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Situs Inversus Totalis: Contribution of Imaging in the Diagnosis, about a Case at the District Hospital of Commune IV of the District of Bamako

Moussa Samaké[1], Ibrahima Maiga[2], Seydou Boire[3], Souleymane Bingué Dembelé[1], Yely Dianessy[1], Abdou Guiré[1], Dorcas Laurel Sodjiné Yede[1], Siaka Konaté[4], Moussa Diassana[5], Bathio Traoré[5], Youssouf Koné[1], Adégné Togo[6]

[1]General Surgery Department, Bamako District IV Hospital, Bamako, Mali
[2]Imaging Service, Bamako District IV Hospital, Bamako, Mali
[3]Ouezzindougou Community Health Center, Commune IV of Bamako, Bamako, Mali
[4]General Surgery Department, Kolondjeba Referral Health Centre, Sikasso, Mali
[5]General Surgery Department, Sikasso Hospital, Sikasso, Mali
[6]General Surgery Department, Gabriel Touré University Hospital, Bamako, Mali
Email: samakemoussafa©gmail.com

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Abstract

Introduction: Situs inversus totalis (SIT) is a rare congenital anomaly characterized by mirror transposition of the abdominal and thoracic organs. This anomaly may be partial or complete. **Results:** This 21-year-old patient was admitted to the emergency department for hematemesis. The onset of symptoms was 4 days ago, marked by hematemesis. Imaging findings were consistent with a case of situs inversus totalis. **Conclusion:** Situs inversus is a very rare asymptomatic congenital anomaly. Its discovery is usually fortuitous. The symptoms that lead patients to seek help are not usually related to situs inversus. Imaging plays an important role.

Keywords

Situs, Inversus, Totalis, Imaging

1. Introduction

The situs inversus is a rare congenital anomaly that causes the reversal in the anatomical arrangement of visceral organs like the heart, as well as the liver, spleen, and other organs [1].

The laterality defect may be complete and is referred to as situs inversus totalis.

Any other variant of laterality anomaly between situs inversus totalis and normal anatomy is called situs solitus.

This is a global defect in situs orientation, as the inability to generate normal left-right asymmetry results in a spectrum of laterality disturbances [2].

The incidence is about 1 in 10,000 [3].

Situs inversus could be classified into situs inversus totalis, where the abdominal organs are mirror images of the normal anatomy, as well as the dextrocardia. Also, situs inversus with levocardia, where the base-to-apex axis points to the left while the abdominal viscera are reversed.

Then, there are situs ambiguous. In these patients, the liver may be midline, asplenia or polysplenia, unclear cardiac morphology, or mal-rotated gut [4].

Situs inversus totalis is the most frequent form (n = 158, 82.7%), situs abdominalis (n = 7, 3.7%) and situs ambiguous (n = 26, 26.13%) with a $P < 0.001$ and a sex ratio of 0.96 [5].

The first case of inversion of the liver and spleen was reported in humans in 1600 [6].

In a study carried out in the United States by Ferencz *et al.* [7], which deals with "Lateral and looping defects", certain risk factors for situs inversus totalis (SIT) were identified. These include a family history of heart defects, family history of non-cardiac anomalies, maternal diabetes, use of cough suppressants, paternal smoking, and low socio-economic status.

A link would be established between these different factors and genetic mutations [8].

Other conditions that situs inversus may occur with include duodenal atresia, biliary atresia, gastroschisis with malrotation, congenital coronary abnormalities, ventricular septal defect, transposition of the great arteries [9].

The diagnosis is usually made by chance.

The aim of this case study was to investigate the contribution of imaging to the diagnosis of situs inversus totalis.

2. Clinical Case

2.1. History of Illness

This 21-year-old patient was admitted to the emergency department for hematemesis. The onset of symptoms dates back 4 days from the date of consultation, marked by the onset of hematemesis, accompanied by: vomiting after eating, early postprandial, of minimal abundance, two episodes in four days. Right hypochondrium pain, moderate intensity, intermittent, no radiation. Given the persistence of this picture, he consulted us for management. On examination, there was no family history of congenital anomalies.

2.2. Physical Examination

Palpation: triggered diffuse abdominal pain, no organomegaly. Complementary

examinations included X-ray, thoracic-abdominal-pelvic CT scan, oesophageal-gastroduodenal fibroscopy, and anorectoscopy.

2.3. Complementary Examinations

2.3.1. Protocol for Face Thoracic Radiography

We checked the patient's identity, date, and right side. The patient was standing.

The framing extended from the cervical spine to the two diaphragmatic domes. It also covered the soft tissues of the thorax. Standard radiological parameters were respected.

Thoracic radiography results: A frontal chest X-ray showed dextrocardia (Figure 1).

