

## Chilaiditi's syndrome demonstrated by SPECT-CT

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### Introduction

Chilaiditi's sign is a radiographic term that is used when the hepatic flexure of the colon is seen interposed between the liver and right hemidiaphragm.<sup>1</sup> This syndrome is a rare condition and most often an asymptomatic anomaly that is typically an incidental finding.<sup>2</sup> It is seen in 0.1 - 0.25% of chest X-rays, most frequently in males, and almost always in adults. Factors contributing to its occurrence are thought to include absence of normal suspensory ligaments of the transverse colon, abnormality or absence of the falciform ligament, redundant colon as might be seen in patients with chronic constipation or in bedridden patients, paralysis or even eventration of the right hemidiaphragm, and patients with chronic lung disease, cirrhosis and ascites. The condition is usually asymptomatic<sup>3</sup> but may present with abdominal pain, nausea, vomiting and constipation.<sup>1,2</sup> Chest pain and dysphagia have been described, therefore Chilaiditi's syndrome should be considered in the differential diagnosis of chest pain.<sup>3,4</sup> Chilaiditi's syndrome may mimic pneumoperitoneum on chest X-ray. Computed tomography (CT) scan usually shows the haustral folds consistent with air within the colon,

while ultrasonography may clearly show a loop of intestine between the liver and diaphragm.

We report here on an unusual and incidental finding of this syndrome using single photon emission computed tomography-CT (SPECT-CT) in a patient referred for a possible inflammatory process. Gallium-67 citrate was the agent used in an attempt to localise a site of active disease. The use of this hybrid imaging modality prevented us from looking into the differential of a 'photon-deficient' area on gallium imaging of the abdomen. Our case is the first in the literature to describe the finding of Chilaiditi's syndrome using this hybrid imaging modality.

### Case report

A 49-year-old woman was referred to us from the neurology general ward for gallium imaging. She was admitted for proximal body weakness possibly caused by myopathy. She gave a 4-year history of weakness that started with fatigue and progressed to the point that she could not walk. She did not offer any history of sensory complaints but occasional double vision (diplopia) was mentioned.

Physical examination revealed nothing abnormal on the vital signs or the cardiovascular and respiratory systems. The CNS examination noted a clear decreased proximal power. The clinical diagnosis of myopathy was retained and she was sent to us for a gallium scan to rule out a granulomatous myositis.

Both planar imaging and SPECT-CT reconstructed images were done using a dual-head GE Medical Systems Infinia hybrid system equipped with a medium-energy collimator. Gallium-67 citrate 5 mCi was injected intravenously 2 days before imaging. Whole-body sweep

