Imaging of the inferior vena cava - MDCT findings

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Learning objectives

To describe and illustrate the imaging findings of wide range of congenital anomalies and pathologic conditions affecting the inferior vena cava (IVC) on MDCT

Background

MDCT with its good availability, great spatial resolution, fast time of image acquisition and high quality multiplanar reconstructions, is able to evaluate and diagnose abnormalities of the inferior vena cava and has replaced conventional venography for this purpose.

The embryogenesis of the IVC is very complex as it involves anastomoses of three paired embryonic veins, resulting in numerous variations of the IVC and its tributaries.

Congenital anomalies of the inferior vena cava are more communly seen on MDCT, being important to recognize and correctly diagnose them in order to avoid diagnostic pitfalls and surgical complications.

Findings and procedure details

Several congenital anomalies of the inferior vena cava, IVC thrombosis, Budd-Chiari Syndrome and miscellaneous conditions, will be illustrated with examples from ours departments databases.

Normal Anatomy

The right and left common iliac veins union formes the inferior vena cava. The IVC ascends in the retroperitoneum, receiving major tributaries, on the right of the aorta. It connects directly with the azygous venous system or through the renal

Congenital Anomalies/Anatomic variants

The inferior vena cava is divided in of four segments (hepatic, adrenal, renal and infrarenal). Each portion is formed after the regression and development of the embryogenic posterior cardinal, subcardinal and supracardinal venous systems.

This embryogenic process is very complex, the persistence or abnormal regression of the embryogenic veins leads to a variety of anomalies, almost in 4% of the population.

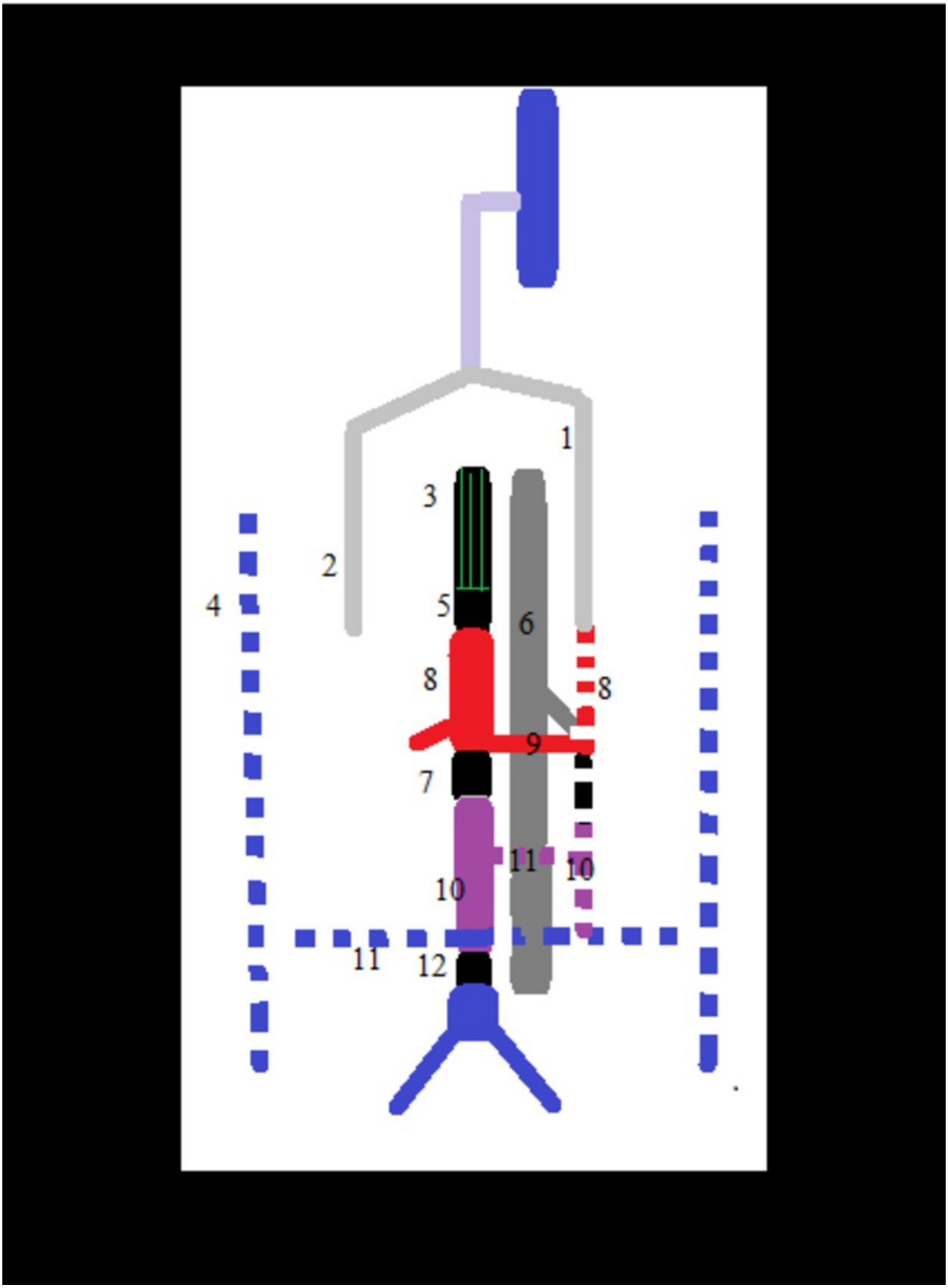
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Fig. 1: Embryologic development of the IVC: three paired veins - the posterior cardinal (blue), subcardinal (vertical red) and supracardinal (purple) veins. Some portions of these embryogenic veins regress (dash colored veins) and other portions persist and (solid colored lines). 1- Hemiazygous vein 2- Azygous vein 3- Vitelline vein 4- Posterior cardinal vein 5- Subcardinal-hepatic anastomosis 6- Aorta 7- Suprasubcardinal anastomosis 8- Subcardinal vein 9- Intersubcardinal anastomosis 10- Supracatdinal vein 11- Interpostcardinal anastomosis 12- Supraposterior cardinal abastomosis (Adapted from RadioGraphics 2008; 28:669-689)
References: Serviço de Imagem Médica, Centro Hospitalar e Universitário de Coimbra, Faculdade de Medicina de Coimbra Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

The vast majority of this anomalies are asymptomatic and frequently are incidentally discovered. This patients are considered at higher risk for developing deep venous thrombosis of the common femoral or

iliac veins at a younger age than general population.

It is pivotal to know this anomalies to avoid potential sources of surgical complications and erroneous diagnosis (retroperitoneal or mediastinal masses).

Left IVC

Represents the persistence of the left supracardinal vein with anomalous regression of the right supracardinal vein.

Occurs in 0,2-0,5% of the population.

The left IVC joins the right renal vein and crosses anterior to the aorta to join the normal suprarenal segment. This Congenital anomaly may be misdiagnosed as a left-sided paraaortic adenopathy, difficult cava filter placement (transjugular access) and complicate during aortic aneurysm repair.

