

Malrotation of Small Bowel with Midgut Volvulus in a COVID-19 Positive Young Male: A Rare Case Report

AJAY KUMAR PAL¹, AMIT KARNIK², AGASTYA MARIA³, AWANISH KUMAR⁴, HARVINDER SINGH PAHWA⁵



ABSTRACT

Malrotation of small bowel with midgut volvulus has a very low incidence of 0.2% in adults. Symptomatic malrotation in neonates occur in one in 6000 live births. The normal 270 degrees counter-clockwise gut rotation around the axis of superior mesenteric artery is absent in such cases. A 20-year-old male presented with intermittent colicky abdominal pain since four to five months, post-prandial bilious vomiting since one week and obstipation since two days. He also had difficulty breathing since two days. Abdominal examination revealed vague lump in right lower abdomen with no signs of peritonitis. Radiological investigations Ultrasonography (USG) and Contrast Enhanced Computed Tomography (CECT) abdomen demonstrated over distended stomach with dilated D1 and D2 showing changes in relation to superior mesenteric artery and superior mesenteric vein with rotation of mesentery in whirlpool pattern. His Reverse Transcriptase-Polymerase Chain Reaction Test (RT-PCR) was positive for Coronavirus Disease-2019 (COVID-19). Conservative trial for two days was followed by surgical exploration which revealed gut malrotation with mid-gut volvulus. Ladd's procedure was performed. Malrotation with midgut volvulus is an acute surgical emergency that demands high index of suspicion in an adult. Associated COVID-19 pneumonia can increase mortality. Patient was followed-up after three weeks with fruitful results, proving that an early diagnosis and definitive surgical correction of malrotation with midgut volvulus is essential.

Keywords: Congenital obstruction, Coronavirus disease-2019, Ladd's band, Small bowel obstruction

CASE REPORT

A 20-year-old male presented with intermittent colicky abdominal pain since four to five months, post-prandial bilious vomiting since one week and obstipation since two days in the Department of General Surgery.

He had similar episodes of colicky mid-abdominal pain over last few years and pain subsided on its own or after taking over the counter analgesic tablets after two or three hours. Patient was febrile, had dry cough, malaise and body ache since four days owing to COVID-19. On examination, he had fair general condition with pulse rate: 96 beats/min; blood pressure 128/68 mm of Hg, respiratory rate of 22/min and SpO₂ 98% on room air. He was thin built with scaphoid abdomen. On physical examination, there was ill-defined abdominal mass in right hypochondriac and lumbar fossa and sluggish bowel sounds with no signs of peritonitis.

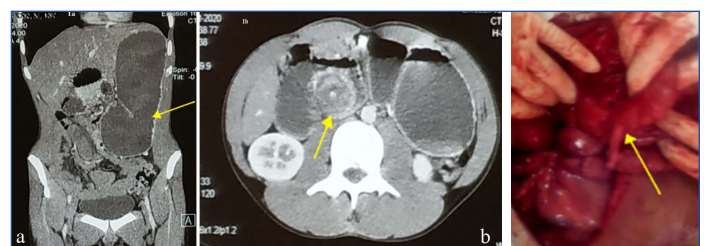
His investigations revealed C-reactive protein of 51.4 mg/L (<0.3), D-dimer levels of 0.30 micrograms/mL (0-6), fibrinogen: 422 mg/dL (150-350), serum ferritin: 222 ng/mL (30-300), lactate dehydrogenase: 850 IU/L (240-480); RT-PCR test came out to be positive for COVID-19 on the day of admission during routine screening for COVID-19 in our institution. There was no H/O fever recently. Therefore, he was simultaneously advised vitamin C, paracetamol and multivitamin tablets and chest physiotherapy.

A USG whole abdomen suggested markedly dilated stomach and first part of duodenum with abnormal relationship of superior mesenteric artery and superior mesenteric vein with swirling motion of superior mesenteric vein around superior mesenteric artery.

A CECT whole abdomen suggested an over distended stomach [Table/Fig-1a] with dilated first and second part of duodenum and changes in Superior Mesenteric Artery (SMA) and Superior Mesenteric Vein (SMV) relation, rotation of mesentery in whirlpool pattern. Small bowel was seen predominately on right side and large bowel on left side [Table/Fig-1b]. The CECT thorax was suggestive of COVID-19 Reporting and Data System (CORADS)

6 according to Dutch radiology scoring system for COVID-19 [1].

