Case Report

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Removing 216 sharp metal foreign objects from the digestive tract of a 30-year-old male: case report

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Introduction and importance: Foreign body (FB) ingestion and its complications are abundant in emergency departments. This potentially severe problem had a peak incidence in children aged 6 months to 6 years. Intentional adult cases are voluntary and more common in prisoners and people with psychiatric problems. However, most patients (90%) remain asymptomatic, and these pass through the body spontaneously.

Case presentation: The authors report a case of surgically removing plenteous sharp-pointed metallic foreign bodies ingested by a young male deaf-mute bipolar schizoaffective patient from his stomach, intestine, and rectum. Furthermore, the authors have reviewed the available literature for similar cases.

Clinical discussion: Less than 1% of patients need surgical removal, 10–20% need to be taken out endoscopically, and the remaining pass spontaneously. Plain radiography is the most available imaging modality detecting the number, material, and estimated place of the alimentary canal trapped.

Conclusion: For the risk of perforation, migration, and peritonitis, surgery is indicated in such situations.

Keywords: bezoars, bipolar schizoaffective disorder, case report, foreign bodies, laparotomy

Introduction

Confronting so many sharp-pointed metal foreign bodies (FBs) rarely occurs for medical care providers. However, a non-operative approach for such multiple and sharp objects could be more practical. The wait-and-watch policy is typically pursued in cases of few, non-sharp, with low risk of chemical spillage as for batteries, which have passed through the duodenum so that it is thought that such objects can pass spontaneously[1]. Otherwise, surgical exploration is indicated in the probability of digestive tract perforation or obstruction at any level[2]. If nondigested or semi-digested foreign materials conglomerate before an aperture, they are called Bezoars, primarily seen in the stomach[3]. Bezoars have many types related to their nature. Metallic types are the least frequent, usually found among those having psychiatric disorders[4]. Having reported a case of metallic FBs ingestion in a young man suffering from psychiatric problems, we also reviewed 22 similar cases reported in the medical literature since 1977. For this, we extracted all adult cases over 19 who had ingested multiple harmful objects since 46 years ago. This work conforms to SCARE 2020 criteria[5].

HIGHLIGHTS

- Voluntary sharp-pointed foreign body ingestions are mostly seen in adults for secondary gain.
- Plain abdominal X-rays is an available, providing acceptable details.
- Wait-and-watch management is conservative, however, preferred in potentially non-dangerous objects.
- Even in the absence of perforation or peritonitis, surgery is highly recommended in cases of harmful materials.
- Since the colon is not prepared during emergency surgery, the surgeon can gracefully milk the foreign bodies to the rectum.

Case presentation

The deaf-mute 30-year-old Iranian patient of low socioeconomic status with multiple histories of suicidal attempts was presented to the emergency department by his parents for a fruit knife sunken into his mid-chest. He was calm, with no ongoing bleeding or respiratory distress. On examination, there were no absent or decreased sounds in his hemithoraces. Fortunately, the sternum had prevented the penetration of the knife tip. The secondary trauma survey was also apparently normal. There were no new signs of self-harming wounds or neurologic deficits. In his abdominal examination, no distension or rebound tenderness was found, and the digital rectal exam was normal. He had not experienced haematemesis, rectorrhagia, or bowel obstructive symptoms. An upright plain chest and an abdominal X-ray revealed countless metal nails conglomerated into the stomach and scattered among intestines without subdiaphragmatic free