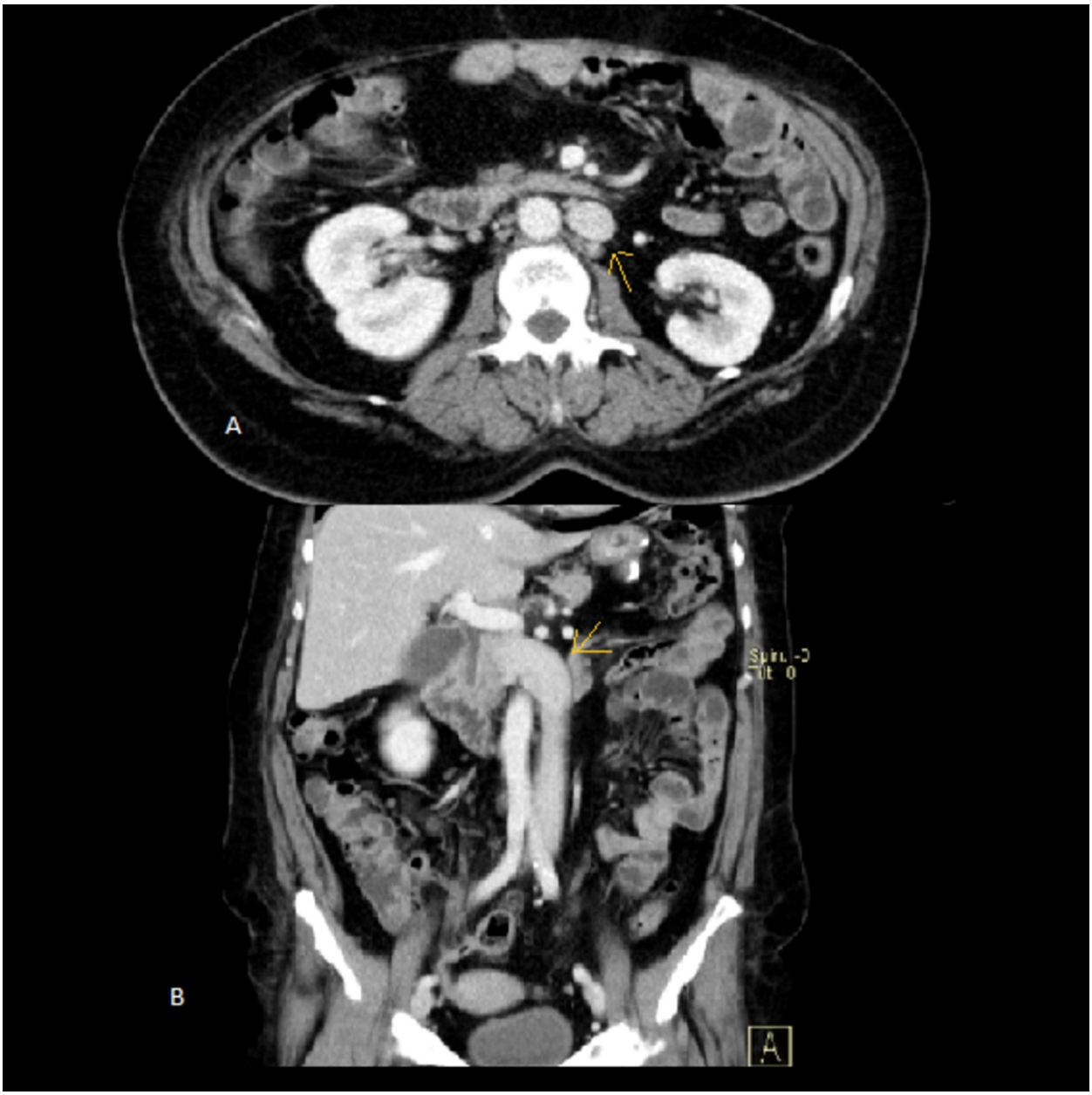

Fig. 2: Left IVC. Axial Computed Tomography reformation (A) images show a large single IVC to the left of the spine at levels below the renal veins (yellow arrow). Coronal computed tomography reformation (B) of the same patient shows the left IVC crossing to the normal right-sided suprarenal IVC.
References: Serviço de Imagem Médica, Centro Hospitalar e Universitário de Coimbra, Faculdade de Medicina de Coimbra Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

Double IVC

Results from the persistence of the left and right supracardinal veins.

Prevalence of 1-3% of the population.

The left IVC joins the left renal vein and crosses to join the right IVC. Commonly the two IVC have asymetrical sizes.

The clinical implications do not differ from the left sided IVC. If the patient has recurrent pulmonary embolism despite IVC filter placement.

