Original Article

Foreign Body in the Gastrointestinal Tract in Children: A Tertiary Hospital Experience

Chukwubuike Kevin Emeka, Nduagubam Obinna Chukwuebuka[1], Enebe Joseph Tochukwu[2]

Department of Surgery, Paediatric Surgery Unit, Enugu State University Teaching Hospital, Departments of [1]Pediatrics and [2]Obstetrics and Gynecology, Enugu State University Teaching Hospital, Enugu, Enugu State, Nigeria

Abstract

Background: Foreign body (FB) ingestion in the gastrointestinal tract (GIT) in children is common. Although most foreign bodies will pass spontaneously, surgical intervention is required when they fail to pass. **Aims and Objectives:** The aim of this study was to evaluate our experience in the management of children who presented with FB in the GIT. **Materials and Methods:** This was a retrospective study of children that underwent laparotomy for the removal of FB in the GIT at the paediatric surgery unit of Enugu State University Teaching Hospital, Enugu over a 10-year period. **Results:** A total of 272 children presented with FB in the GIT during the study period, out of which 30 patients had laparotomy. This gave an operative incidence rate of 11%. There was a slight male predominance and the ages of the patients ranged from 6 months to 5 years (median 3 years). About half of the patients had no symptoms and all the patients were investigated with an abdominal radiograph. Only one-third of the patients had a predisposing factor that could have led to FB impaction. FB impaction was the most common indication for surgery, and enterotomy with FB removal was the most performed surgical procedure. The most common FB removed were tiny parts of toys, and the most common post-operative complication was surgical site infection. There was no mortality. **Conclusion:** FB in GIT in children could be associated with complications that require surgical treatment. FB ingestion is preventable. Focus should be placed on caregivers preventing children from ingesting FB.

Keywords: Children, developing country, foreign body, gastrointestinal

Introduction

Foreign body (FB) ingestion in children is common and is a global health problem: children evaluate objects by tasting and swallowing them.[1] The peak age of occurrence of FB ingestion has been reported to range from 6 months to 3 years, and the male-female ratio is quoted as 1:1.[1,2] Preschool children and children with mental health issues are at the high risk of swallowing foreign bodies.[3] Although deliberate ingestion of a FB can occur, most FB ingestion is accidental. Majority of swallowed foreign bodies will pass through the gastrointestinal tract (GIT) without problems. However, large objects, pointed objects and button battery may become lodged and cause damage. Determining the patients that will require intervention could be a challenge to the clinician.[4] Children with congenital malformations, previous gastrointestinal surgeries and neuromuscular disorders are at a higher risk of FB retention, obstruction and perforation.[5] The nature of FB swallowed by children varies between different regions and cultures. For instance, a coin is the most swallowed object in the United States of America while fish bone is the most ingested in southern China.[6] Plain radiograph is the initial imaging for evaluation of FB in the GIT.[7] Computed tomography (CT) scan and magnetic resonance imaging (MRI) may also be used. FB in the GIT may be removed endoscopically or surgically. Medical treatment involving the use of emetics, muscle relaxants, laxatives and digestant agents is not advised because they are ineffective and cause complications.[8] The aim of this study was to evaluate our experience in the management of children who presented with FB in the GIT.

Received: 03-10-2020 **Revised:** 13-08-2021 **Accepted:** 20-11-2021 **Available Online:** 10-07-2023

Access this article online

Quick Response Code:

Website: https://journals.lww.com/AJPS

DOI: 10.4103/ajps.AJPS_148_20

Address for correspondence: Dr. Chukwubuike Kevin Emeka, Department of Surgery, Paediatric Surgery Unit, Enugu State University Teaching Hospital, Park Lane, Enugu, Enugu State, Nigeria.
E-mail: chukwubuikeonline@yahoo.com

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Emeka CK, Chukwuebuka NO, Tochukwu EJ. Foreign body in the gastrointestinal tract in children: A tertiary hospital experience. Afr J Paediatr Surg 2023;20:224-8.

