

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



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## 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.

## Introduction

Foreign body ingestion is a common cause for Emergency Department (ED) presentation. It is more common in the pediatric population compared with adults, in whom 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 affect the diagnostic and management approach. Imaging can assist with risk stratification of patients based on the location, size, and number of ingested objects as well as exclusion of complications 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 gastrointestinal tract, and approximately 1% of patients 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, which makes behavioral management challenging. Conservative management may break a cycle of repeated swallowing behavior, 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 in comparison with best practice guidelines. We were specifically interested in outcomes among patients with repeated episodes of ingestion of foreign bodies who were managed conservatively.

## Patients 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 center for all prisoners requiring hospital admission in the state of Victoria. The hospital's on-call endoscopy roster was staffed by 31 endoscopists.

### Inclusion and exclusion criteria

Adults aged 18 years and older presenting to the ED 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 esophagus (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 were 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 were 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 >5 cm, diameter >2.5 cm, button battery and/or magnet ingestion, and esophageal location [4, 6]. Complications were defined as perforation, luminal obstruction, or fistula formation.

### Statistical analysis

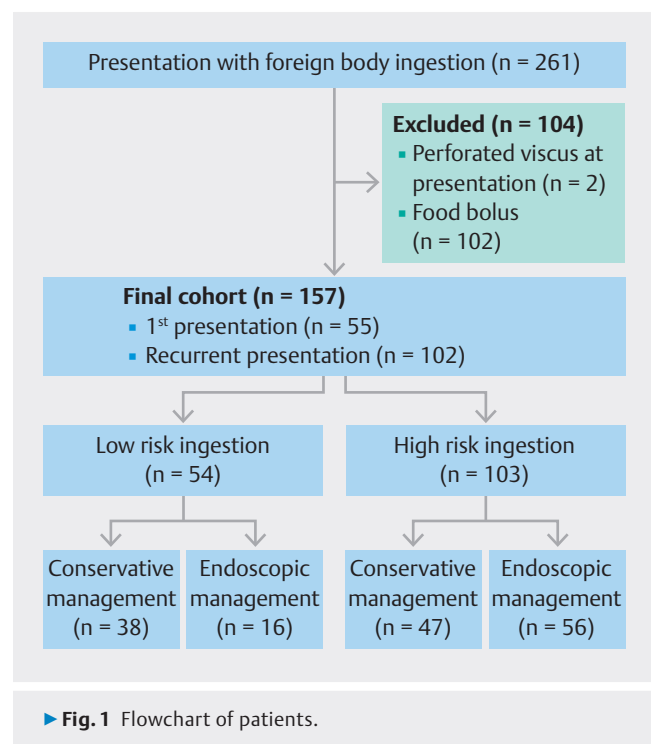
All statistical analysis was performed using SPSS V28. Continuous variables were assessed using mean values and compared using the student t-test for parametric data and Mann-Whitney U test for non-parametric data. Categorical variables were assessed using median values and compared using the Chi-square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

### Ethics statement

St. Vincent's Human Research Ethics Committee 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 (► Fig. 1). Fifty percent of patients were male; the median age 30 years (interquartile range [IQR] 25–30 years). The majority of presentations occurred in prisoners (n = 104 presentations [65%], 36 patients) (► Table 1). Recurrent presentations were common (median =



► **Table 1** Demographics of prisoners vs. non-prisoners.

	Prisoners	Non-prisoners	P value
Number of patients	36	27	
Number of presentations (%)	104 (66)	53 (34)	
Number of presentations per patient (median IQR)	6.5 (1–22.25)	2 (1–5)	<0.001*
Age (median, IQR)	28 (26–30)	33 (25–33)	<0.001*
Gender n, (% patients)			
Male	29 (81)	14 (52)	0.005†
Female	7 (19)	12 (44)	
Non-binary	0 (0)	1 (4)	
Psychiatric comorbidity (% patients)	23 (64)	13 (48)	0.165†
History of self-harm (% patients)	18 (50)	12 (44)	0.492†

\*t-test, †Chi-square test, IQR, interquartile range.

