



Case report

Duodenal dislodgement of an ingested sharp foreign body by mucosal unfolding “Gilan maneuver”; A novel surgical approach

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ABSTRACT

Introduction and importance: Foreign body (FB) ingestion is a common challenge for pediatric health care providers globally. Although endoscopic approach for FB extraction is recommended, surgery remains life giving specifically in developing countries. We presented a novel surgical approach called ‘Gilan maneuver’ for removal of FB which lodged in duodenal loop.

Case presentation: An eighteen months old male infant referred to emergency department while he lied on his mother's arm. Parents stated their son has ingested a sharp metallic pointy thick needle which applies for cattle injection. On examination mid epigastric tenderness was remarkable. Laboratory finding was normal. Plain thoracoabdominal radiologic study confirmed the diagnosis. Patient underwent explorative laparotomy and the needle was removed through ‘Gilan maneuver’ in which mucosal unfolding of duodenal loop facilitated dislodgement of the FB and it was extracted on the jejunal side.

Clinical discussion: Duodenal lodge of sharp FB is rare and could be masked by gastric deposition diagnosis. Mucosal folding, narrow luminal diameter, retroperitoneal adherence, and hard surgical anatomy of the duodenal loop make both sharp and large FBs spontaneous dislodgement and favorable surgical outcome relatively unanticipated.

Conclusion: Despite rarity of duodenal deposition of FB it is possible and could be harmful due to adjacent non-forgiving organs. Although endoscopic extraction of FB is generally recommended in guidelines, surgical approach is safe and could be considered.

1. Introduction

Foreign body (FB) ingestion in pediatric population is a common challenge for surgical teams all around the world [1–3]. The incidence of ingesting FB has raised recently. Involved cases increased near the double from 2005 to 2017. Concurrently need to perform emergent intervention raised from 0.8% to 1.3% in recent decade [1,3]. According to previous studies, it seems the most susceptible age for FB ingestion is from 6 months old to 3 years although data is variable in regard of the upper limit [4–7]. Symptoms could be varied from no complaint to life threatening findings of shock. It is directly contributed to size, shape, and nature of the FB and also anatomical characteristic of the patient and region of FB lodgment. However, data manifested being male, psychotic problems like attention deficit hyperactivity disorder, younger parents with lower educational level, inadequate supervision of child,

living in rural areas, congenital anatomical anomalies, and previous abdominal surgery were risk factors for ingesting of FB [8,9]. Lodgment of FB mostly occurs in upper gastrointestinal tract, in 75–85% of all cases. Although there is no consensus on whether esophagus or stomach is the commonest site for FB lodgment, duodenal loop is considered as one of the rare anatomical area for FB to deposit [4,8–10]. Plain radiologic x-ray study is the first line for investigation. It could illustrate FB in up to 93% of all cases [10]. Coin is the mostly ingested FB worldwide followed by batteries, foodstuff, fish bone, piece of toys, and lastly the needles [6,7,11]. Treatment approach is highly referred to patient's clinical condition. There are available guidelines like the ESPGHAN, NASPGHAN, ASGE, and CMU to manage a kid who has ingested or aspirated a FB [9]. Although primary interventional consideration in all these guidelines is focused on using of endoscopic technique, surgery remains the unique animator for critical condition.

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In this report, surgical management with a novel technique of an ingested thick needle FB is presented which was eaten by an 18 months old boy and lodged in duodenal loop. Current presentation is written in lined with the SCARE 2020 criteria [12].

