Management of foreign body ingestion in adults: Time to STOP and rethink endoscopy

George Tambakis, Tamar Schildkraut, Isabella Delaney, Robert Gilmore, Moshe Loebenstein, Andrew Taylor, Bronte Holt, Edward H Tsoi, Georgina Cameron, Barbara Demediuk, Ashley Miller, William Connell, Emily Wright, Alexander Thompson, Jacinta Holmes.

Affiliations below.

DOI: 10.1055/a-2201-6928

Please cite this article as: Tambakis G, Schildkraut T, Delaney I et al. Management of foreign body ingestion in adults: Time to STOP and rethink endoscopy. Endoscopy International Open 2023. doi: 10.1055/a-2201-6928

Conflict of Interest: The authors declare that they have no conflict of interest.

Abstract:

Background and study aims: Foreign body ingestion is a common cause for Emergency Department presentation. In adults, foreign body ingestion is more common in patients with underlying psychiatric comorbidity, the elderly, alcohol intoxication, and in prisoners. This study reviewed the management of patients presenting to a tertiary hospital with foreign body ingestion.

Patients and methods: A retrospective review of patients presenting with foreign body ingestion to a tertiary hospital in Melbourne, Victoria, was undertaken from January 2017 to December 2021. Data collected included patient demographics, type of foreign body, length of stay, imaging modalities, management strategies, and complications. High-risk ingestion was defined as sharp objects, length > 5 cm, diameter > 2.5 cm, button battery and/or magnet ingestion or esophageal as per international guidelines.

Results: A total of 157 presentations by 63 patients with foreign body ingestion occurred between 2017 and 2021 (50% male; median age 30 years). Of the patients, 56% had underlying psychiatric comorbidities. The majority of presentations occurred in prisoners (65%). The most commonly ingested objects were batteries (23%), alleged drug-containing balloons (17%), razor blades (16%), and miscellaneous (40%). High-risk ingestion occurred in approximately two-thirds of presentations. Conservative management was the most common approach in 55% of patients. Complications, defined as perforation, bowel obstruction or fistula formation, did not occur in this cohort despite more than half presenting with high-risk ingestions. Thirty-day re-presentation rates were high (31%) and that was most common in patients with intentional ingestion, underlying mental health disorders, and a documented history of self-harm.

Conclusions: Conservative management for patients presenting with recurrent high-risk foreign body ingestion was safe in appropriately selected cases. Re-presentation is common and poses significant challenges for health care providers.

Corresponding Author: MBBS (Hons) George Tambakis, St Vincent’s Hospital Melbourne Pty Ltd, Gastroenterology, 41 Victoria Parade, 3065 Fitzroy, Australia, gatambakis@gmail.com

Affiliations: George Tambakis, St Vincent’s Hospital Melbourne Pty Ltd, Gastroenterology, Fitzroy, Australia
Tamar Schildkraut, St Vincent’s Hospital Melbourne Pty Ltd, Gastroenterology, Fitzroy, Australia
Isabella Delaney, The University of Melbourne Medicine at St Vincent’s Hospital, School of Medicine, Fitzroy, Australia
…
Jacinta Holmes, St Vincent’s Hospital Melbourne Pty Ltd, Gastroenterology, Fitzroy, Australia
Introduction
Foreign body ingestion is a common cause for emergency department presentation. It is more common in the paediatric population compared to adults where the cause is usually accidental [1]. In adults, patients with underlying psychiatric comorbidity, the elderly, those with alcohol intoxication and prisoners account for the vast majority of foreign body ingestions [2, 3]. Foreign bodies vary widely with respect to material, shape, length, width, and number, all of which impact on the diagnostic and management approach. Imaging can assist to risk stratify patients based on the location, size and number of ingested objects as well as to exclude complication such as perforation [4]. The majority of ingested foreign bodies pass through the alimentary tract without complication. Endoscopic retrieval is recommended following ingestions with high risk of complication, or ingestion of foreign bodies that are unlikely to traverse the GI tract, and approximately 1% require surgery due to complications or failed endoscopy [4, 5, 6]. Repeated ingestion of foreign bodies by people with psychiatric comorbidity and/or prisoners may be associated with secondary gain making behavioural management challenging. Conservative management may break a cycle of repeated swallowing behaviour, and may be safe even after foreign body ingestion for which guidelines recommend endoscopic retrieval.