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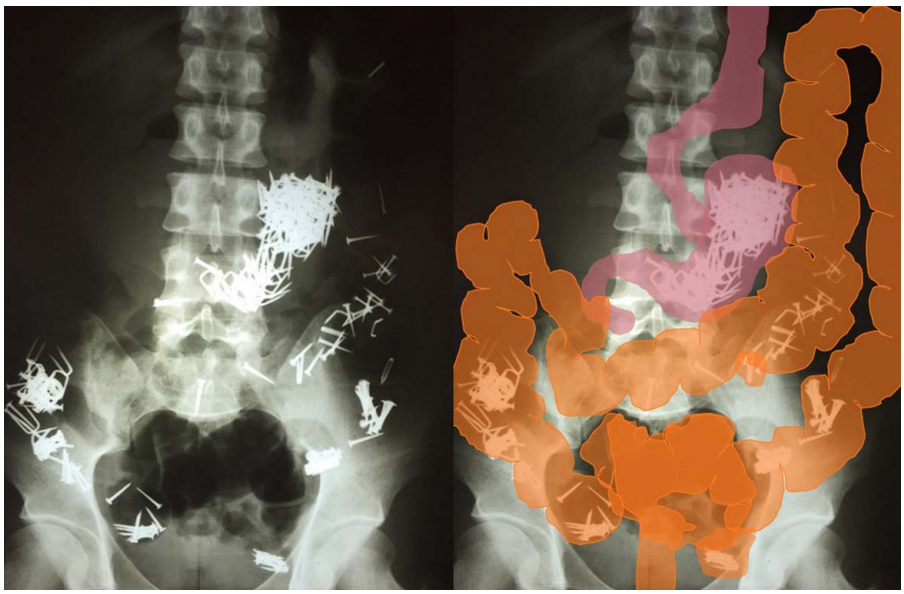

Figure 1. Initial plain abdominal X-ray revealing numerous metallic sharp-pointed nails and screws scattered the allimentary canal, some had taken the shape of the stomach (Fundus and antrum) making a large bezoar, some conglomerated into the, transverse, dicending, and sigmoid colon.

gas or air-fluid levels [Fig. 1]. The blood cell counting, biochemical, and gas analyses were all in normal ranges. He confessed finally with sign language that he had ingested plenty of nails and screws nine days prior. We achieved no information regarding whether some of them had passed spontaneously in this period or what the pattern of ingestion was. We received no

Figure 2. Gastrotomy and removing the nails and screws trapped into the antrom.

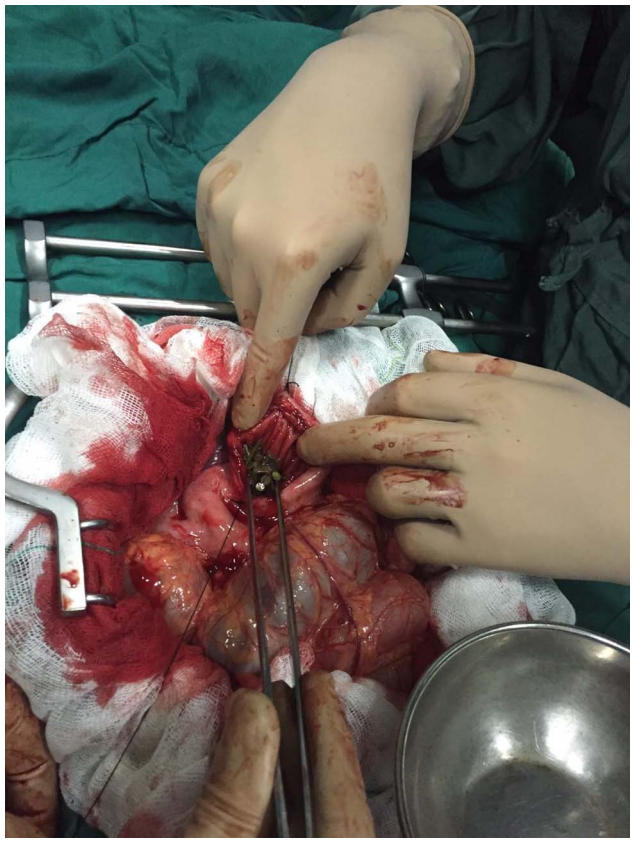

Figure 3. Jejunotomy and taking out the remained FBs. FB, foreign body.