2. Case presentation

An eighteen months old infant referred to our hospital emergency ward while he lied on his mother's arms and cried. Parents were agitated and stated that their son ingested a metallic thick needle which was used for cattle injection. It was about 30 min passed from the time of ingestion when they arrived to hospital and parents claimed of his nausea and abdominal pain. Any positive drug, family, and psychosocial history were denied by child's parents. On examination, the patient was hemodynamically stable, feared, crying, and agitated. Oral cavity observation, neck and chest physical examinations were unremarkable. Abdominal distention was not found, bowel sounds were heard, and mild tenderness was revealed in mid epigastrium. There was no sign of peritonitis or acute abdomen. Patient then was admitted, venous access was achieved, blood sample was sent and analysis of atrial blood gas was performed. He was then sent for performing plain X-ray radiologic study of thoracoabdominal regions. Fig. 1 shows patient's roentgenogram. Laboratory reports contained nothing abnormal. As it is showed in Fig. 1, patient ingested a thick metallic sharp pointed needle with 7–8 cm length which primarily seemed to lodge in stomach.

Serial examination was continued every 15 min. According to persistent mid epigastrium tenderness, patient's nausea and fear of ingestion preparation for FB removal was decided. Because of unavailability of both pediatric gastroenterologist and endoscopic equipment open surgical technique was considered. After obtaining written informed consent from infant's parents he was transferred to the operating room following 90 min of FB ingestion. An expert male general

surgeon with online supervision of a pediatric surgeon was performed operation while an operating room technician aided him. In the theater, after general anesthesia induction, laparotomy was initiated by a horizontal mid epigastric incision followed by intraperitoneal access. There was no sign of bleeding, intracavitary fibrin formation, organ perforation or FB migration in primary abdominal exploration. A nasogastric tube was inserted and gastric juice was suctioned by anesthesia team. No additional FB was suctioned, although there was no sign of presence of the needle in stomach after gastric palpation by surgeon's both hands. Exploration was followed. Pylorus sphincter was intact. Small intestine had completely normal appearance and examination. The ileocecal valve, entire colon, and rectum had unremarkable pathology. Surgeon's opinion on that FB lodged in duodenal loop was confirmed by intraoperative C-arm radiologic study. It was manifested that the needle was remained in its primary area with no further movement. Despite gentle manipulation and about 15 min intraoperative waiting no dislodgement was achieved. In this time, surgeon decided to perform a 2–3 cm vertical gastric incision in an avascular plain parallel to gastric greater curvature and 4–5 cm proximal to the pylorus. Cautious exploration of the lumen was performed although no sign of FB was detected. Then pylorus was grabbed with a babcock forceps and pulled through the incision line. On the other side just 4–5 cm distal to the Treitz ligament, jejunum was picked with fingers and pulled until it became straight to axis of duodenal end part. After about 30–60 s the tip of the needle was shined beyond the jejunal wall and extracted through a 1 cm incision. Fig. 2 showed extracted needle on a tray.

We presented here a novel surgical approach for selected duodenal FB dislodgement which is fundamentally supported by mucosal unfolding that could dislodge and facilitate the passage of FB. The 'Gilan maneuver' consists of a mucosal unfolding that initiates through a gastric incision and pyloric valve straining similar to what is generally performed for pyloric exclusion and continues with gentle jejunal pulling which eventually makes duodenal loop relatively more straighter than its natural curve. Fig. 3 shows a schematic view of the maneuver.

Following needle extraction, both incision lines appropriately repaired with interrupted prolene 3.0 sutures. Layers of abdominal wall also repaired separately and after skin repair and drape patient was sent to surgical ward. Pediatric consult was performed. Following 24 h of fasting, drinking of warm water and clear solutions was started. Regimen was then advanced to semisolid and solid foods during 48 h following patient's tolerance. After inpatient optimal recovery, food tolerance, normal clinical and laboratory examination, and recurrence of patient's daily activity he was discharged home after 3 days of operation. In follow up postoperative visit in 2 weeks later no remarkable finding was found to report.

