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Dr. G Srirama Murthy
Associate Professor,
Department of Radiology, Shri
Sathya Sai Medical College and
Research Institute,
Kancheepuram, Tamil Nadu,
India

Dr. D Saraswathi
Professor, Department of
Radiology, Narayana Medical
College and Hospital, Nellore,
Andhra Pradesh, India

Study on role of computed tomography in internal hernias

Dr. G Srirama Murthy and Dr. D Saraswathi

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Abstract

Introduction: An internal hernia (IH) is defined as the protrusion of abdominal viscera, most commonly small bowel loops, through a peritoneal or mesenteric aperture into a compartment in the abdominal and pelvic cavity. Usually these patients present with acute abdomen and CT scan becomes the first modality of diagnosis.

Aim of the study: To study of role of Computerized Tomography in internal hernias.

Materials and Methods: Twelve patients who presented with acute abdomen and having internal hernias on CT scan were studied for the patient demographics, for the type and location of hernia on CT scan.

Results: A total of twelve patients were studied. There was slight male predominance and the male to female ratio was 2:1. Majority of patients were among 51-60 years ie, 58.3% followed by 41 to 50 years which had 25% patients. The paraduodenal hernias were most common, accounting for 50% of the cases followed by pericecal hernias that were 16.6% cases. In the present study, twelve cases of internal hernias were diagnosed on CT scan and all correlated well with the intraoperative diagnosis.

Conclusion: Clinical diagnosis of internal hernias is often difficult and complicated internal hernias often present as acute intestinal obstruction where urgent diagnosis becomes extremely important. Imaging studies play an important role in the early diagnosis for internal hernias. It is important for the radiologist to recognize these entities so that prompt diagnosis and early intervention can be instituted.

Keywords: Internal hernias, CT scan in internal hernias, paraduodenal hernias

Introduction

An internal hernia (IH) is defined as the protrusion of abdominal viscera, most commonly small bowel loops, through a peritoneal or mesenteric aperture into a compartment in the abdominal and pelvic cavity^[1-3].

Cross-sectional imaging (magnetic resonance imaging-MRI, Computed tomography-CT and Ultrasonography-US) techniques, gained importance and a huge application in gastrointestinal radiology in the emergency department; where they are indicated as first line techniques in the diagnosis, staging and follow-up^[4-7].

Hernial orifices can be congenital, including both normal foramina or recesses and unusual apertures resulting from anomalies of peritoneal attachment and internal rotation, or acquired if caused by inflammation, trauma and previous surgery, like gastric by-pass for bariatric treatment and liver transplantation. In the present day, these procedures are gaining popularity and hence, the overall incidence of internal hernias has also been increasing recently^[5].

The most common types of internal hernias according to the classification of Welch^[6] in descending order of frequency are as follows:

Paraduodenal hernias (left > right): 53%

Pericecal hernia: 13%

Through the foramen of Winslow: 8%

Transmesenteric: 8%

Intersigmoid: 6%

Supravesical and pelvic: 6%

Transomental: 1-4%

Role of computed tomography (CT)

Since the interval between intestinal obstruction and ischemia may be short, a time-consuming diagnostic workup before surgery may be dangerous for an acutely ill patient^[7].

Corresponding Author:
Dr. D Saraswathi
Professor, Department of
Radiology, Narayana Medical
College and Hospital, Nellore,
Andhra Pradesh, India

CT, is the imaging modality of choice for the investigation of acute abdominal conditions due to the fact that it is relatively rapidly in giving results [3]. It is recommended for the evaluation of patients with subacute bowel obstruction, especially when clinical and initial plain film radiography indicates a higher grade obstruction or remains indeterminate or whenever strangulation is suspected [8]. Several studies have demonstrated the accuracy of CT in the detection of small bowel obstruction, with a sensitivity and specificity of 94-100% and 90-95% respectively [9]. Internal hernias may present as intestinal obstruction and account for 0.5-4.1% of all cases [10, 11]. Clinical diagnosis of internal hernias is often difficult and thus imaging studies play an important role in the early diagnosis. It is extremely important for the radiologist to be familiar with the various types of internal hernias and their radiological features so that early diagnosis can be rendered and early intervention can be provided to the patient.

