

BET 1: USE OF GLUCAGON FOR OESOPHAGEAL FOOD BOLUS IMPACTION

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ABSTRACT

A shortcut review was carried out to establish whether intravenous glucagon is a safe and effective treatment for patients with suspected lower oesophageal food bolus impaction. Seven studies were directly relevant to the question. The author, date and country of publication, patient group studied, study type, relevant outcomes, results and study weaknesses of these papers are tabulated. The clinical bottom line is that there is no evidence for the effectiveness of glucagon in this situation. Its use may be associated with adverse effects such as vomiting, with the potential risk of oesophageal perforation. Intravenous glucagon should therefore be avoided.

CLINICAL SCENARIO

A 60-year-old man presents to the emergency department with symptoms of lower oesophageal food bolus impaction. You have previously seen intravenous glucagon used in an attempt to relieve lower oesophageal impactions but wonder if there is any evidence for its use. You wonder if there is any evidence to support use of intravenous glucagon to treat lower oesophageal food bolus impaction.

THREE-PART QUESTION

In [adult patients with suspected lower oesophageal food bolus impaction] is [treatment with intravenous glucagon] [safe and effective at relieving the impaction]?

SEARCH STRATEGY

Ovid MEDLINE 1946 to January Week 5 2014 [exp Esophagus/OR espohag\$.mp. OR oesophag\$.mp OR exp Esophageal Diseases/OR exp Esophageal Sphincter, Lower/OR exp Esophageal Sphincter, Mid/OR exp Esophageal Spasm, Diffuse/] AND [exp Foreign bodies/OR food bolus. mp. OR foreign body.mp. OR impaction. mp OR impacted.mp OR meat impaction. mp OR food obstruct\$.mp.] AND [exp

Glucagon/OR glucagon.mp] Limit to (English language and humans).

OUTCOME

The search revealed 42 papers of which 35 were relevant to the question or of insufficient quality. The remaining seven papers are shown (see table 1).

COMMENTS

The success of glucagon in relieving food bolus impaction is seen to be variable in the studies found, ranging from 9.4% to 75%. The two studies with the higher success rates (69% and 75%) both concerned a very select patient population and excluded any patients with fixed oesophageal strictures or carcinoma of the oesophagus. It is not known whether these patients were excluded before or after trial of treatment. Of note, these studies were from the same department of the same institution, the later study being a continuation of the first. The most common range of percentage success was 32.6%–37.5%. Six of the seven studies are simple cohort studies without controls or randomisation providing a relatively

low level of evidence. The highest level of evidence available is from a multicentre, prospective, double-blind randomised control trial. This showed no significant difference between patients treated with glucagon and patients given placebo. Despite being underpowered and some of the patients also being treated with diazepam, it showed responses to glucagon and placebo of 37.5% and 31.3%, respectively. These figures are very similar to the response rates in several of the other studies, which may suggest that approximately 30% of oesophageal food bolus obstructions relieve spontaneously, rather than this being the effect of glucagon. Several of the studies concluded that even though response rates were relatively low, glucagon is safe and had relatively few side effects. These conclusions are not justified by the studies, as the number of patients studied was too small to observe true effects and side effects. Given that glucagon is known to induce vomiting, this poses a potential risk of oesophageal perforation in patients with distal oesophageal impaction. Vomiting was described in two patients in two studies,

