

## Case Report

# Unusual case of falciform ligament internal hernia in pregnancy

S. P. Rajesh<sup>1</sup>, Venkatesh Kasi Arunachalam<sup>1</sup>, Swathigha Selvaraj<sup>1</sup>, Pudhiavan Arunachalam<sup>1</sup>, Ganesan Ayyasamy<sup>2</sup>

Departments of <sup>1</sup>Radio-diagnosis and <sup>2</sup>General Surgery, Kovai Medical Center and Hospitals, Coimbatore, Tamil Nadu, India.

### \*Corresponding author:

Venkatesh Kasi Arunachalam,  
Department of Radio-diagnosis,  
Kovai Medical Center and  
Hospitals, Coimbatore,  
Tamil Nadu, India.

sprajesh142@gmail.com

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## ABSTRACT

Acute abdomen in pregnancy poses various diagnostic challenges due to limitations in imaging modalities. It can be due to an obstetric or non-obstetric cause. Internal hernia through congenital defects is rare. Although internal hernia is not prevalent in pregnancy, it is increasing nowadays due to previous surgical defects in the mesentery and peritoneal folds. We report an unusual case of an internal hernia through a defect in the falciform ligament in a pregnant female where imaging findings helped in timely surgical intervention.

**Keywords:** Falciform ligament, Internal hernia, Pregnancy

## INTRODUCTION

Internal hernias occur when the abdominal viscus protrudes through an aperture which can be congenital or acquired defects in the peritoneum or mesentery, but the herniated contents stay inside the abdominal cavity. 2% of cases of gastrointestinal obstruction are caused by internal hernias. However, internal hernias resulting from falciform ligament defects are quite uncommon.

## CASE REPORT

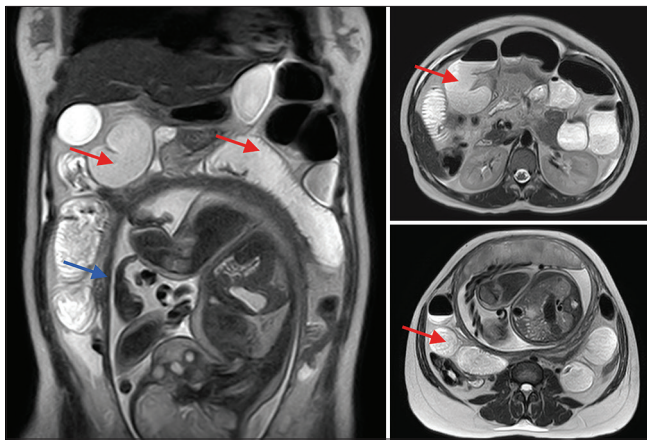
A 29-years-old antenatal mother (gestational age: 37 weeks 5 days) presented with acute onset of pain in the right upper quadrant with vomiting for 1 day. She perceived good fetal movements. On clinical examination, the abdomen was nontender. Bowel sounds were present. She had no history of abdominal surgery. Ultrasonography (USG) was inconclusive. The patient underwent a magnetic resonance imaging (MRI) abdomen to exclude causes of acute abdomen (appendicitis, renal calculi, and pancreatitis). MRI showed dilated jejunal loops noted in the right upper abdomen [Figure 1]. Large bowel loops appear collapsed. There was no definite imaging feature suggestive of acute abdomen except the dilated small bowel loops. The patient was managed conservatively. The patient had normal vaginal delivery on the same day. In view of persistent epigastric pain and vomiting, she underwent contrast-enhanced computed tomography (CECT) of the abdomen and pelvis the next day.

CECT revealed dilated small bowel loops with few air-fluid levels and showed a normal enhancement pattern. A transition point was seen at the mid ileum in the right hypochondriac region [Figure 2]. No intramural/extramural free air was noted. Short segment mild circumferential wall thickening of the proximal ileum was noted. A linear band-like structure

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was noted along the course of the umbilical vein in the region of the falciform ligament, possibly obliterated umbilical vein. The band was seen to course inferiorly, traversing the small bowel mesentery, close to the site of obstruction, reaching the anterior abdominal wall. In view of these imaging features, the diagnosis of small bowel obstruction, possibly secondary to internal hernia through falciform ligament was made. The patient underwent a laparoscopy. Bowel loops were seen trapped through a defect [Figure 3] in the falciform ligament. Herniated small bowel loops showed no evidence of ischemia. The transition point was seen at mid ileal level. After reducing the hernia, a division of the band was made and the defect was laid open. She was discharged home after 7 days of an uneventful hospital stay.

