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Uncommon Celiac Trunk Variations in Association with Other Vascular Anomalies-Two Case Reports

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Abstract: ***Purpose of this paper was to introduce two rare cases of uncommon celiac trunk (CT) variations, respectively: hepatosplenomesenteric trunk (HSMT) with left gastric artery (LGA) deriving directly from the aorta and CT composed of LGA and splenic artery (SA) with the common hepatic artery (CHA) originating from the superior mesenteric artery (SMA). Coexistence of polisplenia and IVC anomalies were also seen in both patients (pts). In addition interatrial septal defect (IASD) with left atrial thromb was discovered in one of the pts. To discuss the clinical importance of these findings in patients' (pts) management. Materials: Both pts underwent MDCT and MDCT angiography with 120 ml i/v contrast medium at an injection speed of 3.5 and 4ml/s, with 3D-reconstructions. Result(s): Accidental finding of CT and IVC variations were found in both pts. The first pt was discovered to have a HSMT associated with azygos continuation of IVC and retroaortic left renal vein (RALRV). The next pt on the other hand revealed to have a CT composed of only the LGA and the SA whereas the common hepatic artery (CHA) derived from the MA. In addition the latter was also found to have IASD with left intraatrial thromb. Polisplenia was another incidental finding in both pts. Conclusion: Detailed recognition of variations of CT and IVC anatomy is important in the accurate interpretation of disease, in diagnostic imaging, Awareness of such variations is crucial in preventing life threatening complications during surgery/interventional radiology procedures.***

Keywords: celiac trunk; inferior venacava; azigos vein

1. Introduction

The celiac trunk (CT) and superior mesenteric artery (SMA) are the most important branches of the abdominal aorta wich supply most of the gastrointestinal tract. The Celiac trunk arises just below the aortic hiatus of the diaphragm at the level of TH 12– L1 and normally divides into left gastric, common hepatic and splenic arteries. While the superior mesenteric artery arises at the level of L1 and divides inferior pancreaticoduodenal, jejunal, ileal, ileocolic, right colic and middle colic arteries [1].

Inferior vena cava is formed by the joining of the two common iliac veins at the level of the fifth lumbar vertebra. It runs along the right side of the vertebral column, on the right side of the aorta, and then perforates the diaphragm to open into the lower and back part of the right atrium [1].

Variations of coeliac trunk and inferior vena cava may result from the unusual development of ventral splanchnic arteries [2] or abnormal regression or persistence of embryonic veins respectively [3].

While anatomical variations of the celiac trunk are very common, congenital anomalies of IVC and left renal vein are rare. Furthermore multiple arterial and venous anomalies in a single person are previously unreported in the literature.

In the present paper we report two cases of associated celiac trunk (CT) and IVC anomaly with their embryologic correlation and clinical importance.

It is widely accepted that detailed knowledge of CT and IVC variations constitute an important topic not only for anatomic purposes but also to radiologists and vascular surgeons. Proper knowledge of CT variations and their possible association with other vascular anomalies is crucial to patient's management.

2. Case Reports

Case 1: Male patient aged 47 years, presents with acute abdominal pain. He didn't refer to be treated for other illnesses and had not undergone previous surgical interventions.

Laboratory tests were within normal range. An US examination was performed which appeared to be normal. Afterwards he was referred for abdominal CT-scan for a more detailed evaluation. Contrast enhanced CT scan (CECT) was performed which didn't found any specific cause for patient's pain. Incidental finding of HSMT with LGA deriving directly from the aorta was found (Figure 1). In addition an atresia of IVC with azygos continuation and retroaortic right renal vein (RARRV) was also evident (figure 2). Polisplenia was another incidental finding in this patient (figure 2). The other vascular structures were within normal findings. The patient did well with analgesics.

Case 2: Female patient of 45 years old, presented with dispnea and pectoral angina. She had previously experienced femoral vein thrombosis for which she had been hospitalized and submitted to a surgical intervention with stent placement. Cardiac US performed upon hospitalization had revealed intertrial septal defect with thrombus within the left atrium.

Subsequently the patient was referred for a CT-angiography which revealed pulmonary embolism with thrombus present in both the pulmonary arteries. In addition it was noticed azygos continuation of IVC. On the other hand the CT was composed of only the LGA and the SA whereas the common hepatic artery (CHA) derived from the MA. Polisplenia was another incidental finding.

3. Discussion

The abdominal structure is supplied by branches of the abdominal aorta which transmit oxygenated blood to these organs.
While the venous drainage of the abdomen is primarily mediated through the portal venous system and the inferior vena cava (IVC).