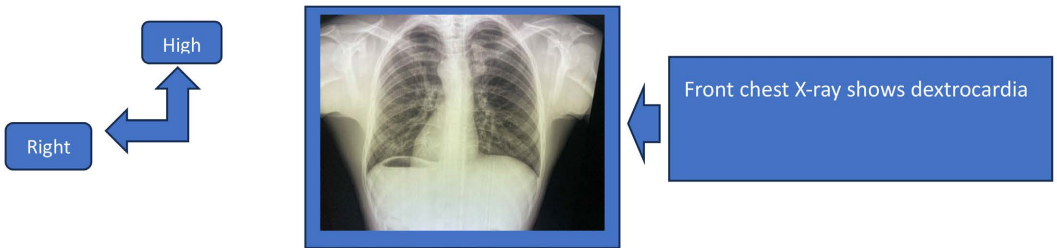

Figure 1. Front chest X-ray.

2.3.2. Scanning Procedure for Thoracoabdominopelvian Scanner

We performed thin sections of the thorax, abdomen, and pelvis using a 16-slice and Ellice 2 mm × 4 mm scanner with and without contrast injection. Renal function was normal. Results were interpreted by imaging specialists.

Scanner results: A CT scan of the thoracic region shows inversion of the lung with dextrocardia (Figure 2), the aorta on the right, and the superior vena cava on the left (Figure 3).

The CT scan of the abdominopelvic region showed a left hepatic location. The liver is homogeneous, measuring 146 mm, with normal vascularity. The inferior vena cava is of normal caliber, located on the left, and biliary drainage is normal (Figure 4).

A pelvic CT scan showed a sigmoid colon on the right (Figure 5) and a coecum on the left (Figure 6).

CT scan: Thoracic Floor

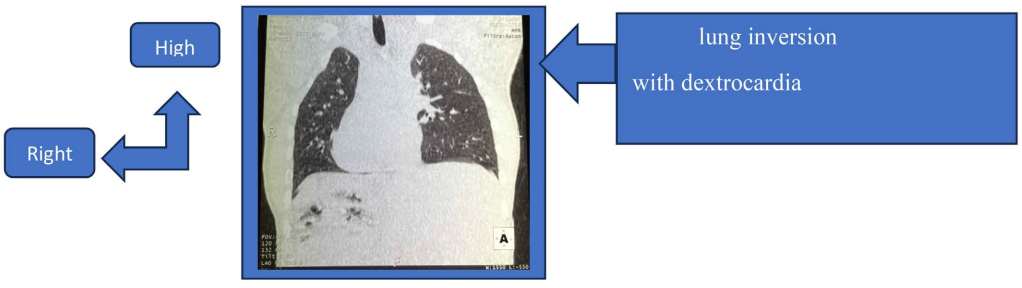

Figure 2. Frontal thoracic CT section.

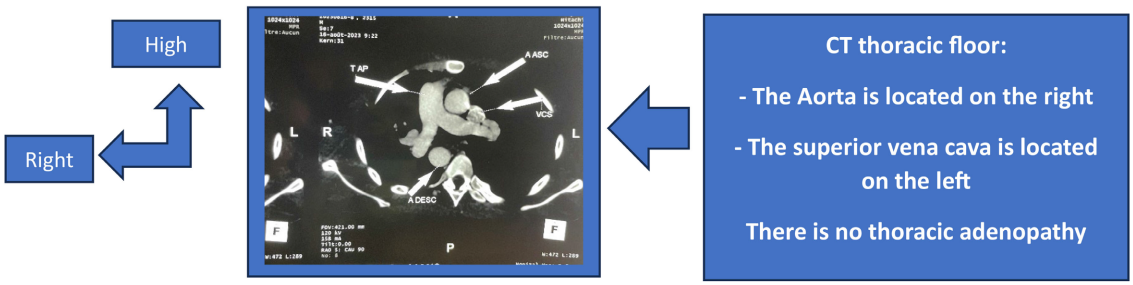

Figure 3. Thoracic axial section, vascular times.

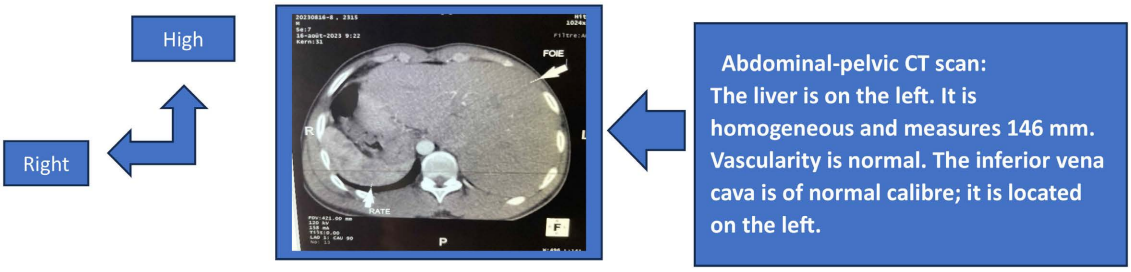

Figure 4. Abdominal axial section.