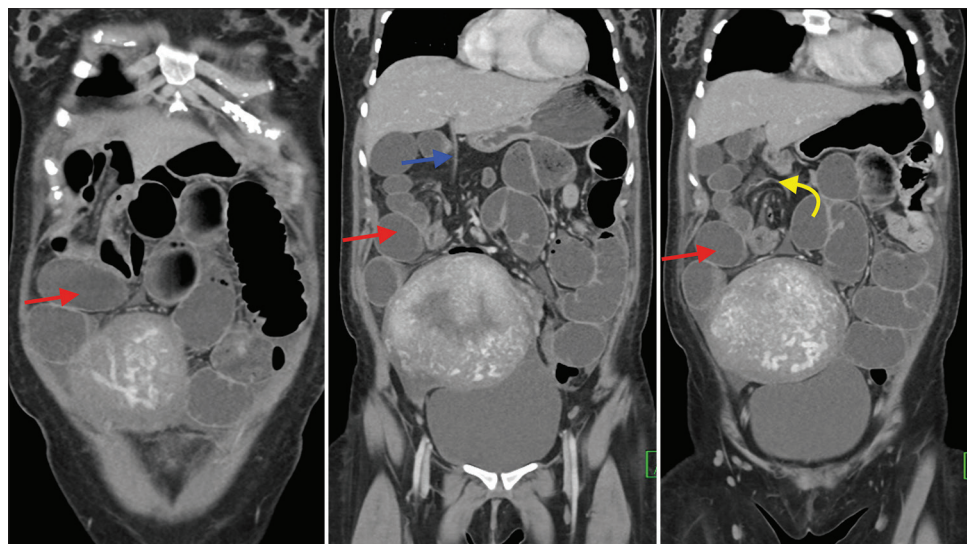


**Figure 1:** T2 HASTE coronal and axial sections of abdomen show gravid uterus (blue arrow) with dilated bowel loops (red arrows) displaced into the upper abdomen.

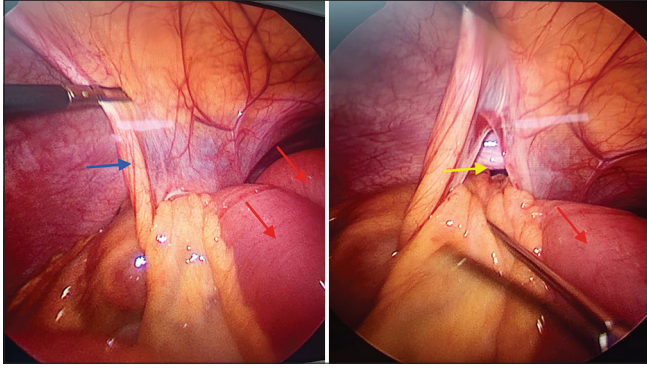
## DISCUSSION

Internal hernia is a protrusion of bowel loops through orifice, where the herniated contents are confined within the peritoneal cavity. It can be due to congenital or acquired causes. Internal hernias are a rare cause of intestinal obstruction. It represents <2% of incidence<sup>[1]</sup> of which internal hernia through the falciform ligament accounts for 0.2%.<sup>[2]</sup> To the best of our knowledge, only two cases of falciform ligament internal hernia in pregnancy were found in the literature. The diagnosis is also often overlooked due to the dearth of research data available and it also mimics other common disorders such as appendicitis, nephrolithiasis, and hyperemesis gravidarum. Imaging has become a cornerstone in the diagnosis of internal hernia with the advent of multidetector-row CT (MDCT). USG and MRI can direct the treating surgeons toward diagnosis and planning appropriate surgery in case of pregnant patients. The embryologically sickle-shaped falciform ligament is derived from ventral mesogastrium. The obliterated umbilical vein forms the round ligament of the liver which forms the free anterior border of the falciform ligament. A congenital defect in the falciform ligament is due to hypoplasia in a falciform ligament.<sup>[3]</sup>

Risk factors for internal hernia could be congenital defects in early childhood, undescended caecum, increased motility, and late pregnancy. Expanding gravid uterus in late pregnancy pushes the small bowel into the upper abdomen, where the effortless passage of the bowel through congenital defects occurs.<sup>[4]</sup> Defect in the falciform ligament occurs due to multiple causes. It includes congenital defect, trauma, inflammatory, and iatrogenic. The iatrogenic cause of falciform ligament internal hernia is steadily increasing due to increase in laparoscopic surgeries in cholecystectomy<sup>[5]</sup>



**Figure 2:** Contrast-enhanced computed tomography abdomen: coronal images from anterior to posterior aspect show dilated bowel loops (red arrows), obliterated umbilical vein (blue arrow) and transition point (yellow arrow).