Aims of the study

To study of role of Computerized Tomography in internal hernias.

Material and Methods

Ethical permission was taken from the Institutional committee. Informed consent was taken from all the patients included in the study.

Sample size: Twelve patients with small intestinal obstruction were selected.

Study design: A cross sectional observational study

Place of study: Study was conducted in the department of Radiodiagnosis at Shri Sathya Sai Medical College and Research Institute, Kancheepuram, Tamilnadu, India.

Duration of study: one year ie from Janaury 2018 to February 2019

Inclusion criteria

Patients willing to participate in the study Both males and females Patient age between 30 to 60 years Patients presenting with small intestinal obstruction and internal hernias on CT scan History of post-surgery

Exclusion criteria

Patients not willing to participate in the study Children were excluded Age below 30 years and above 60 years were excluded Pregnant women Other causes of small intestinal obstruction All the cases included in the study were patients presenting with small intestinal obstruction to the department of General Surgery and were referred to department of Radiodiagnosis for imaging studies. A thorough clinical examination was done including history taking, onset of symptoms, past history of similar complaints, history of any previous surgeries. All the patients with small intestinal obstruction were subjected to CT scan to assess paraduodenal hernias, pericecal hernias and small intestinal loops.

Equipment used: CT machine Toshiba Aquilion (160 slices) was used. The contrast used was water soluble and nonionic (Omnipaque) administered at 300 mg/ml through intravenous injection. The procedure was explained to the patients before hand.

Observations and Results

Table 1: Showing age distribution of the cases

Age (in years)	No. of cases	Percent (%)
30-40	02	16.6%
41-50	03	25%
51-60	07	58.3%
Total	12	100%

In the present study, age group distribution was from 30 years to 60 years. Majority of patients were among 51-60 years ie, 58.3% and 25% were among 41-50 years. In the present study, majority of the patients were males, 66.6% (08/12) as compared to females 33.3% (04/12). The male to female ratio was 2:1.

In the present study, majority of them presented clinically with Small intestinal obstruction with history of abdominal pain of short duration.

Table 2: Showing CT diagnosis of internal hernias

CT Diagnosis	No. of cases	Percent (%)
Paraduodenal hernias	06	50%
Pericecal hernia	02	16.6%
Through foramen of Winslow	01	8.3%
Transmesentric	01	8.3%
Intersigmoid	01	8.3%
Transomental	01	8.3%
Total	12	100%

In the present study, among the 12 cases, 50% were reported as Paraduodenal hernias, 16.6% as Pericecal hernia, and 8.3% as hernia through foramen of Winslow.

On CT scan abdomen, the Paraduodenal hernias were seen as encapsulated cluster of dilated bowel loops with a sac-like appearance. (Figure 1 and figure 2)



Fig 1: Left paraduodenal hernia with small intestinal obstruction



Fig 2: CECT abdomen shows cluster of small bowel loops

Discussion

Internal hernias are kept in mind as a differential diagnosis in cases of intestinal obstruction, especially in patients with no history of previous surgery or trauma.

Because of strangulation and ischemia of the affected loops, internal hernias need to be quickly recognized and managed appropriately. Imaging plays an important role in the diagnosis of these conditions.

CT appearance is important for diagnosing various types of internal hernias, including paraduodenal, foramen of Winslow, pericecal, sigmoid-mesocolon- and transmesenteric- related, and transomental hernias. In the present study, twelve cases of internal hernias were diagnosed on CT scan and all correlated well with the intraoperative diagnosis.

Paraduodenal Hernias

In the classic older literature, paraduodenal hernias were the most common type of internal hernia, accounting for approximately 53% of all cases^[10].

