

## Situs Inversus: An Incidental Rare Case

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After obtaining the informed consent of the patient, a case with situs inversus was presented in this article. A 39-year-old woman admitted to our hospital with left upper quadrant pain had been investigated with upper abdominal magnetic resonance imaging in the radiology department. High C-reactive protein level (5.29 mg/dL), very high level of gamma-glutamyl transferase (552.5 mg/dL), high levels of alanine transaminase (76 mg/dL) and aspartate transaminase (75 mg/dL), high levels of total (0.68 mg/dL), and direct (0.15 mg/dL) bilirubin levels were observed in her blood test results. Urine, creatinine, p-amylase, and lipase levels were within normal ranges, and there were no other positive findings in her biochemistry or hemogram results studied with her blood sample. Her urine test was normal as well.

There was wall thickening observed in her gallbladder on fat-saturated T2-weighted magnetic resonance (MR) images. No dilatation was observed in her intrahepatic or extrahepatic bile ducts. There was a signal loss in the gallbladder that indicated multiple stones formed in the lumen in the same MR sequence. On the other hand, some other findings were monitored during the MR examination. Her liver was located on the left, and her spleen was located on the right upper quadrant of the abdominal region, which is compatible with situs inversus. In the field of view of the upper abdominal region, the heart and basal segment of her lungs were observed, and her heart apex was located in the right hemithorax, which indicated situs inversus totalis for this case (Figure 1).

Situs inversus totalis (SIT) is a congenital anomaly, and this term is used to describe a total transposition of thoracic and abdominal organs. The etiology of this entity is unknown. Situs inversus is a term used to describe the

inverted position of chest and abdominal organs. On the other hand, the term situs inversus incompletus is used for the transposition of the intra-abdominal organs while the intrathoracic organs are in a normal position.<sup>1</sup>

The incidence of SIT has been reported as 1 in every 8000-25 000 births. Situs inversus totalis is often diagnosed by radiological examinations. Heterotaxia (or referred to as situs ambiguus) is the situation with a random arrangement of internal organs; in addition, splenic abnormalities and congenital heart diseases are encountered in this condition. Situs inversus totalis is generally encountered in radiographic evaluations for respiratory stress or other specific reasons, incidentally, in early life for neonates. In this early period of life, x-rays reveal the stomach gas bubbles on the right side of the abdomen, and the apex of the heart is observed in the right chest.<sup>2</sup>

The association of SIT with some congenital malformations and syndromic diseases has been shown in past studies. Particularly, congenital heart diseases (CHD) and SIT association have been reported in the literature.<sup>3</sup> Situs inversus totalis is usually associated with a 3%-5% incidence of CHD, and this association is most commonly observed with the transposition of the great arteries. In this group, 80% of the patients have a right-sided aortic arch. Situs inversus with a left-sided heart (levocardia) is a rare condition (0.00005%) and is almost always associated with congenital heart disease (95%).<sup>4</sup>

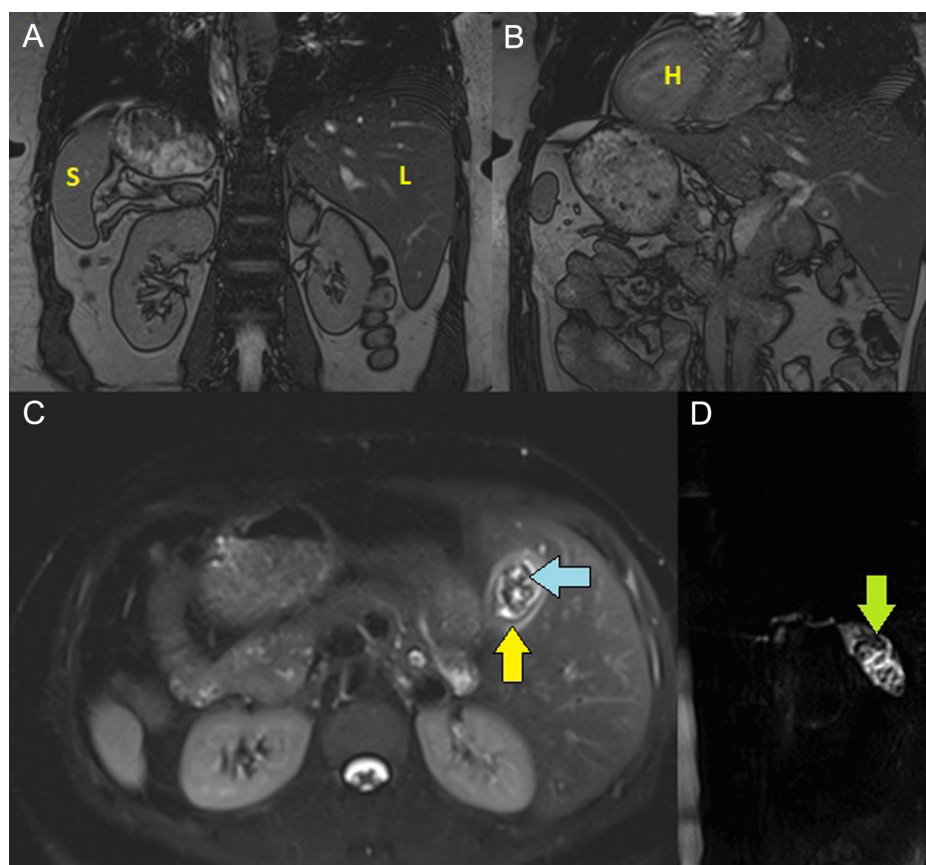
Stones in the gallbladder were observed in our case. No significant difference between normal individuals and situs inversus regarding the incidence of gallbladder stones has been noted in the past literature.<sup>5</sup> The midgut is rotated 270° counter-clockwise in normal individuals;

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**Figure 1** In the coronal plane T2-weighted magnetic resonance image, the spleen (S) is located on the right, and the liver (L) is located in the left upper quadrant of the abdominal region (A). In another coronal image in the same sequence, the patient was observed with a right-sided heart (B). In the axial T2-weighted fat-saturated Half fourier Single-shot Turbo spin-Echo (HASTE) sequence, the thickening of the gallbladder wall (yellow arrow) and low signals depicting gallbladder stones (blue arrow) were indicated (C). Three-dimensional images with the T2-weighted HASTE sequence depict the gallbladder with stones in the lumen (green arrow) (D).

however, rotates clockwise in situs inversus. Eventually, all abdominal and thoracic visceral organs are located on the opposite side of the abdominal region symmetrically. Thus, the gallbladder is positioned in the left upper quadrant in situs inversus.<sup>6</sup>

Kartagener syndrome, which is a subgroup of primary ciliary dyskinesia, is observed in patients with situs inversus in up to 20% of the patients.<sup>7</sup> Situs inversus can also be associated with polysplenia<sup>8</sup> or asplenia.<sup>9</sup> Absence of the inferior vena cava can also be an associated finding in SIT.<sup>9</sup> The presented case had no known congenital heart disease or symptoms indicating Kartagener syndrome. In this presented case, the vena cava inferior was present but left-sided in the abdominal region. No sign of polysplenia was observed in her MR examination.

**Data Availability Statement:** The data that support the findings of this study are available on request from the corresponding author.

**Informed Consent:** Informed consent was obtained from the patient who agreed to take part in the study.

**Peer-review:** Externally peer-reviewed.

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