Patient was initially given conservative treatment for 24 hours with nasogastric decompression, intravenous fluids, broad spectrum antibiotics (intravenous ceftriaxone 1 gm twice daily and paracetamol 1 gm thrice daily). Since there was no symptomatic relief, an operative intervention was planned. Pre-operative anaesthetic work up for airway patency, co-morbidities, drug allergies, previous surgical and medical history was done. Induction of anaesthesia was done by general anaesthetists with inj. propofol 2 mg/kg body weight. Surgical exploration revealed presence of small bowel in right upper quadrant confirming gut malrotation. Midgut was rotated upon its mesentery showing volvulus. Numerous inter-bowel adhesions were present, 20 cm length of small bowel was ischaemic with no obvious gangrene. Ladd's procedure consisting of counter clockwise derotation of midgut volvulus with division of Ladd's bands followed by broadening of mesentery of proximal jejunum was done [2]. Generous adhesiolysis was done followed by repositioning of non rotated small bowel into abdomen. Caecum was placed in left lower quadrant after appendectomy [Table/Fig-2]. The affected small bowel was viable. Patient was shifted to COVID-19 Intensive Care Unit (ICU) after primary closure of abdomen.



[Table/Fig-1]: a) CECT showing Distended stomach (Arrow); b) CECT showing dilated first and second part of duodenum with changes in SMA and SMV relationship and rotation of mesentery in a whirlpool pattern (Arrow).

[Table/Fig-2]: Repositing of small bowel into abdomen and caecum (arrow) being placed in left lower quadrant after appendectomy. (Images from left to right).

Reversal of anaesthesia was done with inj. neostigmine 2 mg and glycopyrrolate 400 micrograms. The intraoperative and postoperative periods were uneventful. Patient was discharged on fifth postoperative day. Follow-up after two weeks showed full recovery and there was no pain or any other symptom.

DISCUSSION

The presentation of gut malrotation with midgut volvulus is uncommon in adult population with an incidence of 0.2% [3-5]. Since the presentation is usually subacute without peritonitis, a low pain threshold is required for timely diagnosis and prompt surgical management to preclude loss of entire midgut. Delay in diagnosis and management is associated with low survival rates and high morbidity due to lifetime dependence on Total Parenteral Nutrition (TPN) or need of small bowel transplantation [6]. Mortality and morbidity is bound to increase in patients with concomitant COVID-19 pneumonia. After proper resuscitation, a Ladd's procedure is the gold standard approach [2,7].

Malrotation occurs due to failure of normal 270 degrees anti-clockwise rotation of midgut around the axis of superior mesenteric artery in the first 10-12 weeks of embryonic period. This results in non fixation of small bowel to the ligament of Treitz and that of right colon to the right lower quadrant [8]. This leads to short mesenteric root, formation of interbowel adhesions and Ladd's band predisposing to obstruction. Midgut might rotate on its central axis causing volvulus [9].

In this report, the presentation was that of chronic intermittent pain in abdomen complicated by acute obstruction secondary to volvulus. Similarly Devlin HB et al., also reported chronic intermittent abdominal pain with post-prandial bloating and vomiting as major presenting symptoms in adults, while only 10-15% adults presented with acute obstruction [9]. Likewise Hsu SD et al., showed that adults with malrotation may present with varying symptoms ranging from acute obstruction to vague abdominal symptoms [10]. COVID-19 has its own morbidity in terms of respiratory complications following general anaesthesia which can adversely affect the surgical outcome.

Management depends on austerly of presentation and complications. Patients without acute volvulus are treated with elective Ladd's procedure however an emergency laparotomy is needed for acute volvulus after proper optimisation of haemodynamic compromise.

It is a five steps procedure via an open or laparoscopic approach:

Step 1: Assessment for volvulus with counter-clockwise detorsion if present.

Step 2: Division of Ladd's band (fibrous bands between cecum and duodenum).

Step 3: Division of inter-mesenteric bands,

Step 4: Appendectomy due to aberrant location of appendix to avoid future confusion about appendicitis.

Step 5: Placement of bowel in the corrected anatomic position. Overt gangrenous bowel mandates resection, however if viability is equivocal, relook laparotomy is recommended within 24-48 hours [10].

The conservative versus surgical management of incidental malrotation without volvulus is controversial due to lack of proper literature

because of low incidence in adults [11]. Durkin ET et al., showed that the outcome depends upon severity of presentation. Mortality in acute volvulus goes upto 25% with morbidity upto 60% [11]. There is 1-1.8% risk of recurrence of volvulus while a higher lifetime risk of small bowel obstruction [12]. Moreover acute abdomen in COVID patients has already become a diagnostic dilemma [13-15] and patients of midgut volvulus with similar abdominal symptoms may bear the risk of missing out on crucial timing of surgical management.