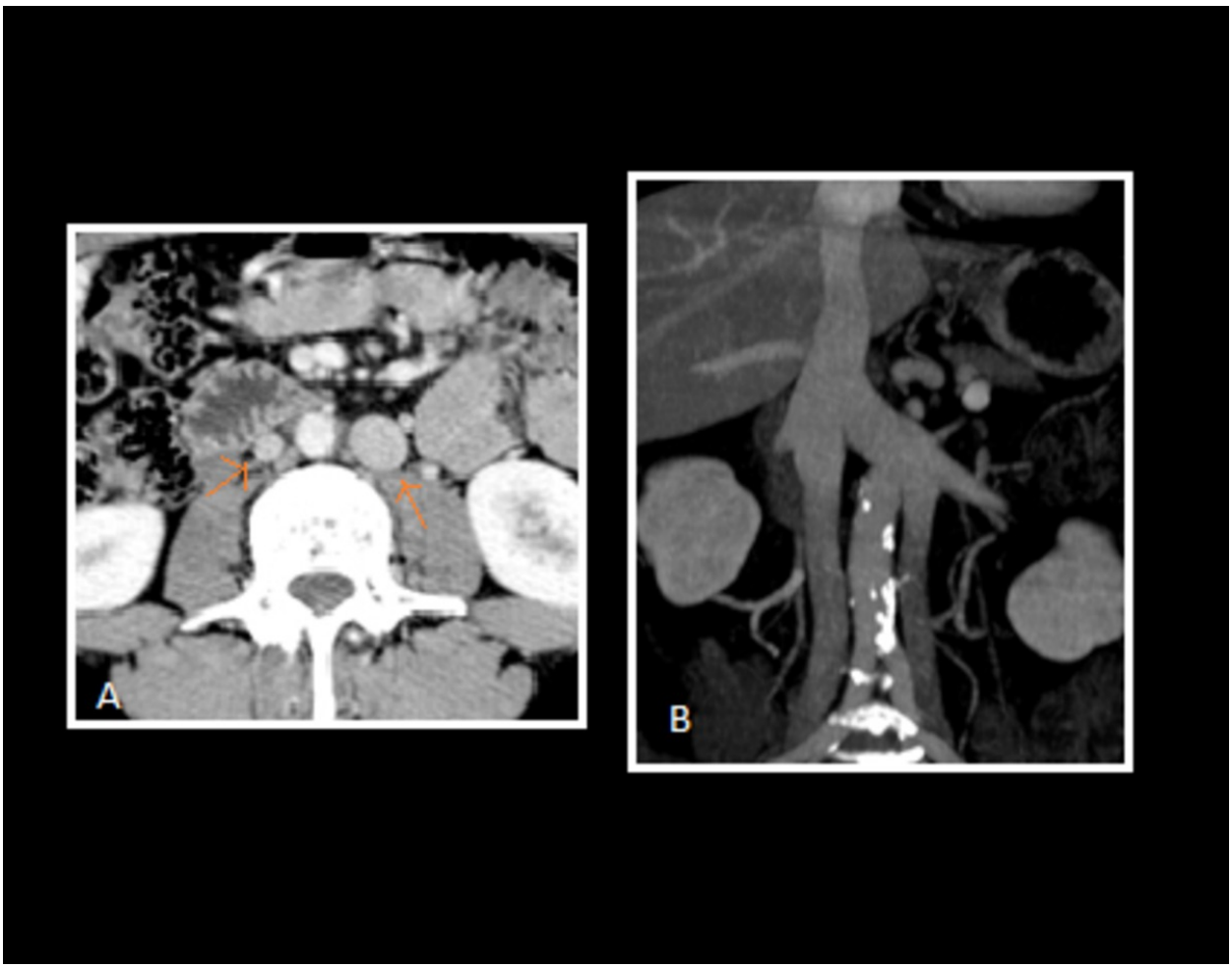

Fig. 3: Double IVC. Contrast enhanced CT (A) shows right and left infrarenal IVCs (orange arrows). The coronal computed tomography (B) shows the left IVC opening into the left renal vein, which crosses anterior to the aorta to form a single right-sided suprarenal IVC.
References: Serviço de Imagem Médica, Centro Hospitalar e Universitário de Coimbra, Faculdade de Medicina de Coimbra Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

Retrocaval ureter

In this anomaly part of the right ureter is located in a posterior and medial position to the IVC. This results from the the persistence of the right posterior cardinal vein. The right ureter is significantly compressed in this route and may be associated with recurrent

urinária tract infections and hydronephrosis. The trestment consists of surgical relocation of the ureter to an anterior IVC route.

Absence of the infrarenal IVC with preservation of the suprarenal segment

Extremely rare anomaly.

May result of a sequelae of intrauterine or perinatal tromboses (not truly a congenital anomaly).

Higher risk of deep venous thrombosis and chronic venous insufficiency.

The venous return occurs via ascending lumbar veins. The enlarged veins may be misdiagnosed as a paraspinal mass.

Fig. 8: Absence of the infrarenal IVC with preservation of the suprarenal segment: Axial contrast-enhanced CT scans show absence of the infrarenal IVC (A). Note the prominent ascending lumbar veins (arrows in (yellow arrow) (C) and the patent

suprarenal IVC (black arrow)(B) with ectasic azygous and hemiazygous veins(blue and red arrows in B and D)
References: Serviço de Imagem Médica, Centro Hospitalar e Universitário de Coimbra, Faculdade de Medicina de Coimbra Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

Retroaortic and circumaortic left renal vein

The retroaortic left renal vein results from the regression of the intersubcardinal anastomosisn (ventral arch) and persistence of the intersupracardinal veins. In this disorder the left renal vein is in a posterior position regarding the aorta. Occurs in 1,7-3,4% of the population.

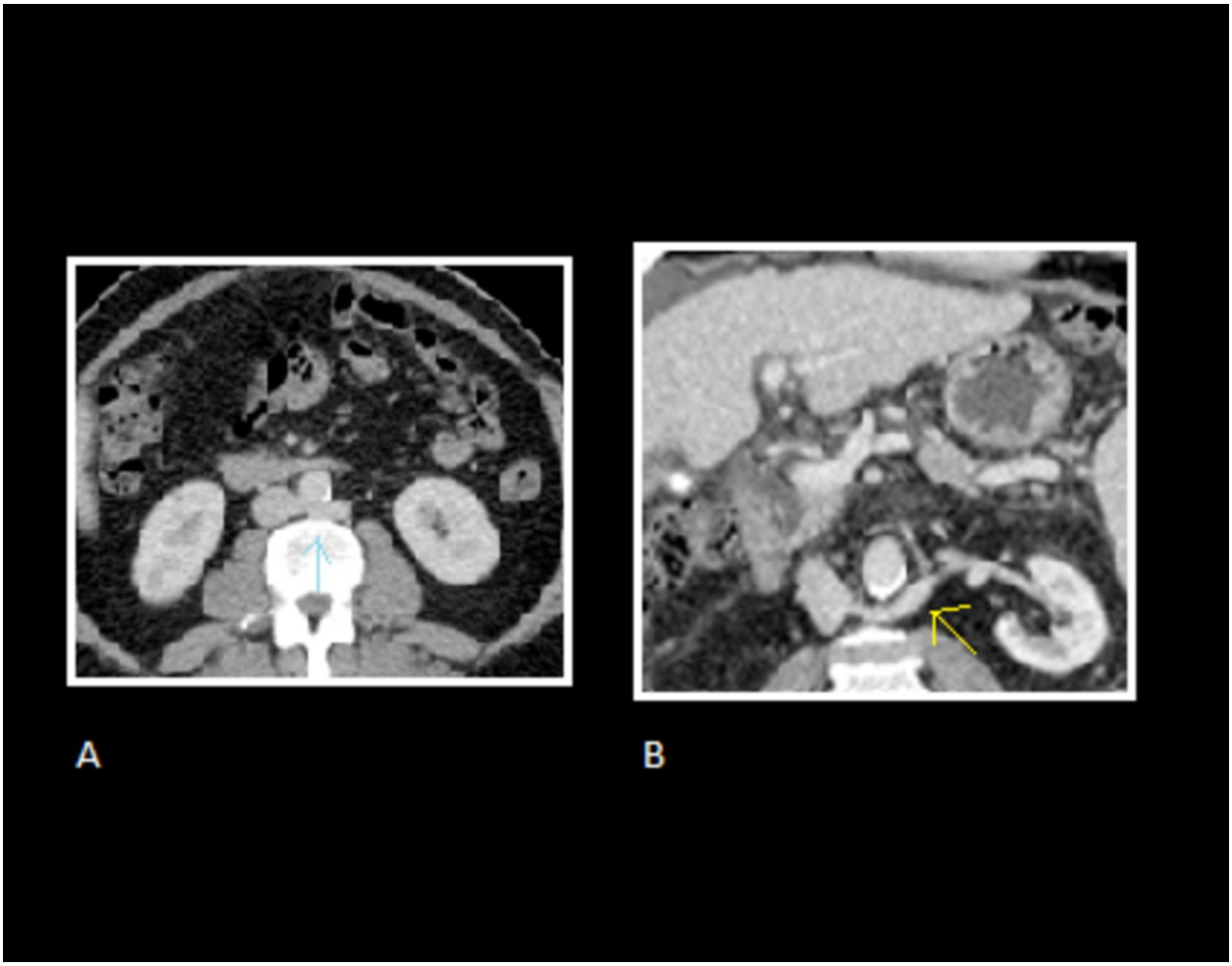

Fig. 4: Retroaortic Left Renal Vein. Contrast-enhanced computed reformations (A, B) reveal a single renal vein passes posterior to the aorta.
References: Serviço de Imagem Médica, Centro Hospitalar e Universitário de Coimbra, Faculdade de Medicina de Coimbra Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

The circumaortic left renal vein results of the persistence of the intersupracardinal and jntersubcardinal veins forming a circumaortic venous ring. The renal veins drain boche info the IVC.

The prevalence is aproximatly 2,4-8,7%.

This anomalies have significant clinical importance when planning a nephrectomy., the aliso may be misdiagnosed as a adenopathy. Rarely the posterior left renal vein is compressed by the aorta - the nutcracker phenomenon.

