

# Appendicular Tourniquet: A Cause of Intestinal Obstruction

PRASHANTH BASAPPA CHOWDARY<sup>1</sup>, SANTHOSH CHIKKANAYAKANAHALLI SHIVASHANKAR<sup>2</sup>, RAJASHEKARA BABU GANGAPPA<sup>3</sup>, EDISON VADAKKENCHERY VARGHESE<sup>4</sup>

## ABSTRACT

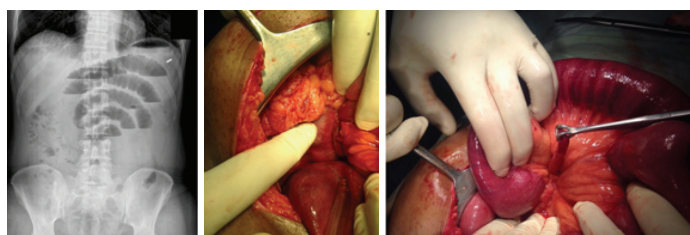
Intestinal obstruction is one of the common surgical emergencies seen in daily practice. Postoperative adhesions are notorious for being the most common cause for intestinal obstruction. Occasionally, laparotomy findings do come as a surprise to surgeons. Here one such case is discussed. A patient was operated on with suspicion of intestinal obstruction secondary to postoperative adhesions. However, laparotomy revealed the appendix to be inflamed, curled around the terminal ileum and acting as a tourniquet.

**Keywords:** Appendix, Emergencies, Laparotomy

## CASE REPORT

A 73-year-old male patient presented to the casualty with history of pain abdomen since 3 days, abdominal distension, inability to pass flatus and vomiting since 2 days and fever since 1 day. Patient had history of surgery 6 years ago. He had undergone a laparotomy for drainage of appendicular abscess. However, patient was unsure whether an appendectomy was done and there were no records of previous surgery. No other significant history could be elicited. On examination, patient was tachycardic, tachypnoeic and mildly dehydrated. Patient's abdomen was distended and there was a right paramedian and drain scar in the right iliac fossa. His bowel sounds were exaggerated. Ryle's tube was inserted and aspirate had feculent material. Patient was resuscitated with intravenous fluids and routine investigations were sent. Patient's erect abdominal X-ray had multiple air-fluid levels and features were suggestive of small bowel obstruction [Table/Fig-1]. Ultrasound of the abdomen showed dilated small bowel loops with to and fro motion and appendix could not be visualized. With a preoperative diagnosis of small bowel obstruction secondary to postoperative adhesions, patient was posted for an exploratory laparotomy after taking an informed and written consent. Intraoperatively, no significant adhesions were found but the appendix was inflamed and had curled around the terminal ileum. The appendix was acting as a tourniquet around the terminal ileum about 8-10 cm from the ileocaecal junction and was causing the obstruction [Table/Fig-2,3]. Appendectomy and a mid-ileal enterotomy to empty the small bowel content were performed. Postoperatively, the patient recovered well and was sent home six days after surgery.

Histopathological examination of the specimen revealed confluent mucosal ulceration and replacement of the mucosal layer by purulent debris. There was a transmural inflammation noted consisting of neutrophils and occasional eosinophils. These microscopic findings confirmed the intraoperative finding of acute appendicitis.



**[Table/Fig-1]:** Erect X-ray of the patient showing multiple air-fluid levels suggesting small bowel obstruction. **[Table/Fig-2]:** Intraoperative image of the appendicular tourniquet that has formed around the terminal ileum. **[Table/Fig-3]:** Intraoperative image of the inflamed appendix after the tourniquet has been released.

## DISCUSSION

Appendectomy done for acute appendicitis is the most common surgery done on an emergency basis [1]. Appendicitis is known to have a bimodal incidence with one peak in adolescence and another peak in older aged patients [2]. Presentation and diagnosis of acute appendicitis in younger patient's is relatively straight forward. However, this is not the case in older patients. Diagnosing acute appendicitis in older patients is harder due to varied presentations. And consequently there is delay in treatment, which is a major deleterious factor that influences outcome in these patients.

Small bowel obstruction secondary to an appendicular pathology is usually due to appendicitis causing small bowel ileus, an appendicular tumour, appendicular perforation or abscess formation [3]. Inflammation of the appendix causing small bowel obstruction secondary to formation of a tourniquet is extremely rare and only a few cases have been reported in literature [2-14]. An appendicular tourniquet causes mechanical obstruction of the bowel in contrast to other appendicular pathologies, which are seen as small bowel obstruction secondary to ileus.

Diagnosis of small bowel obstruction secondary to an appendicular tourniquet preoperatively is challenging, as it is extremely rare. Diagnosing this condition will not be possible on abdominal X-rays or ultrasound of the abdomen. Computed Tomography (CT) with contrast of the abdomen and pelvis might give some clue with regard to the cause for obstruction. The transition point between dilated and collapsed bowel will be noted and an experienced radiologist might be able to note the appendicular tourniquet at the transition point. Sensitivity, specificity and accuracy of CT in the diagnosis of small bowel strangulation was reported as 83%, 93% and 91% respectively by Balthazar et al., [11]. CT is recommended for the evaluation of patients with suspected bowel obstruction, when clinical, biochemical and X-rays show vague findings [2]. However obtaining a diagnosis of an appendicular tourniquet on CECT is going to be a challenge.

