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SHORT REPORT

**Aplasia of the Infrarenal Segment of the Inferior Vena Cava:
CT and MRI Findings**T. Bley^{1*}, A. Hochmuth², J. Winterer¹, M. Frey³ and N. Ghanem¹¹Department of Diagnostic Radiology, ²Section of Neuroradiology, and ³Department of Cardiology, University Hospital Freiburg, Freiburg, Germany

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Introduction

Aplasia of the inferior vena cava (IVC) usually remains unrecognised unless a possible complication like thrombosis occurs leading to hospital admission. The authors present a case of epidural and iliac vein thrombosis complicating a rare aplasia of the infrarenal IVC.

Case Report

A 22-year-old woman was admitted to hospital with acute back pain and hyperaesthesia of both legs. The initial MRI of the spine showed prominent paravertebral and epidural veins; a disc prolapse was excluded (Fig. 1A). Contrast enhanced MR-angiography using a flash 3D sequence (TR 4,6; TE 1,8; FOV 400) demonstrated clearly a missing infrarenal segment of the inferior vena cava. The rope-ladder-pattern of dilated drainage veins of the internal and external vertebral plexus can be seen (Fig. 1B and C).

Contrast enhanced helical CT confirmed the absence of the infrarenal IVC and thrombosis of the left-sided epidural veins and pelvic veins on both sides (Fig. 2). Drainage of both renal veins was via the existing suprarenal inferior vena cava. A tumour as the cause of the obstruction was excluded.

Duplex ultrasound showed extension of the thrombosis down to the popliteal veins on both sides. At this

time the patient was taking oral contraceptives. No thrombophilic abnormality was found in the laboratory investigations.

Systemic anticoagulation therapy was started and the oral contraceptives were stopped. Follow up Duplex ultrasound investigations showed early recanalisation. As the neurological symptoms had resolved the patient was discharged on day 14 with permanent oral phenprocoumon anticoagulation.

Discussion

The inferior vena cava embryologically consists of three segments: a suprarenal, a renal and an infrarenal segment.¹ This complicated development leads to

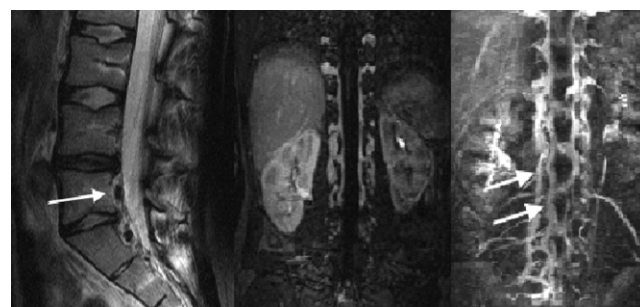


Fig. 1. (A) Sagittal view of T2-weighted MRI of the lumbar spine excludes a disc protrusion. Please note the prominent epidural veins at level L5/S1 (arrow). (B) Coronal view of FLASH-3D magnetic resonance angiography depicts the rope-ladder-pattern of vertebral plexus collateral veins. (C) Aplasia of the IVC begins at the height of vertebra L2/3. Collateral drainage occurs via dilated veins of the internal and external vertebral plexus (arrows).

*Corresponding author. Department of Diagnostic Radiology, University Hospital Freiburg, Hugstetter Straße 55, 79106 Freiburg, Germany.

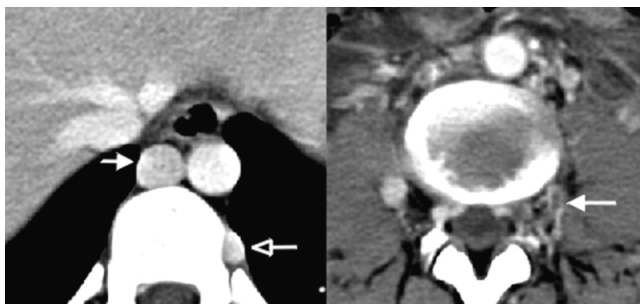


Fig. 2. (A) Enhanced abdominal computed tomography reveals prominent vertebral collateral veins (light arrow) and dilated vena azygous (bold arrow) at the height of the liver. (B) Further below the vena cava inferior is missing, vertebral plexus veins are expanded. Please note the thrombus in the left external vertebral plexus (arrow).

plenty of anatomical variations. In most cases the suprarenal segment is missing. Complete aplasia, a missing infrarenal segment or a missing renal segment is rare.² Most of these anomalies remain undiscovered until complications like deep venous thrombosis occur.³ Additional symptoms such as back pain and paraesthesiae in both legs can be caused by irritation of nerve plexuses when thrombosis of the epidural drainage or physical activity leads to swelling of the collateral veins.

Collateral circulation around an IVC occlusion may be via the following five systems: (1) the most important deep connection, via lumbar veins to the azygous system, (2) the superficial connection via epigastric and para-umbilical vessels, (3) the vertebral

plexus, (4) the portal collateral circulation and (5) the urethral/spermatic veins.

According to the current literature magnetic resonance angiography (MRA) is the favoured diagnostic test for demonstrating anomalies of the IVC and it is preferred to conventional phlebography.⁴

Using the same investigation, possible causes of vena cava obstruction, which all may lead to collateral drainage, can be differentiated. These include tumour compression, thrombosis, aplasia or harmless azygous-continuation of the inferior vena cava.

MRI or duplex ultrasound are good tools for therapeutic monitoring. The individual risk of thrombosis should be evaluated by thrombophilia screening. Additional risk factors such as smoking, immobilisation, etc. should be avoided.

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