Table 1 Use of glucagon for oesophageal food bolus impaction

Author, date and country	Patient group	Study type	Outcomes	Key results	Study weaknesses
Thimmapuram <i>et al</i> , 2013, USA	213 episodes of food bolus obstruction in 192 patients. Outcome in 125 patients given glucagon for food bolus obstruction. Presence of eosinophilic oesophageal infiltration (OOI)	Retrospective review of ED charts. Individual cohort study Level 4 evidence	Relief of obstruction after administration of glucagon Presence of OOI in patients who responded to glucagon and underwent biopsy at endoscopy	32.8% relief of obstruction with glucagon (41/125) 28.5% of responders to glucagon had EOI (8/28); 0% of non-responders to glucagon had EOI (0/17) $p=0.017$	Retrospective chart review only. Limited patient numbers, unpowered study, no sample size calculation. Single centre convenience observational study. No standardisation of treatments given. No inclusion or exclusion criteria given. Variable doses of glucagon given. Unclear if any other treatments given. Unclear if time allowed for glucagon to work after success or failure of treatment decided. Only looked at outcomes and biopsy results in patients who were given glucagon. The outcome of the 88 patients who were not treated with glucagon is not discussed. No mention of adverse events or side effects. p Values given without CIs
Al-Haddad <i>et al</i> , 2006, USA	Cases where glucagon was used in the ED for management of oesophageal food bolus obstruction 92 episodes in 85 patients	Retrospective review of ED case notes. Individual cohort study Level 4 evidence	Relief of obstruction with administration of glucagon Time from administration of glucagon to relief of symptoms Endoscopy findings Logistic regression analysis to determine any presenting factors that are associated with relief of symptoms after administration of glucagon Effect of coadministration with benzodiazepine	32.6% response rate (30/92) Mean time 38 min (range 10–95 min) 79% had distal oesophageal narrowing; 48% had oesophagitis; 37% had hiatus hernia Only previous solid food dysphagia positively associated with resolution of symptoms with glucagon ($p<0.05$) 58% of patients (11/19) had relief of symptoms with combined therapy compared with only 26% (19/73) who had relief with glucagon only ($p<0.01$)	Retrospective study. Limited patient numbers, study not powered, no sample size calculation. Convenience sample. Single institution experience. No inclusion or exclusion criteria given. Unstandardised—potential selection bias. No control group for comparison. Varying doses of glucagon given. Some patients also received benzodiazepines and opiates. Unclear if resolution of symptoms with glucagon actually due to the drug. A study looking at duration of effect of glucagon at the lower oesophageal sphincter concluded its maximum effect occurs within 1 min and lasts for up to 15 min. Most resolutions with glucagon occurred after 15 min (mean 38 min, range 10–95 min). Results of logistic regression analysis not all shown. No adverse events or side effects reported. No CIs for p values
Sodeman <i>et al</i> , 2004, USA	222 patients presenting to ED with oesophageal food bolus obstruction 106 patients in glucagon group 116 patients in 'control' group. No other medical treatments used	Retrospective case note study. Individual cohort study Level 4 evidence	Resolution of obstruction within 30 min of administration of glucagon Difference between glucagon responders and non-responders	9.4% in glucagon group (10/106) 17.2% in control group (20/116) Only significant difference was meat as cause of obstruction. 70% responders, 90% of non-responders ($p=0.03$). Responders also less likely to have fixed oesophageal narrowing ($p=0.05$)	Retrospective study of practice in single institution. Limited patient numbers despite 25-year data collection period would suggest cases may have been overlooked. Identification of patients was dependent upon accuracy of coding of notes – potential for selection bias. Medical practice unlikely to have remained consistent over 25-year period. No randomisation to glucagon and control groups. Unknown how decision to give glucagon was made. No adverse events or side effects reported. No p values for CIs