The aim of this study was to review the management of patients presenting to a single tertiary hospital with foreign body ingestion with comparison to best practice guidelines. We were specifically interested in outcomes among patients with repeated episodes of ingestion of foreign bodies who were managed conservatively
Materials and Methods
A retrospective review of all patients presenting with foreign body ingestion to a tertiary hospital in Melbourne, Victoria, was conducted over the 5-year period between January 2017 and December 2021. The hospital has a prison ward and is the referral centre for all prisoners requiring hospital admission in the state of Victoria. The hospitals on-call endoscopy roster was staffed by 31 endoscopists.

Inclusion & exclusion criteria
Adults aged 18 years and above presenting to the emergency department with foreign body ingestion were included. Patients presenting with clinical or radiological evidence of a perforated viscus, or a food bolus were excluded. Patients were identified through the hospital information system using the hospital coding for foreign body in the oesophagus (T18.1), stomach (T18.2), small intestine (T18.3), other parts of the alimentary tract (T18.8) and alimentary tract unspecified (T18.9).

Variables and outcomes
Demographic data was collected from electronic medical records and included age, gender and financial class (private, public, prisoner). Descriptive data including foreign body type, length and diameter, location on imaging and symptomatology was documented. Imaging modalities, management strategy, complications, length of stay and re-presentation rates were all recorded. High-risk foreign body ingestion was defined as any of the following: sharp objects, hard object length >5cm, diameter >2.5cm, button battery [4, 6]. Complications were defined as perforation, luminal obstruction or fistula formation.

Statistical Analysis
All statistical analysis was performed using SPSS V28. Continuous variables were assessed using mean values and compared using the student t test for parametric data and Mann-Whitney U test for non-parametric data. Categorical variables were assessed using median values and compared using the chi-square test.

Ethics Statement
St. Vincent’s Human Research Ethics Committee (HREC) granted approval to project number 2022/PID06406 in accordance with the research conforming to the National Health and Medical Research Council Act 1992 and the National Statement on Ethical Conduct in Human Research 2007 (updated July 2018).
Results
A total of 157 presentations by 63 patients with foreign body ingestion occurred between 2017 and 2021 (Figure 1). Fifty percent of patients were male; median age 30 years (IQR 25-30 years). The majority of presentations occurred in prisoners (n=104 presentations (65%), 36 patients, Table 1). Recurrent presentations were common (median = 3, range 1-30); recurrent presentation was more common in prisoners (36% vs. 20%, p=0.05). Two prison patients had a very high number of presentations (30 and 29 respectively), accounting for almost 40% of all presentations. 56% of patients had previous documentation of a mental health disorder, and all patients with recurrent presentations had an underlying mental health disorder. A previous history of intentional self-harm was documented in 44% of patients. Prisoners were younger and were more likely to be male (Table 1).

The most commonly ingested objects were batteries (23%), alleged drug-containing balloons (17%), razor blades (16%), magnets (4%), and miscellaneous (e.g. TV/radio parts, pens, cutlery) (40%) (Figure 2 & 3). Multiple different objects were ingested in 25 (16%) presentations. High-risk foreign body ingestion occurred in 103/157 (66%) presentations. Sharp objects were observed in 43 presentations, 52 presentations had an object length >5cm, 9 presentations had an object diameter >2.5cm, 11 presentations with foreign body located in the oesophagus and 49 presentations with magnets and or battery ingestion. High risk foreign body ingestion was less common in the prison population (58% vs 81%; p=0.003).

