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# Dextrocardia with Situs Inversus Totalis: A Case Report in a Malagasy Patient

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## Abstract

Situs inversus totalis (SIT) is a rare congenital anomaly characterized by dextrocardia associated with reverse anatomical position of abdominal and thoracic organs. We report a case of SIT in Malagasy male patient aged 41-year-old admitted to Emergency Unit for an acute abdominal pain located in left iliac fossa. Preoperative chest X-ray showed an image of dextrocardia with reverse location of gastric bubble under the right hemidiaphragm. CT scan showed a situs inversus totalis with an abscess appendicitis located in the left iliac fossa associated with right-sided cardiac position and reversed location of abdominal organs. Patient underwent laparotomy with appendicectomy. Postoperative period was uneventful.

## Keywords

Appendicectomy, Computed Tomography, Dextrocardia, Situs Inversus Totalis

## 1. Introduction

Situs inversus totalis (SIT) is a rare anatomic anomaly characterized by right side of cardiac anatomical position associated with reversed anatomical position of all thoracic and abdominal organs [1]. Situs inversus was first described by Aristotle in animals and by Fabricius in humans [2]. It's a rare congenital disorder with an incidence of approximately 1 in 10,000 live births [3]. The right etiology of situs inversus remains unknown despite some cases reported in the literature. Patient with situs inversus totalis could live normally like all people and the diagnosis is

found usually after a routine imaging exam or an imaging investigation demanded for the presence of disease in thoracic or abdominal organs. We report a case of SIT in Malagasy male patient aged 41-year-old admitted for an acute abdominal pain located in left iliac fossa. Preoperative chest X-ray showed an image of dextrocardia.

## 2. Case

A 41-year-old Malagasy male patient was admitted to Emergency Unit of Soavinandriana Hospital of Antananarivo for an acute abdominal pain localized in left iliac fossa. Pain was insidious onset with a severity of 5 on a scale of 1 - 10 associated with a fever and infectious syndromes. Patient had a previous history of Graves-Basedow disease discovered in 2015 and treated by radioiodine therapy. In admission, vital signs recorded on initial assessment showed temperature of 36.8˚C, tachycardia with 119 beats per minute, blood pressure 140/70 mmHg and oxygen saturation at 91% on room air. Palpation showed a reverse Rovsing's sign with left lower abdominal pain upon palpation of the right side of the lower abdomen. Abdominal ultrasound showed an image of abscess appendicitis localized in left iliac fossa. Blood investigations and radiological investigations were done. Blood investigations showed normal complete blood count (CBC) with white blood cell count of 9340 cells per cubic millimeters, with 59% neutrophils, C-reactive protein (CRP) of 0.4 mg/dL, calcemia of 1.86 mmol/L, serum creatinine of 116 µ mol/L, free T3 level of 1.41 pg/mL and free T4 level of 16.78 pmol/L. Amylase and lipase levels were within normal limits. Preoperative chest X-ray showed right side position of the heart (dextrocardia) with location of gastric bubble under the right hemidiaphragm (**Figure 1**).

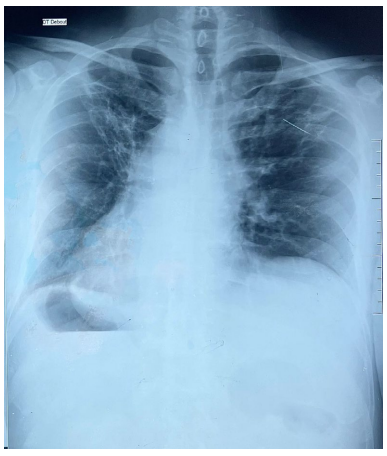

**Figure 1.** Chest X-ray showing dextrocardia with gastric bubble under the right hemidiaphragm.

Exploration was completed by thoracoabdominal CT scan before surgical decision. CT scan showed an image of dextrocardia with descending aorta on the right side of thoracic vertebral body in axial view (**Figure 2**).

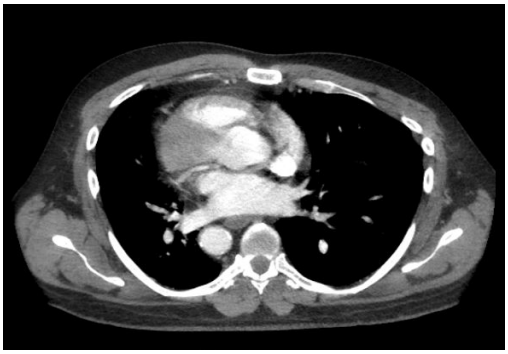

**Figure 2.** Computed tomography showing dextrocardia and descending aorta on the right side of thoracic vertebral body (axial view).

Coronal view CT scan showed the heart on the right hemidiaphragm associated with complete reverse of location of thoracic and abdominal organs (**Figure 3**). Liver was seen in left hypochondrium and spleen in right hypochondrium (**Figure 4**). CT scan on axial view showed an image of appendicular abscess localized in left iliac fossa (**Figure 5**).