Materials and Methods

This was a retrospective study of children aged 15 years and below who presented with FB in the GIT between January 2009 and December 2018 at the paediatric surgery unit of Enugu State University Teaching Hospital (ESUTH) Enugu, Nigeria. ESUTH is a tertiary hospital located in Enugu, South East Nigeria. The hospital serves the whole of Enugu State, which according to the 2016 estimates of the National Population Commission and Nigerian National Bureau of Statistics, has a population of about 4 million people and a population density of 616.0/km^2. The hospital also receives referrals from its neighboring states. Children with foreign bodies in the esophagus and those with incomplete medical records were excluded from the study. Ethical approval was obtained from the ethics and research committee of ESUTH.

Pre-operative protocol

On presentation, the patients were evaluated and resuscitated using the Advanced Trauma Life Support protocol. Urgent neck, chest and abdominal radiographs were obtained to locate the FB. Abdominal CT scan was requested for patients whose FB could not be visualised on X-rays (radiolucent). Asymptomatic patients were admitted and followed with serial radiographs to monitor progress of the FB. Evidence of no progress of the FB after 1 week (impaction), intestinal obstruction and signs of peritonitis (perforation) were the indications for surgery. The patients were optimised and taken to theatre. Prophylactic antibiotics (ceftriaxone and metronidazole) were given at induction of anaesthesia. Endoscopy was not performed on any of the patients due to the absence of the facility in my centre.

Operative protocol

Under general anaesthesia, access was through a transverse supraumbilical abdominal incision. An exploration was performed by palpating the bowels checking for the FB. FB in the bowel lumen was removed by an enterostomy and closure of enterostomy in two layers. A FB in the rectum was milked out through the anal orifice. All surgical procedures were performed by a consultant paediatric surgeon.

Post-Operative Protocol

The patients were placed on parenteral antibiotics and analgesics until bowel function returned. Graded oral sips were commenced when bowel function returned. Post-operative complications were noted and documented. Discharge was based on recovery from surgery, full establishment of oral intake, ambulation and adequate wound healing.

Data collection and analysis

Information was extracted from the medical records, operation notes, operation register and admission-discharge records. The information extracted included age, gender, presenting symptoms, interval between the FB ingestion and presentation, investigations, interval between presentation and intervention, underlying predisposing factors, nature of object swallowed, operative procedure performed at laparotomy, post-operative complications, duration of hospital stay and outcome of treatment. The Statistical Package for the Social Science (SPSS) version 21, manufactured by IBM Cooperation Chicago, Illinois, USA, was used for data entry and analysis. Data were expressed as percentage, median, mean and range.

Results

Patients' demographics

A total of 272 children presented with FB in the GIT during the study period. Thirty-three patients had laparotomy for the removal of FB in the GIT during the study period but only 30 patients had complete case records and formed the basis of this report. This gave an operative incidence rate of 11%.

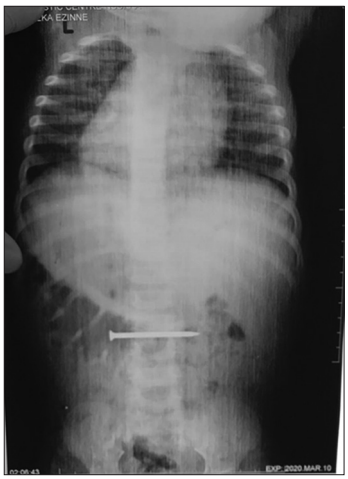


Figure 1: Plain abdominal radiograph showing a nail in the transverse colon

Table 1: Demographic profile of the patients

Parameters	Value
Gender (%)	
Male	16 (53.3)
Female	14 (46.7)
Age range, median (peak)	6 months to 5-3 years
Mean interval between FB ingestion and presentation (mean)	1-3 days (2 days)
Mean interval between presentation and intervention (mean)	1-2 days (1.5 days)
Mean duration of hospitalisation (range)	7 days (3-10)