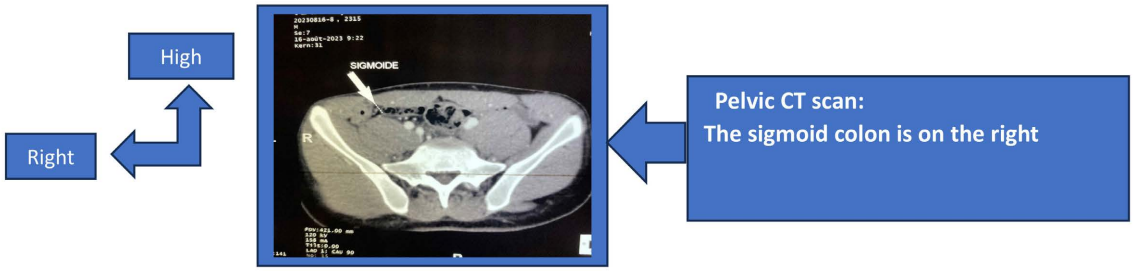

Figure 5. The pelvic axial section shows the sigmoid.

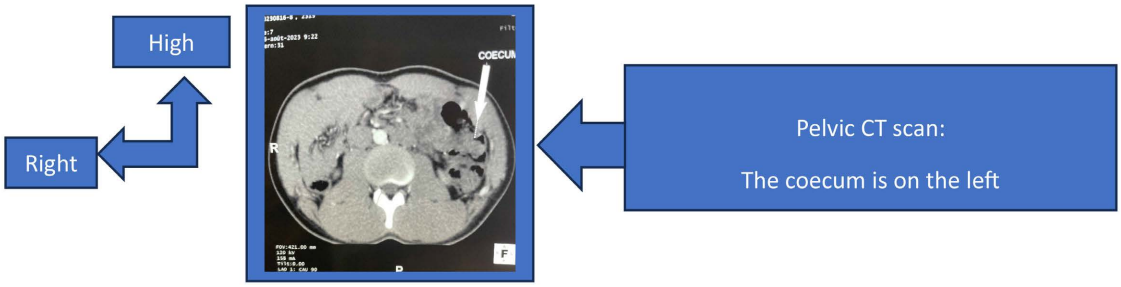

Figure 6. The PELVIC axial section shows the coecum.

2.3.3. Oesophageal-Gastroduodenal Fibroscopy

- Performed without premedication, it enabled visualization up to 40 cm from the dental arches.
- The internal sphincter of the esophagus is normal (absence of cardiac gap).
- The oesophageal, duodenal, and gastric mucosa are unremarkable.
- Absence of oesophageal varices.
- Overall, the examination is normal.

2.3.4. Anorectoscopy

The anal margin was clean and easy to examine; no hemorrhoidal bulge, fistula, or fissure was found. Examination returned normal.

3. Comments and Discussion

Situs inversus totalis is a rare congenital malformation corresponding to complete inversion of the thoracic and abdominal organs, producing an anatomical mirror image of the normal location [10].

3.1. Frequency

Reported in humans at a frequency of 0.01% - 0.02% [11].

Situs inversus can be associated with sometimes complex congenital cardiac anomalies [10]. In our patient, no congenital malformations were noted.

3.2. Clinical

The clinical features are not very suggestive of the diagnosis, which is often dominated by signs of rhinitis and bronchitis associated with Kartagener syndrome (KS) in most cases [11]. This finding differs from our case, which presented with hematemesis, rectal discharge, and abdominal pain. This entity is associated in humans with Kartagener syndrome (SK), a primary ciliary dyskinesia characterized by the clinical triad of "sinusitis, bronchiectasis, and complete or incomplete situs inversus" [12].

Our patient's clinical picture was marked by abdominal pain, hematemesis, and rectal discharge. Anorectoscopy and fibroscopy were normal.

The normality of these two complementary examinations was in favour of minor lesions, which had disappeared before these examinations were carried out.

If the lesions were moderate or even severe, anorectoscopy and fibroscopy would identify them.

The notion of rectorrhagia could be in favor of a spontaneously resolving anal fissure.

Vomiting and pain in the right hypochondrium could suggest malaria in a malaria-endemic setting.

Malaria can take many forms.

3.3. Paraclinical Examinations

On radiological examination of the thorax, we found a mirror inversion of the thoracic organs with the apex of the heart pointing to the right of the midline, a finding reported by some authors [12]-[14] and a leftward position of the vena cava, a finding reported by other authors [15] [16]. The cardiac silhouette was normal. A study carried out in Algeria in 2016 and 2021 involving two men found an inversion of the intra-thoracic and intra-abdominal organs in relation to the sagittal plane. The two men were aged 81 and 71, respectively. They consulted the imaging department of Annaba University Hospital, the first on suspicion of in-

versus and the second for extension workup. The CT study showed inversion of the intra-thoracic and intra-abdominal organs in relation to the sagittal plane in both men [10]. This result is consistent with our case, which also shows inversion of the intra-thoracic and intra-abdominal organs.

In terms of evolution, we don't have enough hindsight to assess the patient's long-term outcome.

4. Conclusion

Situs inversus is a very rare, asymptomatic congenital anomaly. Its discovery is usually fortuitous. The symptoms that lead patients to seek help are not usually related to situs inversus. Imaging plays an important role in the diagnosis and management of situs inversus totalis.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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