

Intestinal Perforation by Foreign Body: Case Report and Literature Review

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Abstract:

The ingestion of foreign bodies intentionally or accidentally is found worldwide especially in paediatric age group⁽⁸⁾, elderly, mentally subnormal individuals, alcoholic and drug abusers proving to be a major cause of morbidity and mortality⁽⁷⁾. The ingestion of foreign bodies is rarely associated with intestinal perforation, even if a sharp object is swallowed. About 80-90% of ingested foreign bodies are passed spontaneously⁽⁵⁾. The consequences may range from un-noticed passage per rectum to severe peritonitis following bowel perforation although less than 1% causes perforation⁽⁶⁾ and there may be acute bowel obstruction.

Method:

This is a 21 year old male patient who presented with abdominal pain. This patient states that the abdominal pain started after the ingestion of liquid. On physical examination the abdomen was firm, flat, no surgical scars, with generalized tenderness and guarding principally in the epigastric to suprapubic region. The investigations which were done had essentially contributed no additional information suggestive of the definitive pathology.

Result:

This patient was resuscitated with intravenous fluid therapy, analgesia, prophylactic antibiotic along with deep vein thrombosis prophylaxis and booked for exploratory laparotomy. The findings at laparotomy are that of a perforated proximal loop of jejunum with a piece of chicken bone.

Conclusion:

The vague symptoms that can be found on physical examination as well as the lack of patients ability to recall whether or not they had ingested a foreign body is the main difficulty in the diagnosis of this entity.

Keywords: intestinal perforation, foreign body, chicken bone.

Introduction

The ingestion of foreign bodies intentionally or accidentally is found worldwide especially in paediatric age group⁽⁸⁾, elderly, mentally subnormal individuals, alcoholic and drug abusers proving to be a major cause of morbidity and mortality⁽⁷⁾.

This demographic has been studied and has demonstrated that the paediatric population can be as high as 83% in regions such as united kingdom⁽²⁸⁾ or half of the study group in the united states of America⁽²⁷⁾ and as low as 14.3% in a Hong Kong⁽²⁹⁾ based research. There has also been data published on the varying types of foreign body found which has revealed a trend in which ingested food items containing bones occupy anywhere between a quarter (27.4%⁽³⁰⁾) to as high as a third (32.2%⁽²⁷⁾).

The ingestion of foreign bodies is a global problem, affecting a major population and may be associated with a significant morbidity and mortality⁽²⁾. The ingestion of foreign bodies is rarely associated with intestinal perforation, even if a sharp object is swallowed. About 80-90% of ingested foreign bodies are passed spontaneously⁽⁵⁾. The commonest being the food products, which although rare in conscious and stable adults, it is a fairly common problem in psychiatric patients⁽³⁾. The morbidity and outcome depends upon the size, shape and nature of the ingested material. The consequences may range from un-noticed passage per rectum to severe peritonitis following bowel perforation although less than 1% causes perforation⁽⁶⁾ and there may be acute bowel obstruction. The perforation of stomach, duodenum or large bowel tends to have a delayed and innocuous presentation compared to the perforation of jejunum and ileum⁽⁴⁾.

This case report being presented is one of intestinal perforation in the jejunum secondary to the unintentional ingestion of a chicken bone in a mentally competent patient. This patient presented with an acute abdomen of unknown cause and was managed as a surgical emergency.

Case report

This is the case of a 21 year old mentally competent male patient who presented with abdominal pain. This patient states that the abdominal pain started after the ingestion of liquid, which had a sudden onset, periumbilical, with an intensity of 9/10, colicky, radiating to the back, nil aggravating factor, nil relieving factor, nil vomiting, nil nausea, nil diarrhoea, nil fever, nil abdominal distension. This patient has no past medical history or surgical history however gives a social history of smoking and ingestion of alcohol.

On physical examination there was no cardiopulmonary distress, and was acyanotic, anicteric, afebrile with pink and moist mucous membranes. On abdominal examination was firm, flat, no surgical scars, with generalized tenderness and guarding principally in the epigastric to suprapubic region, there was no organomegaly and bowel sounds were present and normal. Digital rectal examination proved normal sphincter tone, no masses, no blood, and normal prostate and brown stool on gloved finger.

