A Rare Case of Intestinal Malrotation in an adult Female and its Management

Vigneshkumar Palanisamy*, Marie Sim Johnston, Abdalla Elsabagh

St. John of God Murdoch Hospital, Australia

***Correspondence:** Vigneshkumar Palanisamy, MBBS, PGDipMedEd, St. John of God Murdoch Hospital, 1 Clayton st, Mildland, Western Australia

drvigneshkumar@outlook.com

Radiology Case. 2025 July; 19(7):1-8 :: DOI: 10.3941/jrcr.5777

AUTHORS CONTRIBUTION
VIGNESHKUMAR PALANISAMY: Primary author was responsible for the conception, design, data collection, imaging review, manuscript writing, and final approval of the submitted version.
MARIE SIM JOHNSTON: The Author helped with the manuscript writing, design.
ABDALLA ELSABAGH: The Author helped with data collection, imaging review, analysis.

ACKNOWLEDGEMENTS
None

DISCLOSURES
No

CONFLICT OF INTEREST
None declared.

INFORMED CONSENT
Obtained from patient.

HUMAN AND ANIMAL RIGHTS
Not applicable.

ABSTRACT

Intestinal malrotation is a rare congenital anomaly in adults and is more frequent over age 60. We report a 60-year-old woman with a long history of gastrointestinal symptoms who presented with sudden abdominal pain and constipation. CT imaging revealed malrotation without volvulus. A multidisciplinary team opted for a laparoscopic Ladd's procedure. During surgery, we found Ladd's bands compressing the duodenum and divided them. We straightened the duodenum, widened the mesentery and removed the appendix. The patient left the hospital with no complications. Clinicians should consider malrotation when adults report chronic, vague abdominal symptoms. Although surgeons often use Ladd's procedure in children, they rarely apply it in older patients. This case describes one of the first laparoscopic Ladd's procedures in a patient over 60. It shows that a minimally invasive approach can work in carefully chosen adult patients without bowel obstruction. The findings support further study of this technique in selected older patient populations.

CASE REPORT

BACKGROUND

Intestinal malrotation, though typically diagnosed in infancy, can occasionally remain silent until later adulthood. Intestinal malrotation is a congenital defect caused by abnormal rotation and fixation of the midgut during fetal development. By the 10th to 11th week of gestation, the midgut should rotate 270 degrees counterclockwise around the superior mesenteric artery (SMA) axis [1]. When this does not occur, several structural changes may result. These include the caecum lying to the left of the midline, the duodenojejunal junction located on the right, a narrow mesenteric base, and fibrous bands stretching from the caecum to the right abdominal wall [2]. These fibrous bands, called Ladd's bands, were first described by William E. Ladd in 1932. They can press on the duodenum and cause obstruction [3]. The standard treatment for malrotation is the Ladd's procedure, which corrects the abnormal anatomy and relieves the obstruction [4].

While the condition is well-recognised in the paediatric population with an estimated prevalence of 0.2% and 1% [2], its presentation in adulthood is exceedingly rare and about approximately two-thirds of cases are diagnosed within the first

year of life [5–7]. Adult presentations are frequently under-recognised due to the variability and chronicity of symptoms which often lead to misdiagnosis or attribution to functional or psychiatric conditions [8]. Intestinal malrotation is rarely diagnosed in adults and even less so in the elderly. Symptoms are often vague, leading to delayed recognition and treatment. A recent systematic review documented a limited number of reported cases in older patients, pointing to a clear gap in clinical awareness and the published literature [9]. Here we presented a rare and diagnostically complex case of intestinal malrotation in a 60-year-old female. The condition was confirmed during surgery and treated with a laparoscopic Ladd's procedure. To our knowledge, no prior reports have documented the use of this approach in patients of this age group. This case draws attention to the need for greater clinical suspicion of malrotation across all age groups when common causes of abdominal pain have been ruled out.

Significance

This case presents rare occurrence of intestinal malrotation in a 60-year-old, successfully treated with laparoscopic Ladd's procedure. We discuss about feasibility of minimally invasive surgery in older adults and the importance of considering congenital anomalies in differential diagnoses for chronic abdominal symptoms, even in late adulthood.