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. Of the patients, 56% 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%) (► **Fig. 2** and ► **Fig. 3**). Multiple different objects were ingested in 25 presentations (16%). High-risk foreign body ingestion occurred in 103 of 157 presentations (66%). Sharp objects were observed in 43 presentations, 52 presentations had an object length >5 cm, nine presentations had an object diameter >2.5 cm, 11 presentations with foreign body were located in the esophagus, and 49 presentations were 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 esophagus ( $n=11$ ) were treated endoscopically. Patients managed endoscopically were more likely to present with high-risk ingestions (78% vs. 22%,  $P=0.002$ ). Of presentations in patients undergoing endoscopy, 86% (59/69) had successful retrieval of the foreign body. The foreign bodies passed into the small bowel by the time of endoscopy in 12% of presentations (8/69) 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 of a patient with recurrent presentations ( $n=5$ ) involved ingestion of a metal



► **Fig. 2** A 27-year-old male prisoner ingested a 35-cm television cable. He was managed conservatively and the object passed 3 weeks after ingestion.

spoon (► **Fig. 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.



► **Fig. 3** A 20-year-old non-binary person with recurrent presentations ingested a metal spoon and, as part of a behavioral 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.

Of the cases, 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;  $P = 0.044$ ).

Thirty-day re-presentation with further foreign body ingestion was common (31%), with a median of three presentations per patient. Patients with intentional ingestion (34% vs. 0%;  $P = 0.021$ ), underlying mental health disorders (38% vs. 0%;  $P < 0.01$ ), and documented history of self-harm (36% vs. 20%;  $P = 0.05$ ) were more likely to re-present with foreign body ingestion.

### High-risk ingestions managed conservatively

Forty-seven 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 four presentations (9%) in which 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 three presentations. Conservative management was pursued in 12 presentations (25%) (7 patients), all of which were recurrent presentations by patients in whom a behavioral strategy was being pursued.

Re-presentation 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 behavioral management strategy after recurrent presentations with foreign body ingestions. This was a multidisciplinary 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 multidisciplinary 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 esophagus and was not associated with clinical suspicion of peritonitis. No cases of perforation, luminal obstruction, or fistula occurred in this behavioral management cohort. In five of seven 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, characterized by crescendo presentations with evidence of decreased frequency of presentation after institution of conservative management (**Supplementary Fig. 1** and **Supplementary Fig. 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 in-

► **Table 2** Low-risk vs. high-risk foreign body ingestion.

	Low-risk	High-risk	P value
Number of patients	27	39	
Number of presentations (%)	54 (34)	103 (66)	
Number of presentations per patient (median IQR)	4 (1–21)	6 (1–12.5)	0.121*
Age (median, IQR)	26.5 (25–30)	28 (26–30)	0.733*
Gender n, (% patients)			
Male	18 (67)	24 (62)	0.153†
Female	8 (30)	15 (38)	
Non-binary	1 (3)	0 (0)	
Psychiatric comorbidity (% patients)	17 (41)	28 (72)	0.037†
Management (% presentations)			0.002†
Conservative	38 (70)	47 (46)	
Endoscopic	16 (30)	56 (54)	
LOS (median, IQR)	2 (1–3)	1 (1–3)	0.044*
Re-presentation (% presentations)	18 (33)	35 (34)	0.799†

\*t-test., †Chi-square test, IQR, interquartile range; LOS, length of stay.

gestion 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 behavior; 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 multidisciplinary behavioral management strategy after very frequent re-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.

