



Isolated Dextrogastria: A Case Report

Vecteur Dextrogastria: A case report

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ABSTRACT

BACKGROUND: Isolated dextrogastria is a rare congenital anomaly in which the stomach is right-sided while the intestines, the organs in the chest, and the other organs in the abdomen are in normal situs. The importance of recognising the spectrum of situs anomalies is because the altered anatomy associated with these anomalies may result in misdiagnosis. **OBJECTIVE:** To report a case of isolated dextrogastria in an 18-year old woman who was seen during pre-university admission medical examination.

METHODS: The routine chest X-ray of a young woman as a part of pre-admission medical examination showed the gastric air bubble under the right diaphragm rather than on the left. She was then subjected to further clinical and radiological evaluation.

FINDINGS: The personal, past and family histories were uneventful as was the physical examination. Trans-abdominal ultrasonography showed a normal-sized and a normally sited liver in the right hypochondrium with normal gall bladder, and normally sited left and right lobes of the liver. The liver echo pattern was normal. The stomach was found below the lower border of the right lobe of the liver. The kidneys and the spleen were normal in number, position, size and architectural pattern. A barium meal showed a well-defined and a well-developed stomach with a reverse J shape and duodenal C loop that was reversed in shape.

CONCLUSION: The practice of the radiographer is always placing the marker before exposing the film instead of marking the radiograph after processing, which is the key to accurate identification of situs anomalies need emphasis. *WAJM 2009; 28(4): 270–273.*

Keywords: Dextrogastria, Situs Inversus, Stomach,

RÉSUMÉ

CONTEXTE: *dextrogastria isolée est une anomalie congénitale rare dont l'estomac est du côté droit alors que les intestins, les organes de la poitrine, et les autres organes de l'abdomen sont situs normal. L'importance de reconnaître le spectre des anomalies du situs est altérée en raison de l'anatomie associée à ces anomalies mai entraîner un diagnostic erroné.*

OBJECTIF: *Rapporter un cas de dextrogastria isolé dans un de 18 ans, vieille femme qui a été constaté pendant l'examen préalable à l'admission universitaire de médecin.*

MÉTHODES: *Les X de routine du thorax d'une jeune femme comme une partie de pré-admission à l'examen médical a montré la bulle d'air gastrique sous le diaphragme droit plutôt que sur la gauche. Elle a ensuite été soumis à une nouvelle évaluation clinique et radiologique.*

RÉSULTATS: *Les histoires personnelles, familiales passées et se passent sans incident comme cela a été l'examen physique. Trans-échographie abdominale a montré une taille normale et un foie normalement situé dans l'hypochondre droit et la vésicule biliaire normale, et normalement situés à gauche et à droite lobes du foie. Le modèle d'écho hépatique était normale. L'estomac a été trouvé sous le bord inférieur du lobe droit du foie. Le rein et la rate étaient normaux en nombre, position, taille et architectural pattern. Un repas baryté montre un système bien défini et un estomac bien développé avec une forme inversée J et duodénaux boucle C qui a été infirmé en forme.*

CONCLUSION: *La pratique de la radiographie en plaçant toujours le marqueur avant d'exposer le film au lieu de marquer la radiographie après transformation, qui est la clé de l'identification précise des anomalies du situs nécessaire d'insister. *WAJM 2009; 28(4): 270–273.**

Mots-clés: Dextrogastria, un situs inversus, estomac.

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Abbreviations: CT, Computerised Tomography; MRI, Magnetic Resonance Imaging.

INTRODUCTION

In the imaging of situs inversus of the chest and abdominal organs, plain chest X-ray is the preliminary radiological investigative modality of choice.¹ The heart, cardiac apex, stomach and spleen are usually left-sided while the liver, gall bladder, and the venae cavae are on the right side in normal individuals.^{1,2} Isolated situs inversus of the stomach is a very rare congenital anomaly and is not usually associated with other congenital anomalies.⁴⁻¹⁰ Accurate radiological recognition of situs anomalies is important because of the challenges the altered anatomy may present to diagnosticians and clinicians in the presence of acquired diseases of the chest and abdomen.

CASE REPORT

An 18-year old female undergraduate presented to the Radiology Department of University of Benin Teaching Hospital on the 29th November 2002 for pre-admission chest X-ray. She had no symptoms and no significant past medical history.

She was the third child of a family of four children. None of the siblings had been admitted into a hospital before or had any significant history of cardiovascular, respiratory or gastrointestinal illness. There was no congenital anomaly among the siblings noticed physically. The mother had no remarkable past medical history or any positive history of drug ingestion when she was pregnant. The father was a businessman. Neither of the parents was hypertensive, diabetic, asthmatic or had any significant past medical history. None of the parents smoked or drank alcohol to excess.

