



## PARTIAL INTERCOSTAL HERNIATION OF THE LIVER, A CASE REPORT

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### ABSTRACT

**Introduction:** An intercostal hernia, defined as an acquired herniation of abdominal contents through disrupted intercostal muscles, is a rarely reported entity, but extremely rare is liver herniation. Liver herniation through the intercostal defect or through the lateral abdominal wall usually is incisional. Incisional herniation of the liver usually occurs 2 to 3 years after the previous operation of the abdomen which consequently leads to weakness of the abdominal wall.

**Case report:** We present an extremely rare case of an intercostal incisional hernia of the right lobe of the liver, segment V between 11<sup>th</sup> and 12<sup>th</sup> rib due to preceding lumbar incision for tumor nephrectomy. Therefore there is a weakness in the intercostal space between 11<sup>th</sup> and 12<sup>th</sup> rib at the right midaxillary line through which the herniation of the right lobe of the liver. A CT of the abdomen after an intravenous contrast application, arterial and venous phase was performed to exclude the incarceration of the herniated portion of the liver.

**Discussion:** The intercostal incisional hernia is a delayed complication of abdominal surgery. They can occur anywhere on the abdominal wall and frequently encountered in the vertical than in transverse incisions. Typically, incisional hernia manifest during the first months after surgery but it can occur later. Herniation of the liver through the intercostal defect is a rare condition and usually related to previous major surgery of the abdomen. Due to its rarity, it is, and diagnostic and therapeutic challenge. Abdominal incisional hernia in the intercostal region is rare and therefore easily overlooked.

**Conclusion:** We can conclude that there is a connection between liver herniation in the intercostal space with a previously performed surgery on the abdomen. CT is the method of choice for diagnosis of liver herniation through the intercostal defect.

**KEYWORDS :** a liver hernia, incisional hernia, intercostal hernia, intercostal defect, CT.

### INTRODUCTION:

Abdominal wall hernias are a frequent imaging finding in the abdomen. (1) A hernia of the abdominal wall is a protrusion of the abdominal contents through an acquired or congenital area of weakness or defect in the wall. They are distinguished primarily based on location and content. (2) According to the classification there are two types of external herniation: ventral (anterior and lateral abdominal wall) and dorsal. (3) A lumbar hernia is a rare congenital or acquired defect of the posterior abdominal wall. The acquired type is more common and occurs mainly as an incisional defect after flank surgery. The abdominal intercostal hernia has been rarely reported. The condition occurs as acquired herniation of abdominal contents through disrupted diaphragmatic and intercostal muscles. (4) Incisional hernias occur most frequently through previous laparotomy scars. Widening or dehiscence of the scar allows intra-abdominal content to herniate into the subcutaneous tissues. (5) Incisional herniation of the liver usually occurs 2 to 3 years after previous surgery of the abdomen, which as a consequence leads to weakness of the abdominal wall. (6,7) All reported hernias have been located distal to the eighth rib level. Incarceration or strangulation of hernia contents is uncommon. (8,9) Many hernias are asymptomatic, but some become incarcerated causing pain and requiring immediate surgery. To prevent acute complications, external hernias are usually repaired electively. More diagnostic methods are used for the detection of hernias of the anterior abdominal wall, but computed tomography (CT) due to its superiority in the presentation of anatomical details, in the presentation of the accompanying complications, as well as the possibility of MPR reconstruction, is a diagnostic method of choice. Treatment is elective surgical repair.

### CASE REPORT:

The aim of this case report is to present the diagnostic challenge of intercostal incisional hernia. We present an extremely rare case of an intercostal hernia of the right lobe of the liver, segment V in a 63-year-old patient. It is an incisional hernia on the part of the right lobe of the liver as a result of a previously performed surgery to remove the right kidney tumor. On physical examination, there was a bulging of the right inferolateral region of the chest, above of the lumbar incision. Three years ago, a right kidney nephrectomy was performed in the patient due to kidney tumor. Because of this, there

is a weakness in the intercostal space and lateral abdominal wall through which the part of the right lobe of the liver is herniating. A CT scan image of the abdomen post i.v. contrast administration revealed the widening of the 11<sup>th</sup> intercostal space, through which a portion of the right lobe of the liver segment V, protruded into and occupied the subcutaneous tissue of the lateral chest and abdominal wall. (Figure 1) There was a 40-50 mm distance between the ribs of the 11<sup>th</sup> intercostal space. The herniated part of the right lobe of the liver segment V is in the dimensions of 35 mm x 50 mm. (Figure 2) The hernia defect was through the intercostal space between 11<sup>th</sup> and 12<sup>th</sup> rib at the right mid-axillary line. (Figure 3) Because of its infrequency, the diagnosis was established late although simple clinical examination and CT investigation displayed a hernia. A CT scan of the abdomen revealed the location of the intercostal defect. The hernia sac contained a part of the right lobe of the liver segment V. At our institution, we acquire supine images during a single breath hold with a 16-detector row scanner Bright Speed GE Medical Systems after bolus injection of 100 mL of iodinated contrast material with a power injector. Table speed is 10 mm/sec, and collimation is 2.5 mm. Thin 2.5-mm reformatted images are routinely obtained in all cases. Multiplanar reformatted images provide important information in addition to that provided by axial images in that they may better delineate the size and shape of the hernia sac and associated complications. Moreover, displaying the anatomy in a manner more familiar to clinicians may enhance the communication of imaging findings. For these reasons, we recommend routine use of MPR images in patients with suspected disease of the abdominal wall.