Celiac trunk and Superior mesenteric arteries usually arise independently from abdominal aorta [1]. Variations of the celiac and mesenteric artery are thought to occur as a result of anomaly during embryological development of the ventral splanchnic arteries [2]. The ventral branches arise from the abdominal aorta initially as paired vessels which then coalesce to form four roots for the gut which are connected by ventral longitudinal anastomosis. The second and third roots disappear and the first root becomes the normal celiac trunk. The fourth root remains separate from the longitudinal anastomosis and continues as superior mesenteric artery. Separation of the "longitudinal anastomosis" higher than the SMA, causes one or more celiac branch having common origin with superior mesenteric artery. In our cases in the first patient the LGA remaining with the first omphalo mesenteric root while the second and third root (respectively the common hepatic and splenic artery) joining with the fourth root, forming the hepato spleno mesenteric trunk. While in the second patient the longitudinal anastomosis between the first and second root persist forming the gastro-splenic trunk while the common hepatic artery joint to the fourth root forming the hepato mesenteric trunk.

The hepatosplenomezenteric trunk (HSMT) according to Mischel or Adachi classification was clasificated as type 3. The incidence of HSMT has been found in various frequency in other reports available in literature: 1.2% by Adachi (1928) [2]; 0.5% by Bergman and al. [4]; 0.68% by Song [5]; 0.7% by Chen and al [6].The splenogastric trunk– according to Mischel or Adachi classification was clasificated as type 5. This anomaly has been found in various frequency in other reports available in literature– 0.4% by Adachi (1928) (2), 2.64 % by Song at al. [5] 4% by Lezi at al [7].

A previous knowledge of celiac trunk variations are mandatory in patient prior to a surgical, oncologic, or radiological procedures on all organs supplied by celiac trunk (liver, spleen, stomach, pancreas, duodenum) to avoid iatrogenic injury. Moreover, precise knowledge of the hepatic artery variations is very important especially in living-related liver transplant donors in order to prevent vascular damage [8].

Variations of inferior vena cava may result from unusual development of the embryonic vein. The normal IVC develops between the 6th and 8th week of intrauterine life [3]. Its embryogenesis is a complex process involving the development and regression of 3 sets of paired cardinal veins, namely: the posterior cardinal, the subcardinal, and the supracardinal veins. The interruption of inferior vena cava with azygos continuationis thought to occur as a result of failure of the right subcardinal-hepatic anastomosis with atrophy of the right subcardinal segment. The venous drainage beyond this point is mediated through the dilated azygos and hemiazygos veins, which eventually empty into the superior vena cava. An association of this syndrome with asplenia or polisplenia syndromes has been reported. Our cases present interruption of the inferior vena cava with azigos continuation associated with polisplenia. Interruption of the inferior vena cava with azigos continuation is a rare congenital anomaly with prevalence less than 0.3% among otherwise normal patients [9].

The patients with azygos continuation of IVC have high risk of developing deep vein thrombosis due to venous insufficiency of the lower limbs which they cause [10]. The presence of this variation can complicates the procedure for cardiopulmonary bypass, since the lack of a solid IVC trunk can make difficult to establishing cannula [11]. Ectatic azygos-hemiazygos system may be misdiagnosed as mediastinal, retrocrural and retroperitoneal adenopathies [12]. Also in the patient with azygos continuation of IVC the procedure as angiography and cardiac catheterization, shunt placement for portal hypertension and ligation or clipping of the IVC for thrombo embolism can be difficult [13].

While anatomical variations of the celiac trunk are very common, congenital anomalies of IVC and left renal vein are rare. Furthermore multiple arterial and venous anomalies in a single person are previously unreported in the literature. Knowledge of venous and arterial anomaly is very important for proper preoperative diagnosis and planning of surgical and radiological procedures.

4. Conclusion

We present tow cases with association of arterial and venous anomaly. Multiple arterial and venous anomalies in a single person are previously unreported in the literature.

Detailed recognition of variations of CT and IVC anatomy is important in the accurate interpretation of disease and in diagnostic imaging. Awareness of such variations is crucial in preventing life threatening complications during surgery/interventional radiology procedures.