The investigations which were carried out complete blood count demonstrated a white cell count of **15.94 x 10⁹/l (elevated)**, with a left shift, u/e essentially normal, urinalysis demonstrates trace protein, 2+ ketones. Serum amylase was 75 u/l which is normal.

Imaging studies carried in the form of chest radiograph and abdominal radiograph were not conclusive. The chest radiograph (figure 1.) was done in an erect position in a posterior-anterior view and was essentially normal except for dilated loops of small bowel in the left upper quadrant but had not demonstrated any pneumo-mediastinum or pneumo-peritoneum. The abdominal radiograph (figure 2.) and (figure 3.) were done in a supine and erect position respectively and had demonstrated dilated loops of small bowel in the left upper quadrant on both instances.

Chest radiograph

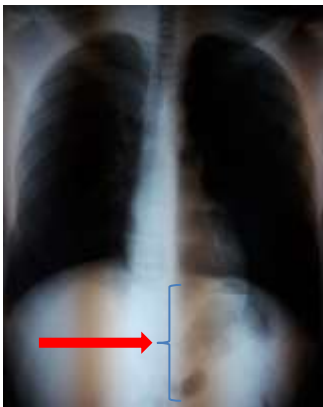


Figure 1; A plain chest radiograph in the erect position with normal chest findings and dilated loops of small bowel in the left upper quadrant (shown with arrow) which does not demonstrate a pneumo-peritoneum.

Abdominal radiograph supine



Figure 2; A plain abdominal radiograph in the supine position which demonstrates dilated loops of small bowel in the upper left quadrant (shown with arrow).

Abdominal radiograph erect



Figure 3; A plain abdominal radiograph in the erect position which demonstrate dilated loops of small bowel in the left upper quadrant (shown with arrow) with no air fluid levels.

This patient was subsequently diagnosed with an acute abdomen with a possible perforated hollow viscous. This patient was resuscitated with intravenous fluid therapy, analgesia, and proton pump inhibitor, prophylactic antibiotic and deep venous prophylaxis and booked for exploratory laparotomy.

The intraoperative findings were; there was a small quantity of purulent collection within loops of jejunum, with a full thickness perforation of the jejunum, 20 cm distal to the duodeno-jejunum flexure. The mesentery adjacent to the perforation was inflamed but for the most part healthy. The rest of the abdominal content was unremarkable.

The foreign body which is found at the base of the perforation was 3cm long with a double pointy end. This had the appearance of a chicken bone and was subsequently presented to the patient in the post-operative period.

Foreign body



Figure 4; The foreign body which was retrieved from the site of jejunal perforation is a piece of chicken bone approximately 3 cm long.

The foreign body was removed, the jejunum defect border was debrided and a primary repair of the jejunum was done using silk suture. The peritoneal cavity was lavaged and subsequent closure was done conventionally.

The patient had an uneventful postoperative recovery and was discharged home on the fifth day post-surgery. On follow up he was well and there had been no late complications.

Discussion

There have been several studies on the population demographics of foreign body ingestion in which it was demonstrated that in the United States of America half of this population happen to be children ⁽²⁷⁾, meanwhile in other similar research done in the united kingdom this was as high as 83% ⁽²⁸⁾, and this was only 14.3% in research done in Hong Kong ⁽²⁹⁾.

The statistical breakdown of the most commonly found foreign body to be ingested indicates that 32.2% were bones, 35.9% consisted of coins and safety pins ⁽²⁷⁾, meanwhile in other studies this was demonstrated to be 27.4% bones and 28.7% coins and safety pins ⁽³⁰⁾, this was taken a step further in the Hong Kong study which highlighted of all the bones retrieved fish bone was present in 84% ⁽²⁹⁾.

The clinical manifestation of an intestinal perforation from a foreign body which was previously ingested whether intentional or not is a surgical emergency, as any delay with therapy could have dire consequence. The vast majority of objects which been involved in this scenario are fish bones, toothpicks, meat bones, dentures ^(9, 10, 11, 12) and most of them pass uneventfully without complications, thus requiring surgical interventions in less than 1% patients ⁽³⁾.