Fig. 5: Circumaortic Left Renal Vein. Contrast-enhanced axial computed reformations (A, B) show the left renal vein coursing anterior (red arrow) and posterior (green arrow) to the aorta
References: Serviço de Imagem Médica, Centro Hospitalar e Universitário de Coimbra, Faculdade de Medicina de Coimbra Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

Interruption of the IVC with Azigous or Hemiazigous continuation

Results from the absence of the right subcardinal-hepatic anastomosis.

Occurs in approximately 0,6% of the population.

The infrarenal IVC is normal until the renal vein level joining the Azigous vein or the Hemiazigous vein (left IVC). The hepatic segment is atrophic (suprarenal segment).

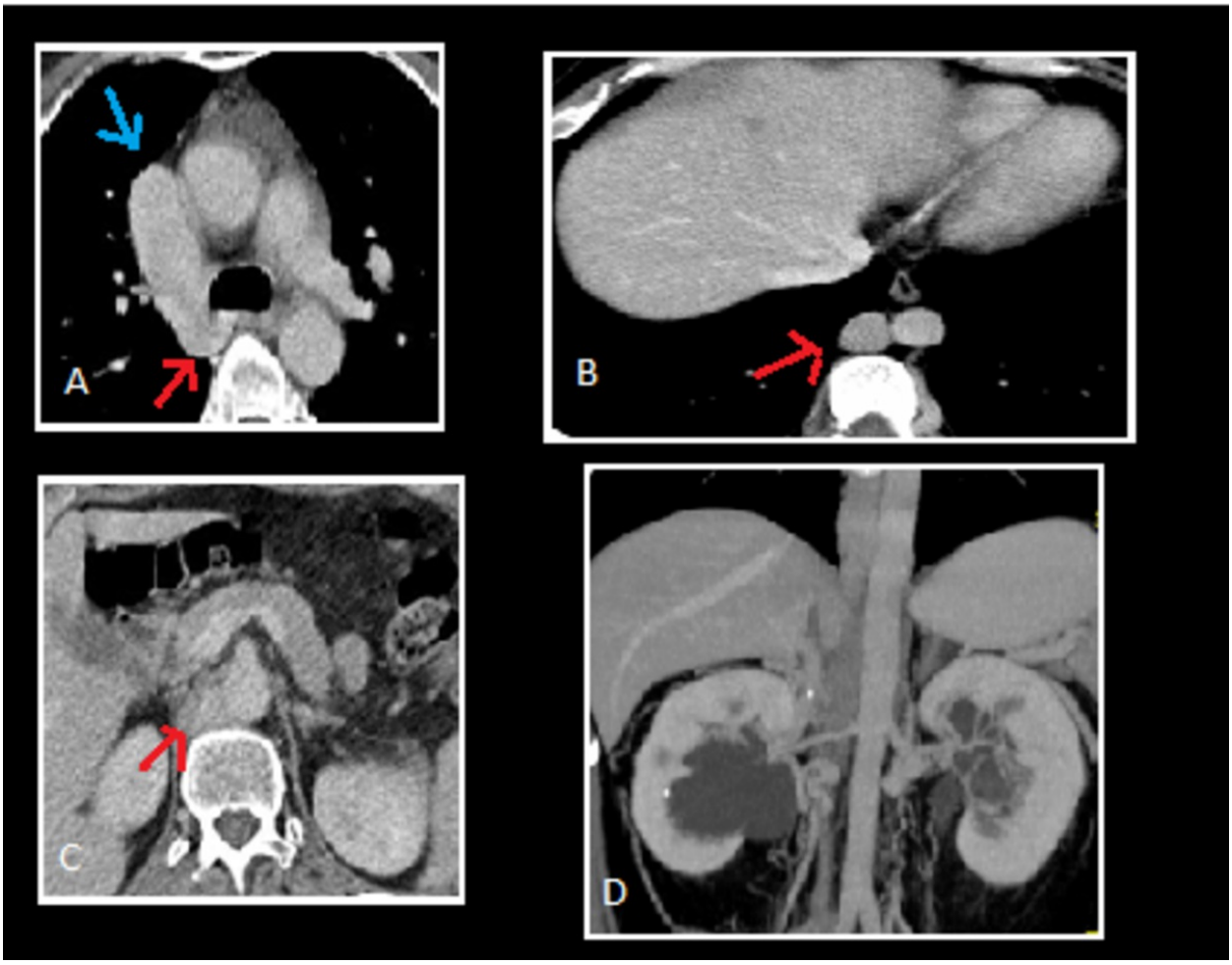

Fig. 6: Interruption of the IVC with azygous continuation. CT images shows: (A) enlarged azygous vein (red arrow) draining into the superior vena cava (blue arrow). (B and C) the vessel parallel to the aorta under the crus is the azygous vein (red arrow). (D) Absence of IVC in its normal location.
References: Serviço de Imagem Médica, Centro Hospitalar e Universitário de Coimbra, Faculdade de Medicina de Coimbra Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

Fig. 7: Left IVC interruption with hemiazygous continuation. Contrast-enhanced CT scans shows hemiazygous continuation (green arrow) of a left-sided IVC (white arrow). The hemiazygous vein joins the azygous vein (red arrow).
References: Serviço de Imagem Médica, Centro Hospitalar e Universitário de Coimbra, Faculdade de Medicina de Coimbra Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal
This disorder is associated with situs anomalies and Congenital heart malformations. The ectasic azigous-hemiazigousn system may be misdiagnosed as mediastinal, retrocrural or retroperitoneal adenopathies. This anomaly is of great importance when planning a cardiopulmonary bypass and performing cardiac catheterization.

IVC Thrombosis

Bland Thrombus

IVC bland thrombus consists in a persisting filling defect within the contrasted IVC. If the thrombotic process becomes extensive and persists in time collateral veins may be formed to bypass the obstruction.

Some conditions lead to higher risk of bland thrombosis like:

Hypercoaguble states

Malignancies

Venous stasis

It can be an isolated process or an extension from lower extremities veins thrombosis.