The authors opine that even if a pre-operative diagnosis of an appendicular tourniquet has been made, it is better to start the surgery with a midline laparotomy incision rather than a Gridiron or a Lanz incision. This is because delivery of the bowel will be easier using a laparotomy incision. Also, other more common causes of small bowel obstruction can be easily ruled out. The surgery performed will be based on the intraoperative findings. In case the bowel appears healthy and only the appendix is inflamed and has formed a tourniquet, an appendectomy might suffice. In our case,

since the proximal small bowel was grossly dilated, the operating surgeon decided to perform an enterotomy to decompress the bowel. However, if the appendicular tourniquet is associated with gangrene of the bowel, resection and anastomosis of the bowel might be required depending on the extent of bowel involved.

Prompt surgery in such patients is absolutely essential as the prognosis is poor with delay in treatment. The appendicular tourniquet compresses on the small bowel and may cause gangrene of the bowel if surgery is delayed.

The authors would like to emphasize that this is a very rare condition. Only a handful of cases with such a diagnosis have been reported in literature. We found that only 15 other cases of appendicular tourniquet causing intestinal obstruction have been described [Table/Fig-4].

## CONCLUSION

Intestinal obstruction, although common, can have surprising intraoperative findings. Appendix forming a tourniquet around the terminal ileum, a remote cause of intestinal obstruction qualifies as one such finding. This finding intraoperatively can come as a surprise to a novice surgeon and hence knowledge about such rare causes can help in successful management of patients.

**Consent:** The patient has given his consent for this report to be published.

## ACKNOWLEDGEMENTS

We thank all staff employed at Victoria Hospital who were involved in treating and caring for this patient.

Serial number	Author	Year	Sex	Age (years)	Duration of symptoms (days)	Symptoms	Operative findings	Surgery	Outcome
1	Naumon [4]	1963	M	58	1	Epigastric abdominal pain, vomiting, constipation	Loop of appendix around a 70 cm section of strangulated non-viable small bowel	Appendectomy and small bowel resection	Died 6-day postoperative from sepsis
2	Naumon [4]	1963	M	45	1	Lower abdominal pain, pyrexia	Appendix forming a loop round 30 cm of viable small bowel	Appendectomy	Cured
3	Srinivasam M [5]	1964	F	40	12	Colicky abdominal pain, vomiting, constipation	Strangulated but viable loop of small bowel constricted by the appendix that had completely encircled the base of the bowel loop	Right hemicolectomy including the strangulated but viable small bowel as the appendix could not be freed from the bowel wall	Cured
4	Paliwal and Singh [6]	1969	F	42	4	Abdominal pain, vomiting, constipation	Loop of ileum encircled by the appendix with bulbous tip adherent to descending colon	Retrograde appendectomy	Cured
5	Gupta and Vaidya [7]	1969	M	15	2	Abdominal pain, vomiting, distension, constipation	Long inflamed appendix winding round the strangulated terminal ileum	Resection of ileocaecal region	Cured
6	Gupta and Vaidya [7]	1969	M	65	13	Generalised abdominal peritonism, dehydration, vomiting, oliguria	Inflamed appendix ensnaring a loop of gangrenous terminal ileum with two perforations	Ileocaecal resection	Cured
7	Bose and Talwar [8]	1973	M	50	1-2	Colicky abdominal pain, vomiting, absolute constipation	Inflamed appendix with distal half wrapped around and encircling a loop of terminal ileum strangulating 5-feet of small bowel	Retrograde appendectomy and small bowel resection	Not stated
8	Bose and Talwar [8]	1973	M	35	1	Right sided abdominal pain, vomiting	Inflamed appendix encircling a loop of ileum causing mechanical obstruction and strangulation of the gut	Retrograde appendectomy	Not stated
9	Ivoulosou and Agounkagou [9]	1996	M	22	1	Severe abdominal pain, nausea, vomiting, constipation	Appendix rolled up around the terminal ileum resulting in obstruction and strangulation of the terminal ileum	Retrograde appendectomy and small bowel resection	Not stated
10	Assenza et al., [2]	2005	F	78	1	Severe crampy abdominal pain, vomiting, diarrhoea	Inflamed appendix completely wrapped around the last loop of ileum leading to nonviable strangulated bowel	Ileocaecal resection	Well 1-month postoperative
11	O'Donnell ME [3]	2006	F	86	3	Generalised abdominal pain, vomiting	Appendix acting as a tourniquet around 2- loops of terminal ileum resulting in strangulated non-viable small bowel	Retrograde appendectomy and small bowel resection	Well 19-months postoperative
12	Bhandari L et al., [10]	2009	M	24	7	Abdominal pain, fever, vomiting, constipation	Strangulated ileal segment by a band composed of inflamed appendix and omentum running from caecum to ileum.	Release of band and appendectomy	Well 90 days postoperatively
13	Chatterjee C et al., [12]	2013	M	26	3	Abdominal pain, bilious vomiting, obstipation, abdominal distension	Inflamed appendix was adherent to the terminal part of ileum forming a ring like structure with herniation of terminal 60 cm of ileum through the ring. The entrapped ileal segment was found to be gangrenous.	Segmental ileocolic resection including the gangrenous ileal segment and ileocolic (end to end) anastomosis was done.	Not stated
14	Altintoprak F et al., [13]	2014	M	42	2	Abdominal pain, abdominal distension, vomiting	Inflamed long appendix wrapped around the ileum and mesentery like a napkin-ring and adhered to the caecum.	Appendectomy	Not stated
15	Awale L et al., [14]	2015	M	20	3	Generalized colicky pain abdomen, abdominal distension, bilious vomiting, obstipation	A phlegmonous appendix had formed a constricting ring around the terminal ileum with its tip adherent to the root of mesentery obstructing an edematous loop of terminal ileum without signs of ischemia	Appendectomy	Well 2 months postoperatively
16	Current report Chowdary PB et al.,	2015	M	73	3	Pain abdomen, abdominal distension, constipation, vomiting, fever	Appendix had formed a tourniquet around the terminal ileum	Appendectomy	Well 1 month postoperatively