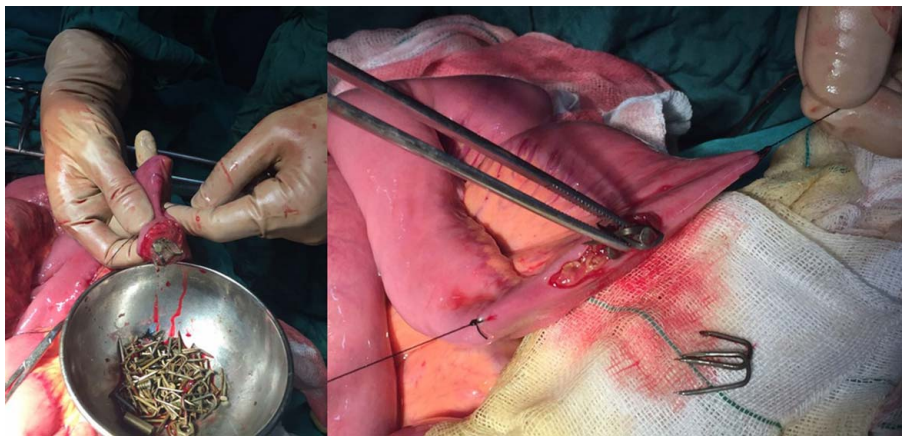

Figure 4. Making incisions in segments of the illeum, guiding the FBs toward the incision by milking method in a gentle style. FB, foreign body.

answer whether he had ingested the whole of things once together or gradually during those 9 days.

The surgeon scheduled laparotomy for the diversity of FBs, their sharpness, and the impossibility of excretion. After the midline incision, a gastrotomy was performed, and objects inside the stomach were brought out [Fig. 2]. In the next step, by Kocherization, the duodenum was fully exposed, and the nails and screws were guided warily to the jejunum using fingers. Some others were removed through enterotomies, one in the jejunum and one another in the distal ileum [Fig. 3]. Making sure that there is no FB in the stomach and small intestine, residual objects by entering quantities of normal saline into the colon from illeal incision and milking were directed to the rectum through which the rest of them were extracted from the anus in the lithotomy position. Finally, 216 metallic ingested materials were counted, including shoe nails, bolts, nuts, and a thin wire [Fig. 4]. The bedside X-ray in the operating room was clear [Fig. 5]. The enteral nutrition was started on the fifth day of surgery in the surgical ICU and then admitted to the psychiatric ward of the same hospital. He then followed physically and mentally from the point of self-mutilation that was uneventful. The research registry unique code of this work is researchregistry8612[6].

