

Incidence and Impact of Contrast-enhanced Fluoroscopic Studies to Evaluate Gastrostomy-button Complications in Pediatric Patients

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Background

Globally, over 2.5 million gastrostomy tubes (g-tubes) and buttons (g-buttons) are placed or replaced each year. These devices provide a reliable method for delivery of nutrition, medications, and fluid therapy. Unfortunately, complications such as leaking or dislodgment are common and often result in contrast-enhanced fluoroscopic studies. These procedures incur significant medical costs and radiation exposure. We sought to determine the incidence and overall costs associated with g-button related fluoroscopic studies at our institution.

Aims

1. Determine incidence and indications for g-button related fluoroscopic studies at our institution.
2. Determine the overall costs associated with g-button fluoroscopic studies at our institution.

Methods

A retrospective review of patients who underwent a fluoroscopic g-button study at Children's Hospital Colorado from 2015-2020 was conducted. Patients were divided into groups based on the reason for the g-button study and compared using frequencies with percentages, means with standard deviations and Fisher's exact or Kruskal-Wallis tests. Radiation dosages and overall total costs/charges associated with g-button study encounters were calculated.

Results

A total of 384 g-button studies were completed during the study period. The most common reason was g-button dislodgement (27%) followed by inability to tolerate feeds (22%), routine replacement/size change (19%), and leaking around the g-button (12%). Of those in the dislodgment and routine replacement groups, 6.3% of g-buttons were found to be improperly replaced and 4.4% required surgery due to improper replacement. There was a significant difference in the age of the tract (11.88 vs 44.53, p=0.02) and hospital admission (66.7% vs 5.5%, p<0.001) in those whose g-buttons were improperly replaced compared to those with proper replacement. The average radiation dose administered per g-button study was 14.99 (mGy) and the median total charge of each medical encounter associated with a g-button study was \$3,333.45.

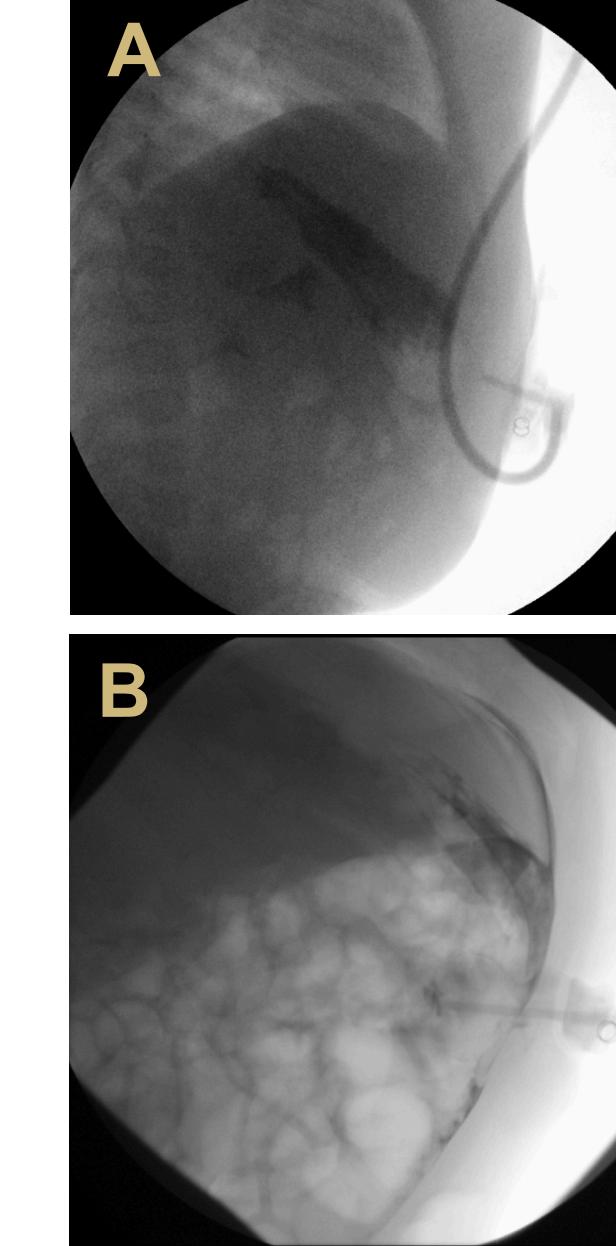


Figure 1
Fluoroscopic g-button studies showing proper positioning of the g-button with contrast confined to the patient's stomach (A) and improper placement with contrast seen lining the peritoneal cavity (B).