FB: Foreign body

Table 2: Symptoms at presentation

Presenting symptoms	Number of patients, *n* (%)
No symptoms	17 (56.7)
Abdominal pain + vomiting	15 (50)
Constipation + abdominal distension	5 (16.7)
Vomiting + bloody stool	4 (13.3)
Fever	1 (3.3)

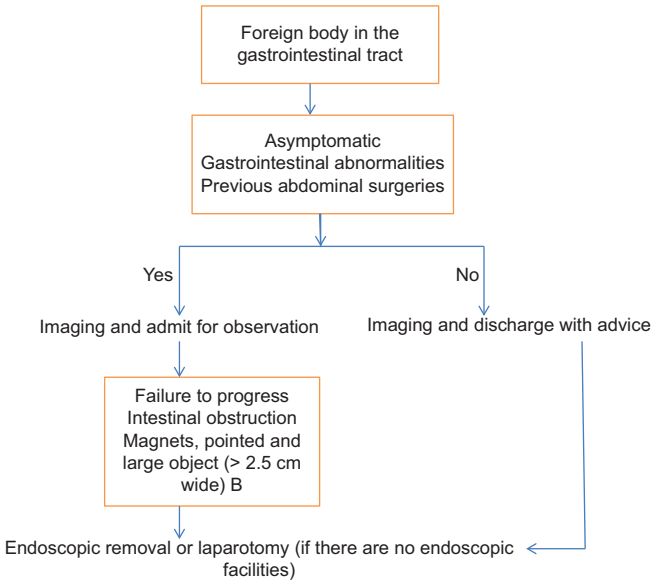


Figure 2: Algorithm for the management of foreign body in the gastrointestinal tract

Table 3: Different types of foreign body swallowed

Nature of foreign body removed	*n* (%)
Toys parts	8 (26.7)
Needles/pins/keys	7 (23.3)
Screws/nails	6 (20.0)
Earrings	5 (16.7)
Pencils/erasers	4 (13.3)

The rest of the patients passed their FB spontaneously. There was a slight male predominance. Details are shown in Table 1.

Presenting symptoms

Seventeen (56.7%) patients had no symptoms at presentation. Symptoms occurred in various combinations and some of the patients had more than one symptom. Details are depicted in Table 2.

Investigations

All the patients had abdominal radiograph. The radiograph showed the swallowed FB in 25 (83.3%) patients and 3 (10%) patients needed CT scan to show the FB. Abdominal ultrasound was useful in detecting FB in 2 (6.7%) patients. None of the patients had MRI. Figure 1 shows the abdominal radiograph of one of the patients that swallowed a 3-inches nail.

Underlying predisposing factors

Seven (23.3%) patients had previous abdominal surgeries while 2 (6.7%) patients were treated for necrotising enterocolitis as neonates. No predisposing factor was found in 21 (70%) patients.

Indications for surgery

The indications for operative treatment included FB impaction in 26 (86.6%) patients, intestinal obstruction in 2 (6.7%) patients and peritonitis in 2 (6.7%) patients.

Operative finding and procedure performed

Out of 30 patients that had laparotomy, 28 (93.3%) patients had their FB in the ileum and enterotomy was performed for removal of the FB. Two (6.7%) patients had their FB in the rectum and were milked out through the anal orifice.

Nature of the foreign body retrieved at surgery

Broken tiny parts of children toys were the most common FB swallowed. Others are listed in Table 3.

Post-operative complications and outcome of treatment

Twenty-four (80%) patients did not develop any complications. Three (10%) patients had surgical site infection and one (3.3%) patient each had incisional hernia, burst abdomen and a leak from the site of the enterostomy. All the patients made a full recovery and were discharged home. There was no mortality.