The risk factors that influence an ingested foreign body to eventually provoke an intestinal perforation can usually be classified as anatomical, functional and intrinsic property of the foreign body. With regards to the anatomical factor this normally occurs in areas where they become impacted and these can be sites of natural or acquired narrowing; crico-pharyngeal ring, lower oesophageal sphincter, pylorus, duodenal loop, ileo-cecal valve and anus, angulation (curvature of the duodenum) or flexure such as the ileo-caecal and recto-sigmoid regions ⁽¹⁶⁾, pouching segments, segments with adhesions or surgical anastomosis and segments containing diverticulae ⁽³⁾ or pathology such as crohn's disease ⁽²⁵⁾. The anatomic factor which has been previously mentioned has lead to statistical correlations demonstrating that most common area of intestinal perforation from the ingestion of foreign body are the lower oesophagus and terminal ileum ^(26, 33).

The functional attributes which make an individual more propense or which increases the risk of intestinal perforation after the ingestion of a foreign body would be those that have abnormal peristaltic function as are seen in old people, those with history of surgical intervention, previous bowel pathology, alcoholic and psychiatric patients (such as schizophrenia, depression, bipolar disorder, self-mutilation, masochism, post-traumatic stress disorder and suicide attempts)-the latter group of patient as they are not mentally competent

and most likely to intentionally or inadvertently ingest a foreign body- ^(13, 14). There is also a subset of patients who have intentionally ingested foreign body in order to gain access, to a less secure institution, and this accounts for the most common reasons for prisoners to be transferred to a hospital or a psychiatric unit with subsequent attempts to escape from prison ^(25, 31, 32).

The intrinsic properties of a foreign body to increase the risk factor of intestinal perforation post ingestion are those objects which are Sharp, elongated and have barbed edges ⁽¹⁵⁾. With regards to specific dimensions of the foreign bodies, it has been shown that those larger than 2-2.5 cm in diameter progress through the pyloric canal and that foreign bodies with a length between 6-10 cm or even greater do not navigate the curvature of the duodenum and might become impacted in same areas and lead to subsequent erosion ^(25, 26). The cumulative effect of some foreign body such as batteries is postulated to be due to electrical burns, lightning and necrosis that may lead to subsequent perforation ^(1, 25, 26).

The presenting complaint and subsequent symptomatology might range from vague abdominal discomfort to a much more florid acute abdominal scenario in which the latter will always prompt immediate surgical intervention, and the former will always pose some diagnostic dilemma even with the most sophisticated investigations. It was also observed that the average time from ingestion of foreign body to the presentation of clinical manifestation of intestinal perforation was 10.4 days ⁽¹³⁾.

Most of the symptoms are nonspecific and mimic other commonly occurring conditions like appendicitis, inflammatory bowel diseases and diverticulitis ⁽¹⁷⁾. The Clinical presentation post ingestion of foreign body were noted to include peritonitis, abdominal abscess formation ⁽³⁴⁾, perineal and scrotal abscess ⁽³⁵⁾, entero-bladder fistulas, bowel obstructions and gastrointestinal bleeding ⁽³⁴⁾. The data retrieved from operative log books with regards to preoperative diagnosis was most frequently recorded as surgical acute abdomen of unknown cause ⁽¹³⁾ which was the situation in our case presentation. The definitive diagnosis for the cases with acute abdomen of unknown was established during laparotomy in more than 90% of cases ^(3, 13, 16). The average time period between ingestion and clinical presentation also meant that all cases had some amount of abdominal contamination and approximately 66.7% of these cases had diffuse peritonitis ⁽¹³⁾. The diagnosis of intestinal perforation can be difficult as the symptoms may be vague and as such ascribed chronic abdominal discomfort hence a thorough history and physical examination has to be taken along with the relevant investigation.