Physical examination showed a slim healthy looking young woman without any systemic abnormality. Plain radiograph of the chest showed a normal-size and shaped heart. The chest showed normal situs of the bronchi and the heart. The gastric air-bubble was noted under the right hemi diaphragm. There was no gastric air-bubble under the left hemi diaphragm (Figure 1). The 'thickness of the diaphragm' between the gastric bubble and the dome of diaphragm on the right was 2.2 cm. After disclosure of the result of chest x-ray, the patient



Figure 1: Postero-anterior chest radiograph of the patient showing gastric air-bubble (black arrow head) under the right hemidiaphragm and a normal positioned heart.



Figure 2: Erect antero-posterior view of barium meal examination showing the stomach in the right hypochondrium with the normal shape reversed (white arrow head). Note also normal positioned heart.



Figure 3: Full length of barium meal and follow through examination (antero-posterior view) showing the stomach in the right hypochondrium under the right hemidiaphragm (curved arrow) and normal small intestines. Also note the reversed shapes of the stomach and duodenal c-loop.

volunteered that she normally felt coldness in the right hypochondrium after drinking cool water. Trans-abdominal ultrasonography using real time B-mode two-dimensional Sonoace 1500 scanner (Medison Inc, South Korea), fitted with 3.5 MHz curvilinear probe showed a normal-sized and a normally sited liver in the right hypochondrium with normal gall bladder, and normally sited left and right lobes of the liver. The liver echo pattern was normal. The anechoic fluid-containing stomach was found below the lower border of the right lobe of the liver. Patient was given some water to drink and the position of the stomach confirmed. No stomach or cystic mass was noted in the left hypochondrium under the left hemi diaphragm. The kidneys and the spleen were normal in number, position, size and architectural pattern.

A barium meal examination showed a well-defined and a well-developed stomach with a reverse J shape (that is shaped like L), and the duodenal C loop reversed in shape (Figure 2).

From the jejunum to the ileum, there was normal and continuous column of barium with normal bowel mucosal pattern in barium follow-through examination. There was no sign of stasis or obstruction (Figure 3). A barium enema showed normal colonic shape pattern, normal colonic situs, and a hepatic flexure that was depressed or displaced downwards, a splenic flexure that was elevated to occupy a position the normally sited stomach would have occupied. The appendix was in normal position (Figures 1–4). Echocardiography was normal. Computed tomography scan was carried out and axial sections taken through the upper abdomen after ingestion of oral contrast (dilute barium sulphate). This showed the stomach beneath the liver in the right hypochondrium (Figure 5). Only one spleen was identified, and sited within the left hypochondrium and normal in position. Magnetic resonance imaging (MRI), colour doppler ultrasonography, and facilities for angiography were not available in our centre at the time and thus were not carried out. A diagnosis of isolated situs inversus of the stomach

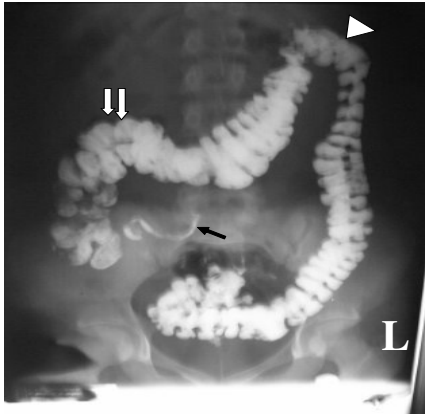


Figure 4: Barium enema examination showing depressed hepatic flexure (double white arrows) due to the position of the stomach in the right hypochondrium; and elevated splenic flexure (white arrow head) due to absence of the stomach in the left hypochondrium. Also note normal shaped colon without rotational abnormality, and normal sited appendix (black arrow).

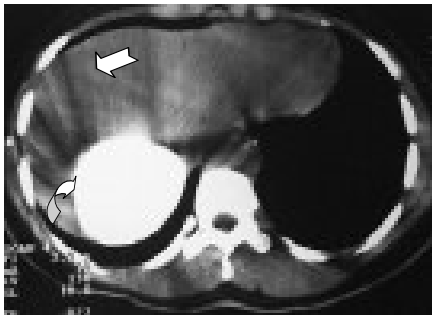


Figure 5: Axial CT scan of the upper abdomen after ingestion of oral contrast (diluted barium) showing contrast-filled stomach (curved white arrow) under the larger right lobe of the liver (straight white arrow) in the right hypochondrium.

was made following the above investigations and findings.