Urgent endoscopy was performed in 45% of presentations. All presentations with a foreign body lodged in the oesophagus (n = 11) were treated endoscopically. Patients managed endoscopically were more likely to present with high-risk ingestions (78% vs. 22%, p=0.002). 86% (59/69) of presentations undergoing endoscopy had successful retrieval of the foreign body. The foreign body passed into the small bowel by the time of endoscopy in 12% (8/69) of presentations and were not able to be retrieved. Two patients failed endoscopic management and proceeded to surgery. The first patient ingested 47 magnets, while the second ingested 500 coins. In both cases, endoscopic extraction was not possible and the patients required surgical gastrostomy. A third case involving a patient with recurrent presentations (n=5ingested a metal spoon (Figure 3) and was initially managed
conservatively. After the spoon failed to pass on serial imaging, endoscopic retrieval was attempted. At endoscopy, the spoon was lodged in the duodenal cap with erosion into the duodenal wall at both the proximal (D1) and distal (D2) ends, such that it could not be removed endoscopically. The patient proceeded to surgery.

55% were managed conservatively, defined as clinical observation without urgent endoscopy. Presentations with low-risk ingestions were more likely to be managed conservatively (70% vs 46%, p=0.002), while presentations with high-risk ingestions were more likely to be managed endoscopically (54% vs 30%, p=0.002) (Table 2).

Management did not differ between patients presenting for the first time and recurrent presenters (conservative management 51% vs 56%, p= 0.460). Management did not differ between first time and recurrent presenters with high-risk ingestion (conservative management 46% vs. 50%; p=0.694). However, in patients presenting with low-risk ingestions, recurrent presenters were more likely to be managed conservatively compared with first time presenters (conservative management 83% recurrent presentations vs. 54% first presentations; p=0.042).

As previously discussed, one case required surgical intervention for a metal spoon lodged in the duodenal cap with erosion into the duodenal wall. In the remainder of the cohort, no cases of perforation, luminal obstruction or fistula occurred. The median length of stay (LOS) for all foreign body ingestion presentations was 2 days (range 1-13 days) and did not differ between patients receiving conservative vs. endoscopic management (median 2.1 (range 1-13) days vs. 2.4 (range 1-7) days; p=0.408). However, in high-risk ingestions, conservative management had a shorter LOS compared with endoscopic management (median LOS 1 day vs 2 days; p=0.044).

30-day re-presentation with further foreign body ingestion was common (31%),

*High-risk ingestions managed conservatively*
47 presentations (24 patients) involved high-risk ingestions that were managed without endoscopy (Table 3). In this cohort, the most commonly ingested foreign bodies were razor blades (41%), batteries (14%) and drug containing balloons (9%). The most common reason for pursuing conservative management was that the object had passed the duodenum on imaging (n = 28, 60%) and endoscopy was felt to be futile. There were 4 presentations (9%) where there was a history provided of ingestion of a high-risk object, but radiology was negative and endoscopy was not performed. Endoscopy was refused by the patient for 3 presentations. Conservative management was pursued in 12 presentations (25%) (7 patients), all of which were recurrent presentations by patients in whom a behavioural strategy was being pursued.

Representation with further foreign body ingestion was common (34%) in high-risk ingestions managed conservatively. In more detail, 12 presentations (7 patients) had conservative management as part of a behavioural management strategy after recurrent presentations with foreign body ingestions. This was a multi-disciplinary plan developed to manage admitted secondary gain associated with hospital transfer, analgesia and sedation after multiple recurrent presentations in a small number of prisoners. The multi-disciplinary team included gastroenterologists, emergency physicians, psychiatrists, nurses and prison clinical staff. Conservative management was then pursued for foreign body ingestion in this subgroup, as long as the foreign body had passed the oesophagus, and was not associated with clinical suspicion of peritonism. No cases of perforation, luminal obstruction or fistula occurred in this behavioural management cohort. In 5/7 patients, all prisoners, there were no more ingestion episodes after the decision was made to pursue conservative management for all foreign body ingestion (median follow up 12 months). The remaining two patients continued to ingest foreign bodies, characterised by crescendo presentations with evidence of decreased frequency of presentation after institution of conservative management (supplementary figure 1 & 2). This included the patient who required surgical removal of the metal spoon.
Discussion

