

## CRITICAL REVIEW FORM: THERAPY ARTICLES

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**Citation:** Warner TN et al. [Esophageal Bougienage for Management of Lodged Esophageal Coins: Safe, Effective, Efficient, and Underused](#). *Pediatr Emerg Care*. 2022 Nov 1;38(11):589-597.

**Study Objective:** “To report on our ongoing outcomes with use of esophageal bougienage for management of lodged esophageal coins, including safety, efficacy, cost, and LOS, and (2) to assess via survey the extent of bougienage usage and barriers to its usage among ED providers who care for children.”

**Primary outcomes** were procedural success and complications.  
**Secondary outcomes** included LOS and hospital charges.

**Study Methodology:** Single quaternary urban academic center, retrospective chart review of patients who met ICD-10 diagnostic or procedural codes for esophageal foreign body (FB). Groups were compared regarding types of intervention, procedural outcomes, complications, LOS, cost bougienage vs. endoscopy. In addition, authors generated a survey of pediatric EM physicians (list-server of approximately 4000 pediatric EM clinicians) at different institutions regarding use of and barriers to esophageal bougienage.

GUIDE	COMMENTS
<b>I. Are the results valid?</b>	
<b>A. Did experimental and control groups begin the study with a similar prognosis</b>	N/A there is no control group, did compare outcomes esophageal bougie vs endoscopy but no control variables
1. Were patients randomized?	N/A
2. Was randomization concealed (blinded)? In other words, was it possible to subvert the randomization process to ensure that a patient would be “randomized” to a particular group?	N/A

3. Were patients analyzed in the groups to which they were randomized?	N/A
4. Were patients in the treatment and control groups similar with respect to known prognostic factors?	Patients in the endoscopy group were younger 1.5 vs. 4.5 yrs., were more likely to have unwitnessed ingestion, coughing, FB sensation, fever, irritability, epistaxis, voice change, upper respiratory symptoms, temperature instability, and somnolence. (Table 1)
5. Were patients aware of group allocation?	N/A
6. Were clinicians aware of group allocation?	N/A
7. Were outcome assessors aware of group allocation?	No mention of blinding of data assessors to the study objectives and primary and secondary outcomes. This is one group that can be blinded in retrospective data analysis.
8. Was follow-up complete?	No mention of any specific follow up though authors report on some return visits.
<b>What are the results ?</b>	
1. How large was the treatment effect?	<p><b>Primary outcomes:</b>  Bougienage (n=147) 97% success.  Endoscopy (n=56) 100% success.  No statistical difference in complications  Compared to endoscopy, lower LOS and hospital charges. No sig. difference in complications</p> <p><b>Secondary Outcomes:</b>  <b>Length of stay</b> significantly shorter for endoscopic retrieval (median 2.18 vs 11.92 hours, <math>P &lt; 0.001</math>), as was PED LOS (median 2.18 vs 2.98 hours, <math>P &lt; 0.001</math>).  <b>Hospital charges</b> were significantly lower than those for bougienage (median \$3533 vs \$12,679, <math>P &lt; 0.001</math>).</p>
2. How precise was the estimate of the treatment effect? (CI's?)	No CI's were reported though p values were.
<b>III How can I apply the results to patient care?</b>	
1. Were the study patients similar to my patient?	Likely similar institution to ours (quaternary teaching hospital in southern USA). MUSC seems to have used bougienage for a long time so experience of clinicians likely to be much greater than non-practicing centers.

2. Were all clinically important outcomes considered?	Mostly. No patient or clinician preference which would likely require a prospective study. No description of who performed the 147 successful procedures and their experience level Would be interested to look at risk factors for failed attempt and time to EGD so that this procedure can be applied to centers that don't have access to peds GI
3. Are the likely treatment benefits worth the potential harm and costs?	Yes, benefits: decreased LOS and cost, less major complications though study may not be powered to sufficiently identify sig. comps.

**Limitations:**

Data retrospectively collected, may have missed cases. Abstracted data dependent on accuracy of study team (did do audit of 20% of cases). Only utilized institution records, cases may have been seen at outside facility for follow up complications- this is important because 78.5% patients were transferred to MUSC from outside institution. Not able to assess patient satisfaction.