Discussion

FB ingestion is often a difficult diagnosis in the paediatric population.[9] The ingestion may not be witnessed by the caregiver and small children may not vocalise: a high index of suspicion is therefore required to make a diagnosis. Many cases of FB ingestion are not brought to medical attention probably because most of the foreign bodies are passed spontaneously in stool.[4] FB ingestion is a significant cause of parental anxiety and recurrent FB ingestion occurs in mentally challenged children.[4] The challenge in the management of FB in the GIT is to distinguish the patients who require intervention from those that can be safely observed. Due to the absence of randomised clinical trials on FB ingestion in children, management depends on clinical experience and each case should be decided on individual basis.[4]

In the present study, the male predominance recorded is consistent with the report of other studies.[10,11] However, Adnan *et al*. reported female predominance while one study from Romania reported no gender difference.[12,13] The reason for the gender differences is unknown. The peak age, of 3 years, of our patients is similar to the report of another researcher.[14] The peak age of 6 years has been reported.[15] The peak age of FB ingestion may depend on the nature of the FB swallowed. For instance, schoolchildren are more likely to ingest bits of broken pencils and eraser while preschool children may ingest tiny parts of a toy. The mean interval between FB ingestion and presentation to the hospital in the index study is at variance with the report of Khurshid *et al*.[16] The late presentation of our patients may be due to lack of parental awareness and poverty that is prevalent in developing countries. The mean interval between presentation to the hospital and treatment of 1.5 days in our patients may be due to the time required for the investigation, optimisation of the patient and provision of funds needed to procure materials required for surgery. There is a need for timely removal of ingested FB in children to avoid complications such as peritonitis resulting from bowel perforation. The mean

duration of hospitalisation of our patients is comparable to the findings of other authors.[17,18]

Unlike in adults who can report ingestion of FB, caregivers may only suspect the ingestion due to disappearance of an item. Even when the ingestion is witnessed, there may not be any symptoms. Fifty percent of the children with FB in the GIT may be asymptomatic.[7] Children with FB in the GIT may present with abdominal pain, vomiting and passage of bloody stool. Prolonged presence of FB in the GIT may result in fever and weight loss.[6] One series from Brussels reported no symptoms in half of the children whose FB ingestion was witnessed.[7] The onset of symptoms such as fever, vomiting and abdominal pain may signify the presence of complications such as intestinal obstruction or perforation. FB may be found incidentally on imaging evaluation of a child that has non-specific symptoms such as weight loss.[19]

Four-fifth of the foreign bodies in the present study showed on plain radiographs. It is of interest to note that mostly the metallic parts of the broken toys were ingested which explains the radiopacity of the objects. Plain radiograph is the initial imaging modality of choice in evaluating FB ingestion due to its ability to detect most foreign bodies.[20] Radiograph is available, affordable and has low radiation exposure. In contrast, radiolucent objects such as wood and plastic may not be visible on radiographs. Abdominal ultrasound is a sensitive tool for detecting radiolucent foreign bodies which are not visualised on radiograph.[21] CT scan provides a more accurate three-dimensional localisation of FB in the GIT. The drawback of CT scan is the cost and risk of significant exposure to radiation.[22] In the present study, all the patients had plain X-rays and an abdominal ultrasound scan was indicated when the FB was radiolucent. Abdominal CT was not performed because the FBs were seen either on X-rays or on ultrasound scan.

Certain congenital factors such as intestinal stenosis and acquired conditions such as adhesions following previous surgery are predisposing factors that may prevent the smooth passage of FB through the GIT. About one-third of our patients were noticed to have such predisposing factors. Previous abdominal surgeries predispose a patient to adhesions which narrows the bowel lumen without causing complete intestinal obstruction. The long-term effects of necrotising enterocolitis include intestinal strictures and adhesions which may not allow FB to pass freely.[23] However, in the current study, majority of our patients had no predisposing factors. Other factors such as size and shape of FB may affect the passage of objects through the GIT.[24]

It has been reported that <1% of patients who ingest FB will require surgical intervention.[25] However, in the absence of the facilities for endoscopy and laparoscopy, all our patients had laparotomy for the removal of the FB. Surgical intervention is indicated when there are complications, in symptomatic patients or when the FB is impacted evidenced by failure of the FB to advance after 3 days.[26] At surgery, the areas to look out for the foreign bodies are the anatomical narrowed areas such as pylorus, ligament of Treitz, ileocecal valve and rectosigmoid junction.[27] Surgical treatment entails an enterotomy which should be made on a fresh area (not over the FB) to avoid dehiscence. Repair of the enterotomy was performed in two layers to avoid breakdown and leakage of intestinal content.