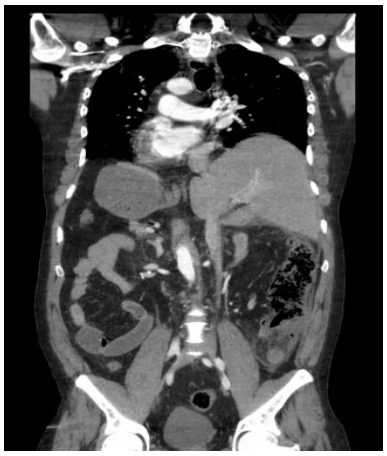

**Figure 3.** Dextrocardia associated with reverse location of thoracic and abdominal organs on CT scan (coronal view).

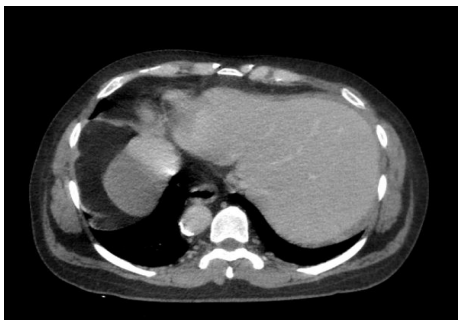

**Figure 4.** Left side of liver and right side of spleen on CT (axial view).

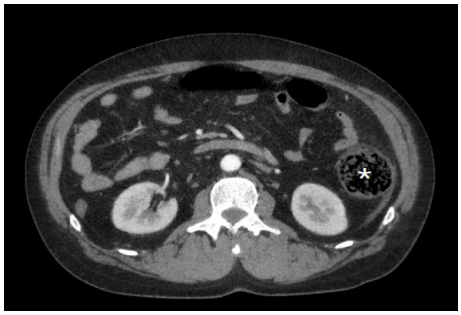

**Figure 5.** Image of appendicular abscess on the left iliac fossa.

Patient was planned for an emergency laparotomy on the same day. Midline abdominal incision was performed to make an abundant peritoneal lavage due to presence of appendicular abscess. Surgical exploration found moderate purulent peritoneal fluid with gangrenous appendicitis localized in left iliac fossa. Surgical procedures consisted of appendicectomy followed by peritoneal abundant lavage with warm saline solution. Antibiotic treatment continued in postoperative period. Postoperative period was uneventful.

## 3. Discussion

Situs inversus totalis (SIT) describes an abnormal situation characterized by association of dextrocardia with mirror image of intrathoracic and intra-abdominal organs. SIT is a rare congenital condition, including laterality defects, with an estimated birth prevalence of about 1.1 per 10,000 live births, based on the data collected in the National Birth Defects Prevalence Study [4]. Few cases of SIT have been reported in Sub-Saharan African literature and no previous case has been reported in Malagasy studies. The exact cause of SIT remains unknown. However, some authors revealed a genetic condition in patients with SIT [5] [6]. But, there is no sex predilection according to the study of Osarenkhoe in 2022 [1].

The diagnosis of SIT is not obvious and is always made after a radiological imaging or computed tomography. Patients with SIT live generally like all people without it. SIT is often diagnosed lately when patients present to the hospital with unrelated health conditions. In otherwise, the diagnosis of acute appendicitis is not too obvious due to location in left iliac fossa of the pain, making the necessity of imaging investigation to confirm the diagnosis. The circumstances of the diagnosis of SIT were multiple. Some authors reported cases of SIT discovered after disease like acute appendicitis [7], after trauma [6], after investigation for hematuria [8] or after another imaging exam like a barium enema examination [9]. The differential diagnosis for left-sided lower quadrant abdominal pain in patient with SIT includes bowel obstruction, acute sigmoid diverticulitis, strangulated or incarcerated hernia, small bowel enteritis, Meckel's diverticulum, ruptured ovarian cyst or ectopic pregnancy, ureteric colic, acute epididymitis and psoas abscess [10]. Chest X-ray is one of current imaging techniques, making the diagnosis initially by show-

ing dextrocardia. Although chest X-ray and ultrasound are useful in initially diagnosing this condition, computed tomography and magnetic resonance imaging are the best exams for confirmation. The diagnosis of SIT was confirmed in thoraco-abdominal CT showing presence of image of dextrocardia with mirror image of intrathoracic and intra-abdominal organs.

The presence of SIT had an impact on the surgical procedure, such as modification of the appendicectomy incision onto the left iliac fossa in patient with acute appendicitis due to reverse location of appendixes [11]. However, midline exploratory laparotomy offers an advantage for exploring the disease in question and localizing intra-abdominal organs. In case of appendicular abscess, midline abdominal incision gives more advantage to perform an abundant peritoneal lavage.

## 4. Conclusion

The diagnosis of dextrocardia with SIT is not obvious. Many clinicians have never seen this abnormality because of its rarity. Acute abdominal pain located in the left iliac fossa could reveal an acute appendicitis. Laparotomy not only treats the abdominal disease in question, but also allows all intra-abdominal organs to be explored.

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## Consent

The patient was informed and gave consent for this case report and any related images to be published.

## Ethical Approval

The study is exempt from ethical approval in our institution.

## Conflicts of Interest

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

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