CONCLUSION(S)

Adult intestinal malrotation with volvulus has vague symptomatology hence it requires a high index of suspicion for proper diagnosis and timely management. Contrast Computerised Tomography (CT) scan and doppler ultrasound are helpful in early preoperative diagnosis showing typical whirlpool pattern of mesenteric rotation along superior mesenteric artery. Robust management guidelines in adult population with midgut malrotation are yet to be finalised but an acute volvulus needs prompt surgical intervention to preclude ischemia to entire small bowel, which includes anticlockwise detorsion, and intestinal resection in case of gangrene. This should be followed by Ladd's procedure.

REFERENCES

- [1] Prokop M, Van Everdingen W, van Rees Vellinga T, Quarles van Ufford H, Stöger L, Beenen L, et al. CO-RADS: a categorical CT assessment scheme for patients suspected of having COVID-19—definition and evaluation. *Radiology*. 2020;296(2):97-104.
- [2] Ladd WE. Congenital obstruction of the duodenum in children. *New England Journal of Medicine*. 1932;206(6):277-83.
- [3] Dietz DW, Walsh RM, Grundfest-Broniatowski S, Lavery IC, Fazio VW, Vogt DP. Intestinal malrotation. *Diseases of the Colon & Rectum*. 2002;45(10):1381-86.
- [4] Fung AT, Konkin DE, Kanji ZS. Malrotation with midgut volvulus in an adult: a case report and review of the literature. *Journal of surgical case reports*. 2017;2017(5):rjx081.
- [5] Faouzi N, Yosra BA, Said J, Soufiane G, Aouatef C, Rachid K, Beji C. Intestinal volvulus: Aetiology, morbidity and mortality in Tunisian children. *African Journal of Paediatric Surgery*. 2011;8(2):147.
- [6] Maxson RT, Franklin PA, Wagner CW. Malrotation in the older child: surgical management, treatment, and outcome. *The American surgeon*. 1995;61(2):135-38.
- [7] Torres AM, Ziegler MM. Malrotation of the intestine. *World Journal of Surgery*. 1993;17(3):326-31.
- [8] Peterson CM, Anderson JS, Hara AK, Carezza JW, Menias CO. Volvulus of the gastrointestinal tract: appearances at multimodality imaging. *Radiographics*. 2009;29(5):1281-93.
- [9] Devlin HB, Williams RS, Pierce JW. Presentation of midgut malrotation in adults. *British Medical Journal*. 1968;1(5595):803.
- [10] Hsu SD, Yu JC, Chou SJ, Hsieh HF, Chang TH, Liu YC. Midgut volvulus in an adult with congenital malrotation. *The American Journal of Surgery*. 2008;195(5):705-07.
- [11] Durkin ET, Lund DP, Shaaban AF, Schurr MJ, Weber SM. Age-related differences in diagnosis and morbidity of intestinal malrotation. *Journal of the American College of Surgeons*. 2008;206(4):658-63.
- [12] Fonkalsrud E. Rotational anomalies and volvulus. *Principles of Pediatric Surgery*. St. Louis: Mosby, 2003;477.
- [13] Hadi A, Werge M, Kristiansen KT, Pedersen UG, Karstensen JG, Novovic S, et al. Coronavirus disease-19 (COVID19) associated with severe acute pancreatitis: Case report on three family members. *Pancreatolgy*. 2020;20:665-67.
- [14] Ahmed AOE, Mohamed SF, Saleh AO, Al-Shokri SD, Ahmed K, Mohamed MFH. Acute abdomen-like-presentation associated with SARS-CoV-2 infection. *ID Cases*. 2020;21:e00895.
- [15] Saeed U, Sellevoll HB, Young VS, Sandbaek G, Glomsaker T, Mala T. Covid-19 may present with acute abdominal pain. *Br J Surg*. 2020;107:e186-87.

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Surgery, King George's Medical University, Lucknow, Uttar Pradesh, India.
2. Senior Resident, Department of Surgery, King George's Medical University, Lucknow, Uttar Pradesh, India.
3. Junior Resident, Department of Surgery, King George's Medical University, Lucknow, Uttar Pradesh, India.
4. Professor, Department of Surgery, King George's Medical University, Lucknow, Uttar Pradesh, India.
5. Professor, Department of Surgery, King George's Medical University, Lucknow, Uttar Pradesh, India.

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

Dr. Ajay Kumar Pal,
Department of Surgery, King George's Medical University, Lucknow, Uttar Pradesh, India.
E-mail: akpal.jnmc@yahoo.com

PLAGIARISM CHECKING METHODS: [Jan H et al.]

- Plagiarism X-checker: Apr 02, 2021
- Manual Googling: Aug 10, 2021
- iThenticate Software: Sep 14, 2021 (4%)

ETYMOLOGY: Author Origin

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Mar 31, 2021**

Date of Peer Review: **May 24, 2021**

Date of Acceptance: **Aug 11, 2021**

Date of Publishing: **Oct 01, 2021**