In the present study, parts of a toy were the most frequently ingested FB. This finding is at variance with the report of several series on FB ingestion which documented coin as the most ingested FB.[1,13,15] This may be explained by the fact that coins are not used as a medium of exchange in Nigeria and therefore not available for the child to swallow. In the Niger delta area of Nigeria where fish is the stable food, fish bone is most frequently ingested FB.[28]

Surgical site infection was the most common post-operative complication recorded in the present study. Enterotomy for the removal of the FB involves entering the bowel lumen and exposure to intestinal bacteria which may account for the wound infection. One series from India also reported surgical site infection as the most common post-operative complication.[29] No mortality was recorded in the present study similar to the report of other studies.[30,31]

Duration of hospital stay as low as 2 days has been reported.[32] The duration of hospitalisation may be dependent on the modality of treatment. Minimal access procedure (endoscopy) is associated with shorter hospital stay.

Figure 2 shows the algorithm for the management of FB in the GIT.

Conclusion

Complications such as impaction, obstruction and perforation may result from FB ingestion in children and in such situations, surgical treatment is required. Broken tiny parts of children's toys was the most common FB ingested in the present study. Absence of endoscopy and laparoscopy in most centres in developing countries makes open surgery the only option. FB ingestion in children is preventable by the caregivers. This underscores the importance of close supervision of children by the parents.

Imaging: Radiographs, ultrasound (USS), Computed tomography (CT) scan.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Lee JH. Foreign body ingestion in children. Clin Endosc 2018;51:129-36.
2. Balci AE, Eren S, Eren MN. Esophageal foreign bodies under cricopharyngeal level in children: An analysis of 1116 cases. Interact Cardiovasc Thorac Surg 2004;3:14-8.
3. Prasad V, Samuel V, Ramakrishnan M, Ravikumar D, Sharna N. Management of foreign body ingestion in children with cerebral palsy:

