



Impact of Concomitant Fundoplication on Post-operative Outcome in Patients Undergoing Gastrostomy Tube Placement

Loren Berman, MD, MHS, Iman Sharif, MD, MPH, David Rothstein, MD, Jobayer Hossain, PhD, Charles Vinocur, MD

ABSTRACT

Background: Fundoplication is often performed in conjunction with gastrostomy tube (GT) placement in children, but there is a great deal of variation in rates of and indications for this procedure. Little is known about the impact of fundoplication on peri-operative outcomes. This study examines a national cohort of pediatric patients to compare risk-adjusted surgical outcomes in patients undergoing GT placement with or without concomitant fundoplication.

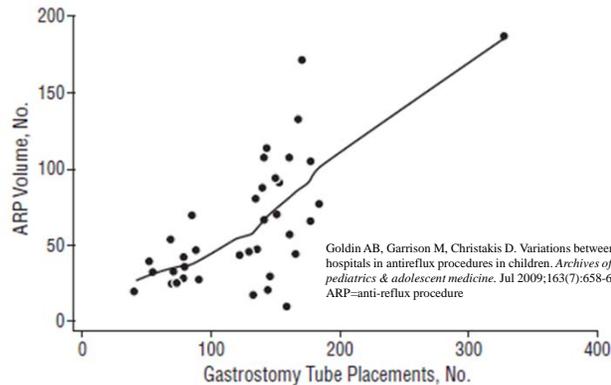
Methods: We identified all patients undergoing GT placement in the 2012 National Surgical Quality Improvement Program-Pediatric. We evaluated demographics, co-morbidities, complications, and length of stay for GT with fundoplication versus GT alone. We defined composite morbidity as a dichotomous variable for the presence of any complication. Logistic regression was performed to identify predictors of morbidity after adjusting for covariates.

Results: 1289 GT patients were identified, and 148 (11.5%) underwent concurrent fundoplication. The fundoplication patients were more likely to be younger, have cardiac risk factors, and be on respiratory support. They also had higher rates of surgical site infection (7.4% vs 3.7%, $p=0.03$) and composite morbidity (16.9% vs 8.7%, $p=0.001$), and longer LOS (median 5 vs 3 days, $p<0.0001$) compared to GT only. After adjusting for covariates, fundoplication was a predictor of composite morbidity and increased LOS.

Conclusion: Concomitant fundoplication is an independent risk factor for 30-day post-operative morbidity in patients undergoing GT placement. These findings do not negate the value of fundoplication but underscore the importance of careful patient selection, and should be taken into consideration when discussing risks and benefits with families.

BACKGROUND

- About 14,000 gastrostomy tubes are placed in children per year in the United States
- Huge variation across centers regarding how often fundoplication is performed in these patients



BACKGROUND, CONT'D.

How does the surgeon decide when to perform fundoplication?

- Reflux is physiologic for many children up to one year of age
- A diagnosis of reflux alone does not necessarily mean fundoplication is indicated
 - ? Neurologic impairment
 - ? Cardiac/pulmonary disease
- Some argue that fundoplication does not increase morbidity during gastrostomy placement

OBJECTIVE

To determine the impact of fundoplication on post-operative gastrostomy tube outcomes

METHODS

- Identified all patients with primary CPT 2011 codes for gastrostomy placement or fundoplication included in 2012 NSQIP-P PUF
- Using concurrent procedure codes, determined which patients were undergoing GT placement alone and GT with fundoplication
- Evaluated:
 - Demographic characteristics
 - Co-morbidities
 - Inpatient versus outpatient status
 - Surgical approach (laparoscopic versus open)
 - Composite morbidity (SSI, wound disruption, pneumonia, unplanned intubation, pulmonary embolism, renal failure/insufficiency, urinary tract infection, coma, stroke, seizure, nerve injury, intraventricular hemorrhage, cardiac arrest, transfusion greater than 25 cc/kg in first 72 hours, ventricular tachycardia, sepsis, and central line associated bloodstream infection)
 - Length of stay
- Predicted that the patients undergoing fundoplication would be more likely to be sicker patients and therefore at higher risk of post-operative complications
- Performed multiple logistic regression to adjust for co-morbidities and determine whether fundoplication was still associated with increased morbidity

RESULTS

1289 GT patients; 148 of these (11.5%) had concurrent fundoplication.

- Fundoplication patients compared to GT alone were more likely to be younger, inpatient, have GERD, cardiac risk factors, inotropic or oxygen support, ventilator-dependent, or have pneumonia at the time of surgery
- Higher proportion of fundoplication patients had laparoscopic surgery compared to GT alone (82% vs 72%, $p=0.006$).
- No difference in rates of neurologic impairment, seizure disorder, cerebral palsy, neuromuscular disorder, or chronic lung disease between the two groups

RESULTS, CONT'D.

Post-operative outcomes:

	GT only n (%)	GT with fundoplication n (%)	P-value
Composite morbidity	99 (8.7)	25 (16.9)	0.001
Any SSI	42 (3.7)	11 (7.4)	0.03
Bleeding >25 cc/kg	3 (0.26)	2 (1.4)	0.04
Sepsis	12 (1.1)	5 (3.4)	0.02
Reintubation	24 (2.1)	7 (4.7)	0.05
Any return to OR	32 (2.8)	9 (6.1)	0.03
Any readmission	134 (11.7)	16 (10.8)	0.7
Mortality	11 (1.0)	1 (0.7)	0.7

Median LOS was higher in the fundoplication group compared to the GT only group (5 days vs 3 days, $p<0.0001$)

Findings after adjusting for covariates:

- Fundoplication still associated with composite morbidity (odds ratio 2.25, 95% C.I. 1.35 to 3.76).
- Other significant predictors of morbidity:
 - Open versus laparoscopic surgery
 - Hematologic disorder
 - Major cardiac risk factors
 - Pre-operative oxygen support
- LOS still longer for fundoplication patients after adjusting for covariates

CONCLUSIONS

Patients undergoing fundoplication were more likely to experience:

- Surgical site infection
- Unplanned intubation
- Bleeding requiring transfusion >25 cc/kg
- Postoperative sepsis
- Composite morbidity
- Longer length of stay

Effect of fundoplication on composite morbidity and length of stay was sustained after adjusting for increased co-morbidities.

IMPLICATIONS

- Adding a fundoplication to GT placement increases 30-day morbidity and LOS, but these findings should not be interpreted as a reason not to perform fundoplication when it is truly indicated
- Understanding of the added morbidity of fundoplication will help to encourage more careful and thoughtful selection of fundoplication patients
- Consistent and uniform approach to the diagnosis and treatment of children with reflux is likely to reduce the number of children referred for fundoplication and therefore decrease unnecessary morbidity

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