Foreign body ingestion was a common presentation to our health service over the period of review. Our health service currently holds the prison contract for the state of Victoria, and this likely contributed to the relatively high rates of foreign body ingestion, with two-thirds of presentations occurring in prisoners. People who present recurrently with foreign body ingestion are an uncommon, but very challenging patient population, especially among prisoners, and consume very high levels of healthcare resources. Prisoners may present with foreign body ingestion for secondary gain. However, intentions can vary widely and include suicidal ideation, self-mutilation, masochism, genuine accidental ingestions and drug trafficking [7, 8]. Psychiatric comorbidity is common among patients with recurrent ingestions [2, 3, 9, 10]. Recurrent ingestions may represent a self-harm behaviour; they may also involve secondary gain.

In this experience, two-thirds of presentations were classified as high-risk foreign body ingestions. Conservative management was the most common management approach, either because the foreign body had passed into the small bowel by the time of presentation to hospital, or as part of a multi-disciplinary behavioural management strategy after very recurrent presentations. Non-endoscopic management was safe. In the cohort of high-risk ingestions managed conservatively, one case failed conservative management and required surgery. The data suggest that in the appropriate clinical context, conservative management is safe in this cohort.

Our data also highlight that a significant minority of patients with low-risk foreign body ingestion proceeded to endoscopy. The data highlight the need for ongoing education and defined clinical pathways to manage patients with low-risk ingestions as well as high risk ingestions.

The data suggest that a multi-disciplinary behavioural management strategy that does not involve endoscopy may be safely developed for a subset of patients with recurrent foreign body ingestion and complex psychopathology (Figure 4). The one case in our experience where conservative management failed involved a metal spoon that lodged between the duodenal cap and the wall of the 2nd part of the duodenum. Recent data suggests that foreign body length is a key characteristic in predicting perforation or failure to progress, necessitating surgical intervention [11]. Other caveats to consider include patients presenting with symptoms of luminal obstruction, radiological evidence of foreign body in
the oesophagus, ingestion of multiple magnets and ingestion of button batteries. In such cases, endoscopy should be considered due to the risk of complications. The decision to consider a strategy of conservative management should involve multi-disciplinary discussion including gastroenterologists, emergency physicians, surgeons, psychiatrists, social workers and where relevant prison clinical staff.

Re-presentation with foreign body ingestion within 30 days in this challenging prisoner population was high. The prison population was particularly challenging with higher rates of re-presentation compared with the general population. Re-presentation was more common in patients with underlying psychiatric co-morbidity. The data highlight the complexity of this patient population and the need for holistic, multi-disciplinary management approaches.

There are a number of limitations to our study. Firstly, this is a single centre study, and the data may lack generalisability, particularly given our health service cares for the state’s prison population. Two patients accounted for over a third of all presentations, which may introduce selection bias and impact on generalisability. Although complications as a result of conservative management were rare, patients may have presented to other health services unbeknownst to our unit, although this is unlikely in the prison population. Furthermore, patients presenting to multiple health services can also affect re-presentation rates. Finally, patients with underlying mental illness may re-present to hospital with other forms of self-harm, and this was not able to be identified within the limits of this review.

