Is Glucagon Effective for Relieving Acute Esophageal Foreign Bodies and Food Impactions?

**TAKE-HOME MESSAGE**

Glucagon is not associated with improved treatment success of esophageal foreign body and food impaction compared with placebo but does have a higher rate of adverse events.

**METHODS**

**DATA SOURCES**

Meta-analysis authors identified studies from PubMed, the Cumulative Index of Nursing and Allied Health, Latin American and Caribbean Health Sciences Literature, Scopus, the Cochrane Database of Systematic Reviews, and the Cochrane Central Register of Controlled Trials from the date of database creation to March 2018, with no language or age restrictions. Authors also reviewed references of included studies and review articles.

**STUDY SELECTION**

Inclusion criteria consisted of all retrospective, prospective observational, and randomized controlled trials evaluating glucagon for relief of acute esophageal food impactions and foreign bodies when compared with a comparator group. Authors excluded case reports, case series, and studies in abstract form only. Two reviewers independently screened titles and abstracts. Articles meeting initial screening criteria were reviewed as full-text articles. Authors included studies meeting all eligibility criteria, with discrepancies resolved by consensus or with the inclusion of a third author.

**RESULTS**

Glucagon for relief of esophageal obstruction or impaction.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>No. of Studies (No. of Patients)</th>
<th>OR or RD (95% CI)</th>
<th>Evidence Quality (GRADE)</th>
<th>Heterogeneity ($I^2$, %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Success rate</td>
<td>5 (1,185)</td>
<td>OR 0.90 (0.69 to 1.17)</td>
<td>Low</td>
<td>14</td>
</tr>
<tr>
<td>Overall adverse events</td>
<td>3 (213)</td>
<td>RD 0.18 (0.03 to 0.33)</td>
<td>Moderate</td>
<td>62</td>
</tr>
<tr>
<td>Vomiting</td>
<td>3 (213)</td>
<td>RD 0.07 (-0.03 to 0.17)</td>
<td>Moderate</td>
<td>59</td>
</tr>
</tbody>
</table>

OR, Odds ratio; RD, risk difference; CI, confidence interval; GRADE, Grading of Recommendations Assessment, Development and Evaluation.

A total of 1,988 studies were identified, and after removal of duplicates, 1,842 abstracts were reviewed, with 14 selected for full-text review. Five studies, comprising 23 study sites and 1,185 patients, were selected for the final analysis. Four studies were conducted in the emergency department (ED) setting, and 1 was conducted in 4 otolaryngology clinics. Two
Concomitant nitroglycerin or benzodiazepines to a proportion of patients. 

One study provided diazepam to all patients, and one study administered 2 to 3 ounces of water to all patients. Four studies reported treatment success with clinical signs and symptoms, whereas one study used radiologic imaging. Two studies reported esophageal abnormalities by treatment group, and they were similar. One study found esophageal abnormalities in 37.2% of patients, whereas another found esophageal ring, stricture, web, or narrowing in 30.9%; erosive esophagitis and stricture in 27.7%; and eosinophilic esophagitis in 11.1%.

TREATMENT SUCCESS

Treatment success did not differ between the glucagon group and control group (Table). Overall adverse events occurred more frequently in patients receiving glucagon (15% for glucagon versus 0% for comparators) and most commonly consisted of vomiting and retching. Other adverse events included hypotension and lightheadedness. All studies were at overall low risk of bias. One randomized controlled trial was at moderate risk of bias in regard to blinding. All retrospective studies were at moderate risk of bias for confounding. Based on the Grading of Recommendations Assessment, Development and Evaluation approach, evidence certainty was low for the primary outcome and moderate for secondary outcomes. Sensitivity analysis revealed no difference in the primary outcome.

Commentary

Esophageal foreign body impaction occurs when an object or piece of food becomes lodged in the esophagus. This can result in inability to tolerate oral intake, airway obstruction, and esophageal necrosis and perforation, prompting patients to present to the ED for evaluation and management. Although endoscopy is the definitive modality for evaluation and management, medical management is often attempted beforehand. Glucagon, typically administered in doses of 0.5 to 1.0 mg, is thought to reduce lower esophageal sphincter resting pressure.

This systematic review and meta-analysis sought to evaluate the efficacy and safety of glucagon for acute esophageal foreign bodies and impaction. It differs from previous systematic reviews by using a more comprehensive search strategy, including only studies with a comparator group, and being the first to perform a meta-analysis. Previous studies have suggested efficacy with glucagon in relieving acute esophageal food impaction but did not include a comparator group. Consequently, this present meta-analysis found no difference in treatment success with glucagon when a comparator group was used. The meta-analysis also found increased risk of adverse events, of which the most common was vomiting, which can increase the risk of aspiration and esophageal perforation.
studies did not control for concomitant medication administration, and they did not standardize care in the comparator groups. However, these studies were at low risk of bias and of overall good quality. Studies used different definitions of treatment success, including radiographic findings and symptomatic relief. Different types of foreign body impaction (eg, food, objects) were included, but this reflects current practice. Rates of underlying esophageal pathology were not included in all studies. Studies also did not control for time to treatment, which may have affected outcomes, but similar probability of occurrence between groups and the large sample sizes do not make this likely. Only 3 studies reported adverse events, and they were not powered to assess this outcome.

In accordance with the current data, glucagon does not appear to improve the relief of esophageal impaction compared with placebo (30.2% versus 33.0%, respectively) and possesses a higher rate of adverse events (15.0% versus 0%, respectively). Future randomized controlled trials should be conducted that evaluate different glucagon dosing strategies, control for concomitant medication administration, are powered to assess for adverse events, and determine the effects in different populations.