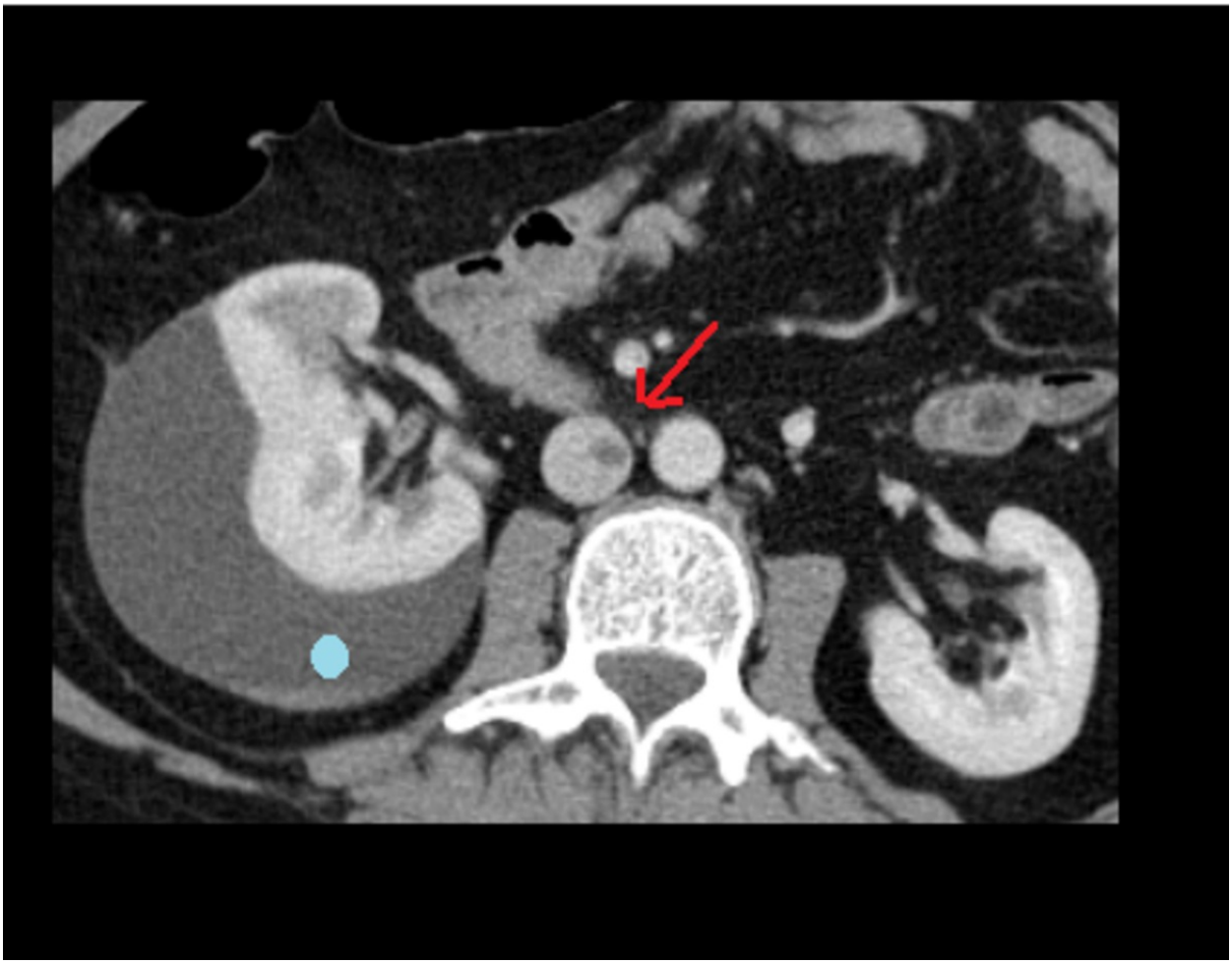

Fig. 9: Infrarenal IVC bland thrombus: Small thrombus in the infrarenal IVC (red arrow). Subcapsular homogeneous collection (blue dot) in the right kidney, compatible with an urinoma in a trauma patient.

References: Serviço de Imagem Médica, Centro Hospitalar e Universitário de Coimbra, Faculdade de Medicina de Coimbra Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

Malignant thrombus

Several carcinomas can spread to the IVC, commonly the renal cell carcinoma, hepatocellular carcinoma (HCC) and adrenocortical carcinoma in adults and Wilms' tumor in children.

MDCT can delineate, especially with coronal and sagittal reformations, the extension of the tumor thrombus and help to differentiate tumor thrombosis and bland thrombosis, by showing continuity from the tumor and the thrombus. It. can also demonstrate neovascularization within the thrombus in the arterial phase.

Supradiaphragmatic thrombus extension in the IVC needs cardiopulmonary bypass surgery and is associated with higher morbidity and mortality.

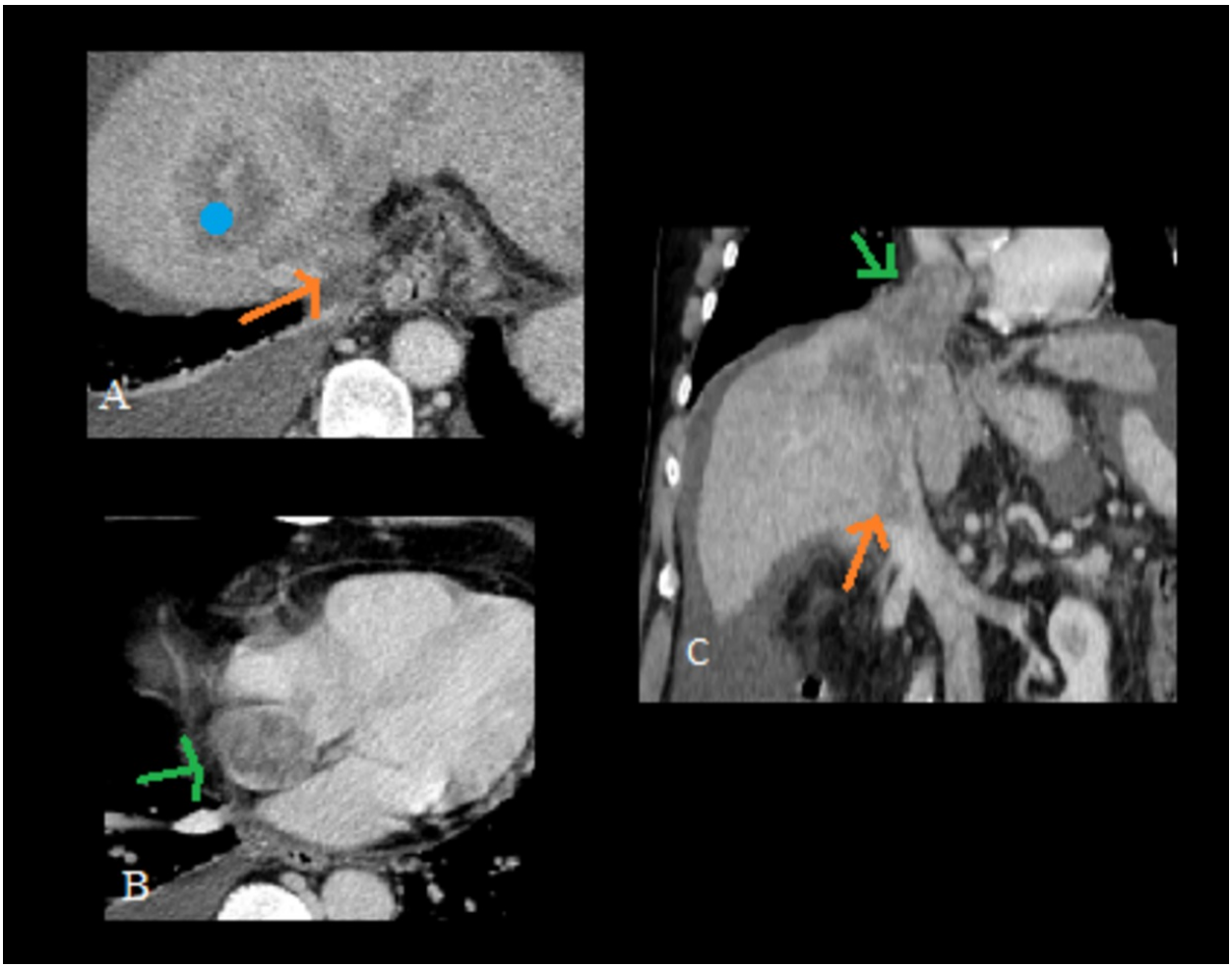

Fig. 10: Malignant IVC thrombosis: Contrasted CT scans reveal a large HCC (blue dot) extending to the IVC (orange arrow) and right atrial appendage (green arrow).
References: Serviço de Imagem Médica, Centro Hospitalar e Universitário de Coimbra, Faculdade de Medicina de Coimbra Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