**Conclusion**

Recurrent foreign body ingestion represents a challenging patient population and consumes high levels of healthcare resources. Patients with recurrent presentations, history of mental health disorder and suspected secondary gain, can be managed safely with a conservative, multidisciplinary approach in the appropriate clinical context.
References


### Table 1: Demographics prisoners vs. non-prisoners

<table>
<thead>
<tr>
<th></th>
<th>Prisoners</th>
<th>Non-prisoners</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>36</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>Number of presentations (%)</td>
<td>104 (66)</td>
<td>53 (34)</td>
<td></td>
</tr>
<tr>
<td>Number of presentations per patient (median IQR)</td>
<td>6.5 (1-22.25)</td>
<td>2 (1-5)</td>
<td>&lt;0.001&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Age (median, IQR)</td>
<td>28 (26-30)</td>
<td>33 (25-33)</td>
<td>&lt;0.001&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Gender n, (% patients)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>29 (81)</td>
<td>14 (52)</td>
<td>0.005&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Female</td>
<td>7 (19)</td>
<td>12 (44)</td>
<td></td>
</tr>
<tr>
<td>Non-binary</td>
<td>0 (0)</td>
<td>1 (4)</td>
<td></td>
</tr>
<tr>
<td>Psychiatric comorbidity (% patients)</td>
<td>23 (64)</td>
<td>13 (48)</td>
<td>0.165&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>History of self-harm (% patients)</td>
<td>18 (50)</td>
<td>12 (44)</td>
<td>0.492&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup> t-test  
<sup>b</sup> chi-square test
Table 2

<table>
<thead>
<tr>
<th>Table 2: Low-risk vs. High-risk foreign body ingestion</th>
<th>Low-risk</th>
<th>High-risk</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients</td>
<td>27</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td>Number of presentations (%)</td>
<td>54 (34)</td>
<td>103 (66)</td>
<td></td>
</tr>
<tr>
<td>Number of presentations per patient (median IQR)</td>
<td>4 (1-21)</td>
<td>6 (1-12.5)</td>
<td>0.121^a</td>
</tr>
<tr>
<td>Age (median, IQR)</td>
<td>26.5 (25-30)</td>
<td>28 (26-30)</td>
<td>0.733^a</td>
</tr>
<tr>
<td>Gender n, (% patients)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>18 (67)</td>
<td>24 (62)</td>
<td>0.153^b</td>
</tr>
<tr>
<td>Female</td>
<td>8 (30)</td>
<td>15 (38)</td>
<td></td>
</tr>
<tr>
<td>Non-binary</td>
<td>1 (3)</td>
<td>0 (0)</td>
<td></td>
</tr>
<tr>
<td>Psychiatric comorbidity (% patients)</td>
<td>17 (41)</td>
<td>28 (72)</td>
<td>0.037^b</td>
</tr>
<tr>
<td>Management (% presentations)</td>
<td></td>
<td></td>
<td>0.002^b</td>
</tr>
<tr>
<td>Conservative</td>
<td>38 (70)</td>
<td>47 (46)</td>
<td></td>
</tr>
<tr>
<td>Endoscopic</td>
<td>16 (30)</td>
<td>56 (54)</td>
<td></td>
</tr>
<tr>
<td>LOS (median, IQR)</td>
<td>2 (1-3)</td>
<td>1 (1-3)</td>
<td>0.044^a</td>
</tr>
<tr>
<td>Re-presentation (% presentations)</td>
<td>18 (33)</td>
<td>35 (34)</td>
<td>0.799^b</td>
</tr>
</tbody>
</table>

^a t-test  
^b chi-square test
<table>
<thead>
<tr>
<th><strong>Table 3</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Table 3: High risk foreign body ingestion managed conservatively</strong></td>
<td></td>
</tr>
<tr>
<td>Total number of high risk presentations</td>
<td>102</td>
</tr>
<tr>
<td>Number of presentations with high-risk ingestion managed conservatively (n)</td>
<td>47</td>
</tr>
<tr>
<td>Age (median, IQR)</td>
<td>29 (27-32.5)</td>
</tr>
<tr>
<td>Gender n, (%)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>23 (49%)</td>
</tr>
<tr>
<td>Female</td>
<td>24 (51%)</td>
</tr>
<tr>
<td>First presentation (n)</td>
<td>15</td>
</tr>
<tr>
<td>Sharp object (n)</td>
<td>27</td>
</tr>
<tr>
<td>Length &gt;5cm (n)</td>
<td>17</td>
</tr>
<tr>
<td>Diameter &gt;2.5cm (n)</td>
<td>2</td>
</tr>
<tr>
<td>Button battery and/or magnet (n)</td>
<td>8</td>
</tr>
<tr>
<td>Oesophageal location (n)</td>
<td>0</td>
</tr>
</tbody>
</table>
Legends