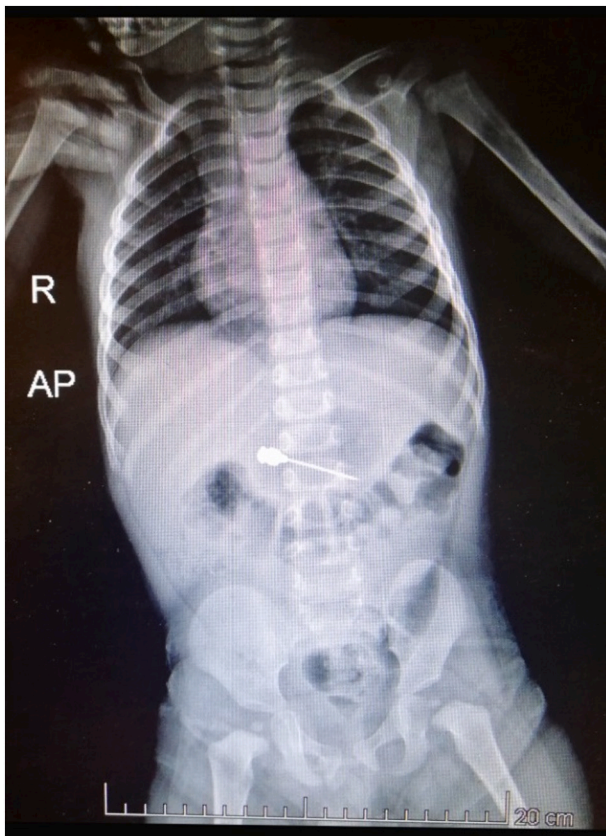


Fig. 1. Plain X-ray roentgenogram shows thick needle in abdominal area.



Fig. 2. Extracted thick needle on tray.

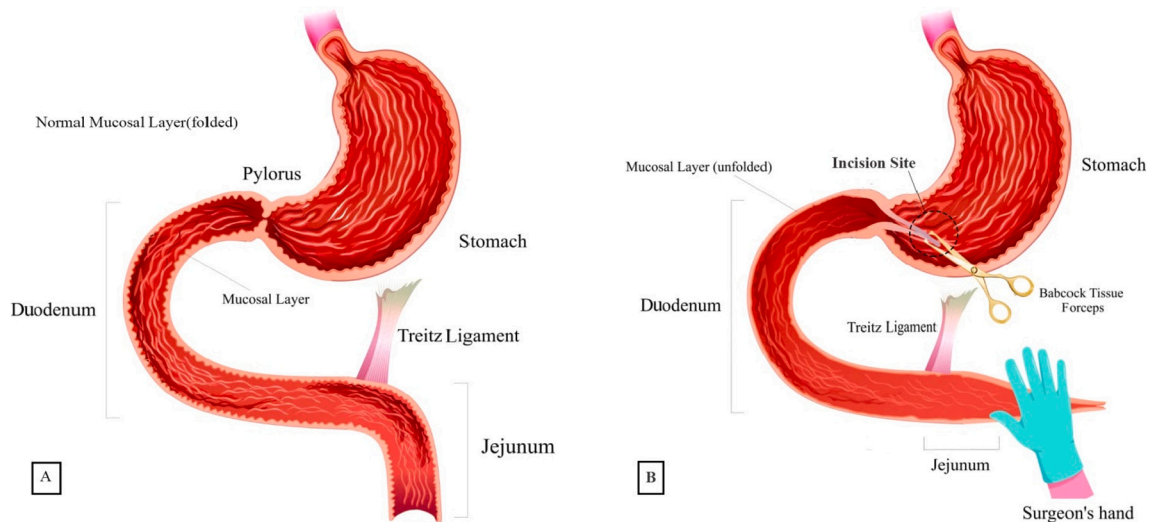


Fig. 3. Schematic view of normal anatomy of duodenal folded mucosal layer (A) and unfolded mucosal layer after unfolding Gilan maneuver (B).

This study was established after written informed consent was obtained from the parents of patient for publication of this case report and accompanying images.