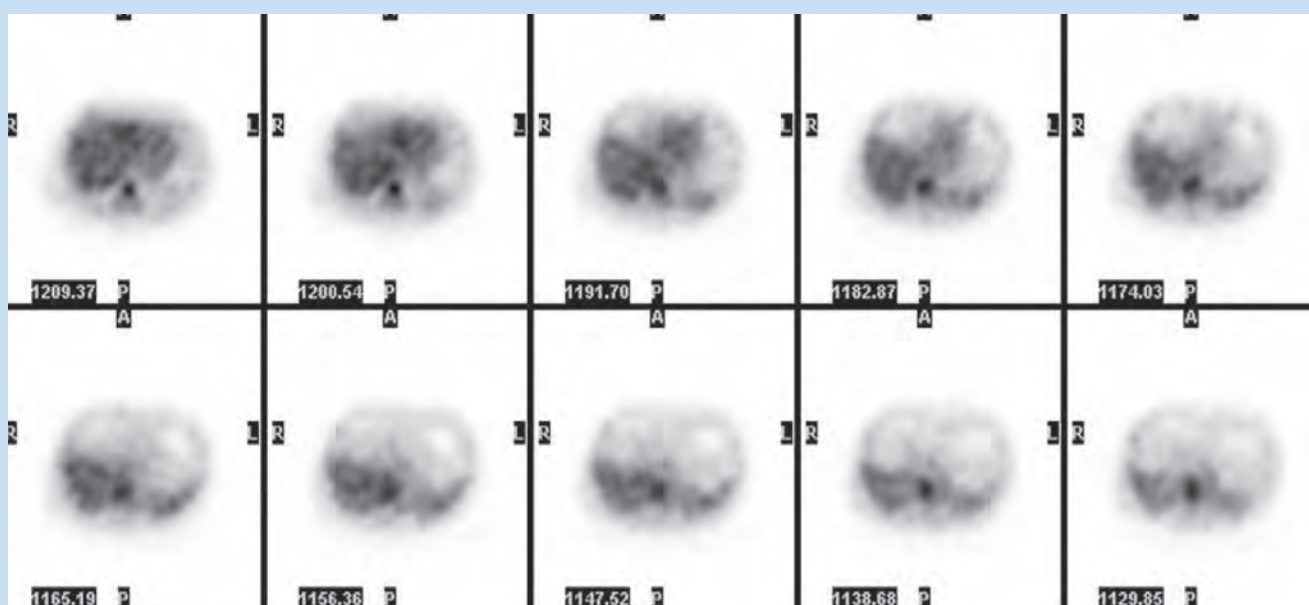


Fig. 1. SPECT-reconstructed images of the gallium-67 scans showing a 'cold' area on the transverse plane.

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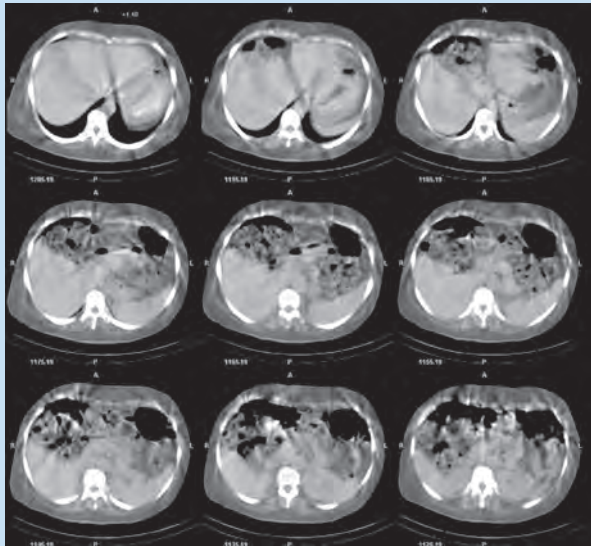


Fig. 2. The CT scans for localisation on the same imaging machine (hybrid equipment) show air in the area of no gallium uptake, suggesting the clinical diagnosis of Chilaiditi's syndrome.

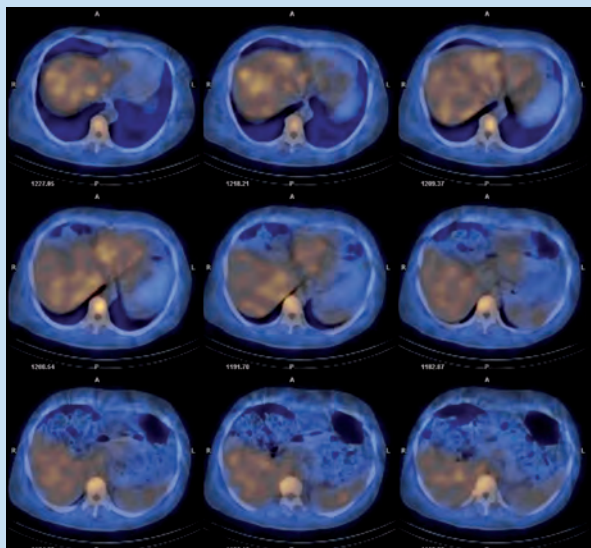


Fig. 3. Fused anatomical and functional images confirming the findings on SPECT and CT of the abdomen.

