient's airway is protected before administering a neuromuscular blockade and is achieved by applying cricoid pressure (Sellick maneuver) after sedation is given and throughout the administration of the paralytic. RSI minimizes the time that the unconscious patient has an unprotected airway. The patient is adequately preoxygenated and then cricoid pressure is applied prior to induction medications being given in rapid succession. The patient is NOT hand ventilated once apneic to reduce the chance of gastric insufflation of air which predisposes to vomiting. Once the endotracheal tube (ETT) is confirmed to be in the trachea, the ETT is secured, and the stomach should be decompressed to relieve the presence of any gastric contents. The patient is then extubated completely awake at completion of the

procedure.<sup>27</sup> Certainly, the skill of the anesthesiologist in this setting may play a role in the proficiency by which this method can minimize the chance of pulmonary aspiration.<sup>28</sup> The minimal complications in our study might be due to modern anesthesia techniques and skilled, fellowship-trained pediatric anesthesiologists at the authors' center. Furthermore, the retrospective nature of the data collection in this study brings into question the reliability of the RSI information. It is likely that RSI was used more commonly than was documented in this patient population.

The hypothesis that there is no clear increased risk of respiratory complications in patients undergoing orthopaedic pediatric emergency surgeries who did not meet fasting guidelines was somewhat supported by the findings of this preliminary pilot study. No obvious risk association was found between patients not meeting fasting criteria and anesthetic complications. However, we were largely limited by the rarity of complications with modern anesthesia in this population. Post-hoc power analysis revealed that with such a rare event of perioperative aspiration-related anesthesia complication (0.3% in this study; 0.1% in Borland et al.<sup>1</sup>) 12 times as many patients would be needed to have appropriate power (N = 2067). Given this analysis, a large multicenter retrospective study might be able to provide the statistical power needed to reach a more definitive conclusion. Nonetheless, given the available patient population and rates of complications, this study demonstrated that fasting guidelines may not provide any safety benefit against aspiration of gastric contents in patients undergoing surgical intervention of pediatric orthopaedic emergencies, with further analysis needed on a larger scale.

The rate of pulmonary complications following modern anesthesia in children remains so small as to suggest that additional research is needed to determine if fasting guidelines are truly necessary in the majority of cases or if other factors beyond the time since last oral intake should be more carefully considered.

## Conclusion

Aspiration-related complications following anesthesia using modern techniques in pediatric patients are very rare. This underpowered pilot study failed to find a relationship between these complications and fasting status at the time of emergent pediatric orthopaedic surgery. Future studies should expand the size of the study population, perhaps through a multicentered approach, in order to increase power.

## Disclaimer

No funding was received. The authors report no conflicts of interest related to this manuscript.

## Additional Links

- National Library of Medicine: [Hunger Games: Impact of Fasting Guidelines for Orthopedic Procedural Sedation in the Pediatric Emergency Department](#)

## References

1. Borland LM, Sereika SM, Woelfel SK, et al. Pulmonary aspiration in pediatric patients during general anesthesia: incidence and outcome. *J Clin Anesth.* 1998;10(2):95-102.
2. Tan Z, Lee SY. Pulmonary aspiration under GA: A 13-year audit in a tertiary pediatric unit. *Paediatr Anaesth.* 2016;26(5):547-552.
3. Abouleish AE, Leib ML, Cohen NH. ASA provides examples to each ASA physical status class. *ASA Newsletter.* 2015;79(6):38-49.
4. Mpody C, Hayes S, Rusin N, et al. Risk assessment for postoperative pneumonia in children living with neurologic impairments. *Pediatrics.* 2021;148(3):e20211050130.
5. Sakai T, Planinsic RM, Quinlan JJ, et al. The incidence and outcome of perioperative pulmonary aspiration in a university hospital: a 4-year retrospective analysis. *Anesth Analg.* 2006;103(4):941-947.
6. Yildirim AO, Unal VS, Oken OF, et al. Timing of surgical treatment for type III supracondylar humerus fractures in pediatric patients. *J Child Orthop.* 2009;3(4):265-269.
7. Warner MA, Warner ME, Warner DO, et al. Perioperative pulmonary aspiration in infants and children. *Anesthesiology.* 1999;90(1):66-71.
8. Wu JP. Pediatric anesthesia concerns and management for orthopedic procedures. *Pediatr Clin North Am.* 2020;67(1):71-84.
9. Engelhardt T, Webster NR. Pulmonary aspiration of gastric contents in anaesthesia. *Br J Anaesth.* 1999;83(3):453-460.
10. ASA Committee on Economics. ASA Physical Status Classification System. [ASA web site]. American Society of Anesthesiologists. October 15, 2014. Available at: <https://www.asahq.org/standards-and-guidelines/asa-physical-status-classification-system/> Accessed December 8, 2022.
11. Berkow LC. Rapid sequence induction and intubation (RSII) for anesthesia. [UpToDate web site]. June 2, 2022. Available at: <https://www.uptodate.com/contents/rapid-sequence-induction-and-intubation-rsii-for-anesthesia>. Accessed December 8, 2022.
12. Martins A de J C, Serva CA de S, da Fonseca TH, et al. Fasting of less than eight hours in urgent and emergency surgeries versus complication. [Article in English, Portuguese]. *Rev Bras Enferm.* 2016;69(4):712-717.