3. Discussion

We present in this report, an 18 months old male infant who ingested a thick sharp pointy cattle needle which lodged in duodenal loop and remained there unmoving for relatively long time. Because of persistent mid epigastric tenderness with no sign of recovery in serial examination, patient underwent explorative laparotomy. In the theater, there was no safe and easy access to the FB because of its retroperitoneal and fixed anatomical zone i.e. over the second portion of duodenum. According to limitations for intraoperative endoscopic intervention, surgeon applied a novel mucosal unfolding technique for duodenum called the 'Gilan maneuver' which facilitated FB to dislodge and be extracted. In this maneuver gastric incision and pyloric mucosa pulling gently through incision line is performed alike with that happens in pyloric exclusion. The differences are first not performing pyloric valve sewing and second to concurrent pull of jejunum adjacent to the Treitz ligament to make a straight unfolded pavement for intraluminal contents.

FB ingestion or aspiration in pediatrics is commonly seen by health care providers worldwide. Its incidence, numbers of emergent cases and complications have increased recently [3,13]. The latter could be due to various reasons including growth of population, increased numbers of children in each family, parents' inadequate time to spend for their children, change in life style, and more production of battery operated toys [1]. In most studies coins were seen to be more ingested by infants from 6 months of age who could identify the his/her mouth to 3–6 years old kids [1,4–7,13–15]. Sharp and pointy objects like needles were ingested almost always lesser in most of previous reports [5–11]. Esophagus and stomach were common sites of FB lodgment, although there was no consensus on which of these two organ was finally ranked the first [10,13–16]. However, it was manifested in prior studies that FB deposition in duodenal loop was extremely rare although could be severely catastrophic [12–15]. Although some authors claimed of that ingestion of FB was asymptomatic in over 55% of cases, opponents reported vomiting, drooling, nausea, sensation of FB, pain, dysphagia, hematemesis, stridor, cough, wheezing, organ perforation, and even death could be seen in most cases [2–11,13–17]. Logically presentation of any specific symptom is directed to anatomical region of lodgment [6–10]. Interestingly, it is recommended for physician to become highly suspected for FB ingestion diagnosis while in best condition only 75–78% of patients (parents) presented positive history of FB ingestion

[6,9]. When the diagnosis is suspected the next step is radiologic study. Routinely plain x-ray roentgenogram study of neck, chest, and abdominopelvic areas could illustrate the lodgment zone of ingested FB if it is not radiolucent [8,9,17]. Clinical management of whether ingested or aspirated FB related to passed time of ingestion, type of FB, symptoms, and age of the patient. There are available guidelines today including the ESPGHAN, NASPGHAN, ASGE, and CMU which help to manage FB more accurately based on aforementioned variables [9]. Prior data showed although near 14% of FB removed from body spontaneously with no complication, over 81% of FBs needed endoscopic intervention to be extracted. It is while there was yet near 5% of cases underwent surgical removal of FB [15]. The latter mostly involved cases who were younger infants, ingested sharp and pointy objects, presented with complication or shock [13–17]. Hence, surgery has saved its position in management of FB ingestion. Of course, although it is recommended by most guidelines to use endoscopic approach for FB extraction, there are yet many health centers with no adequate equipment or specialist to manage FB by endoscope. Therefore, making adequate knowledge and experiment for general surgeons in this regard should be considered by attributed educational systems.

Although we performed a novel successful technique called 'Gilan maneuver' for extraction of FB which lodged in hazardous loop of duodenum, data of long term follow up and possible complication was not available. However, there was no clinical or biochemical side effects after a short 2 weeks follow up visit.

4. Conclusion

Ingestion of FB in children should be considered for every child who referred to emergency unit, specifically in selected ages. Although it could remove from body spontaneously, it also could be harmful and life threatening. Current recommended advisement for FB management is endoscopic approach. However, surgery could be safe and life giving under expert hands in unequipped health centers of developing areas.

CRedit authorship contribution statement

IB: Study design, supervision, interpret results; AP: AM: Study design, supervision, interpret results; RE: AM: Study design, supervision, interpret results; AH: Study design, data collection, interpret results, article draft.

Declaration of competing interest

The authors declared that they have no competing interests.

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Ethical approval

Reference code IR.GUMS.MED.REC.1400.72.

Consent

Written informed consent was obtained from the parents of patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Research registration

N/A.

Guarantor

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Provenance and peer review

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