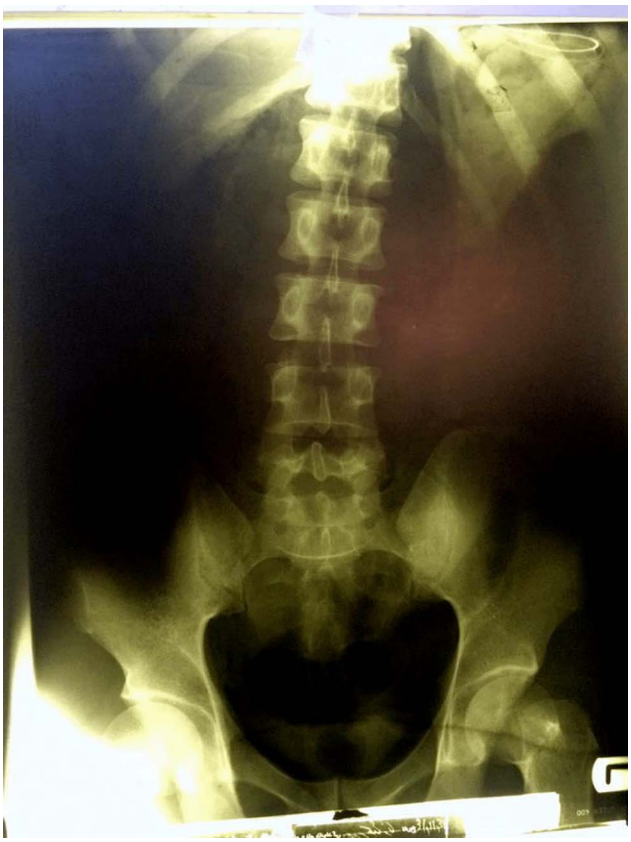

Figure 5. Intraoperative portable abdominal radiography showing no remained FBs. FB, foreign body.

Discussion

FB ingestion, either voluntary or non-voluntary, is not a rare phenomenon for a surgeon or primary care physician, especially among children. It also occurs iatrogenic or for individual satisfaction[7]. Adults ingest meat, fish bones, dentures, nails, and screws[8]. Among them, voluntary foreign material swallowing are observed in those suffering from alcoholism, psychiatric disorders, or learning disability, and especially repeatedly who follow secondary gains involving prisoners attempting to leave their prisons[9]. Schizophrenia and other psychotic problems were the commonest mental problems reported. Only three have pointed to pure mood problems: two with depression[10,11] and one with bipolar spectrum disorders[12]. Past digestive tract surgical histories or congenital malformations like strictures along the alimentary tract, diverticula, malignancy and achalasia, reduced sensitivity of oropharyngeal mucosa and neurological deficits makes them vulnerable to obstruction or perforation complications[13,14].

A study comparing the clinical presentations of ingested FBs requiring operative and non-operative management resulted that even though most FBs spontaneously ward off the GI tract, up to 10–20% may need endoscopic removal, and less than 1% indicates surgical intervention[15]. European Society of Gastrointestinal Endoscopy (ESGE), via a review article about FBs trapped in the upper gastrointestinal (GI); however, with low-quality proof, proposed a physical examination focused on the patient's general condition and signs of any

Table 1

Previously reported cases of adult multiple mettalic objects ingestion

References	Age and sex	Clinical presentation	Region of trapping	Therapeutic interventions	Complications	Psychiatric history	Follow-up
Devanesan *et al.* 1976[20]	38/M	Abdominal pain	Innumerable coins, chains, keys, silverware, and broken thermometers, a few coins were found in the distal ileum	Gastrotomy, Milking the 37 illeal FB beyond the ileocecal valve into the colon	Bowel obstruction	Schizophrenia	ND
Jacob *et al.* 1990[35]	46/M	Acute massive swollen abdomen and dyspnoea	Two screws pointed the two main bronchial trunks and a total of 287 metallic whether sharp-pointed or blunt FBs.	CPR, Autopsy	Two episodes of cardiopulmonary arrests	Depressive schizoid psychoses	Death
Kumar *et al.* 2001[36]	54/M	Severe anaemia and leukopenia	A large mass of coins measuring 20 × 2.0 cm into the sigmoid colon, a few scattered among the antrum and ileum	Autopsy	Chronic hyponatremia, hypertension, AAA, left hip prosthesis, long-standing history of "pica syndrome" Bowel perforation and multi organ failure	Paranoid schizophrenia, psychogenic polydipsia	Death
Hermosa *et al.* 2004[21]	35/F	Repeated multiple harmful FBs ingestion and self-harm over the 15 years	A sewing needle stuck in the hypopharynx, 2 sewing needles, crochet hook, 1 ball of cellulose and 1 coin scattered all over the digestive tract	Laryngoscopy, EGD, Rectal expulsion, Gastrotomy , Enterotomy	Small intestinal perforation	Borderline personality disorder, Defective psychosis	ND
Kaplan *et al.* 2005[22]	36/M	Abdominal pain	Several metal nails, necklaces, and coins in the stomach causing bezoar.	Gastrotomy	Giant gastric ulcer on the anterior wall.	Schizophrenia	U
Ma *et al.* 2006[23]	67/M	Fever	9 Swing needles, one at the larynx, 8 scattered throughout the small intestine, ascending, transverse, and sigmoid colon	Laryngoscopy, Gastrotomy, Enterotomy, Colotomy and by mini C-arm fluoroscopy	Peritonitis after 2 days of observation	Schizophrenia	U
Fry *et al.* 2007[24]	38/M	Swollen testicles, Low-grade fever, Mild nausea	One 6-cm trapped into the caecum, another one into the sigmoid colon	Colotomy, Diverting colostomy, Pelvic and scrotal abscess drainage,	Right epididymitis, Hydrocele, and abscess, Right inguinal hernia, Orchitis	Schizophrenia	ND
Kariholu *et al.* 2008[10]	20/F	No symptoms	A bunch of sharp-ended glass bangles ranging from 2–6 cm occupying almost 50% of the stomach volume	6 bangle pieces were removed by EGD, Gastrotomy One stuck in the caecum that was removed via appendicular stump, Two enterotomies	U	Depressive disorder and a possibility of pica	U
Prieto-Aldape *et al.* 2009[25]	34/M	Abdominal pain and distention, Vomiting of gastric and metal fragment contents, History of metallic FBs removal two years earlier	389 objects stuck including nails, copper wires, stones, plastic rosary beads and the remains of partially digested food	Gastrotomy	ND	Long term epilepsy and schizophrenia	U