Unlike most types of internal hernias, this subtype does have a gender predilection, being found more commonly in men by a ratio of 3:1^[12, 13]. There are two main types, left and right, with the former consisting of most (75%) cases^[13-15]. They are found more frequently in men than in women, with a ratio of 3:1, having a gender predilection unlike most types of internal hernias. There are two main subtypes: left-sided, which account for 75% of all paraduodenal hernias and right-sided, which account for the remaining 25%^[16].

Paraduodenal hernias occur when small intestinal loops enter into a congenital, unusual peritoneal fossa in the vicinity of the duodenum as a result of abnormal rotation of the small intestine and failure of mesenteric fusion with the parietal peritoneum^[2]

The characteristic CT feature of left paraduodenal hernia is an encapsulated cluster of commonly dilated bowel loops with a sac-like appearance in the left upper quadrant at the level of the anterior para-renal space^[17].

They can be noted either at the duodeno-jejunal junction between stomach and pancreas, at the level or just above and exterior to the ligament of Treitz, or behind the pancreatic tail or between transverse colon and the left adrenal gland, although these findings are non-specific^[5].

The characteristic CT feature of right paraduodenal hernias is an encapsulated cluster of dilated small bowel loops located in the right mid abdomen, lateral and inferior to the descending duodenum^[18]. In addition, looping of the small intestine around the superior mesenteric artery and superior mesenteric vein at the root of the small bowel mesentery can be observed. In cases of intestinal non rotation, the superior mesenteric vein is located in a more ventral and leftward position to the superior mesenteric artery and the horizontal duodenum is absent, with cecum in its normal position.¹⁹ In our study also the paraduodenal hernias were most common, accounting for 50% of the cases. One of the case also had necrosis of the pancreatic parenchyma. (Figure 3)

Through foramen of Winslow

The incidence of hernia through the Winslow foramen is higher in men with a ratio of 2.5: 1, with a peak incidence between 20 and 60 years of age^[20].

The intestinal segment most commonly involved is the small intestine (60% -70%). The terminal ileum, the cecum

and the ascending colon are involved at a rate of approximately 25% -30%. Hernias that affect the transverse colon, omentum and gallbladder are rare, although some have been reported in the literature^[2].

CT with contrast medium describes the dilation of the right colon posterior to the hepatoduodenal ligament, combined with the lateral displacement of the stomach, as a typical sign for the diagnosis of hernia through the Winslow aperture. Other classic signs include: elongated mesenteric vessels in front of the inferior vena cava and posterior to the portal vein, hydroaerial levels in the lower sac with a peak directed towards the Winslow foramen, absence of the ascending colon in the right parietocholec canal, and two or more bowel loops in the subhepatic spaces^[2]. In our study, there were 8.3% cases of hernias through foramen of Winslow.

Transomental hernia

A transomental hernia through the omentum is rare, representing approximately 1% -4% of internal hernias. Transomental hernias are usually found in patients older than 50 years, in which case they are commonly iatrogenic and result from surgical interventions, Y-roux gastric bypass, liver transplant, small bowel or colon resection, trauma or peritoneal inflammation. In children, transgenic congenital hernias are common, the severity of the disease depends on the size of the hole and the length of the loops of the small intestine herniated. In rare cases, internal hernias through the greater or less omentum occur spontaneously as a result of senile atrophy with no history of surgery, trauma or inflammation^[21]. Yamaguchi *et al.*^[22] classified transomental hernias as type A (peritoneal cavity → greater omentum → peritoneal cavity), B (peritoneal cavity → omental bursa → peritoneal cavity), or C (peritoneal cavity → omental bursa).

Abdominal CT is useful for diagnosis; it can reveal the dilated loops of the small intestine with a “peak sign”, which is a triangular configuration of the transition zone between the proximal dilated intestines and the herniated intestinal segments or between dilated and herniated intestinal segments and distal and collapsed intestinal segments^[21]. The CT scan may also reveal a “swirling” pattern of the mesenteric vessels, prominent mesenteric vessels with a large impact on the surrounding organs and thickening of the intestinal wall. In addition, a transomental hernia should be suspected if the dilated loops of the small intestine are located in the lower sac, that is, surrounded to the right by the gallbladder and liver, to the left by the stomach and by the pancreas^[21]. In our study, we had 8.3% cases of transomental hernias.