DISCUSSION

Situs solitus refers to the normal arrangement of the thoracic and abdominal organs while situs inversus totalis refers to a complete mirror image or reverse isomeric form of the thoracic and abdominal viscera.¹⁻³ There are several arrangements between these two extremes and are referred to as heterotaxia.¹⁻⁴ This occurs in the chest and abdomen. In situs inversus totalis, the stomach is on the right side and is the most common condition.⁵ Heterotaxias is referred to as situs ambiguous. In this condition, which is less common than situs inversus totalis, the

left- or right-sided nature of the abdominal or thoracic organs and the atria situs are not clearly defined. There is a midline liver running across the abdomen, the spleen is absent or multiple, the stomach is centrally positioned in the abdomen, and the bronchial anatomy shows right sided morphology of both major bronchi. There are frequently other congenital and intra-cardiac anomalies. Situs inversus totalis is not usually associated with congenital or intracardiac anomalies.¹⁻⁵ Another condition where the stomach can exist in abnormal position is in isolated situs inversus of the stomach or isolated dextrogastria. It is very rare and not usually associated with other congenital anomalies.⁶⁻¹⁰

Most abnormal situs in humans occur sporadically, however there is growing evidence that interference with normal genetic mechanisms and pathways may be responsible for most cases. Familial cases have been observed, and this suggests a major effect of both autosomal and X-linked genes with both dominant and recessive expression. Isolated situs inversus or non-syndromic birth defect in close relatives suggests that some pathways important in situs determination may also be involved in causing sporadic malformation not obviously associated with defect in laterality determination.¹¹ Our patient had four brothers, all of them refused to be examined for the purpose of this study.

The imaging recognition of normal situs, is in the presence of the liver and inferior vena cava lying on the right side, while the spleen, and the heart lying on the left.^{1-3,11} However, the easiest way a radiologist can recognize normal situs, is that the heart and gastric air bubble be on the left side on plain chest x-ray. Accurate diagnosis of situs inversus or isolated situs inversus requires that the radiographer exposes the film with the marker otherwise, when the marker is written after normal film processing, situs inversus will most likely be missed.^{1,6,12-14}

The liver, gall bladder, and the spleen should be confirmed by ultrasound scan, which will show characteristic features of these organs with the gall bladder within the liver.¹⁻⁷

The porta-hepatis and splenic hilum should be demonstrated. The stomach should be shown by ultrasound scan while the patient is drinking water, this will show the water with the true position of the stomach thus eliminate errors which may arise from a dilated duodenum lying in the midline.^{1,5,6}

Barium studies are used to demonstrate the lower oesophagus during swallow, the stomach and duodenum during meal. The "J" and "C" shape of stomach and duodenal loop respectively should be demonstrated also. In our case they were reversed. Barium follow-through and barium enema demonstrate the small bowels and the colon respectively which were normal. Where facilities are available and the cost not a major problem, computed tomography (CT) scan and Magnetic Resonance Imaging (MRI) of the abdomen should be used to demonstrate the abdominal organs in addition to ultrasonography. Cardiac catheterisation, magnetic resonance angiography (MRA) and conventional angiography, where available, should be used to establish the vascular anatomy of both the chest and the abdomen.^{1,3,5,14,15} These facilities are not available in our centre or any nearby centre. Liver scintigraphy was previously used to demonstrate the accurate position of the liver,² but modern imaging modalities like ultrasonography, CT scan and MRI are less invasive, more sensitive, carry lower risk of radiation, and have thus limited use.

In our case, because of the absence of the stomach on the left side and its position on the right side, the splenic flexure of the colon was found to be elevated while hepatic flexure was depressed on large bowel enema. Echocardiography is also useful to show any possible intracardiac anomaly.¹⁻⁵ Many cases of situs inversus totalis, congenital heart disease, isolated situs inversus, and situs ambiguous, present major challenges to diagnosticians, physicians and surgeons. For instance, in our case, peptic ulcer disease will present with pain probably towards the right hypochondrium. Several cases of carcinoma of the stomach have been reported with the right side probably contributing to a delay in diagnosis. A

left sided liver may be diagnosed as massive splenomegaly where facilities are not available for accurate imaging of these organs.^{12,13} Also in organ transplant surgeries, inversus position of the stomach or liver presents a major challenge to the surgeons since the altered shape of the vascular supply and anatomy of the organ may not correspond to the normal shape of most donors.^{3,10, 12-15}

In the absence of previous surgery the differential diagnosis is straightforward provided that the radiographer exposes the films with the marker as a strict routine. Situs inversus totalis and situs ambiguous are the other conditions in which the stomach can exist outside its normal place in the left hypochondrium. These conditions can be clearly diagnosed using barium studies, and CT scan. They features are describe above. There was no sign of eventration in any of the hemidiaphragms in this patient, gastric volvulus was completely ruled out after the barium meal and CT scan. They features are described above.^{6, 8, 15}

Thus, the importance of recognition of the spectrum of situs anomalies is the altered anatomy associated with these anomalies may result in confusing imaging findings, misdiagnosis and

difficulties with treatment when seen in conjunction with acquired abnormalities of the chest and abdomen. The practise of the radiographer in always placing the marker before exposing the film instead of marking the radiograph after processing, which is the key to accurate identification of situs anomalies is emphasized.

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