The plain radiographic studies are still very important in ascertaining the diagnosis as they are low cost, they are easily accessed and there are several foreign body which are radio-opaque especially metallic objects, the contributing factor is that pneumo-mediastinum, pneumo-peritoneum is highly suggestive of hollow viscous perforation (although incidence is far lower as perforation in these cases occurs due to gradual and progressive erosion of bowel which allows it to be covered with fibrin or omentum impeding the escape of any significant amount of gas) ⁽⁷⁾. Although most imaging findings can be nonspecific, this has aided in the eventual diagnosis when evaluated along with the clinical signs of peritonitis, mechanical bowel obstruction, pneumo-peritoneum or pneumo-mediastinum ^(36, 37). Plain radiography although very essential in the diagnosis and follow up of ingested metallic objects is not useful in locating foreign bodies such as chicken or fish bones ⁽¹⁾. It was found that contrast radiography (water soluble used preferentially as it will cause less chemical irritation of serous membranes if leaked into these cavities) is not reliable for the detection or diagnostic exclusion of foreign bodies, and in certain circumstances, contrast studies are contraindicated ⁽³⁸⁾. The ultrasound modality has been used in several studies to diagnose the presence of foreign body especially those that are non-radio-opaque. This has been achieved through the acoustic shadowing effect of the foreign body as well as the fact that the ultrasound in the modern clinical setting is easily availability, very repeatable and cost effective further bolsters its diagnostic utility ^(18, 19, 20, 21) the down side of this study modality is that it is operator dependent.

The computerised tomography CT has been utilised in abdominal study and demonstrated a high sensitivity with regards to intestinal perforation. The multi-detector MDCT modality has proven to be the study of choice in the detection in the preoperative diagnosis of foreign body as it has a high resolution and generates reconstructed images with a high level of accuracy ^(22, 23). The magnetic resonance imaging has a similar

diagnostic profile with regards to detection of intestinal perforation however it's utility is limited as it is not readily available, it has a substantial cost factor and should not be used if there is a metallic foreign body.

There has been reported use of endoscopy in the management of ingested foreign body ⁽³⁸⁾, where direct visualization and subsequent removal has made it a more attractive therapeutic modality in the early stages, however in the later stages can worsen the clinical scenario by provoking more contamination. The early endoscopic removal of sharp objects such as wires, metal rods, shaving blades, clamps, needles that are embedded in the oesophagus is recommended to be removed immediately ^(25, 26) to prevent perforation. These before mentioned objects if they have somewhat successfully navigated the natural narrowing of the oesophagus, and have reached the stomach or duodenum, it is still recommended to have endoscopic removal attempted immediately, because the risk of intestinal perforation at the ileo-cecal valve is approximately 35% ^(25, 26, 33). If however these pointed objects go beyond the duodenum, then it is recommended to have daily monitored radiographic studies along with close clinical observation. Surgical intervention will be necessary if these objects do not progress radiographically after 72 hours. Emergency laparoscopy and or laparotomy will be required if the patient develops subtle clinical signs of acute peritonitis ^(25, 26).

The small window for laparoscopy in the diagnosis of intestinal perforation secondary to foreign body ingestion essentially is limited to those patients who have been subjected to the current imaging study of election and have no signs of peritonitis ^(17, 24).

The treatment of choice for intestinal perforation secondary to an ingested foreign body is surgical be it a conventional/open or laparoscopic ^(17, 24) approach. In the setting of intestinal perforation the treatment usually involves bowel resection but the most common treatment was debridement of the perforated edges and primary repair with suture perforation ⁽¹⁶⁾ which was the approach taken in this case. The laparoscopic approach has not been proven to be superior to laparotomy with regards to bowel resection and anastomosis leak but laparoscopy has the benefit of less scar tissue, decreased hospital stay, overall cost and shorter recovery time. Although laparoscopic exploration and retrieval may be preferable in some circumstances, such as patients with no prior surgical intervention, relatively fit patients, patients with a normal BMI, however in patients with multiple prior abdominal surgeries, access to the peritoneal cavity may be difficult, due to extensive adhesion, and distorted anatomy. This increase the risk of bowel injury and may also prolonged operative time because of poor visualization and exposure. The overall effect may increase the potential morbidity of the patient. These difficulties are also inherent during conventional laparotomy in this setting as well ⁽¹⁾.

Conclusion

The diagnosis of intestinal perforation from the ingestion of a foreign body has been demonstrated to be a difficult task. This is due to the fact that the clinical manifestation might be vague and give the impression of a chronic abdominal discomfort. The eventual intestinal perforation depends on several factors; anatomical, functional and intrinsic property of the foreign body.