Need for proper trauma management protocol. J Family Med Prim Care 2018;7:638-41.
4. A-Kader HH. Foreign body ingestion: Children like putting objects in their mouth. World J Pediatr 2010;6:301-10.
5. Kramer RE, Lerner DG, Lin T, Manfresi M, Shah M, Stephen TC, *et al.* Management of ingested foreign body in children: A clinical report of the NASPGHAN Endoscopy committee. J Pediatr Gastroenterol Nutr 2015;60:562-74.
6. Conners GP, Mohseni M. Pediatric foreign body ingestion. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2020. Available from: https://www.ncbi.nlm.gov/books/NBK 430915/. [Last assessed on 2020 Sep 04].
7. Arana A, Hauser B, Hachimi-Idrissi S, Vandenplas Y. Management of ingested foreign bodies in childhood and review of the literature. Eur J Pediatr 2001;160:468-72.
8. Anderson HA. Perforation of the esophagus after use of a digestive agent: Report of case and experimental study. Ann Otol Rhinol 1959;68:890-6.
9. Mohamad Ishak LA, Khor KG, Tan SN. Foreign body ingestion in an infant: A high index of suspicion is required. Pediatr Invest 2019;3:188-90.
10. Khorana J, Tantivit Y, Phiuphong C, Pattapong S, Siripan S. Foreign body ingestion in pediatrics: Distribution, management and complications. Medicina (Kaunas) 2019;55:E686.
11. Louie MC, Bradin S. Foreign body ingestion and aspiration. Pediatr Rev 2009;30:295-301.
12. Adnan Q, Joanne C, Sobia N. Common etiology of foreign body ingestion. Surg Med Open Access J 2018;1:1-5.
13. Diaconescu S, Gimiga N, Sarbu I, Stefanescu G, Olaru C, Ioniuc I, *et al*. Foreign body ingestion in children: Experience of 61 cases in a pediatric gastroenterology unit from Romania. Gastroenterol Res Pract 2016;2016:1982567.
14. Yeh HY, Chao HC, Chen SY, Chen CC, Lai MW. Analysis of radiopaque gastrointestinal foreign bodies expelled by spontaneous passage in children: A 15-year single-center study. Front Pediatr 2018;6:172.
15. Singh G, Sharma S, Khurade S, Gooptu S. Ingested foreign body in children: A report of two cases. J Family Med Prim Care 2014;3:452-5.
16. Khurshid Z, Ali AE, Al Hamidi SA, Alnafisah TI. Foreign body ingestion in children. A hospital based experience in Riyadh. Acta Sci Paediatr 2019;2:13-9.
17. He S, Zuo ZL. Different anatomical sites of the foreign body injury with 2999 children during 2012-2016. Chin J Traumatol 2018;21:333-7.
18. Wu W, Lv Z, Xu W, Liu J, Sheng Q. An analysis of foreign body ingestion treatment below the pylorus in children. Medicine (Baltimore) 2017;96:e8095.
19. Arango AA, Leon LP, Martinez DC, Jurado GM. Incidental foreign body in the gastrointestinal tract: Report of three cases and literature review. Rev Col Gastroenterol 2011;26:316-27.
20. Campbell EA, Wilbert CD. Foreign body imaging. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2020. Available from: https://www.ncbi.nlm.nih, gov/books/NBK470294/. [Last assessed on 2020 Sep 04].
21. Tahmasebi M, Zareizadeh H, Motamedfar A. Accuracy of ultrasonography in detecting radiolucent soft-tissue foreign bodies. Indian J Radiol Imaging 2014;24:196-200.
22. Gou ZH, Peng Y, Yang K. Sonographic and CT imaging features of intestinal perforation from a pill and packing: A case report. Medicine (Baltimore) 2018;97:e0427.
23. Bazacliu C, Neu J. Necrotizing enterocolitis: Long term complications. Curr Pediatr Rev 2019;15:115-24.
24. Murty P, Ingle VS, Ramakrishna S, Shah FA, Varghese P. Foreign body in the upper aero-digestive tract. J Sci Res Med Sci 2001;3:117-20.
25. Zamora IJ, Vu LT, Larimer EL, Olutoye OO. Water-absorbing balls: A "growing" problem. Pediatrics 2012;130:e1011-4.
26. Bradford V, Vadi M, Carter H. Diagnosis and management of a postpyloric foreign body causing small bowel obstruction in an infant. Clin Med Insights Case Rep 2017;10:1-4.
27. Chauvin A, Viala J, Marteau P, Hermann P, Dray X. Management and endoscopic techniques for digestive foreign body and food bolus impaction. Dig Liver Dis 2013;45:529-42.
28. Nwagbo AC. Eke N. Oesophageal foreign body in Port Harcourt. Port Harcourt Med J 2012;6:211-4.
29. Sarmast AH, Showkat HI, Patloo AM, Parray FQ, Lone R, Wani KA. Gastrointestinal tract perforations due to ingested foreign bodies; a review of 21 cases. BJMP 2012;5:a529.
30. Hong KH, Kim YJ, Kim JH, Chun SW, Kim HM, Cho JH. Risk factors for complications associated with upper gastrointestinal foreign bodies. World J Gastroenterol 2015;21:8125-31.
31. Melek M, Cobanoglu U, Bilici S, Beger B, Kizilyidiz BS, Melek Y. Management and treatment of foreign body ingestion in childhood. Eastern J Med 2011;16:194-8.
32. Gregori D, Scarinzi C, Morra B, Salerni L, Berchialla P, Snidero S, *et al.* Ingested foreign body causing complications and requiring hospitalization in European children: Results from the ESFBI study. Pediatr Int 2010;52:26-32.