Because of the asymptomatic partial herniation of the liver portion through the intercostal space and lateral abdominal wall, the patient was treated conservatively and regular controls with US examination of the anterior abdominal wall are recommended. The case that we present can be considered extremely rare because it is diagnosed for the first time in our Clinic. Different multi-detector row CT techniques have been described for the evaluation of abdominal wall hernias. Because most of these hernias are unsuspected findings, axial imaging performed with the patient supine is typical. If hernias are seen, we recommend thin reconstruction ( $\leq 2.5$ -mm sections) to improve multi planar reformation. Adequate visualization of intraabdominal organs and the abdominal wall, fast imaging acquisition, three-dimensional

data sets, and multi planar reformation capabilities are important advantages of multi-detector row computed tomography (CT). Because of its superior anatomic detail, multi-detector row CT may help detect subtle signs of complication within the hernia sac, including bowel obstruction, incarceration, strangulation, and traumatic wall hernias. A CT of the abdomen after an intravenous contrast application, arterial and venous phase was performed to exclude the incarceration of the herniated portion of the liver.

#### DISCUSSION:

An intercostal hernia is defined as an acquired herniation of the abdominal contents through intercostal muscles (6). The condition generally occurs following the previously performed major surgery on the abdomen and lumbar region, or disruption of intercostal muscles as a consequence of either blunt or penetrating trauma (11,12) An intercostal hernia is rare sequelae of injury. On initial clinical examination, intercostal hernias have been mistaken for lipomas or hematomas. The abdominal intercostal hernia has been rarely reported. (12) The condition occurs as acquired herniation of abdominal contents through disrupted diaphragmatic and intercostal muscles. (13) An abdominal intercostal hernia occurs rarely, with only 26 previous cases reported in the literature. (4) The clinical features of intercostal abdominal hernias typically include bulges causing discomfort and pain. (4) All reported hernias have been located distal to the eighth rib level, usually in the left hemithorax. The surgical findings include intercostal defects, and a hernia sac containing abdominal organs (liver in 23%). (4) Radiologic findings of lateral abdominal wall defect. Abdominal CT scan showed partial liver herniation through lateral abdominal wall defect below the costal margin of the 12<sup>th</sup> rib. The hernial content can be more accurately evaluated by CT. (14)

All reports of cases of liver herniation show a history of previous major surgical interventions in the upper abdomen as it is in our case. We emphasize the linkage of liver herniation to the upper abdomen with previously performed operative interventions in that region of the abdomen. (5) Through that weakness of the lateral abdominal wall, a part of the liver is herniating. (15,16) These hernias are quite rare so they are considered a rare phenomenon. Also, liver herniation is very rarely seen through a weakness or defect of the diaphragm, which is usually congenital or as a consequence of chest trauma. (13,16) Most often, this liver herniation is not accompanied by marked symptomatology. In the literature, we encountered only one case with the incarceration of the herniated lobe of the liver. (16)

Lumbar hernias are rare postero-lateral abdominal wall hernias. Lumbar hernias are rare defects of the posterior abdominal wall. (19) Lumbar hernias can be classified as congenital or acquired. The acquired type may be secondary to trauma or surgical operations. (13) Most incisional lumbar hernias occur after flank surgery (nephrectomy or aortic aneurysm repair). (15) Lund et al. (20) reported a postero-lateral abdominal wall hernia secondary to a severe cough spells. However, the hernia was located at a more posterior position than the present case. However, herniation of the liver into the thoracic cavity either through congenital diaphragmatic defects or secondary to trauma is not uncommon. (13) Intercostal liver herniation has also been reported. (13) Regarding liver herniation through the anterior abdominal wall, we were able to find only two cases in which the liver was protruding through an incisional hernia, (2) and one cases of hepatic herniation into the rectus muscle. (21) An intercostal hernia is a rare pathology with only sporadic cases published in the literature. (4,5) We report the case of an Intercostal hernia of segment V of the liver. Nonincisional lateral abdominal wall hernia (LAWH) is an extremely rare condition, although incisional hernias along the lateral abdominal wall incision can occur infrequently. (15) Its location is different from that of a Spigelian hernia or a lumbar hernia.