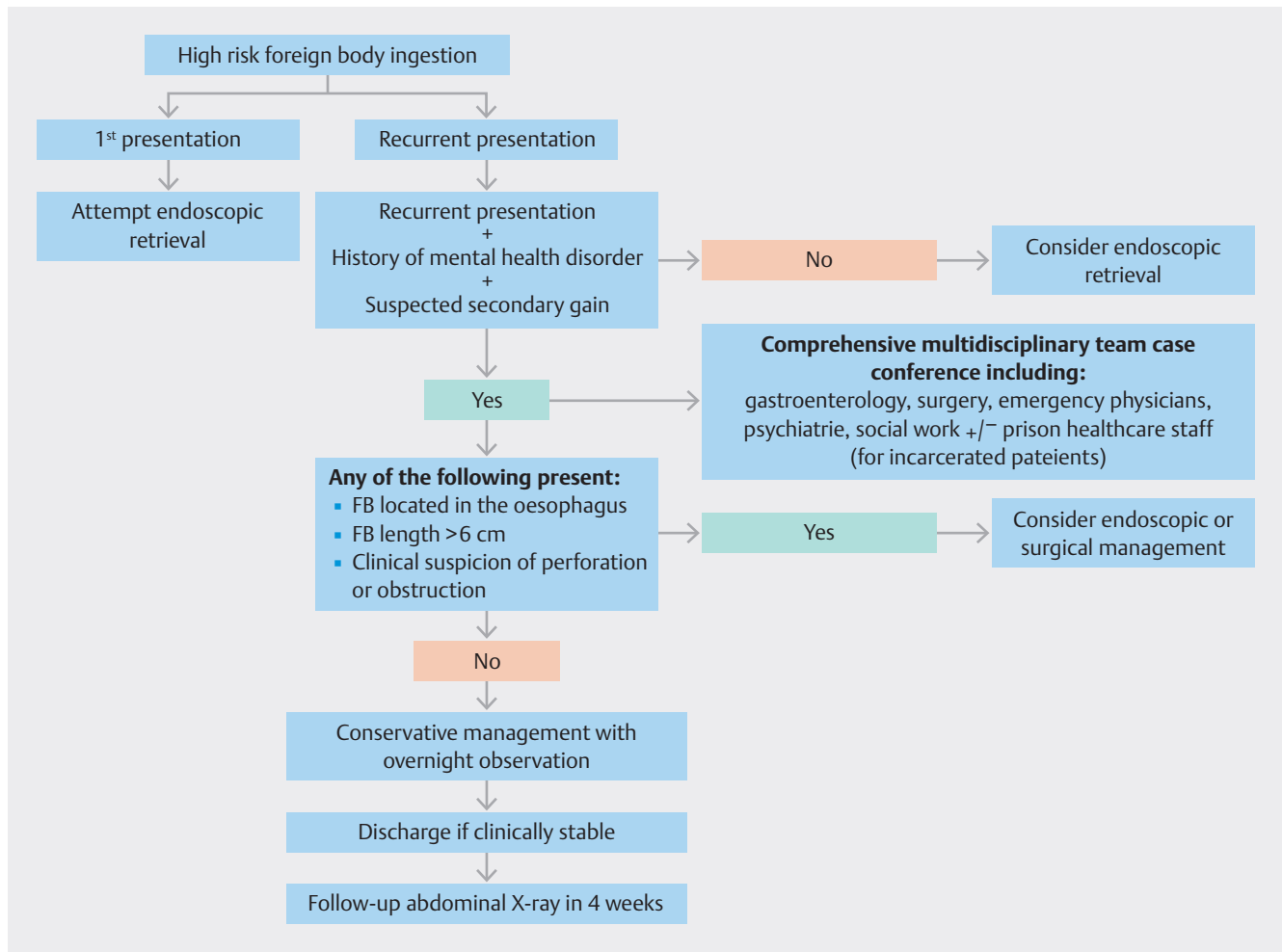
The data suggest that a multidisciplinary behavioral management strategy that does not involve endoscopy may be safely developed for a subset of patients with recurrent foreign body ingestion and complex psychopathology (► Fig. 4). The one case in our experience in which conservative management

► **Table 3** High-risk foreign body ingestion managed conservatively.

