

ABSENT INFRARENAL INFERIOR VENA CAVA REPLACED BY OVARIAN VEIN: CROSS-SECTIONAL IMAGING CASE STUDY

Khalid Mahmood, Shabbir Naeem, Sulaeman Aziz

Department of Radiology, Sindh Institute of Urology and Transplantation (SIUT), Karachi, Pakistan.

PJR October - December 2017; 27(4): 383-385

Introduction

The inferior vena cava (IVC) drains venous blood from the lower trunk, abdomen, pelvis and lower limbs to the right atrium of the heart. It is not uncommon to come across the absence of a segment of inferior vena cava (IVC) with blood draining through collateral channels, but complete absence of IVC with draining into ovarian vein is a rare congenital anomaly. In this condition the blood from the caudal half of the body drains via the paravertebral and azygous venous systems with resultant distention of these veins.

Gross Anatomy

The IVC is formed by the confluence of the two common iliac veins at the L5 vertebral level. The IVC has a retroperitoneal course within the abdominal cavity. Various other veins drain into the IVC along its course. It has a short intra-thoracic course before draining into the right atrium.

Tributaries

T8: paired inferior phrenic veins, T8: hepatic veins (3), L1: right suprarenal vein.
L1: renal veins, L2: right gonadal vein, L1-L5: lumbar veins and L5: common iliac veins¹ (origin).

Development

Normal IVC has a complex embryological development with many embryological veins contributing to different parts : right vitelline vein: forms supra-

hepatic and hepatic segments of IVC, right subcardinal vein: forms suprarenal segment, right subsuprarenal anastomosis: forms renal segment, right suprarenal vein: forms infrarenal segment, right posterior cardinal vein: forms distal most IVC and its bifurcation into common iliac veins.²

The complete absence of IVC with azygous continuation is usually associated with other anomalies like polysplenia, asplenia, persistent left superior vena cava and transposed abdominal viscera¹ and its discovery should prompt a search for these additional congenital defects. We report a case of complete absence of IVC with left ovarian vein draining the lower extremities.



Figure 1

Case Report

A 45 year old housewife and mother of three children referred to Radiology department for donor renal angiography as institute's donor's protocol for surgery planning regarding renal transplantation. The donor was generally healthy with no significant cardio-respiratory³ or Deep Vein Thrombosis history.⁴ Multiple thin axial sections were taken after I/V contrast and reconstruction of the images obtained in different

Correspondence : Dr. Khalid Mahmood
Department of Radiology,
Sindh Institute of Urology and Transplantation (SIUT),
Karachi, Pakistan.
Email: nazilakhalid@gmail.com

Submitted 22 April 2017, Accepted 14 June 2017

planes. The images were taken in early arterial and venous phases.

The Inferior vena cava was not visualized on either side below infrarenal level with abrupt cut off on the right side.⁵ The bilateral external and internal iliac veins were seen draining into the venous plexus of the broad ligament. Numerous large collaterals were seen in bilateral broad ligament. The confluence of these venous plexuses formed the left ovarian vein. The left ovarian vein was dilated and tortuous running along the left side of abdomen, replacing the IVC and draining both the lower extremities and pelvis through the bilateral external and internal iliac veins. The left ovarian vein drains into left renal vein then into IVC veins.⁶

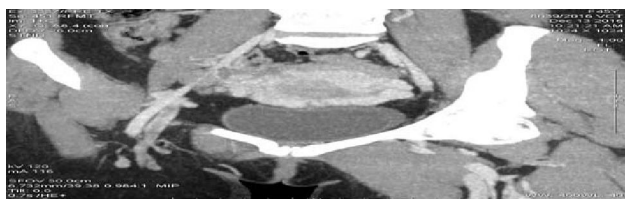


Figure 2

The collaterals were also seen draining the left anterior abdominal and chest wall and drained into the tributaries of the left Subclavian vein. The intrahepatic part of IVC and Superior Vena Cava were patent. No abnormality seen in major veins of the neck. The intrathoracic part of Azygous vein appears prominent until it entered the SVC.

The Aorta and its major branches were normal. Thus it was concluded that infrarenal part of IVC was absent along with bilateral common iliac veins. The IVC was replaced by left ovarian vein draining the lower extremities and pelvis through bilateral external and internal veins. The diagnosis of absent IVC was made. For further management she was referred to the vascular unit to assess for DVT or other sequel of absent IVC. The decision of donor nephrectomy was deferred.