	Properly Placed (N=128)	Improperly Placed (N=6)	
Required Admission			
Yes	7 (5.47%)	4 (66.67%)	p<0.001
No	121 (94.53%)	2 (33.33%)	
Median Age of Tract (days)	44.53	11.88	p=0.02
Median Total Cost	\$3238	\$76,413	p=0.053

Table 2 Comparison of outcomes for patients with proper or improper g-button positioning who underwent g-button study due to dislodgement or routine replacement in the ED or outpatient clinic.

Conclusions

Contrast-enhanced fluoroscopic g-button studies are commonly performed at our institution for dislodgement and other common complications. Importantly, 6.3% of g-buttons were found to be malpositioned following replacement, reinforcing the importance of a fluoroscopic study after a dislodgement episode, especially among those < 6 weeks out from initial placement.

	Dislodged Tube (N=105)	Leaking Tube (N=47)	Inability to Tolerate Feeds (N=86)	Pain Around Tube (N=29)	Routine placement, replacement, (N=72)	Suspected Infection (N=14)	Suspected Obstruction (N=7)	Suspected Malposition (N=5)	Other Reason (N=19)
Gender									
Female	41 (39%)	21 (45%)	37 (43%)	14 (48%)	39 (54%)	9 (64%)	4 (57%)	2 (40%)	11 (58%)
Male	64 (61%)	26 (55%)	49 (57%)	15 (52%)	33 (46%)	5 (36%)	3 (43%)	3 (60%)	8 (42%)
Ethnicity									
Hispanic/Latino	37 (35%)	18 (38%)	23 (27%)	11 (38%)	26 (36%)	4 (29%)	2 (29%)	0 (0%)	6 (32%)
Not Hispanic/Latino	65 (62%)	27 (57%)	58 (68%)	17 (59%)	46 (64%)	10 (71%)	5 (71%)	5 (100%)	12 (63%)
Unknown	3 (3%)	2 (4%)	4 (5%)	1 (3%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (5%)
Age at Surgery (yrs)	2.9 (4.84)	4.2 (7.13)	4.0 (5.97)	5.7 (5.09)	5.0 (6.97)	3.3 (4.05)	3.0 (4.02)	2.4 (3.7)	4.7 (8.7)
Age at G-button Study (yrs)	4.0 (5.6)	8.1 (8.9)	6.4 (7.2)	7.2 (4.5)	6.3 (7.5)	3.9 (3.9)	5.0 (5.6)	5.2 (6.3)	6.6 (8.9)
Age of Tract (days)	397 (818)	1411 (2191)	831 (1432)	464 (768)	439 (991)	189 (223)	752 (1163)	1052 (2263)	614 (1010)
Inpatient Status									
Clinic	24 (23%)	13 (28%)	36 (42%)	18 (62%)	41 (57%)	6 (42%)	3 (43%)	3 (60%)	3 (16%)
ED	52 (49%)	9 (19%)	19 (22%)	4 (14%)	4 (6%)	4 (29%)	2 (29%)	1 (20%)	4 (14%)
Inpatient	29 (28%)	25 (53%)	30 (35%)	7 (24%)	27 (37%)	4 (29%)	2 (29%)	1 (20%)	12 (64%)
Required Admission									
Yes	7 (9%)	2 (9%)	9 (16%)	1 (4%)	1 (2%)	1 (11%)	1 (20%)	1 (25%)	0 (0%)
No	69 (91%)	21 (91%)	46 (84%)	21 (96%)	44 (98%)	8 (89%)	4 (80%)	3 (75%)	7 (100%)
Radiation Dose (mGY)	5.95 (13.54)	21.97 (67.5)	31.12 (145.56)	20.36 (60.76)	10.33 (36.93)	2.27 (2.95)	0.60 (0.85)	14.97 (17.46)	3.18 (7.51)
Total Charge to Patient	\$3,111.88 [2,268.05, 61,645.76]	\$25,327.87 [1,224.16, 401,515.50]	\$3,680.73 [819.0, 71,969.95]	\$1,519.740 [880.0, 51,528.11]	\$1,620.61 [919.50, 72,680.89]	\$13,650.46 [1568.25, 86,972.62]	\$7,234.6 [797.5, 27,884.38]	\$1,794.0 [1,161.21, 856,465.48]	\$84,955.5 [3,060.39, 241,655.44]

Table 1 Reason for Contrast-enhanced Fluoroscopic G-button Study. Demographics, clinical features, and total charge to patients who underwent a fluoroscopic g-button study stratified by reason for study.

Significance

G-button placement is a common pediatric surgical procedure. An improved method for securing g-buttons may reduce the number of dislodgment episodes, leakage, ED visits, radiation exposure, and overall costs.

Disclosures

The authors report no disclosures.