Continued

Table 1 Continued

Author, date and country	Patient group	Study type	Outcomes	Key results	Study weaknesses
Tibbling <i>et al</i> , 1995, Sweden	43 patients with oesophageal food bolus obstruction randomised to receive either placebo or active treatment with intravenous glucagon and diazepam. Patients with known oesophageal pathology excluded	Prospective double-blind, randomised control trial Level 2b evidence	Relief of obstruction	37.5% (9/24) in active treatment group had relief of obstruction. 31.3% (6/19) in placebo group had relief of obstruction. No significant difference between groups	Small study. No sample size calculation performed but likely to be underpowered to detect small differences. Diazepam also given in the treatment arm in varying doses. Only three of the nine patients in the active treatment group had relief of symptoms within an hour. True effect of intervention may be biased as some of this group may have had a spontaneous resolution of symptoms
Robbins and Shortsleeve, 1994, USA	48 episodes of acute (<24 h) distal oesophageal food bolus obstruction in 43 patients diagnosed on contrast swallow 1 mg intravenous glucagon then given, followed 2 min after by a standard dose of effervescent agent and 30 mL water. Repeat contrast swallow to ensure clearance of obstruction and no oesophageal perforation. Patients with known fixed oesophageal pathology excluded	Prospective cohort study Level 4 evidence	Relief of obstruction Underlying oesophageal abnormality Adverse outcomes	69% obstructions relieved with treatment (33/48) Treatment success group (n=33): 16 lower oesophageal rings 5 oesophagitis 3 stricture 1 normal. Treatment failure group (n=15): 8 oesophageal ring 3 oesophagitis 4 stricture One episode of haematemesis from mucosal laceration after two failed attempts at treatment	Single centre observational study. No control group or randomisation. Limited patient numbers, not powered with sample size calculation. Combined therapy used, therefore effect of glucagon unclear. Unclear how many attempts at the treatment protocol were used in each patient. One patient in the treatment failure group had treatment success after 30 min. Two patients in the treatment success group cleared the food bolus via vomiting induced by the treatment rather than passage into the stomach. Large number of patients not followed up. No analysis of similarities/differences between patients with treatment success and failure
Kaszar-Seibert <i>et al</i> , 1990, USA	16 episodes of distal oesophageal food bolus impaction diagnosed by barium swallow in 14 patients. Patients given 1 mg intravenous glucagon followed by 30 ml water and a sachet of effervescent agent. Second barium swallow then performed to ensure clearance of bolus in patients with relief of symptoms. Patients with known fixed stricture of the oesophagus excluded	Prospective cohort study Level 4 evidence	Relief of obstruction Adverse events	Relief of obstruction occurred in 75% of patients (12/16) No adverse events reported	Single centre observational study. No control group or randomisation. No sample size calculation. Combined therapy used therefore effect of glucagon unclear. The conclusion of the study was that the protocol is efficient, safe and cost effective, but careful patient selection was advised. However, this study unlikely to be sufficiently powered to support this conclusion
Trenkner <i>et al</i> , 1983, USA	19 patients with distal oesophageal food bolus impaction. Patients given intravenous glucagon 10–15 min after glucagon contrast imaging was performed	Prospective cohort study Level 4 evidence	Relief of obstruction Endoscopy findings	37% of the patients had successful treatment (7/19) 18 of the 19 patients were diagnosed with an abnormality. 15 had distal oesophageal narrowing/stricture	Small single centre study. No control group for comparison. Varying doses of glucagon given (0.5–2 mg). Eight patients received multiple doses of glucagon. Two of the patients in the treatment success group cleared the obstruction by vomiting following glucagon administration rather than passage into the stomach

ED, emergency department; EOI, eosinophilic oesophageal infiltration.

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and an adverse event of haematemesis and oesophageal mucosal laceration was also reported. The majority of the other studies did not report or make any reference to side effects or adverse events.

Clinical bottom line

There is no evidence to support the use of intravenous glucagon in patients with oesophageal food bolus impaction. Glucagon may induce vomiting which is undesirable in any distal oesophageal impaction due to the risk of oesophageal perforation. Patients presenting with oesophageal food bolus impaction may have undiagnosed fixed narrowing or pathology and glucagon and should therefore be avoided.

- ▶ Robbins MI, Shortsleeve MJ. Treatment of acute esophageal food impaction with glucagon, an effervescent agent, and water. *AJR Am J Roentgenol* 1994;162:325–8.
- ▶ Thimmapuram J, Oosterveen S, Grim R. Use of glucagon in relieving esophageal food bolus impaction in the era of eosinophilic esophageal infiltration. *Dysphagia* 2013;28:212–6.
- ▶ Al-Haddad M, Ward EM, Scolapio JS, *et al.* Glucagon for the relief of esophageal food impaction does it really work? *Dig Dis Sci* 2006;51:1930–3.
- ▶ Sodeman TC, Harewood GC, Baron TH. Assessment of the predictors of response to glucagon in the setting of acute esophageal food bolus impaction. *Dysphagia* 2004;19:18–21.
- ▶ Tibbling L, Bjorkhoel A, Jansson E, *et al.* Effect of spasmolytic drugs on esophageal foreign bodies. *Dysphagia* 1995;10:126–7.
- ▶ Kaszar-Seibert DJ, Korn WT, Bindman DJ, *et al.* Treatment of acute esophageal food impaction with a combination of glucagon, effervescent agent, and water. *AJR Am J Roentgenol* 1990;154:533–4.
- ▶ Trenkner SW, Maglinte DD, Lehman GA, *et al.* Esophageal food impaction: treatment with glucagon. *Radiology* 1983;149:401–3.

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