Fig. 14: Malignant IVC thrombosis: Axial enhanced computed tomography in arterial phase show a large malignant thrombus in the IVC (HCC), with heterogeneous arterial enhancement (yellow arrow).(Same patient in figure 10)
References: Serviço de Imagem Médica, Centro Hospitalar e Universitário de Coimbra, Faculdade de Medicina de Coimbra Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

Fig. 23: Malignant IVC thrombosis: Axial enhanced computed tomography (arterial phase (A,B), venous phase (C) and delayed venous phase (D)) show a large thrombus in the IVC, with heterogeneous arterial enhancement with wash-out on venous and delayed venous phase. This patient had a left radical nefrectomy for a renal cell carcinoma.
References: Serviço de Imagem Médica, Centro Hospitalar e Universitário de Coimbra, Faculdade de Medicina de Coimbra Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

Pseudolesions

Pseudolesions may be misdiagnosed as thrombus. Generally are caused from the mixture of enhanced blood from the renal veins with unpacifiec blood from the lower extremities or from the mixture of refluxed enhanced blood into the hepatic veins and IVC in patients with right heart failure or with rapid contrast injection rate. Prominent fat deposit near the IVC can be misdiagnosed as a IVC lipoma.

Fig. 19: Retrograde contrast enhancement of the IVC: Axial enhanced computed tomography reformations show a filling defect in the IVC, due to poor mixing between the unenhanced stream of blood in the IVC and the refluxed contrast material. This filling defect may simulate a thrombus, especially on axial images and in the absence of venous phase images, on which such artifactual lesions usually resolve.
References: Serviço de Imagem Médica, Centro Hospitalar e Universitário de Coimbra, Faculdade de Medicina de Coimbra Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

Fig. 12: Pseudolesion of the IVC: Axial and coronal enhanced computed tomography show a filling defect with apparent narrowing of the IVC after liver transplant in a patient with dorsal decubitus. Notice also the spleen enlargement and bile duct dilation. ***References:*** Serviço de Imagem Médica, Centro Hospitalar e Universitário de Coimbra, Faculdade de Medicina de Coimbra Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

Primary tumor of the IVC

Leiomyossarcoma of the IVC is extremely rare. This mesenchymal tumor originates from smooth-muscle cells in the vessel wall. It is associated with poor prognosis with 10-year survival rate of 14%.

They are classified according to the affected segment:

Segment I Leiomyossarcoma - 37% of the cases; located bellow the renal veins level and higher than the common iliac veins bifurcation.

Segment II Leiomyossarcoma - 43% of the cases; located between the renal veins and hepatic veins levels; slightly better prognosis.

Segment III Leiomyossarcoma - 20% of the cases; located above the hepatic veins level.

This disorder frequently presents extraluminal growth (>60%).

They may present as large retroperitoneal masses with heterogeneous enhancement (exophytic leiomyossarcoma), commonly with cystic areas (necrosis). Focal dilatation with IVC obstruction and homogeneous enhancement suggest an intraluminal leiomyossarcoma.

IVC stents, filters and other devices

IVC stents are used to bypass occlusion or stenotic areas. MDCT easily displays the stent and patency of the stent.

Long-standing venous catheters and surgical anastomosis highly increase the risk of stenosis.

IVC filters are also easily evaluated with MDCT, regarding their location, relationship with renal veins or complications like thrombosis, migration and extension to IVC wall.

Fig. 22: IVC filter: Axial unenhanced computed tomography reformations show a spontaneously hyperdense annular structure inside the IVC compatible with an IVC filter, located below the renal veins.
References: Serviço de Imagem Médica, Centro Hospitalar e Universitário de Coimbra, Faculdade de Medicina de Coimbra Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

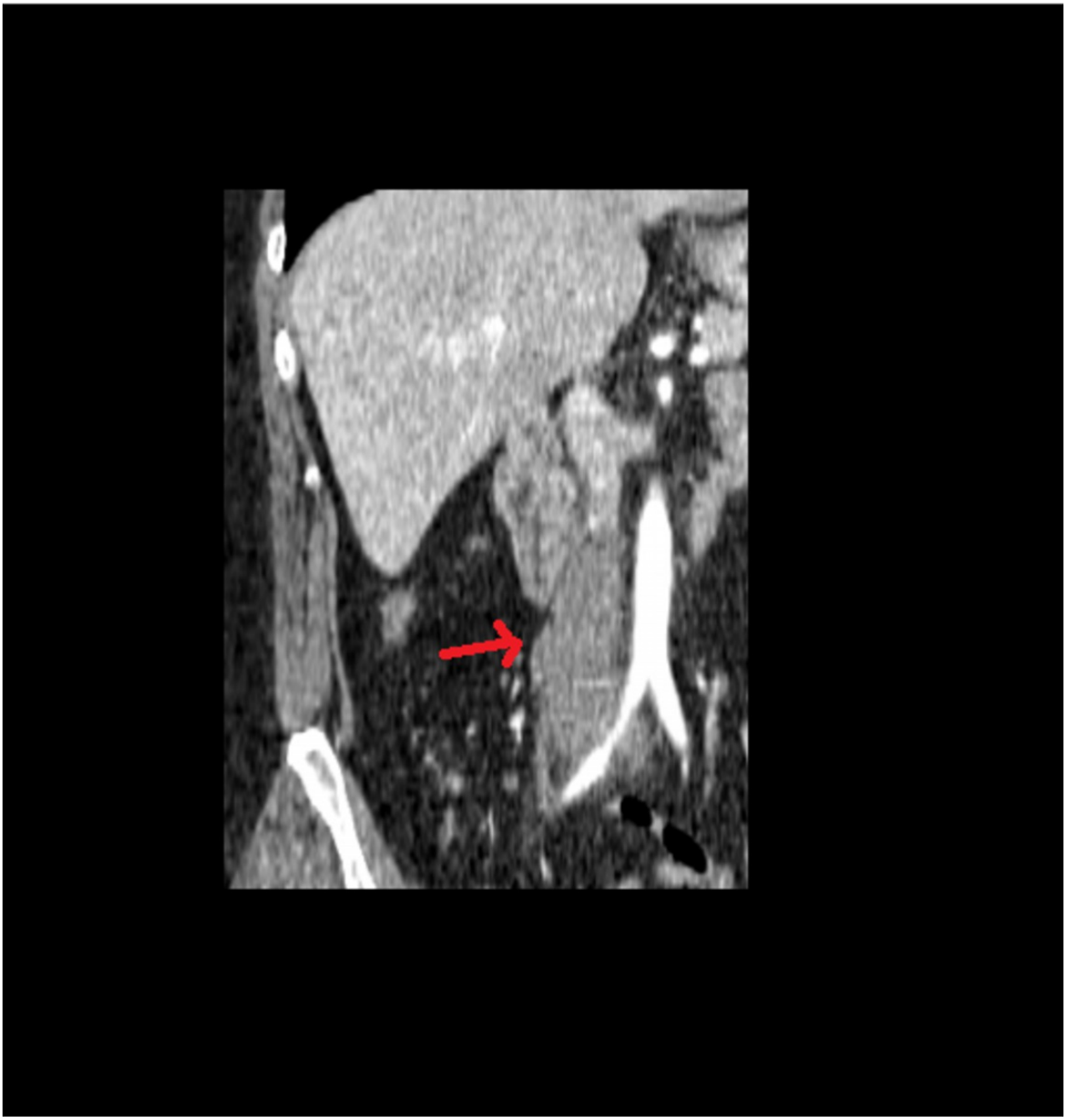

Fig. 18: IVC filter removal complication: This patient had left lower extremity thrombosis and was placed an IVC filter below the renal veins level. Coronal enhanced computed tomography, after the IVC removal, shows a large filling defect in the infrarenal IVC (red arrow), with extension to the common iliac vein, right common and superficial veins.
References: Serviço de Imagem Médica, Centro Hospitalar e Universitário de Coimbra, Faculdade de Medicina de Coimbra Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