(H-mode for anterior-posterior, feet first) was done for planar acquisition using a continuous mode with an exposure time per pixel of 300 seconds. SPECT recording of imaging was done on a step-and-shoot mode (40 seconds per projection and 10 mm slice step) using a 128 x 128 matrix. The CT tomography was acquired with a full CT/AC range using a current of 2.5 mA, 140 kV voltage and rotation velocity of 2.6 RPM.

The planar images on gallium scintigraphy showed a large photon-deficient area in the right lobe of the liver. The SPECT-reconstructed images confirmed the presence of this large photopenic area (Fig. 1), and the CT scan shows evidence of air consistent with bowel filling the

abovementioned photon-deficient area (Fig. 2) as positively identified on the combined or fused images of SPECT-CT (Fig. 3). A full diagnostic 16-slice CT scan with contrast was ordered for academic interest and confirmed all the above.

## Discussion

We report on a female patient with a clinical diagnosis of myopathy thought to be caused by granulomatous myositis. An incidental finding of Chilaiditi's syndrome was noted during imaging investigation by using SPECT-CT for gallium scanning.

The use of SPECT-CT made the interpretation of our finding easier and prevented the search for differential diagnoses of decreased gallium uptake such as cysts, fibrosis, benign tumours, bile peritonitis, and liver replacement by non-Ga-67-avid lesions, amoebic abscess or a necrotic liver metastasis.

Previous incidental finding of this syndrome on scintigraphic studies has been described in the literature but with clear contrast to our findings. A linear area of intensely increased gallium activity was seen along the superior and lateral margins of the right lobe of the liver during the search for a possible opportunistic infection or neoplastic disease in a male patient with AIDS who had fever and lymphadenopathy.<sup>6</sup> This activity was caused by interposition of the colon as demonstrated on a concurrent chest radiograph that shows the gas-filled hepatic flexure of the colon between the right diaphragm and the liver. In another scintigraphic study on a male patient with ulcerative colitis that was not responding to treatment, Chilaiditi's syndrome was identified with Tc-99m hexamethyl-propylene amine oxime-labelled leukocytes requested to evaluate the site, extent and severity of disease.<sup>7</sup> A prominent increased uptake was seen in the right side of the colon, which was interposed between the liver and the diaphragm; this was a segment of active inflammatory bowel that was confirmed at surgery.

In our case presentation, the use of CT as part of the hybrid imaging modality made it easier to suspect this syndrome in a patient without symptoms of either abdominal or chest pain. In fact, the increased number of studies with SPECT-CT in the current clinical practice of nuclear medicine clearly signals the need to accurately localise the site of functional abnormalities; this was also our motivation for using such a modality. The use of SPECT-CT for gallium-67 citrate by Fuertes and colleagues was shown to improve the diagnostic yield of their study in providing better anatomical localisation of lesions.<sup>8</sup> O'Connor and Kemp recently stated that the anatomical and functional information presented by SPECT-CT can aid in the decision-making process by enabling better localisation and definition of organs and lesions and thus improve the precision of sites for biopsies.<sup>9</sup> Finally, the most recent publication of the procedure guideline for SPECT-CT imaging to assist physicians in performing, interpreting, and reporting SPECT-CT images is an indication that the use of this integrating device containing both a CT scanner and a SPECT gamma camera will offer numerous advantages, the most important being the anatomic referencing.<sup>10</sup>

In conclusion: the use of the hybrid imaging technique that combines anatomical and functional information should be considered when it is available in cases where there is a need for accurate localisation of active disease. Regardless of the nature of radioactive tracer on scintigraphy, increased or decreased within the interposed colon in the right hepatic

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flexure, the CT component should confirm the presence of air in symptomatic or asymptomatic patients with Chilaiditi's syndrome.

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