CASE REPORT

A 60-year-old female presented to an emergency service with a two-day history of abdominal pain, inability to pass stool and reduced passage of flatus. Her medical history includes rheumatoid arthritis managed with hydroxychloroquine, a transabdominal hysterectomy and a right-sided parathyroidectomy. She had undergone a routine colonoscopy without complication one year prior. She is a non-smoker and a social drinker who lives independently with her husband and holds a job as a shop assistant.

There was no family history of bowel cancer or known malrotations. On further questioning however, she described a lengthy history of personal and familial issues with her bowel habits. She recalls recurrent abdominal pain and spells of constipation as a child which would resolve prior to seeking medical attention.

Computerised tomography scan showed intestinal malrotation (small bowel on the right side and the colon on the left side) without evidence of volvulus or obstruction. The patient was admitted to the hospital and was planned for a laparoscopy with Ladd's procedure after the MDT discussion.

During them laparoscopy was performed there were multiple Lapp bands that were adhered to the duodenum, liver and retroperitoneum (Figure 1) causing an acute angulation along 2nd part of duodenum. After which the Lapp bands were divided, duodenum was straightened along with the caucarisation around the duodenum, widening of the mesentery up to its root and following which appendicectomy was performed. Finally the haemostasis was achieved and the orientation of the bowel was position as described. All of the small bowel was positioned to the left side of the abdominal cavity and the colon to the right of the abdominal cavity to avoid any malrotation in the future.

DISCUSSION

Intestinal malrotation is characterized by abnormal positioning of the intestines due to failure or incomplete rotation of the embryonic gut, resulting in a narrow mesenteric base that predisposes to volvulus and obstruction [10]. Although traditionally considered a pediatric condition, malrotation in adults is increasingly recognized, particularly in individuals aged 25–40 years. Nonetheless, it remains uncommon in those over 60 [9]. This age-specific rarity often delays diagnosis in older patients, contributing to increased risk of complications.

In infants, malrotation typically presents with sudden-onset bilious vomiting—an alarm symptom that triggers prompt investigation. In contrast, adults often experience vague, intermittent abdominal pain and occasional vomiting, symptoms that are easily misattributed to functional or benign causes [11,12]. The non-specificity of adult presentations frequently leads to diagnostic oversight, increasing the likelihood of volvulus, bowel ischemia, and associated morbidity and mortality [13].

The Ladd's procedure is the gold standard for treating malrotation, especially in cases complicated by volvulus or obstruction. The procedure involves four critical steps: (1) counterclockwise detorsion of the midgut, (2) division of Ladd's bands to relieve duodenal compression, (3) broadening of the mesenteric base to prevent recurrent volvulus, and (4) prophylactic appendicectomy to avoid future diagnostic confusion [14]. While both laparoscopic and open techniques are used, the latter remains the standard in emergencies or when there is concern for ischemia or gangrene [8]. In the present case, given the absence of acute obstruction, a laparoscopic approach was deemed suitable. Across existing literature, laparoscopic correction is consistently reported as the preferred approach in stable, non-obstructed patients [15]. However, almost all documented cases involve younger adults. Our report appears to be the first to describe a laparoscopic Ladd's procedure performed in a patient over 60. This underscores the need for greater awareness of adult malrotation and highlights that advanced age alone should not be considered a contraindication for minimally invasive correction.

Importantly, this case reinforces the necessity of including intestinal malrotation in the differential diagnosis for unexplained abdominal pain, particularly when chronic and unresponsive to standard treatment. The surgical outcome in our patient also supports the growing evidence that laparoscopic Ladd's procedure offers advantages such as reduced morbidity, shorter hospital stay, and faster recovery. That said, this assertion

remains tentative due to the paucity of high-quality, age-specific data. Further studies—particularly those involving older populations—are essential to validate the long-term efficacy and safety of laparoscopic approaches in this demographic.