Yasin *et al.* 2009[29]	22/M	abdominal pain, vomiting,	several instruments, blades, batteries and even gold jewellery in the stomach	Gastrotomy	Pulmonary TB Posterior wall gastric ulcer	chronic psychosis–persistent delusional disorder	U
Tammana *et al.* 2012[37]	26/M	Abdominal pain, nausea and vomiting, productive cough & fever	shower curtain hooks into the stomach, one in the right bronchus, one another in the caecum	Removing the five ones via EGD, one with rigid bronchoscopy and the last one by colonoscopy	ND	Bipolar schizoaffective disorder	ND
Kumar *et al.*2013[30]	24/M	Abdominal pain, Melena, Passing metal fragments in stools for the last 1 year	A total of 27 nails of varying in size from 5 to 15 cm	Gastrotomy	U	Maniac-depressive psychosis	U
Bhatti *et al.*2014[11]	25/F	Abdominal pain, vomiting, melena, fullness sensation	Several metal objects including needles and shaving blades making gastric bezoar, scattered needles in the duodenum and mesentery of the small bowel	EGD for few of FBs, Gastrotomy for the rest, One needle in the lesser sac and one in Jejunal mesentery were deeply stuck and could not be removed.	Some of them stuck in the stomach wall	Major depressive disorder with suicidal tendency	U
Upadhyay *et al.*2015[34]	20/M	Gross haematuria and colicky right loin pain	Migrated three linear metallic FBs occupying the right renal pelvis, partly extending into the adjacent renal parenchyma	Retrograde nephrostomy using Lawson's technique	ND	ND	U
Atayan *et al.* 2016[18]	21/M	Abdominal pain, vomiting, and inability to swallow for a week	A plum at the level of the diaphragmatic hiatus, 12 lighters of multiple sizes in the gastric corpus and antrum.	EGD: Failed, Surgery	Gastric mucosa penetration	Schizophrenia ID	ND
Chahine *et al.*2017[26]	52/M	Fever and nausea	More than 50 metallic nails, clips, and blades	Gastrotomy and many enterotomies	Generalised peritonitis due to gastric perforation	Schizophrenia	U
Vats *et al.*2017[13]	20/F	Abdominal pain	Multiple metallic sharp-pointed nails, A cup full (~100 ml) of toilet cleaner (corrosive acid)	Conservative care with laxative intake and repeated imaging until the whole of FBs were passed, Billroth II gastrojejunostomy for the later GOO	Pyloric stenosis	ND	U
Emamhadi *et al.* 2018[38]	44/M	Abdominal pain and nausea	64 pieces of metal bolts, coins, and fittings, measured at 3685 g, scattered among the stomach, small intestine, and colon.	Autopsy	Deep erosions in the gastric wall, Duodenal perforation, Peritonitis	ND	Death
Dorado *et al.*2018[19]	44/M	Melena,	Gastric and caecal metallic bezoar by ingesting 238 screws and nails	Failed EGD, Gastrotomy, Colotomy	ND	ID	U
Mohammed 2020[27]	37/F	Abdominal pain & nausea	Multiple metallic nails in the upper abdomen and the right lower abdomen	Gastrotomy, Making incision on the caecum	Perforation of the gastric wall	Mental abnormality	U
Potti *et al.* 2021[12]	60/M	Abdominal pain, Nausea, Fatigue,	a 3-cm linear foreign body penetrating the anterior wall of the aorta making pseudoaneurysm	ECMO via femoral artery, Laparotomy, proximal and distal controlling the aorta then removal the FB, Controlled	Gastrohepatic intra-abdominal abscess, Perisplenic abscesses, Two liver abscesses, Occlusion	Bipolar disorder	U

