MHA MEDIHEALTH ACADEMY

Surgery on Children

Case Report

doi:10.51271/SOC-0024

Suspecting the unsuspected: spontaneous colonic perforation in healthy children

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Received: 13/06/2024 ◆ **Accepted**: 01/10/2024 ◆ **Published**: 05/12/2024

Cite this article: Al Zahra F, Gunasekar S, Sibyan H. Suspecting the unsuspected: spontaneous colonic perforation in healthy children. *Surg Child.* 2024;1(4):105-107.

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ABSTRACT

Colonic perforation is a notorious entity in surgical domain attributing to high morbidity and mortality. Luckily enough this is a rare and sporadic event in pediatric patients, specifically when it comes to spontaneous idiopathic type. The neonates are known to have colonic perforations due to certain known conditions like Hirschsprung's disease, necrotizing enterocolitis, anorectal malformation, meconium ileus and atresia. Beyond infancy the incidence of spontaneous colonic perforations has a steep decline owing to diminution of congenital and developmental causes. In this case report we bring forth a case that we encountered as an acute abdomen secondary to idiopathic colonic perforation.

Keywords: Colonic, child, spontaneous, perforation

INTRODUCTION

Gastrointestinal tract is prone to perforation in events of distension, ischemia, volvulus, or a disease setting that may render the circumferential layers susceptible for thinning out. The cause and effect relationship is constant and sporadic events of perforation probe the investigator to look deeper into underlying reason. These causes include previous enterocolitis, Hirschsprung disease, swallowed foreign bodies, focal intestinal perforations, and distension tears due to atresia, especially in preterm infants.[1] Most cases are clearly related to necrotizing enterocolitis, but some have no symptoms or clinical findings. Interestingly, the regions where most idiopathic perforations are located are the flexures.[1] Biopsy examinations are important in these patients because Hirschsprung's disease may be one of the causes of perforation.

The case here needs mention as there was no disease process or trauma that may have attributed to development of pneumoperitoneum. The diarrhea was the effect not the cause. It wasn't severe or copious and was indirect depiction of peritoneal irritability with mild collection progressing gradually. The child developed a concerning condition without any background setting of disease or trauma that is rather rare in the given age group.

CASE

A 2-years-old female patient presented with 4 days' history of diarrhea, low grade fever, non-bilious vomiting. According to mother patient had no previously known condition. The patient was born at term, and was doing fine till she developed episodes of diarrhea which was mild in form of loose stool, subsequently she experienced vomiting, 2-3 in frequency and non-bilious. In mean time she developed a continuous low grade fever and she had been taking medication for fever when she presented in hospital. On day of presentation to hospital child had developed abdominal pain and fullness without obvious distension. On arrival child was hemodynamically stable but in agony with grunting. There was moderate dehydration owing to diarrhea and decreased intake. Abdominal review demonstrated guarding and tenderness in all quadrants, abdomen was minimally distended but no evidence of any bruising or collection. Inguinal regions were also normal.

On arrival her blood labs revealed normal hemoglobin of 13.3 g/dl. Platelets were normal and WBC was minimally deranged to 3.65. Serum biochemistry and liver function tests were normal with creatinine deranged due to dehydration. Urgent X-ray sought that revealed pneumoperitoneum on lateral X-ray that was supplemented with computed tomography (CT) scan. Alongside patient was resuscitated with intravenous fluids with initial bolus and later on with maintenance and antibiotics. CT scan findings revealed pneumoperitoneum with minimal collection around ascending colon and diffuse small bowel thickening. Urgent laparotomy planned and parents briefed about the possible outcomes of celiotomy; stoma formation, resection anastomosis, long term morbidity etc.

Blood was arranged and patient was shifted to operating theater. On review whole of the gut from dudenojejunal junction till rectum was intact and normal with no erythema except for a solitary punched out perforation encountered in ascending colon adjacent to hepatic flexure. The diffuse bowel thickening mentioned in CT report couldn't be appreciated and correlated per operatively. No evidence of any local chronic disease, no enlarged lymph nodes. The margins were refreshed and primarily repaired in two layers. Thorough lavage was done to attenuate contamination. Patient was kept in PICU and antibiotics were upgraded postoperatively from ceftriaxone and metronidazole to vancomycin, ceftriaxone and metronidazole. She was rendered non per oral till bowel movements established on bowel auscultation. The culture report came back as positive for pseudomonas for which antibiotics were changed to merepenem that showed promising sensitivity. On regular course of recovery patient was discharged in 3 days with no active complaint. The patient was examined in outpatient clinics and on follow-up evaluation; the patients had a healthy healing wound and soft non tender abdomen.