CONCLUSION

This case shows that intestinal malrotation can occur in older adults and may present with chronic, vague symptoms. A laparoscopic Ladd's procedure led to a successful outcome in a 60-year-old woman, demonstrating that minimally invasive surgery is a safe option, even without signs of acute obstruction. Although rare, malrotation should remain on the differential diagnosis list for unexplained abdominal issues in adults. This report is the first to describe a laparoscopic approach in this age group and adds to existing evidence. Early recognition and a patient-centered surgical plan are key. More research is needed to guide care in similar cases.

TEACHING POINTS

- Always consider congenital anomalies in adult patients with chronic abdominal symptoms.
- Intestinal malrotation can present without volvulus or obstruction, even in the elderly.
- Laparoscopic Ladd's procedure is feasible and effective in selected older adults.
- Multidisciplinary planning optimizes outcomes.
- Early diagnosis reduces risk of complications.

QUESTIONS

Q1: What is intestinal malrotation, and how does it occur?

A1: Intestinal malrotation is a congenital anomaly caused by abnormal rotation and fixation of the midgut during embryogenesis. Normally, the midgut undergoes a 270-degree counterclockwise rotation around the SMA. When this process fails, it results in misplacement of the bowel and a narrow mesenteric base, predisposing to volvulus and obstruction.

Q2: Why is malrotation rarely diagnosed in adults?

A2: Adult presentations of malrotation are rare and often involve vague, chronic gastrointestinal symptoms. These are frequently misattributed to functional disorders, leading to delayed diagnosis unless advanced imaging is pursued.

Q3: What are Ladd's bands, and why are they significant?

A3: Ladd's bands are abnormal peritoneal fibrous bands that stretch from the malpositioned caecum to the right abdominal wall, often compressing the duodenum. They are a key pathological feature in malrotation and must be divided during surgical correction to relieve obstruction.

Q4: What is the Ladd's procedure, and what does it involve?

A4: The Ladd's procedure includes detorsion of the bowel (if volvulus is present), division of Ladd's bands, widening of the mesenteric base, and prophylactic appendicectomy. It reorients the intestines to reduce future risk of volvulus or obstruction.

Q5: Why was laparoscopy chosen in this 60-year-old patient?

A5: The absence of volvulus or ischemia made this patient a good candidate for laparoscopic surgery. Minimally invasive approaches offer reduced recovery time and morbidity, even though they are rarely reported in patients over 60.

Q6: Is it safe to perform laparoscopic Ladd's procedure in elderly patients?

A6: Based on this case and limited literature, laparoscopic Ladd's procedures can be safely performed in carefully selected elderly patients. More research is needed to confirm safety and efficacy in this demographic.

Q7: What is the rationale behind performing an appendicectomy during Ladd's procedure?

A7: Appendicectomy is performed prophylactically to avoid future diagnostic confusion, as the appendix is relocated to the left side post-reorientation.

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FIGURES

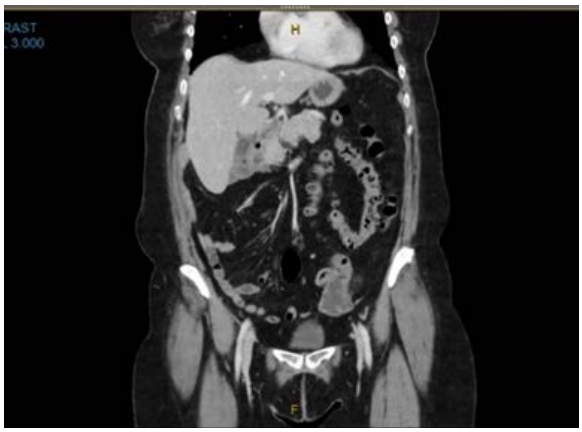

Figure 1: Left (Coronal View): Contrast-enhanced CT image in the coronal plane demonstrates an abnormal arrangement of bowel loops, with the small intestine predominantly located on the right side of the abdominal cavity and the large bowel positioned on the left. This configuration is consistent with intestinal malrotation. No evidence of volvulus or bowel obstruction is observed.

