

# Comparison Between Intubating and Not Intubating Pediatric Patients for Esophagogastroduodenoscopy

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## Abstract

**Background** There are wide array of methods in providing deep sedation or general anesthesia to pediatric patients having esophagogastroduodenoscopy (EGDs). It can range from intravenous sedation, insufflation, propofol sedation, and endotracheal intubation with general anesthesia. Some studies found that not intubating pediatric patients for EGDs were associated with more complications than intubating them. There is still controversy whether intubating is safer than not intubating EGD pediatric patients. Thus, we compared intubating versus not intubating pediatric patients undergoing EGDs. **Methods** After getting IRB approval, a retrospective chart review was performed on EGDs performed during a one year time period. Patients included had EGDs, were between 2 and 18 years old, ASA I or II, and had a BMI less than 30. We included 200 subjects who were intubated during EGDs and 200 subjects who were not intubated during EGDs. Comparisons between the groups included adverse events such as nausea or vomiting, aspiration, laryngospasm, sore throat, dysphagia, and respiratory depression. Total surgical time, anesthesia time before turnover to surgeon, time to recovery, and time to discharge was also compared.

**Results** There was no significant difference in adverse outcomes between the two groups. The only variable that was statistically significant ( $p < .05$ ) was the anesthesia time before turnover to surgeon (TOTS), with the time to recovery being shorter in the not intubated group compared to the intubated group. **Conclusions** There was not a higher incidence of complication in patients who were not intubating compared to the patients intubated.

## INTRODUCTION

Most pediatric patients require general anesthesia for esophagogastroduodenoscopy (EGD). This procedure is fairly quick but adverse events like aspiration, hypoxia, and laryngospasm could happen especially if the patient's airway is not intubated. The incidence of overall immediate complication from EGD was 2.3% in one cross-sectional database study (1).

There are wide array of methods in providing deep sedation and general anesthesia to pediatric patients having EGDs. It can range from intravenous sedation, insufflation, propofol sedation, and endotracheal intubation with general anesthesia. Some studies found that not intubating pediatric patients for EGDs were associated with more complications than intubating them (1,2,3,). Others studies found that propofol sedation is safe for pediatric patients if adequately trained professionals are present (4,5,6,7).

In our institution, there are two different anesthetic techniques that anesthesia providers use in pediatric patients

undergoing EGD under general anesthesia. One technique is the use of propofol infusion titrated to keep the patient spontaneously breathing and using supplemental blow-by oxygen without intubating the trachea. The second technique is general endotracheal anesthesia using inhalational agents. The authors sought to compare these two anesthetic techniques and to determine the differences between intubating versus not intubating pediatric patients for esophagogastroduodenoscopy (EGD). Specifically, the authors wanted to look at adverse events, anesthesia turnover time to surgeon (TOTS), time to recovery room, and time to discharge between the two techniques.

## METHODS

After getting an Institutional Review Board approval, a one-year retrospective chart review of children who underwent elective EGD under general anesthesia was performed. Patients between 2 and 18 years old, ASA I or II, and a BMI less than 30 were included in the study. Excluded were those patients on oxygen, those actively nauseated or vomiting,

diabetics, or having other procedures (e.g., colonoscopy, flexible sigmoidoscopy, dental) at the same time. Patients were assigned to one of two: (1) intubated group (IT) and (2) not intubated/propofol infusion group (NT). Adverse events that included postoperative nausea or vomiting, aspiration, laryngospasm, sore throat, and respiratory depression/desaturation were collected. Total procedure time, anesthesia time before turnover to surgeon, time to recovery room, time to discharge, and anesthetic drugs that were administered during the procedure were also recorded. The data was collected from the anesthesia and post operative records. Statistical analysis of the demographics and the above events from both groups were analyzed and compared.

**RESULTS**

There were a total of over 600 pediatric patients who underwent just EGD. The NT group had 200 patients who met criteria of the study, and these were matched with 200 patients in the IT group based on inclusion criteria and demographics. There were no difference between the groups with regards to demographics and anesthesia providers (Table 1). The NT group had an average weight of 42 kg compared to 38.7 kg in the IT group but this was not significant. There was also no significant difference in adverse outcomes between the two groups (Table 2). One patient in the NT group had aspiration compared to none in the IT group. There were more patients in the IT group who had postoperative nausea or vomiting (9 patients) compared to the NT group (3 patients). This difference was also not statistically significant. There was a difference between 2 of the time periods, which was significant. Anesthesia time before turnover to surgeon was shorter in the NT group compared to the IT group (8.4 min vs 9.8 min) that was significant ( $p < .001$ ). The time to the recovery room was also shorter in the NT group compared in the IT group (4.1 min vs 6.0 min), which was also statistically significant ( $p < 0.001$ ) (Table 3). Though these statistically significant values had no significant clinical implications due to the small differences.