[Table/Fig-4]: List of all reported cases of appendicular tourniquet causing small bowel obstruction.

## REFERENCES

- [1] Hagos M. Acute Abdomen in Adults: A two year experience in Mekelle, Ethiopia. *Ethiop Med J.* 2015;53(1):19-24.
- [2] Assenza M, Ricci G, Bartolucci P, Modini C. Mechanical small bowel obstruction due to an inflamed appendix wrapping around the last loop of ileum. *G Chir.* 2005;26(6-7):261-66.
- [3] O'Donnell ME, Sharif MA, O'Kane A, Spence RA. Small bowel obstruction secondary to an appendiceal tourniquet. *Ir J Med Sci.* 2009;178(1):101-05.
- [4] Naumov ID. 2 cases of strangulation of the small intestine in the loop of the vermiform appendix. *Khirurgija (Mosk).* 1963;39:130-32.
- [5] Srinivasan M. Intestinal obstruction caused by a long appendix ensnaring a loop of ileum. *J Indian Med Assoc.* 1964;43:400-01.
- [6] Paliwal YD, Singh RP. An unusual complication of appendix (intestinal obstruction)-case report. *Indian J Surg.* 1969;31:288.
- [7] Gupta S, Vaidya MP. Mechanical small bowel obstruction caused by acute appendicitis. *Am Surg.* 1969;35:670-74.
- [8] Bose SM, Talwar BL. Appendicitis causing acute intestinal obstruction with strangulation. *Aust NZ J Surg.* 1973;43:56-57.
- [9] Ivoulso DP, Agounkagou M. Uncasd'occlusion du grelesur strangulation par appendicevermiculare. *Med Trop.* 1996;56:413-14.
- [10] Laxminarayan Bhandari, PG Mohandas. Appendicitis as a cause of intestinal strangulation: a case report and review. *World J Emerg Surg.* 2009;4:34.
- [11] Balthazar EJ, Liebeskind ME, Macari M. Intestinal ischemia in patients whom small bowel obstruction is suspected: evaluation of accuracy, limitations, and clinical implications of CT in diagnosis. *Radiology.* 1997;205(2):519-22.
- [12] Chatterjee C, Dash S, Gupta S, Ghosh S. Appendiceal knotting causing small bowel strangulation. *J Res Med Sci.* 2014;19(10):1016-17.
- [13] Altintoprak F, Dikicier E, Çakmak G, Yalkın O, Akbulut G, Dilek ON. Acute appendicitis presenting with small intestinal obstruction findings - 2 cases report. *Sakarya Med J.* 2014;4(2):89-92.
- [14] Awale L, Joshi BR, Rajbanshi S, Adhikary S. Appendiceal tie syndrome: A very rare complication of a common disease. *World J Gastrointest Surg.* 2015;7(4):67-70.

### PARTICULARS OF CONTRIBUTORS:

1. Resident, Department of General Surgery, Bangalore Medical College and Research Institute, Bangalore, Karnataka, India.
2. Assistant Professor, Department of General Surgery, Bangalore Medical College and Research Institute, Bangalore, Karnataka, India.
3. Associate Professor, Department of General Surgery, Bangalore Medical College and Research Institute, Bangalore, Karnataka, India.
4. Resident, Department of General Surgery, Bangalore Medical College and Research Institute, Bangalore, Karnataka, India.

### NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Prashanth Basappa Chowdary,  
Resident, Department of General Surgery, Bangalore Medical College and Research Institute,  
Fort, KR Road, Bangalore – 560002, Karnataka, India.  
E-mail: prashanth.chowdary@outlook.com

Date of Submission: **Jan 17, 2016**

Date of Peer Review: **Mar 08, 2016**

Date of Acceptance: **Mar 22, 2016**

Date of Publishing: **May 01, 2016**

FINANCIAL OR OTHER COMPETING INTERESTS: None.