Table 1

(Continued)

References	Age and sex	Clinical presentation	Region of trapping	Therapeutic interventions	Complications	Psychiatric history	Follow-up
		One episode of rectorrhagia, fever		EGD	of the portal and splenic veins,		
				Intra-abdominal abscesses drainage	Splenic infarcts Mycotic aneurysm Endocarditis		
			A total of 52 metallic nails from the stomach and 14 ones extracted from the 100 cm proximal to the ileocecal junction	Gastrotomy, Enterotomy Gastrotomy Enterotomy		ID, Schizophrenia,	U
AlMuhsin *et al.* 2021[28]	29/M	No symptoms			U		
		Fruit knife sunken into his mid-chest	216 metallic shoe nails, bolts and nuts, and a thin wire	Milking illeal FBs toward the colon		Bipolar schizoaffective disorder	
Our case	30/M				U		U

AAA, abdominal aortic aneurysm; CPR, cardiopulmonary resuscitation; ECMO, extracorporeal membrane oxygenation; EGD, esophagogastroduodenoscopy; F, female; FB, foreign body; GOO, gastric outlet obstruction; ID, intellectual disability; M, male; ND, non-declared; TB, tuberculosis; U, unremarkable.

complication. This society also indicates computed tomography scans in only critical situations such as perforation or obstruction and not to order barium swallow for the risk of aspiration and blurring the endoscopic visualisation[16]. Our study may claim that patients, who ingested multiple injurious FBs, will not benefit from minimally invasive GI endoscopic intervention except one[17]. However, in two of them, it entirely failed[18,19] and in another two, could only remove a portion of things[10,11]. The rest of the literature initially adopted gastrotomy with enterotomy procedures or while non-invasive management had failed[10,11,18–33]. In the two exceptional cases, retrospective nephrostomy helped remove the FBs since they had migrated from the GI tract to the right renal pelvis and parenchyma[34]. On the other, the patient had vomited containing a portion of ingested materials[25]. Enterocutaneous fistula was another notable complication had been occurred in middle-aged female with multiple sewing needles ingestion. Table 1 has ordered the 28 cases by the year reported clinical presentation(s), the region of FBs' trapping, management, complications, and psychiatric diagnoses. Some evidence shows that once the object, even sharp-point ones, passes beyond the oesophagus, it can mostly pass the entire tract and defecate without further complications[15,39–41]. However, they have not provided information in cases of multiple object ingestion. Among ours, in only two cases, endoscopy successfully removed FBs. One patient had ingested metallic curtain hooks, primarily trapped in the stomach, one aspirated to the right bronchus, and another reached the colon, that diagnostic and therapeutic upper endoscopy, rigid bronchoscopy, and colonoscopy had solved the problem[37]. Of those, also one required Billroth II gastrojejunostomy later for gastric outlet obstruction. However, it cannot be considered a pure FBs ingestion complication since that patient had also swallowed a cup full of corrosive acid[13]. The large, long, sharp, or irregular borders the increased risk of complications.