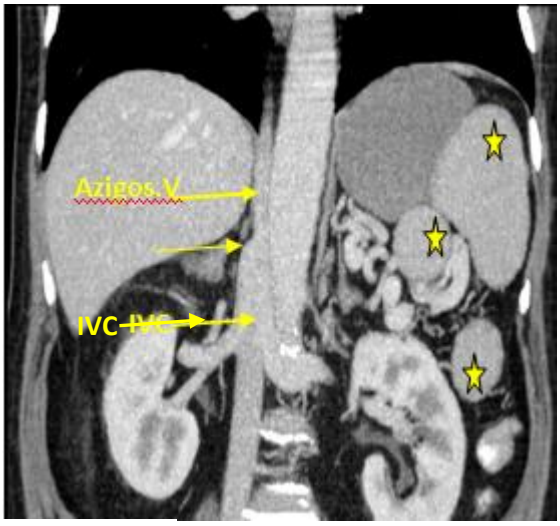

Figure 1: Case 1: Azygos continuation of IVC. Coronal reconstructed CT-image showing azygos continuation (thin arrow) of IVC. Note also the presence of polisplenia (stars)

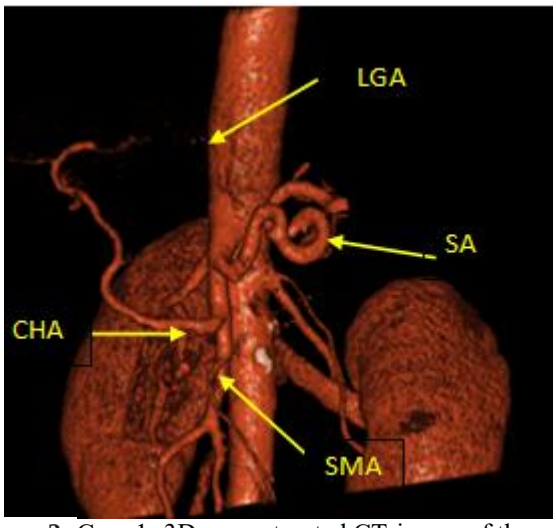

Figure 2: Case 1- 3D reconstructed CT-image of the same patient show the presence of hepato spleno mesenteric trunc (SMA-superior mesenteric artery, SA-splenic artery, CHA-common hepatic artery and LGA-left gastric artery with origin from the aorta).

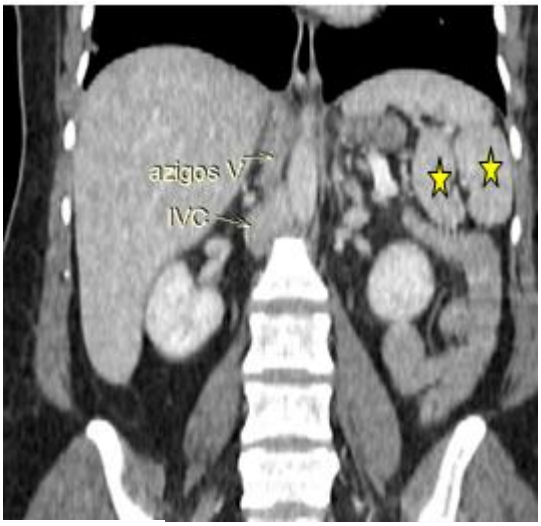

Figure 3: Case 2: Azygos continuation of IVC. Coronal reconstructed CT-image showing azygos continuation (thin arrow) of IVC. Note also the presence of polisplenia (stars)

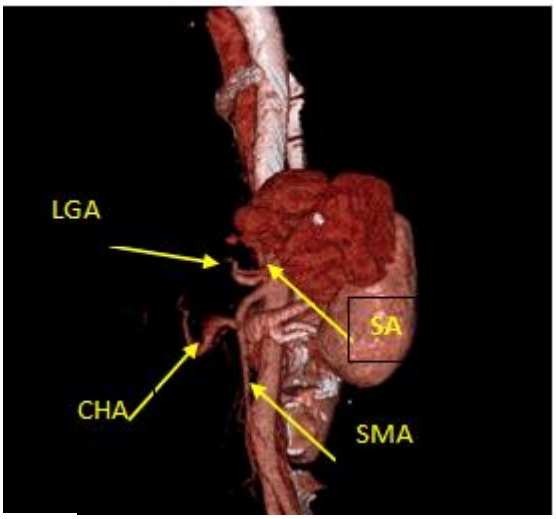

Figure 2: Case 2- 3D reconstructed CT-image of the same patient show the presence of splenogastric trunk (SMA-superior mesenteric artery, SA-splenic artery, CHA-common hepatic artery and LGA-left gastric artery; CHA with origin from SMA).

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