Table Legends
Table 1: Demographics prisoners vs. Non-prisoners
Table 2: Low-risk vs. High-risk foreign body ingestion
Table 3: High risk foreign body ingestion managed conservatively

Figure Legends
Figure 1: Flow chart of patients

Figure 2: A 27-year-old male prisoner ingested a 35cm television cable. He was managed conservatively and the object passed three weeks after ingestion.

Figure 3: A 20-year-old non-binary person, with recurrent presentations, ingested a metal spoon and as part of a behavioural management approach, was initially managed conservatively. After the spoon failed to pass on serial imaging, endoscopy was attempted. At endoscopy, the spoon was lodged in the duodenal cap with erosion into the duodenal wall at both ends, such that it could not be removed endoscopically. The patient proceeded to surgery.

Figure 4: Proposed management of recurrent high-risk foreign body ingestion
Supplementary Material

Complications

Two patients presented with clinical and radiological evidence of perforation. The first patient presented 72-hours after intentional ingestion of a sharp metal object with signs and symptoms consistent with an oesophageal perforation. Computed tomography (CT) of the chest and neck confirmed a contained oesophageal perforation with a metal foreign body within the lumen of the oesophagus. The second patient presented 72-hours after intentional ingestion of 70 plastic cutlery with signs and symptoms consistent with a perforated viscous. CT abdomen-pelvis demonstrated mid-small bowel circumferential thickening with associated fat stranding and intra-abdominal fluid, suggestive of a perforation. The patient proceeded to urgent gastroscopy, gastrostomy and laparotomy. Both patients were late presentations, with signs of perforation on arrival, and were not a complication of conservative management.

Management overview of two patients with recurrent presentations

Two prisoners accounted for 59 presentations, of which 37 presentations (58%) were categorised as high-risk. Conservative management was the most common management strategy employed (63% of presentations; 59% low risk vs. 41% high risk presentations) Conservative management was employed as part of a behavioural management strategy to reduce presentations and occurred during the 5th and 10th high-risk presentation respectively. Endoscopic management was performed for 22 presentations (14% low risk vs. 86% high risk presentations). Compared with the overall group, the patients shared a similar age (median 27 years vs. 30 years; p=0.127), rates of high-risk ingestion (64% vs. 70; p=0.103) and management strategy (conservative management 63% vs. 55%; p=0.085).
Presentation with foreign body ingestion (n=261)

Excluded (n=104)
- Perforated viscus at presentation (n=2)
- Food bolus (n=102)

Final cohort (n=157)
- 1st presentation (n=55)
- Recurrent presentation (n=102)

Low risk ingestion (n=54)
- Conservative management (n=38)
- Endoscopic management (n=16)

High risk ingestion (n=103)
- Conservative management (n=47)
- Endoscopic management (n=56)
High risk foreign body ingestion

1st presentation

Attempt endoscopic retrieval

Recurrence presentation

Recurrence presentation + History of mental health disorder + Suspected secondary gain

No

Consider endoscopic retrieval

Yes

Comprehensive multidisciplinary team case conference including: gastroenterology, surgery, emergency physicians, psychiatry, social work +/- prison healthcare staff (for incarcerated patients)

Any of the following present:
- FB located in the oesophagus
- FB length >6cm
- Clinical suspicion of perforation or obstruction

Yes

Consider endoscopic or surgical management

No

Conservative management with overnight observation

Discharge if clinically stable

Follow-up abdominal X-ray in 4 weeks