13. Brady M, Kinn S, Ness V, et al. Preoperative fasting for preventing perioperative complications in children. *Cochrane Database Syst Rev.* 2009;(4):CD005285.
14. Green S, Leroy P, Roback M, et al. An international multidisciplinary consensus statement on fasting before procedural sedation in adults and children. *Anaesthesia.* 2020;75(3):374-385.
15. Scarlett M, Crawford-Sykes A, Nelson M. Preoperative starvation and pulmonary aspiration. New perspectives and guidelines. *West Indian Med J.* 2002;51(4):241-245.
16. Stewart RJ, Strickland CD, Sawyer JR, et al. Hunger games: impact of fasting guidelines for orthopedic procedural sedation in the pediatric emergency department. *J Emerg Med.* 2021;60(4):436-443.
17. Okubo M, Gibo K, Hagiwara Y, et al. The effectiveness of rapid sequence intubation (RSI) versus non-RSI in emergency department: an analysis of multicenter prospective observational study. *Int J. Emerg Med.* 2017;10(1):1.
18. Neilipovitz DT, Crosby ET. No evidence for decreased incidence of aspiration after rapid sequence induction. *Can J Anaesth.* 2007;54(9):748-764.
19. Walker RWM. Pulmonary aspiration in pediatric anesthetic practice in the UK: a prospective survey of specialist pediatric centers over a one-year period. *Paediatr Anaesth.* 2013;23(8):702-711.
20. Olsson GL, Hallen B, Hambraeus-Jonzon K. Aspiration during anaesthesia: a computer-aided study of 185,358 anaesthetics. *Acta Anaesthesiol Scand.* 1986;30(1):84-92.
21. Warner MA, Warner ME, Weber JG. Clinical significance of pulmonary aspiration during the perioperative period. *Anesthesiology.* 1993;78(1):56-62.
22. American Society of Anesthesiologists. Practice guidelines for preoperative fasting and the use of pharmacologic agents to reduce the risk of pulmonary aspiration: application to healthy patients undergoing elective procedures an updated report by the American Society of Anesthesiologists Task Force on Preoperative Fasting and the Use of Pharmacologic Agents to Reduce the Risk of pulmonary aspiration. [ASA Publications website]. March 1, 2017. Available at: <https://pubs.asahq.org/anesthesiology/article/126/3/376/19733/Practice-Guidelines-for-Preoperative-Fasting-and>. Accessed December 8, 2022.
23. Andersson H, Zarén B, Frykholm P. Low incidence of pulmonary aspiration in children allowed intake of clear fluids until called to the operating suite. *Paediatr Anaesth.* 2015;25(8):770-777.
24. Kafrouni H, Ojaimi RE. Preoperative fasting guidelines in children: should they be Revised? *Case Rep Anesthesiol.* 2018;2018:8278603.
25. Thomas M, Morrison C, Newton R, et al. Consensus statement on clear fluids fasting for elective pediatric general anesthesia. *Paediatric Anaesth.* 2018;28(5):411-414.
26. Denton TD. Southern hospitality: how we changed the NPO practice in the emergency department. *J Emerg Nurs.* 2015;41(4):317-322.
27. Bledsoe GH, Schexnayder SM. Pediatric rapid sequence intubation. *Pediatr Emerg Care.* 2004;20(5):339-344.
28. Nason KS. Acute intraoperative pulmonary aspiration. *Thorac Surg Clin.* 2015;25(3):301-307.