Total number of high-risk presentations	102
Number of presentations with high-risk ingestion managed conservatively (n)	47
Age (median, IQR)	29 (27–32.5)
Gender n, (%)	
Male	23 (49%)
Female	24 (51%)
First presentation (n)	15
Sharp object (n)	27
Length >5 cm (n)	17
Diameter >2.5 cm (n)	2
Button battery and/or magnet (n)	8
Esophageal location (n)	0

IQR, interquartile range.

failed involved a metal spoon that lodged between the duodenal cap and the wall of the second part of the duodenum. Recent data suggest 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 esophagus, ingestion of multiple magnets, and ingestion of button batteries. In such cases, endoscopy should be considered due to the risk of com-



► **Fig. 4** Proposed management of recurrent high-risk foreign body ingestion.

plications. The decision to consider a strategy of conservative management should involve multidisciplinary discussion including gastroenterologists, emergency physicians, surgeons, psychiatrists, social workers, and where relevant, prison clinical staff.

The rate of 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 comorbidity. The data highlight the complexity of this patient population and the need for holistic, multidisciplinary management approaches.

There are a number of limitations to our study. First, this was a single-center study, and the data may lack generalisability, particularly given our health service cares for the state's prison population. Two patients accounted for over one-third of all presentations, which may introduce selection bias and affect generalizability. 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 pre-

senting 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 could not be identified within the limits of this review.

## Conclusions

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

## Conflict of Interest

The authors declare that they have no conflict of interest.

## References

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- [1] Cevik M, Gókdemir MT, Boleken ME et al. The characteristics and outcomes of foreign body ingestion and aspiration in children due to lodged foreign body in the aerodigestive tract. *Pediatr Emerg Care* 2013; 29: 53–57 doi:10.1097/PEC.0b013e31827b5374
- [2] Poynter BA, Hunter JJ, Coverdale JH et al. Hard to swallow: a systematic review of deliberate foreign body ingestion. *Gen Hosp Psychiatry* 2011; 33: 518–524 doi:10.1016/j.genhosppsych.2011.06.011
- [3] Volpi A, Laforgia R, Lozito C et al. Ingestion of foreign bodies among prisoners: a ten years retrospective study at University Hospital of Southern Italy. *G Chir* 2017; 38: 80–83
- [4] Birk M, Bauerfeind P, Deprez PH et al. Removal of foreign bodies in the upper gastrointestinal tract in adults: European Society of Gastrointestinal Endoscopy (ESGE) Clinical Guideline. *Endoscopy* 2016; 48: 489–496 doi:10.1055/s-0042-100456
- [5] Ambe P, Weber SA, Schauer M et al. Swallowed foreign bodies in adults. *Dtsch Arztebl Int* 2012; 109: 869–875 doi:10.3238/arztebl.2012.0869
- [6] ASGE Standards of Practice Committee. Ikenberry SO, Kue TL et al. Management of ingested foreign bodies and food impactions. *Gastrointest Endosc* 2011; 73: 1085–1091
- [7] Telford JJ. Management of ingested foreign bodies. *Can J Gastroenterol* 2005; 19: 599–601 doi:10.1155/2005/516195
- [8] Bisharat M, O'Donnell ME, Gibson N et al. Foreign body ingestion in prisoners – the Belfast experience. *Ulster Med J* 2008; 77: 110–114
- [9] Palta R, Sahota A, Bemarki A et al. Foreign-body ingestion: characteristics and outcomes in a lower socioeconomic population with predominantly intentional ingestion. *Gastrointest Endosc* 2009; 69: 426–433
- [10] Fung BM, Sweetser S, Wong Kee Song LM et al. Foreign object ingestion and esophageal food impaction: An update and review on endoscopic management. *World J Gastrointest Endosc* 2019; 11: 174–192
- [11] Gallagher S, Ghafil C, Wu Y et al. Predictors for operative intervention in adult patients with foreign body ingestion. *J Gastroenterol* 2023; 164: S1507–S1508