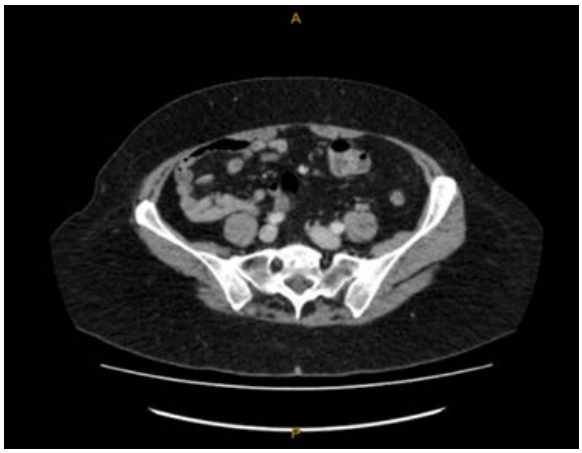

Figure 2: Right (Axial View): Axial CT image further supports the diagnosis of malrotation, showing the duodenum failing to cross the midline, and mesenteric vessels appearing in an atypical orientation. There is no radiological evidence of a whirl sign or bowel ischemia, ruling out acute midgut volvulus.

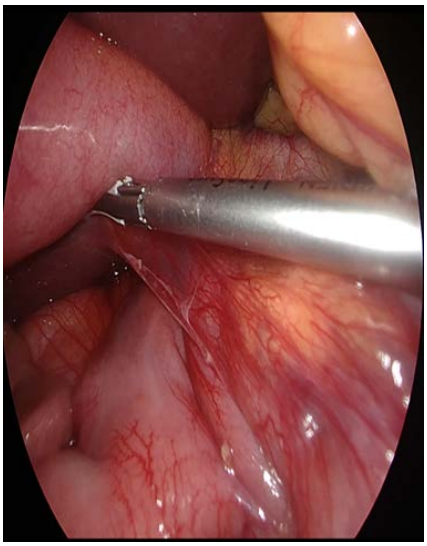

Figure 3: (Ladd's bands

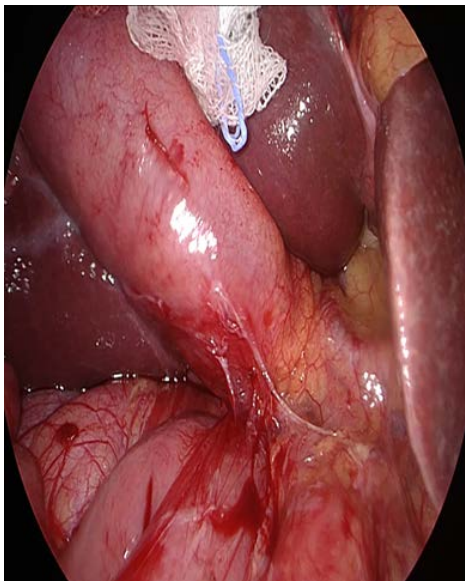

Figure 4: Bands posterior to the duodenum

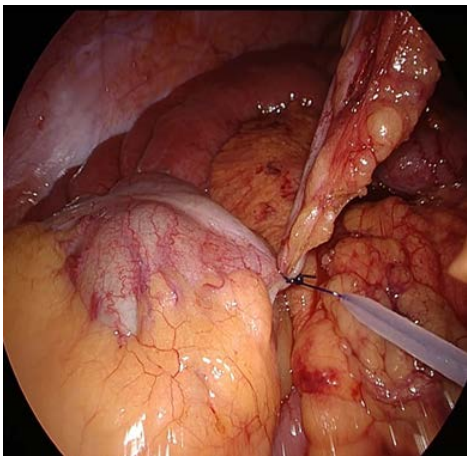

Figure 5: Appendicectomy

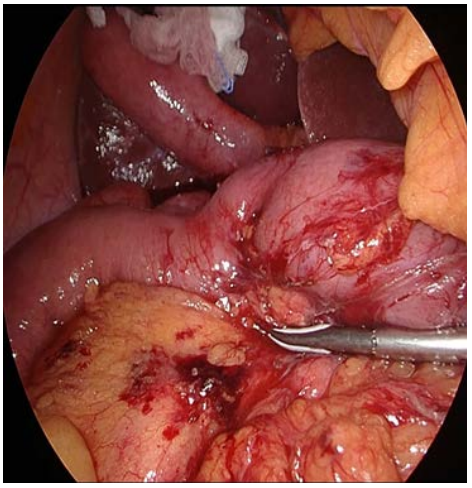

Figure 6: straightened duodenum post Ladd's band removal

Table 1: Summary Table: Intestinal Malrotation in Adults

Category	**Description**
Etiology	Congenital anomaly due to incomplete or abnormal rotation and fixation of the midgut around the superior mesenteric artery during embryogenesis.
Incidence	Rare in adults; prevalence in general population: 0.2–1%. Most cases diagnosed in infancy.
Gender Ratio	No clear gender predilection noted in adult cases.
Age Predilection	Primarily diagnosed in neonates; adult diagnosis extremely rare, particularly beyond age 60.
Risk Factors	Congenital condition; possible genetic predisposition. Family history of bowel anomalies (anecdotal); no established adult-specific risk factors.
Treatment	Ladd's procedure (division of Ladd's bands, duodenal straightening, mesenteric broadening, appendicectomy). Preferably laparoscopic in adults.
Prognosis	Good if diagnosed early and treated appropriately. Laparoscopic approach in adults associated with shorter recovery and reduced morbidity.
Findings on Imaging	CT: Small bowel on right, colon on left; abnormal mesenteric vessel orientation; absence of whirl sign or volvulus. Duodenum not crossing midline.

Table 2: Differential Diagnosis Table

Diagnosis	**X-Ray**	**US**	**CT**	**MRI - T1**	**MRI - T2**	**MRI - DWI**	**Contrast Pattern**	**Scintigraphy**	**PET Scan**