The areas that have shown a greater tendency to perforation from foreign body ingestion have been where the lumen have narrowed or where there is a sudden change in direction; ileo-caecal, rectosigmoide and anal canal regions ^(1, 3, 16) meanwhile sites of impaction would occur in areas of surgical anastomoses, diverticular disease or similar process and zones involved in adhesions ^(1, 3, 16).

The functional factor which contributes to an increase risk of intestinal perforation has been demonstrated to occur in situation where there is an altered mechanical and secretory function ^(13, 14). The foreign body which have caused more intestinal perforation have been those that have Sharp, elongated and have barbed edges ⁽¹⁵⁾ and also those that have an accumulative corrosive effect ^(1, 25, 26).

There has to be a high index of suspicion for intestinal perforation from ingested foreign body in patients who present with symptoms of vague abdominal pain especially in those patients with decreased mental capacity, even if the diagnostic medium has been inconclusive.

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References

- i. Mesina C, et al *Problems of Diagnosis and Treatment Caused by Ingested Foreign Bodies. Chirurgia* (2013) 108: 400-406
- ii. Ayantunde AA, Oke T.A review of gastrointestinal foreign goodies. *Int Clinical Pract.* 2006;60(6):735–9.
- iii. Goh BK, Chow PK, Quah HM, Ong HS, Eu KW, Ooi LL, Wong WK. Perforation of gastrointestinal tract secondary to ingestion of foreign bodies. *World J Surg.* 2006;30(3):372–7.
- iv. Karamarkovic AR, Djuranovic SP, Popovic NP, Bumbasirevic VD, Sijaki AD, Ivan V. Hepatic abscess secondary to a rosemary twig migrating from stomach into liver. *World j Gastroenterol.* 2007;13(4):5530–32.
- v. Perelman H. Toothpick perforation of the gastrointestinal tract. *J Abdom Surg* 1962; 4: 51-53
- vi. McPherson RC, Karlan M, Williams RD. Foreign body perforation of the intestinal tract. *Am J Surg* 1957; 94: 564-566
- vii. Singla DK, Sonkar MD, Thami G, Agrawal N. An unusual case of small bowel perforation due to ingestion of foreign body. *Int. J. Pharm. Med. Res.*, 2014;2(1):5-7.
- viii. Litovitz T., Schmitz BF., Ingestion of cylindrical and button batteries: an analysis of 2382 cases, *Pediatrics* 1992; 89 (4 Pt2):747-57.
- ix. Steenvoorde P., Moues CM., Viersma JH., Gastric perforation due to the ingestion of a hollow toothpick: report of a case, *Surg Today* 2002;32:731-3.
- x. Hsu SD., Chan DC., Liu YC., Small-bowel perforation caused by fish bone, *World J Gastroenterol* 2005;11:1884-5.
- xi. Nagaraj HS., Sunil I., Multiple foreign body ingestion and ileal perforation, *Pediatr Surg Int* 2005;21:718-20.
- xii. Bhatia R., Deane AJ., Landham P., Schulte KM., An unusual case of bowel perforation due to fish fin ingestion, *Int J Clin Pract* 2006;60:229-31.
- xiii. Rodríguez-Hermosa JJ., Codina-Cazador A., Sirvent JM., Martín A et al., Surgically treated perforations of the gastrointestinal tract caused by ingested foreign bodies, *Colorectal Disease* 2012;10(7):701-707.
- xiv. Velitchkov NG., Grigorov GI., Losanoff JE., Kjossev KT., Ingested Foreign Bodies of the Gastrointestinal Tract: Retrospective Analysis of 542 Cases, *World J Surg* 2005; 20:1001-1996.
- xv. Cash DJ., Sadat MM., Abu-Own AS., Anorectal abscess and fistula caused by an ingested chicken bone, *Am J Gastroenterol* 2004; 99:1617-8
- xvi. Pinero Madrona A., Fernández Hernández JA., Carrasco Prats et al., Intestinal perforation by foreign bodies, *Eur J Surg* 2000;166:307-9.
- xvii. Yao CC., Yang CC., Liew SC., Lin CS., Small bowel perforation caused by a sharp bone: laparoscopic diagnosis and treatment, *Surg Laparosc Endosc Percutan Tech.*, 1999; 9(3):226-7.
- xviii. Nylund K., Odegaard S., Hausken T., et al., Sonography of the small intestine, *World JGastroenterol* 2009; 15:1319–1330.
- xix. Chau WK., Wu SSM., Wang JY., Ultrasonic detection of an intraabdominal Foreignbody, *J Clin Ultrasound* 1985; 13:130–131.
- xx. Matricardi L., Lovati R., Intestinal perforation by a foreign body: diagnostic Usefulness of ultrasonography, *J Clin Ultrasound* 1992; 20:194–196.
- xxi. Rioux M., Langis P., Sonographic detection of clinically unsuspected swallowed toothpicks and their gastrointestinal complications, *J Clin Ultrasound* 1994; 22:483–490.
- xxii. Coulier B., Tancredi MH., Ramboux A., Spiral CT and multidetector-row CT diagnosis of perforation of the small intestine caused by ingested foreign bodies, *Eur Radiol* 2004; 14:1918–1925.