Pathology examination revealed margins resected from the perforation and the examined sections reveal fibromuscular tissue with heavy infiltration by inflammatory cells rich in neutrophils. The lining mucosa is totally ulcerated with neutrophils and fibrin deposition.

DISCUSSION

Neonates are more prone to perforation due to developmental conditions that may lead to aberrant dynamics of gut transit, commonly encountered neonatal conditions are Hirschsprung's disease and necrotizing enterocolitis.[2] Older children also pose a risk but are less frequent as compared to aforementioned.[2] Children without preceding history of any disease or trauma are rarely encountered with perforation more so in colonic region that is more capacious and adaptable with slow transit and formed and lessened bulk as compared to small bowel. In cohort studies, it has been determined that the problem causes perforation regardless of the part of the gastrointestinal tract for three basic reasons: birth under 1,000 grams, premature birth, and use of mechanical ventilation.[1] Additionally, Hirschsprung disease was detected in all patients with colon perforation.

The colonic perforation may be of two types; stercoral being strongly associated with constipation, is even rarer in juvenile as compared to idiopathic type.[3] The classification doesn't give much insight into disease process that remains a mystery. No pathophysiology can be associated with idiopathic perforation though some studies have showed an indirect link of over usage of NSAIDs in such patients because of fever or pain. The excess usage of NSAIDs has a more pronounced link with elderly patients having diverticula but the association has been suspected in Pediatric age group as well.[4] The enteric coated or slow release forms are riskier as they bypass stomach increasing contact time with colon but their use isn't in pediatric age group. Other reason could be frequent dosage, and the inhibition of prostaglandin mediators leading to susceptibility of gut mucosa.[5] Having said that it remains one of the postulations in idiopathic colonic perforations and not taken as concrete evidence.

Histopathological assessment of such patients is more significantly suggesting acute inflammation and neutrophilic infiltration instead of ischemic changes or chronic conditions. Similar condition was found in our patient with marked neutrophilic infiltration.

The delay may lead to gross fecal contamination and sepsis that can increase morbidity and mortality many folds. The key is to be vigilant in this subset of patients where there is no obvious differential diagnosis presenting with minimal abdominal findings. As it may be earlier presentation in emergency due to pain and not having developed full blown abdominal distention characteristic of perforation. The learning curve for minimally invasive exploration is high and with gross contamination and hemodynamic instability seen in such patients it remains an inferior approach though a subset of surgeons belong to other school of thought preferring minimally invasive surgery.[6]

The rarity of this condition mandates mention so correlation with different centers and experiences may yield a better understanding of the condition and contribute to evidence based practice.

In our case, the reason of intestinal perforation is unknown. One known cause that could support the reason of perforation could be severe diarrhea or obstruction leading to substantial gaseous distension impinging on anchoring sides of colon. Studies about the effect of *Pseudomonas* on bowel perforations especially for necrotizing enterocolitis have not been proved yet.[7] Another disease condition common to children in this age group are inflammatory bowel disease but here there wasn't any evidence of any complaint prior to this and that too if present has other squeal like stricture, fistula, abcess or granuloma formation instead of perforation except in instances of toxic megacolon that may sometimes accompany advanced stages of ulcerative colitis. A Meckel's diverticulum may also lead to kink and obstruction but usually with a noticeably sized Meckel's diverticula there is association of ectopic mucosa with history of occult or gross hematochezia. In this case the cause remained truly idiopathic.

CONCLUSION

Intestinal perforations in infancy mainly occur on occasions that the patients had suffered previously. Some of perforations were predisposed by reasons like premature or very low birth weight. Idiopathic spontaneous perforations must not be underestimated. Diagnosis of a spontaneous perforation needs careful examination and evaluation protocols.

ETHICAL DECLARATIONS

Informed Consent

Written informed consent was obtained from the patient's parents.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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