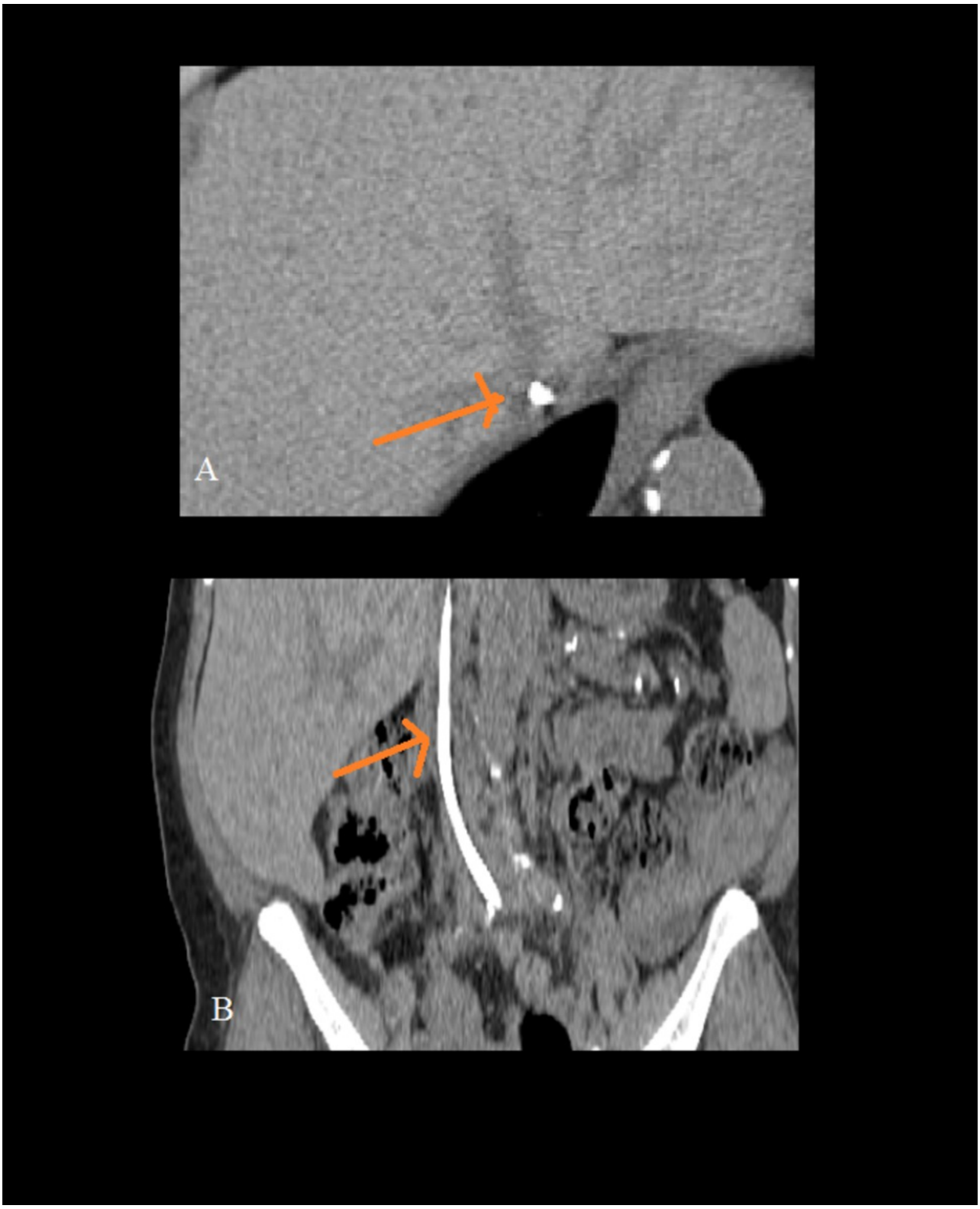

Fig. 17: Dialysis catheter in the IVC: Unenhanced axial and coronal computed tomography reformations show a dialysis catheter in the IVC(red arrow).
References: Serviço de Imagem Médica, Centro Hospitalar e Universitário de Coimbra, Faculdade de Medicina de Coimbra Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

Occasionally we may visualise foreign objects in the IVC lumen, like in figure 16.