Discussion

Absence of the intrahepatic segment of IVC with azygous continuation occurs in 0.6% - 2% of patients investigated for congenital heart disease⁷ and frequently coincides with situs inversus, asplenia, or



Figure 3

polysplenism, persistent left superior vena cava and congenital pulmonary venolobar syndrome. More recently, absent IVC has also been recognized as a solitary, incidental finding in patients without symptoms.⁸ And may not have other associated congenital anomalies.

There is no consensus that absent IVC manifests the embryonic anomaly. These typically result from abnormal embryologic development involving the vitelline, posterior cardinal, subcardinal and supracardinal veins 3: absence of IVC⁹ (entire or only the infrarenal segment), IVC duplication, azygos continuation of the IVC, left sided IVC, circumcaval ureter, circumaortic venous collar, IVC webs, and extrahepatic portocaval shunt (Abernethy malformation).

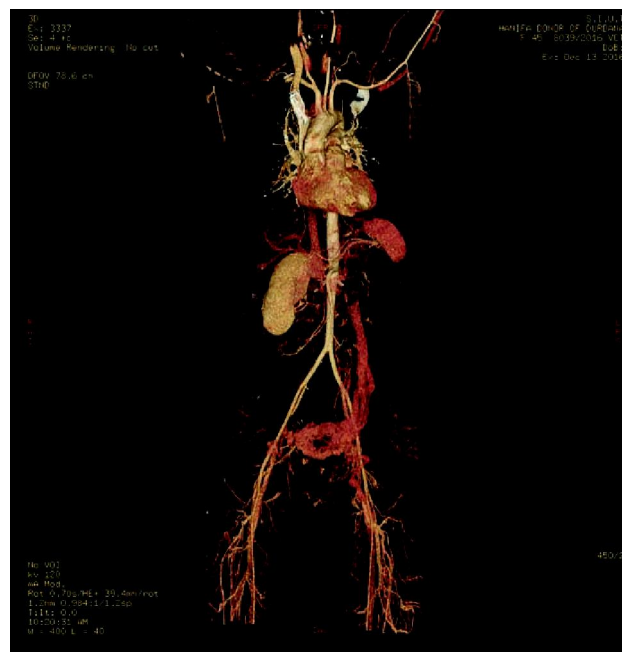


Figure 4

Conclusion

The anomaly of an absent IVC with renal atrophy or agenesis highlights the underlying vascular anatomy. This knowledge may prove to be pivotal for diagnosis, treatment and transplantation planning. Thus the knowledge of IVC anomalies is essential to avert diagnostic and surgical pitfalls.

References

1. Smillie RP, Shetty M, Boyer AC et-al. Imaging evaluation of the inferior vena cava. *Radiographics*. 2015; **35(2)**: 578-92.
2. Bass JE, Redwine MD, Kramer LA et-al. Spectrum of congenital anomalies of the inferior vena cava: cross-sectional imaging findings. *Radiographics*. 2000; **20(3)**: 639-52.
3. Kandpal H, Sharma R, Gamangatti S et-al. Imaging the inferior vena cava: a road less traveled. *Radiographics*. 2008; **28(3)**: 669-89.
4. Iqbal J, Nagaraju E. Congenital absence of inferior vena cava and thrombosis: a case report. *J Med Case Rep*. 2008; **2(1)**: 46.
5. Floyd G, Nelson W. Developmental interruption of the IVC with azygous and hemiazygous substitution. *Radiology*, 1976; **119**: 55.
6. Lawrence H. Bannister, Martin M. Berry, Patricia Collins, Mary Dyson, Julian E. Dussek, Mark W. J. Ferguson. *Gray's Anatomy the anatomical basis of medicine and surgery*. Thirty-eight Edition. Churchill Livingstone. 1995. pp. 1593-1600
7. Gosling JA, Harris, Hunpherson JR, et al. *Atlas of human anatomy with integrated text*. Philadelphia : J.B. Lippincott Company, 1985, pp. 2 . 35 - 2. 36.
8. Folger GM. Plain film identification of failure of Inferior Vena Caval - right atrial continuity. *Cath. Cardiovasc. Diag.*, 1977; **3**: 267-77.
9. Debing E, Tielemans Y, Jolie E, et al.. Congenital absence of Inferior Vena Cava. *Eur. J. Vase. Surg.*, 1993; **7**: 201-3.