

# Incidental Detection of Situs Inversus Totalis in a Young Female by Technetium-99m Mebrofenin (HIDA) Nuclear Imaging

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## Abstract

Situs inversus totalis, a not so uncommon congenital positional anomaly can be a diagnostic problem at times. We present a case of situs inversus totalis that was picked up during Technetium-99m Mebrofenin (HIDA) hepatobiliary nuclear scan of a young female patient with pain abdomen.

## Keywords

Technetium, HIDA, Situs inversus

## Introduction

Situs inversus is a congenital positional anomaly characterized by transposition of abdominal viscera, and when associated with a right sided heart (Dextrocardia) is referred to as situs inversus totalis (1). Except for a positional anomaly the hearts of such individuals are normal (2, 3). It was Mathew Baillie who first described situs inversus totalis in early twentieth century (3). Transposed thoracic and abdominal organs are a mirror image of the normal anatomy (4). Situs inversus associated with a primary ciliary dyskinesia often leading to infection of the paranasal sinuses and lungs is called Kartagener's syndrome (5, 6). Generally, patients with situs inversus totalis are asymptomatic and have a normal life expectancy (7). Documenting situs inversus in an individual is important in order to correctly interpret any future symptoms and avoid any inadvertent clinical or surgical mishap.

## Case Report

Eighteen year old unmarried girl was referred to the department of Nuclear Medicine at Sher-i-Kashmir Institute of Medical Sciences, Srinagar for Technetium-99m (Tc-99m) Mebrofenin (HIDA) hepatobiliary imaging. Historically patient complained of dull upper abdominal pain for previous two years. Pain would occasionally get aggravated by a heavy meal. There was no associated history of vomiting, yellow discoloration of eyes, painful micturation or passing blood with urine. The patient did not give any past history suggestive of diabetes, hypertension, tuberculosis etc. She was a non smoker and had normal menstrual cycles. General physical examination was normal. On systemic examination the cardiac apex was located in the fifth right intercostal space 1.5 centimeters inside the midclavicular line. Rest of the systemic examination was unremarkable. Serum

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chemistry that included liver function tests and the kidney function tests were within the normal limits. Haemogram was normal. Abdominal ultrasonographic examination done at a private clinic had revealed a grossly contracted gallbladder (Cholecystitis) with mild splenomegaly. The patient was taken up for Tc-99m Mebrofenin (HIDA) scan on an empty stomach. 5 millicuries (mCi) of Tc-99m Mebrofenin were injected intravenously under the detector of a large field of view (LFOV) gamma camera fitted with a parallel hole low energy all purpose (LEAP) collimator. Gamma camera energy was centered at 140 keV using a 20% symmetrical window. One minute dynamic images of the abdomen on a 64 by 64 matrix size were acquired for 30 minutes. At completion of this dynamic imaging a 2 minute static pre-meal image was acquired on a matrix size of 256 by 256. Patient was instructed to eat a fatty meal of eggs, bread and butter and return after a period of 30 minutes for a 2 minutes post-meal static image. Pre-defined computer software was used to analyze this study. The scan revealed a left sided liver and gallbladder (Fig. 1). The hepatocyte function was normal and the gallbladder ejection fraction was calculated as 60% which was within normal limits. In order to ascertain the splenic position, the patient was rescanned after a few days with Tc-99m Sulfur colloid, a macrophage agent. Liver was confirmed to be placed on the left side and spleen was positioned on the right side (Fig. 2). A subsequent plain X-ray of the chest revealed a right sided heart (Dextrocardia) and inverted bronchial situs with a left sided bronchial pattern transposed to right (Fig. 3). Barium study of esophagus and stomach confirmed gastric location on the right side (Fig. 4). The patient was subjected to cardiology consultation that included an electrocardiogram and echocardiography. A normally functioning right sided heart (Dextrocardia) was reported. A repeat abdominal sonographic examination done in the Department of Radiology, Sher-i-Kashmir Institute of Medical Sciences confirmed the diagnosis of situs inversus with a normal gallbladder (Fig. 5). The patient was referred back to the Gastroenterology Department, where she was reassured and put on symptomatic treatment.

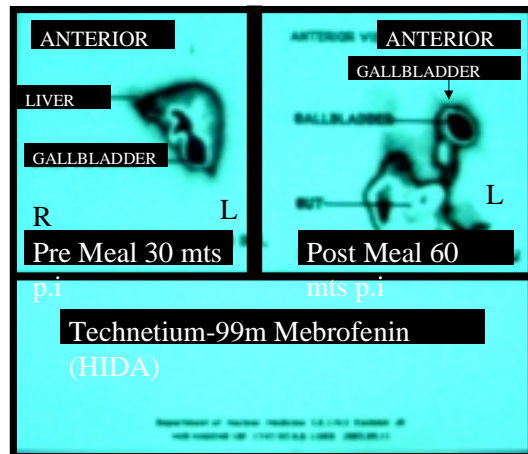


Fig. 1. Tc-99m Mebrofenin (HIDA) scan shows left sided liver & biliary system

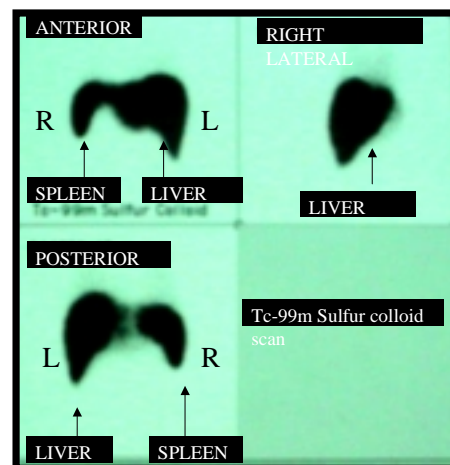


Fig. 2. Tc-99m Sulfur colloid scan confirms left sided liver & right sided spleen



Fig. 3. X-ray chest (PA) showing dextrocardia and the gas bubble in gastric fundus.



Fig. 4. Barium study showing stomach on the right side



Fig. 5. Abdominal ultrasonography confirming situs inversus with right sided gallbladder

### Discussion

Situs inversus has a reported incidence of 0.01% in United States of America (1), making this positional anomaly not very uncommon. Situs inversus totalis usually does not cause any significant morbidity to an individual harboring it (2, 3). However, its timely diagnosis is crucial for correct interpretation of future symptoms and the results of diagnostic procedures (4, 5). An antedated diagnosis of this disorder will form a baseline reference

for future surgical procedures and as such will be invaluable in preventing an unintentional operative mishap. The present case report also underscores some important shortcomings of modern day investigational tools. Ultrasonography no doubt a very useful diagnostic modality is highly subjective and based on the interpreter's reproducible and simple to interpret. In addition to anatomical details it gives excellent quantifiable functional information regarding the hepatobiliary system (8). It would be worthwhile if a base line Tc-99m Mebrofenin (HIDA) imaging is done in all patients suspected of hepatobiliary disorders particularly before they are taken up for surgery. In a patient of atypical abdominal pain not conforming to a standard sequence the possibility of situs inversus though rare needs to be ruled out with appropriate investigations including Tc-99m Mebrofenin (HIDA) scan.

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