**Figure 1**

Table 1. Baseline characteristics

Characteristic	Intubated (N=200) n (%) or mean (SD)	Not Intubated (N=200) n (%) or mean (SD)	p-value*
Age (yrs)	9.7 (4.1)	10.0 (4.2)	.43
Weight (kg)	38.7 (19.3)	42.0 (20.1)	.09
Personnel			.63
Solo	69 (35)	76 (38)	
Resident	42 (21)	47 (24)	
CRNA	60 (30)	56 (28)	
Student	28 (14)	21 (10)	

\*Based on Chi-square test for categorical variables and unpaired t-tests for continuous variables

**Figure 2**

Table 2. Adverse events by intubated or not intubated

Adverse Events	Intubated (N=200) n (%)	Not Intubated (N=200) n (%)	p-value*
Any Adverse Event†	12 (6)	5 (2.5)	.08
Nausea or vomiting	9 (4.5)	3 (1.5)	.08
Aspiration	0	1 (.5)	.32
Laryngospasm	0	1 (.5)	.32
Sore throat	0	0	1.0
Dysphagia	0	0	1.0
Desaturation/Obstruction	3 (1.5)	3 (1.5)	1.0
Respiratory Depression	1 (.5)	1 (.5)	1.0

\*Based on Chi-square test

†Only one adverse event is counted for this variable (1 subject had 4 AEs and another had 2 AEs)

**Figure 3**

Table 3. Times by intubated or not intubated

Time (min)	Intubated (N=200) mean (SD)	Not Intubated (N=200) mean (SD)	p-value*
Anesthesia time	9.8 (2.9)	8.4 (2.6)	<.001
Surgical time	6.9 (2.3)	6.8 (2.2)	.72
Time to PACU	6.0 (3.9)	4.1 (3.7)	<.001
Time to discharge	51.7 (19.4)	52.7 (15.3)	.56

\*Based on unpaired t-test

**DISCUSSION**

There was no significant difference in adverse events between IT and NT in pediatric patients undergoing EGD. Not intubating a patient resulted in slightly faster anesthesia time and time to recovery room than intubating a patient but did not make a difference in discharge times. Assuming that

highly trained pediatric anesthesia providers are involved, it appears that elective EGD can be done safely on ASA 1 or 2 pediatric patients without intubation.

One of the serious risks of not intubating patients for EGDs is aspiration. Even though the procedure is very short, there is stimulation when the EGD scope is placed which could cause the patient to gag if sedation is not adequate. The overall incidence of complications during EGDs for pediatric patients is around 2% with hypoxia being the most common complication (1). In this study there was one aspiration in the NT group and this was the only aspiration out of the 400 EGDs we looked at that year.

There have been studies which indicate that hypoxia and desaturations are more common in non-intubated pediatric patients having EGDs (2,3). These studies don't compare propofol sedation that was used in the NT group in this study. Propofol sedation has been performed on pediatric patients and deemed to be safe (3,4,5).

One of the limitations of this study is that this was a retrospective study and some of the desired information may not be available at the time of the study. There was variation between the anesthesia for the patients. Since the study was retrospective there was no standardization in the patients. The drugs used of each group varied. Some of the patients received fentanyl that could have increased the incidence of nausea postoperatively. Moreover, some of the patients received ondansetron which would improve post-operative nausea. There is also variation in the amount of propofol given.

Taking these limitations into account, the authors still conclude that this study shows that not intubating can be safe in healthy pediatric EGD patients between 2-18 years old. The patients in this study received anesthesia by experienced personal. Anesthesiologists supervised all the cases. We do recognize that some pediatric anesthesia cases for EGDs need to be intubated and the provider should decide this. Not every case can be standardized. Each patient should be evaluated and the risks of aspiration or other comorbidities need to be weighed when making the decision.

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