Conservative therapy is considered the first choice in the treatment of these patients; however, surgical therapy may be an option in patients with marked symptomatology. The incisional hernias are more common in those patients who have had an aortic aneurysm

surgery. (22) They are also more common in patients with connective tissue disorders. Herniation of the liver is often seen as a congenital diaphragmatic hernia or after a traumatic lesion of the diaphragm. (12) the literature we find only 6 cases with confirmed herniation of the liver through the weakness of the anterior abdominal wall. (5)

Salemis et al. (9) Presented a case of right lumbar incision hernia with herniation of the right lobe of the liver. Losanoff et al. (6) Presented a case of recurrent intercostal herniation of the liver. All reports of cases of liver herniation show a history of previous major surgical interventions in the upper abdomen as it is in our case. We emphasize the linkage of liver herniation to the upper abdomen with previously performed operative interventions in that region of the abdomen.

CT scan is the diagnostic modality of choice. (23) It can provide detailed information about the anatomy of the lumbar area, the extent of the defect and the presence of herniated intraabdominal viscera. CT scan can also differentiate a hernia from muscle atrophy with no fascial defect for which no surgical intervention is required. (24) The implementation of CT is also of great importance as it allows differentiation of a hernia from hematoma or abscess and can also detect various coexisting injuries. (24) Surgical repair is a treatment of choice for lumbar hernias. The incisional hernias are delayed complications of abdominal surgery. They can occur everywhere on the abdominal wall and are more commonly seen in vertical, than in transverse cuts. Usually, the incisional hernias are manifested during the first months after surgery but may occur later. Because of its rarity, it presents a diagnostic and therapeutic challenge.

#### CONCLUSION:

Abdominal incisional hernia in the intercostal region is rare and therefore easily overlooked. There is a link between the herniation of the liver in the intercostal space previously performed operative interventions of the abdomen. CT is a method of choice for diagnosing the herniation of the liver through the intercostal defect and lateral abdominal wall. CT allows estimating the extent and characteristics of a hernia, that is, the state of sustainability of the parenchyma in the herniated liver. We recommend routine use of MPR CT images in patients with suspected disease of the abdominal wall.

#### Conflicts of interest:

Dr. Antonio Gligorievski declares that there is no conflict of interest.

#### Funding:

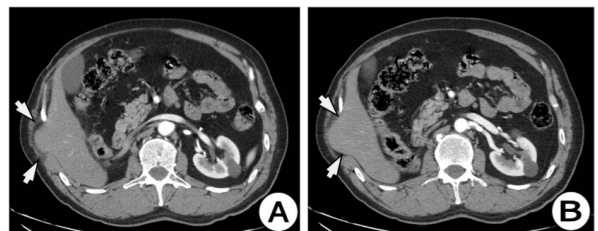
In this case report, there are no sponsors.

#### Ethical approval:

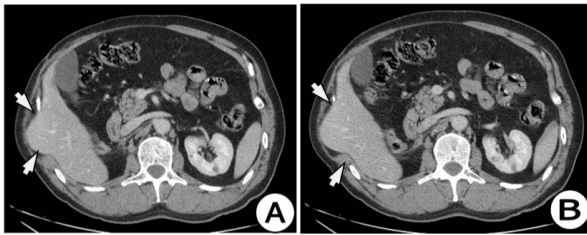
Ethical approval was not necessary in this case report.

#### Consent:

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written informed consent is available for review by the Editor in Chief of this journal on request.



**Figure 1 (A and B)** Axial CT view of the abdomen post i.v. contrast administration arterial phase: an intercostal herniation of the liver segment V between the 10th rib and 11th rib at the right mid-axillary line (white arrows).



**Figure 2 (A and B):** Axial CT view of the abdomen post i.v. contrast administration venous phase: an intercostal herniation of the liver segment V between the 10th rib and 11th rib at the right mid-axillary line (white arrows). A CT of the abdomen after an intravenous contrast application, arterial and venous phase was performed to exclude the incarceration of the herniated portion of the liver.



**Figure 3: (A)** Coronal reformatted CT scan images of the abdomen post i.v. contrast administration venous phase: an intercostal hernia of the liver segment V between the 10th rib and 11th rib at the right mid-axillary line (white arrows); **(B)** Sagittal reformatted CT scan images of the abdomen post i.v. contrast administration venous phase: an intercostal hernia of the liver segment V between the 10th rib and 11th rib at the right mid-axillary line (white arrows). A CT of the abdomen after an intravenous contrast application, arterial and venous phase was performed to exclude the incarceration of the herniated portion of the liver.

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