Hernia related to the sigmoid colon

This corresponds to 6% of internal hernias^[5]. It consists of the passage of small bowel loops dilated and medial to the sigmoid. There are three types of hernias that involve the sigmoid colon: Intersigmoid, which is the most common, with 65% in this group^[23]. The intersigmoid hernia titer has been used to designate a hernia in a congenital fossa, the intersigmoid fossa, located in the accessory of the lateral aspect of the sigmoid mesocolon^[24]. In our study, we had 8.3% cases of sigmoid hernias^[24].

Pericecal Hernias

Historically, pericecal hernias account for 13% of all

internal hernias. The pericecal fossa is located behind the cecum and ascending colon and is limited by the parieto-cecal fold outward and the mesenterico-cecal fold inward^[24]

Although there are actually four subtypes (ileocolic, retrocecal, ileocecal, and paracecal) of pericecal hernias, most commonly the herniated loop consists of an ileal segment protruding through a defect in the cecal mesentery and extending into the right paracolic gutter^[10, 24]. These hernias can therefore be subcategorized as either acquired or congenital defects in the cecal mesentery.

Clinically, patients with pericecal hernias present in a similar manner to those with all other types of internal hernias except for the location of symptoms, which tends to be in the right lower quadrant, so that pericecal hernias are sometimes mistaken for appendiceal abnormalities^[10, 24].

Imaging studies, including both barium and CT, show similar findings. These hernias can often be confidently diagnosed as a cluster of bowel loops (usually ileal) located posteriorly and laterally to the normal cecum, occasionally extending into the right paracolic gutter^[10, 24]. In our study, we had 16.6% of pericecal hernias.

Comparative studies

Present study described 12 cases of internal hernias. In our study, among 12 cases, 50% were reported as Paraduodenal hernias, 16.6% as Pericecal hernias. There were 8.3% as hernia through foramen of Winslow, transmesentric hernia, intersigmoid and transomental hernias.

Duran *et al.*^[25] described 3 cases of internal hernias. They reported the cases in a 53-year-old female patient, who came for abdominal CT with contrast medium with history of two months of generalized abdominal pain. The CT findings were compatible with a Winslow hiatus hernia. Their second case was in a 69 year old male patient with a history of arterial hypertension who was admitted for moderate intensity abdominal pain, predominantly in the epigastrium and diagnosed as intestinal obstruction due to transomental hernia. Their third case was of a 88 year old male patient with a history of diabetes mellitus, chronic kidney disease and hyperuricemia. Abdominal CT with contrast showed a hernia related to the sigmoid colon which showed significant dilation of the intestinal loops with thin liquid inside.

Kohli *et al.*^[26] studied a case of 46 years old male with head injury. Patient also gave history of three episodes of similar abdominal pain in the past. CT scan with oral, rectal and intravenous contrast was done and it revealed twisting of mesenteric vascular pedicle at its root along with jejunal loops, with the classic Whirl sign.

Bellini *et al.*^[27] studied CT diagnosis of small bowel obstruction caused by internal hernia from persistent attachment of a Meckel's diverticulum to the umbilicus by the obliterated omphalomesenteric duct.

Hasan S *et al.*^[28] studied the importance of CT in evaluating Internal Hernias after Roux-en-Y Gastric bypass surgery in a 51 year old obese man and his CT scan showed dilated small bowel loops, up to 3.4 cm, in the mid abdomen.

Conclusion

Internal hernias are more common in the fifth and sixth decades and have a slight male preponderance. Clinical diagnosis of internal hernias is often difficult and complicated internal hernias often present as acute intestinal

obstruction where urgent diagnosis becomes extremely important. Imaging studies play an important role in the early diagnosis for internal hernias. It is important for the radiologist to recognize these entities so that prompt diagnosis and early intervention can be instituted.

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