In case of suspicion of metal FB ingestion in the absence of signs and symptoms mentioned above, plain radiographies of anteroposterior and lateral views, chest, and abdomen suffice[42]. Even though computed tomography scan provides accurate views of FBs to detect them better[43], plain radiographies remain the primary imaging modalities. The nature of ingested FBs primarily predicted by silhouette, size, contour, and radiodensity. The art of physicians is to determine where these objects are placed along the digestive tract. For this, radiographies that cover the whole digestive tract from the oral cavity to the anus are required[7].

Furthermore, the evidence of perforation and obstruction is assessed. There is almost always a delay in diagnosing FBs ingestion, which becomes apparent when shifts are symptomatic[44]. Swelling, erythema, tenderness, and crepitus in the neck region, pain, tenderness and guarding in the abdomen represent perforation in oropharyngeal or proximal oesophagus and gastric or intestinal perforation consequently. In these situations, running after an endoscopy consultation is not allowed and urges immediate operation[45]. The most common symptoms were abdominal pain and nausea followed by vomiting, lower GI bleeding and fever. They are summarised in Table 2. The three patients expired before surgery. One probably for bronchial trunks occlusion after aspiration of FBs[35], another for his underlying diseases such as hypertension, chronic hyponatremia, and abdominal aortic aneurysm[36], and the last one for

Table 2

The frequency of each presentation symptom(s)

Symptoms	Frequency
Abdominal pain	11
Nausea	6
Fever	5
Vomiting	4
Melena and rectorrhagia	4
Abdominal distention	2
Fullness sensation	2
No symptoms	1
Dyspnoea	1
Bicytopenia	1
Cough	1
Haematuria and loin pain	1
Fatigue	1

his long delay referring to the hospital[38]. FBs larger than 2 cm cannot pass through the pyloric canal or ileocecal valve, and ones longer than 5 cm are almost trapped in the duodenum[1]. Erosion, ulceration, and even perforation of the intestinal wall by sharply pointed can cause critical conditions involving extraluminal or extra-abdominal migration[1,46]. Preventing path finding heavy bacterial load to the sterile peritoneal space, colostomy and its complications, the surgeon decided not to colotomy. Taking out the rest of the objects trapped in the distal segments, he gracefully milked the whole colon with the help of saline pushing via illeal incision while the patient was set in the lithotomy position. We found this technique in the oldest case reported in the literature that met our criteria[20].

Conclusion

However rare, in such plentiful sharp-pointed object ingestion, surgical intervention necessitates particularly in critical injuries, perforation at any segment of the GI tract, or peritonitis. It will be the surgeon's art to make fewer incisions and abstain from colotomy while there is no previous colon preparation.

Ethical approval

This issue has been raised and approved by the ethics committee of Ardabil University of Medical Sciences, Iran.

Consent

The consent in which the patient has allowed to use medical records and therapeutic information is attached to the medical document. The authors testify the patient privacy maintenance. On request, a copy of the written consent is available for review by the Editor-in-Chief of this Journal. The authors ensure that all the images/figures/photos are suitably anonymised with no patient information or means of identifying the patient.

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None.

Author contribution

A.R. is the chief surgeon operated the patient, proposed reporting this case, and in the role of supervision. A.S.K. prepared the manuscript, designed as "Case Report and Review of the Literature", and prepared the images and radiographs. He is the corresponding author. S.M. was the surgeon who provide primary medical care and attend the operation. F.N., from the surgical team, performed grammar revision.

Conflicts of interest disclosure

The authors declare that they have no conflicts of interest.

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