Intestinal Malrotation	Often nonspecific	May show abnormal bowel loops	Small bowel right-sided, colon left-sided; duodenum not crossing midline; abnormal SMA/SMV orientation	Variable	Variable	Limited use	Typically none or mild enhancement	Not routinely used	Not routinely used
Midgut Volvulus	May show "double bubble"	Whirlpool sign in SMA/SMV area	"Whirl sign"; twisted mesentery; signs of ischemia	Ischemic areas may appear hypointense	Hyperintense bowel wall if edema present	Restricted diffusion in ischemic areas	May show mucosal hyperenhancement if ischemia present	May show cold spots (ischemia)	May show increased uptake if inflamed
SMAS (SMA Syndrome)	Nonspecific gas patterns	Duodenal dilation proximal to compression	Dilated proximal duodenum with compression between SMA and aorta	Normal	Normal	Normal	Variable, possible delayed enhancement	Not used	Not used
Crohn's Disease	Thickened loops, obstruction signs	Bowel wall thickening, hyperemia	Skip lesions; terminal ileum involvement; fistulas; enhancement pattern	Mural thickening	Mural edema	Restricted in active disease	Layered or homogeneous enhancement of active segments	May show increased activity	Hypermetabolic areas in active disease
Small Bowel Obstruction	Dilated loops, air-fluid levels	Dilated loops with decreased peristalsis	Transition point; cause of obstruction (adhesion, band) visible	Wall thickening	Hyperintense fluid if present	May show stasis	Delayed, variable enhancement	Not used	Not typically useful
Internal Hernia	Nonspecific signs	May detect herniated loop	Clustered bowel loops; mesenteric vessel crowding/displacement	Variable	Fluid or edema if present	Possibly abnormal if strangulated	Heterogeneous if ischemic	Not used	Not used

ABBREVIATIONS

CT = COMPUTED TOMOGRAPHY
MDT = MULTIDISCIPLINARY TEAM
SMA = SUPERIOR MESENTERIC ARTERY
RA = RHEUMATOID ARTHRITIS
OR = OPERATING ROOM
H&P = HISTORY AND PHYSICAL

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