- xxiii. Gonzalez JG., Gonzalez RR., Patino JV., Garcia AT., Alvarez CP., Pedrosa GSA., CT findings in gastrointestinal perforation by ingested fish bones, *J Comput Assist Tomogr* 1988;12:88–90.
- xxiv. Winchmann MW, Huttel TP, Billing Ajauch KW: laparoscopic management of small bowel perforation caused by a toothpick, *Surgical Endoscopy*, 2004; 18:718.
- xxv. Pavlidis TE, Marakis GN, Triantafyllou A, Psarras K, Kontoulis TM, Sakantamis AK. Management of ingested foreign bodies. How justifiable is a waiting policy? *Surg Laparosc Endosc Percutan Tech*. 2008;18(3):286-7.
- xxvi. Eisen GM, Baron TH, Dominitz JA, Feigel DO, Goldstein JL, Johansson JF et al. Guideline for the management of ingested foreign bodies. *Gastrointest Endosc*. 2002;55(7):802-6.
- xxvii. Jackson CL. Foreign bodies in the esophagus. *Am J Surg*. 1957;93(2):308-12.
- xxviii. Baraka A, Bikhazi G. Oesophageal foreign bodies. *Br Med J*. 1975;1(5957):561-3.
- xxix. Nandi P, Ong GB. Foreign body in the oesophagus: review of 2394 cases. *Br J Surg*. 1978;65(1):5-9.
- xxx. Clerf LH. Foreign bodies in the air and food passages: observations on end-results in a series of nine hundred and fifty cases. *Surg Gynecol Obstet*. 1940;70:328-39.
- xxxi. Barros JL, Caballero A Jr, Rueda JC, Monturiol JM. Foreign body ingestion: management of 167 cases. *World J Surg*. 1991; 15(6):783-8.
- xxxii. Blaho KE, Merigian KS, Winbery SL, Park LJ, Cockrell M. Foreign body ingestion in the Emergency Department: case reports and review of treatment. *J Emerg Med*. 1998;16(1):21-6.
- xxxiii. Murshid KR, Khairy GE. Laparoscopic removal of a foreign body from the intestine. *J R Coll Surg Edinb*. 1998;43(2):109-11.
- xxxiv. Akhtar S, McElvanna N, Gardiner KR, Irwin ST. Bowel perforation caused by swallowed chicken bones -a case series. *Ulster Med J*. 2007;76(1):37-38.
- xxxv. Moreira CA, Wongpakdee S, Gennaro AR. A foreign body (chicken bone) in the rectum causing extensive perirectal and scrotal abscess: report of a case. *Dis Colon Rectum*. 1975;18(5):407-9.
- xxxvi. Singh RP, Gardner JA. Perforation of the sigmoid colon by swallowed chicken bone: case reports and review of literature. *Int Surg*. 1981;66(2):181-3.
- xxxvii. Yeung KW, Chang MS, Hsiao CP, Huang JF. CT evaluation of gastrointestinal tract perforation. *Clin Imaging*. 2004;28(5):329-33.
- xxxviii. Brady PG. Endoscopic removal of foreign bodies. *Therapeutic Gastrointestinal Endoscopy*. 1985;85:67-93.