**Figure 3:** Intraoperative laparoscopic images show obliterated umbilical vein (blue arrow) and image on right showing herniating bowel loops (red arrows) through defect (yellow arrow) in falciform ligament.

and laparoscopic fundoplication. Clinically, the patient usually presents with acute obstruction of small bowel loops, sometimes large bowel loops also. Non-specific complaints and overlapping signs pose significant challenges in clinical diagnosis, especially in pregnant patients. Obstruction can be intermittent; hence, imaging at the time of symptom is of utmost importance to look for defects.

USG findings are non-specific, showing only dilated bowel loops. Barium studies and fluoroscopy are not useful in case of acute obstruction. When trying to rule out common causes of an acute abdomen during pregnancy, MRI is frequently used as a safe and reliable investigation. However, the drawback of MRI is its lack of spatial resolution, limitations on the acquisition of thin sections, and multiplanar reconstructions and artifacts from the moving fetus. Still, if the cause of acute abdomen is not found, the patient may be taken up for MDCT as radiation dose to the fetus in single phase protocol for CT abdomen and pelvis is 25 mGy, which does not pose any threat to the fetus.<sup>[6]</sup> The use of intravenous contrast agents provides information about bowel enhancement and the orientation of mesenteric vessels with respect to hernia. As per ACR Manual on contrast media 2023, iodinated contrast media is not contraindicated in pregnancy and lactation. Shiozaki *et al.*<sup>[7]</sup> described few specific findings for internal hernia through falciform ligament in abdominal imaging. They have mentioned that there will be a marked difference between bowel loops on the right and left side due to edematous bowel on the right side. They have also quoted that membranous structure can be seen extending from the anterior abdominal wall to liver, identified by edematous bowel compressed on the anterior liver. As edematous intestines were pushed onto the anterior aspect of the liver, the point of compression by the falciform ligament could be seen clearly, and this marks a crucial visual finding in falciform ligament herniation if it occurs at the level of the liver. It will be difficult to spot a hernia if the defect is caudal

to the liver. In these circumstances, the diagnosis can still be suspected by seeing the dilated bowel loops under the abdominal wall on the right side. Laparoscopy is used as both a diagnostic and therapeutic tool in these scenarios. Optimal preoperative imaging provides useful information for surgical planning.

Complications of falciform ligament internal hernia:

- Acute small bowel obstruction
- Strangulation
- Bowel ischemia
- Bowel perforation
- Peritonitis.

## DIFFERENTIAL DIAGNOSIS

Dilated small bowel loops in pregnancy: Differentials include

1. Paralytic ileus
2. Adhesions
3. Internal hernias.

## CONCLUSION

Internal hernia is one of the causes of acute abdomen in pregnancy. Despite its rarity, internal hernia through the falciform ligament should be contemplated in differential diagnosis of acute abdomen when dilated bowel loops are confined to the right upper quadrant. Imaging at appropriate timing is very essential for timely management with MDCT being the investigation of choice.

## TEACHING POINTS

1. It is vital for radiologists to keep a differential of internal hernia in case of pregnant women with or without history of abdominal surgery.
2. Radiologist/clinician should not hesitate to proceed for single venous phase CT of abdomen in pregnancy, which provides vital information with no proven radiation damage to fetus.

## MCQs

1. Falciform ligament is embryologically derived from?
  - a) Ventral mesentery
  - b) Dorsal mesentery
  - c) Hepatic bud
  - d) Umbilical vein
2. Landmark vessels used to diagnose falciform ligament internal hernia?
  - a) Obliterated umbilical vein
  - b) Superior mesenteric artery and vein
  - c) Right colic artery and vein
  - d) Hepatic artery and portal vein

Answer Key: a

3. Shape of falciform ligament?  
a) Square  
b) Wedge  
c) Sickle  
d) Rectangle

Answer Key: c

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