

A Case Report Study of Situs Inversus

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Abstract

Introduction: Left-right asymmetry is established following gastrulation, when the notochord has transiently fused to the endoderm to form the notochordal plate. In the rare human disorder, situs inversus viscerum totalis, the handedness of all of the viscera is reversed. However, the reversal is rarely complete or exact, and errors in morphogenesis often produce subsidiary malformations, such as malrotation of the midgut. More often, the different organ systems exhibit a discordance of sidedness or heterotaxy.

Methods: Dissection of the abdomen was performed during the routine dissection class. An incision was given on the anterior abdominal wall. A vertical midline incision was made in the skin from the xiphoid process, around the umbilicus, up to the pubic symphysis. Another incision was made transversely along the costal margin up to the midaxillary line superiorly, and an inferior transverse incision was given from the pubic symphysis up to the Holden's line.

Results: The liver was found in the left upper quadrant instead of its normal position.

Conclusion: Knowledge of situs inversus is essential and is of immense significance in various clinical procedures performed on the liver and other abdominal organs by surgeons.

Key Words: Situs Inversus, liver, Dissection, Abdomen, Umbilicus, Incision.

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I. INTRODUCTION

Situs inversus is a condition in which transposition of the viscera in the thorax and abdomen occurs. In the rare human disorder, situs inversus viscera totalis, the handedness of all of the viscera is reversed. However, the reversal is rarely complete or exact, and errors in morphogenesis often produce subsidiary malformations such as the malrotations of the midgut. More often the different organ systems exhibit a discordance of sidedness or heterotaxy. More than 40 years ago, a mouse mutant was discovered that exhibits situs inversus, the iv/iv mouse (iv stands for inversus viscerum). The phenotype is inherited as an autosomal recessive single – gene trait, and it has been mapped to chromosome 12.

Molecular Basis of Left–Right Asymmetry

Left-right asymmetry is established following gastrulation, when the notochord has transiently fused to the endoderm to form the notochordal plate. The widened posterior (caudal) aspect of the notochordal plate serves as the LRO (left- right organizer): notochordal plate cells at that stage harbor motile cilia that rotate in a clockwise manner because cilia are tilted and polarised to the caudal pole of the notochordal plate cells, their rotation causes a fluid flow in the extracellular space from the right to the left side of LRO. As a result of this leftward flow, the nodal signalling cascade is asymmetrically induced in the left lateral plate mesoderm. This

cascade involves three asymmetrically expressed genes, nodal, its feedback inhibitor lefty, and the transcription factor pitx2. lefty and pitx2 genes are activated when nodal signalling is first induced in the left lateral plate mesoderm. Nodal signalling is on only transiently, because lefty binds to the nodal receptor and prevents sustained activation of the cascade. Pitx2 in contrast stays on and mediates the asymmetric placement and morphogenesis of organs of the chest (heart, lungs) and abdomen (liver, spleen and gastrointestinal tract: stomach as well as small and large intestine).

II. METHOD

During a routine dissection class cadaver is placed in supine position. Dissection instruments used were probe, forceps, scalpel, scissors, rat-toothed forceps (tissue forceps). Following structures were palpated. Xiphoid process, costal margin, pubic symphysis, pubic crest, pubic tubercle, anterior superior iliac spine, tubercle of iliac crest. A midline skin incision is given from xiphisternal junction to the pubic symphysis, encircling the umbilicus. A transverse incision is given from umbilicus to midaxillary line. Skin is cut. Skin flap is removed. Subcutaneous fat is cleaned. External oblique aponeurosis, internal oblique aponeurosis (anterior lamina of internal oblique) forms the anterior wall of rectus sheath was cut by blunt dissection. Then rectus abdominis muscle was excised. Half of rectus abdominis muscle is reflected superiorly and another half is reflected inferiorly. Then posterior wall of rectus sheath is excised with the help of blunt dissection and with scissors.

TOPOGRAPHY

Topographical divisions of the abdomen are used to describe the location of abdominal organs and the pain associated with abdominal problems. Two schemes most often used are: A four-quadrant pattern- a horizontal trans umbilical plane passing through the umbilicus and the intervertebral disc between vertebrae L3 and L4 and intersecting with the vertical median plane divides the abdomen into four quadrants – right upper, left upper, right lower, left lower quadrants.

NINE – REGION PATTERN

Nine region pattern is based on two horizontal and two vertical planes. The superior horizontal plane (the subcostal plane) is immediately inferior to costal margins, which places it at the lower border of the costal cartilage of rib 10 and passing posteriorly through the body of vertebra L3. inferior horizontal plane (the intertubercular plane) connects the tubercles of the iliac crests, which are palpable structures 5cm posterior to the anterior superior iliac spine and passes through the upper part of the body of vertebra L5. Vertical planes pass from the midpoint of the clavicles inferiorly to a point midway between the anterior superior iliac spine and pubic symphysis.

RESULT CASE REPORT

The liver is the largest visceral organ in the body and is primarily in the right hypochondrium and epigastric region, extending into the left hypochondrium (or in the right upper quadrant, extending into the left upper quadrant. During routine dissection liver was not present in right upper quadrant, it was present in left upper quadrant. Major portion of liver was in left hypochondriac region. Anatomical position of stomach was also abnormal. Stomach was present right to the liver. Stomach was absent on left upper quadrant. It occupied the right hypochondriac region and epigastric region. Attachment of falciform ligament divides the liver into right and left lobes. Nodules were present on the liver. Hepatic surface was rough. Hepatic cell death (necrosis) followed by fibrosis and regeneration result in formation of nodules.

III. DISCUSSION

Cirrhosis is a condition in which the liver slowly deteriorates and is unable to function normally due to chronic, or long lasting, injury. Scar tissue replaces healthy liver tissue and partially blocks the flow of blood through the liver.

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After detecting a nodule in the liver in a cirrhotic patient the nodule requires to be characterized with multidetector computerized tomography, magnetic resonance imaging, contrast enhanced ultrasound or functional imaging of HCC by hepatocyte specific MRI, DW MRI, and Positron emission tomography (PET).

Each technique has advantages and disadvantages. The choice of imaging modality depends upon many factors like number of nodules, presence or absence of cirrhosis, availability, expertise in interpretation and cost.

Investigation done by Padaki N. Rao.

Liver nodules can have many causes, including: Focal nodular hyperplasia (FNH), Nodular regenerative hyperplasia (NRH), Hepatic cirrhosis, Hepatic adenomas, Malignant lesions, Infections.

IV. CONCLUSION

Knowledge of situs inversus becomes essential and it is of immense significance in various clinical procedures performed on liver and other organs by surgeons. We can lower our chances of getting cancerous liver lesions by exercising, maintaining a healthy weight, and drinking alcohol in moderation.

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Conflicts Of Interest

There are no conflicts of interest

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