

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

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**Purpose:** Complications associated with gastrostomy buttons (g-buttons) such as leaking or dislodgment are common and often require contrast-enhanced fluoroscopic studies. These procedures incur significant medical costs and radiation exposure. We sought to determine the incidence and costs associated with g-button-related 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 stratified based on the reason for the study and compared using frequencies, means, and Fisher's exact or Kruskal-Wallis tests. Radiation dosages and charges associated with study encounters were calculated.

**Results:** A total of 384 g-button studies were included. The most common reason was dislodgement (27%) followed by inability to tolerate feeds (22%), routine replacement (19%), and leaking (12%). Studies for dislodgment and routine replacement showed 6.3% of g-buttons were improperly replaced and 4.4% required surgery. 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 with improperly replaced g-buttons. The average radiation dose administered per study was 14.99 (mGy) and the median total charge was \$3,333.45.

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

**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.

**Table 1** Demographics and Clinical Characteristics Associated with G-button Studies

<b>Reason for Contrast-enhanced Fluoroscopic G-button Study</b>									
	<b>Dislodged Tube (N=105)</b>	<b>Leaking Tube (N=47)</b>	<b>Inability to Tolerate Feeds (N=86)</b>	<b>Pain Around Tube (N=29)</b>	<b>Routine placement, replacement, size change (N=72)</b>	<b>Suspected Infection (N=14)</b>	<b>Suspected Obstruction (N=7)</b>	<b>Suspected Malposition (N=5)</b>	<b>Other Reason (N=19)</b>
<b>Gender</b>									
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%)
<b>Ethnicity</b>									
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%)
<b>Age at Surgery (yrs)</b>	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)
<b>Age at G-button Study (yrs)</b>	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)
<b>Age of Tract (days)</b>	397 (818)	1411 (2191)	831 (1432)	464 (768)	439 (991)	189 (223)	752 (1163)	1052 (2263)	614 (1010)
<b>Inpatient Status</b>									
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%)
<b>Required Admission</b>									
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%)
<b>Radiation Dose (mGY)</b>	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)
<b>Total Charge to Patient</b>	\$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]