Not able to control variables when comparing EGD vs bougie groups, patients who underwent EGD may have had more comorbidities since did not meet bougie inclusion criteria though age seems to have been biggest difference. Younger patients got endoscopy.

Survey response bias. Survey had only 7% response rate, 3.3% respondents reported using it as standard of care, all from Minnesota (has previously published studies regarding safe bougie use at this institution).

**Comments:** If physicians at our facility receive training, can be applied to patients who meet procedure inclusion criteria: > 1 YO, no resp distress, no prior GI surgery or disease, 1 coin ingestion confirmed on xray, witnessed ingestion within 24 hrs

**Clinical Bottom Line:** Esophageal bougienage technique is safe and effective with no major complications. It has greater cost and LOS benefit compared to endoscopic removal. It is significantly underused, due to lack of education and training, concern for safety and efficacy, and is not significantly supported by the literature.

## From MUSC:

# Lodged Esophageal Coin Treatment Guidelines

### Background

Coins are the most common non-organic foreign bodies ingested by children. Coins which lodge in the oropharynx, airway or esophagus can cause serious complications and must be removed from these sites emergently. There are at least four methods used to manage coins lodged in the esophagus: esophagoscopy with forceps retrieval, esophageal bougienage coin advancement into the stomach, Foley catheter retrieval and expectant monitoring for spontaneous coin passage into the stomach. The criteria for selecting esophageal bougienage are given below.

Criteria for Esophageal bougienage

1. Single coin ingested.

2. Coin radiographically located in the esophagus.
3. Witnessed ingestion of <24 hours duration.
4. No prior history of esophageal foreign body, esophageal disease (GE reflux, esophagitis, stricture or hiatal hernia) or esophageal surgery.
5. No known gastrointestinal tract anomalies or surgery that would prevent the spontaneous passage of the coin from the stomach and through the intestinal tract.
6. No acute respiratory distress (tachypnea, stridor or wheezing).
7. Physician performing procedure has received in-service education from physician experienced in bougienage technique for coin advancement.

### Esophageal bougie size per patient age:

Patient age	Bougie size
1-<2 yrs	28F
2-<3 yrs	32F
3-<4 yrs	36F
4-<5 yrs	38F
5 yrs and >	40F

### Procedure

1. Informed consent is recommended.
2. Estimate length of bougie necessary to reach the stomach (nares to subxiphoid distance) and mark this length on the bougie with circumferential tape.
3. Patient seated in upright position, arms wrapped at the side by a cloth sheet and head and arms restrained from behind by assistant personnel.
4. Conscious sedation for an overly anxious older child may be considered, but is usually not necessary due to the very brief time needed to perform the procedure.
5. Tongue blade induced gag. Stack and tape 3 or 4 tongue blades together to serve as bite block to prevent the patient biting the bougie.
6. Gentle but firm insertion and advancement of bougie into oropharynx (tactile appreciation of the bougie tip hitting the coin is not experienced by the physician), advance to marked depth into stomach (one pass) and withdraw bougie.
7. Repeat radiograph of chest and upper abdomen to assess for coin advancement into stomach.
8. Discharge instructions to monitor for coin passage in stool. Return or immediate evaluation if abdominal pain, dysphagia, vomiting, hematemesis, hematochezia, chest pain or shortness of breath develops.

### Potential Complications

1. Transient patient discomfort, gagging, retching, vomiting and/or respiratory distress during procedure.
2. Esophageal perforation (never reported).
3. Gastric perforation (never reported).
4. Failure to advance coin from esophagus into stomach (can occur if bougie is too small).
5. Bowel obstruction due to coin passage failure (never reported).

### References

1. Connors GP. A Literature-based Comparison of Three Methods of Pediatric Coin Removal. *Ped Emerg Care* 1997; 13: 154-157.
2. Soprano JV, Mandl KD. Four Strategies for the Management of Esophageal Coins in Children. *Pediatrics* 2000; 105: e-5.
3. Bonadio WA. Coin Ingestion: Small Change, Big Problem. *Contemporary Pediatrics* 1992; 9:71-88.
4. Connors GP. Esophageal Coin Ingestion: Going Low Tech. *Ann Emerg Med*. 2008;51:373-374.
5. Arms JL, Mackenberg-Mohn MD, Bowen MV, et al. Safety and Efficacy of a Protocol Using bougienage of Endoscopy for the Management of Coins Acutely Lodged in the

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