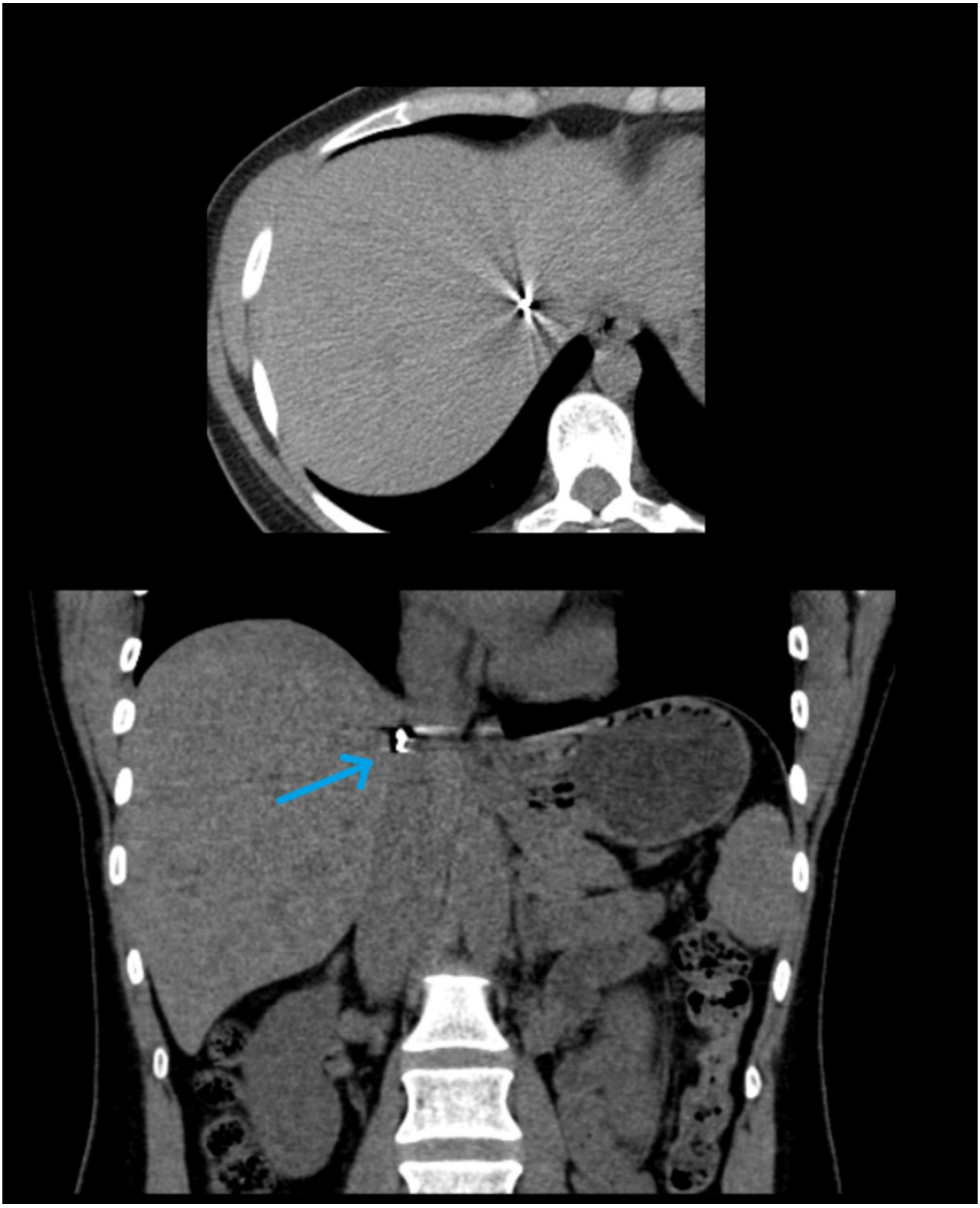

Fig. 16: Foreign body in the intrahepatic IVC (blue arrow in unenhanced CT scans) after a gun shoot accident.

References: Serviço de Imagem Médica, Centro Hospitalar e Universitário de Coimbra, Faculdade de Medicina de Coimbra Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

Budd-Chiari Syndrome

The Budd-Chiari syndrome consists of the obstruction of the hepatic vein outflow tracts, generally at the hepatic veins level. This disorder is frequently associated with hypercoagulable status. The obstruction may be caused by a congenital web, stenosis, clot, tumor, massively enlarged caudate lobe or even hepatic intrathoracic herniation, like in figure 24.

The CT appearance of this condition depends of the phase of the disease. In the acute phase of this disease the hypertrophied caudate lobe shows preferential enhancement in the arterial phase with hole liver heterogeneous enhancement (peripheral linear low-attenuation bands and areas of infarction). In the chronic phase the liver presents with patchy enhancement areas (portal venous phase) and regenerative nodules (hypervascular in arterial phase). IVC and hepatic veins thrombosis may be present with or without enlarged and tortuous collateral veias from lumbar veins and azygous-hemiazygous venous system.

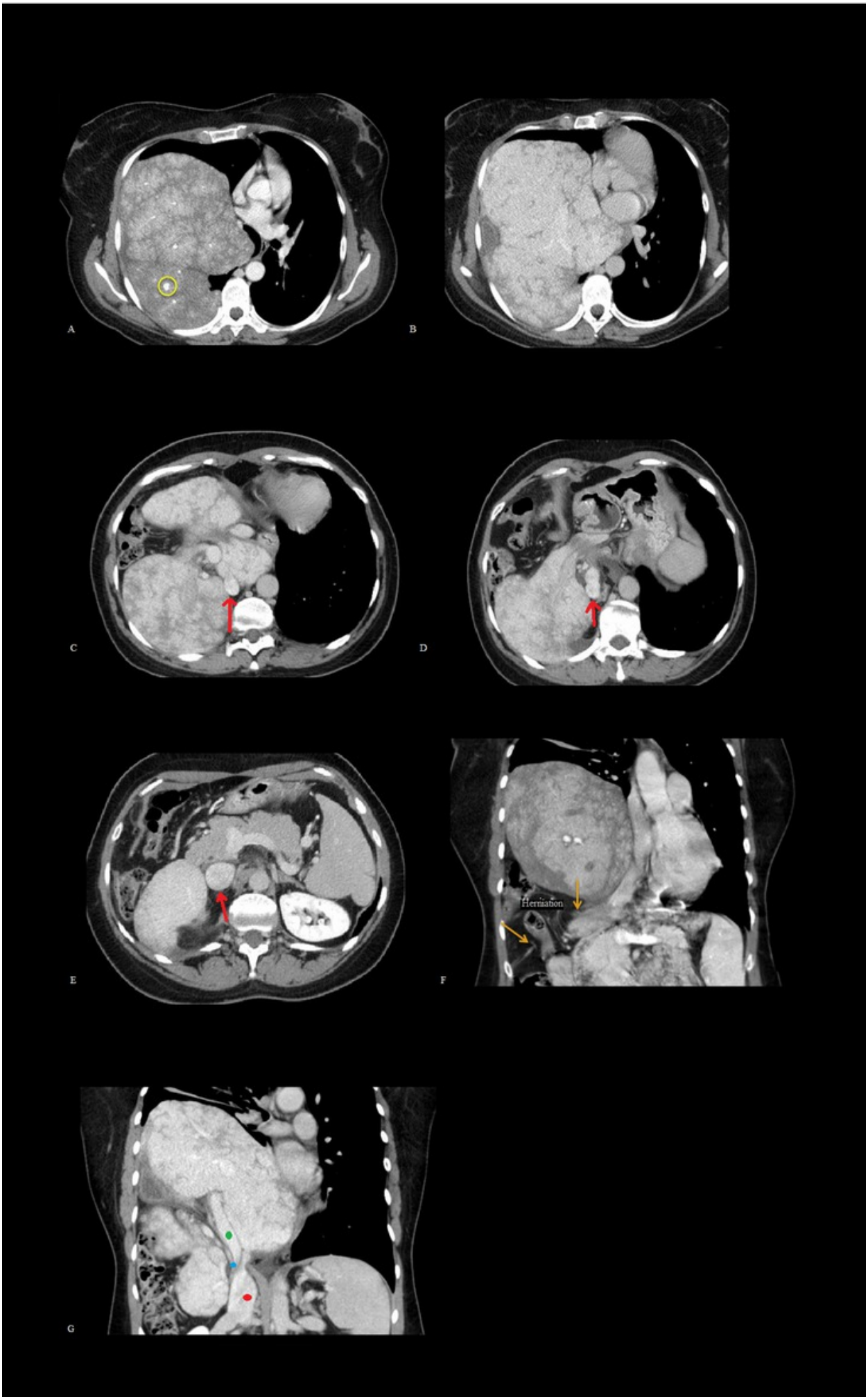
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Fig. 24: Hepatic herniation secondary Budd-Chiari: Axial and coronal enhanced computed tomography show a chronic Budd-Chiari, with patchy enhancement areas (portal venous phase - figures B-F) and regenerative nodules (hypervascular in arterial phase - figure A). IVC is compressed by the abnormal intrathoracic hepatic location, without thrombosis.
References: Serviço de Imagem Médica, Centro Hospitalar e Universitário de Coimbra, Faculdade de Medicina de Coimbra Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

Miscellaneous condition

Retrograde opacification of the IVC

Consist of brightly enhanced blood from the right atrium in the hepatic veins and IVC.

This condition may be associated with right heart failure however the frequency of this finding highly varies with the contrast injection rate (more common with injection rates >3mL/s).

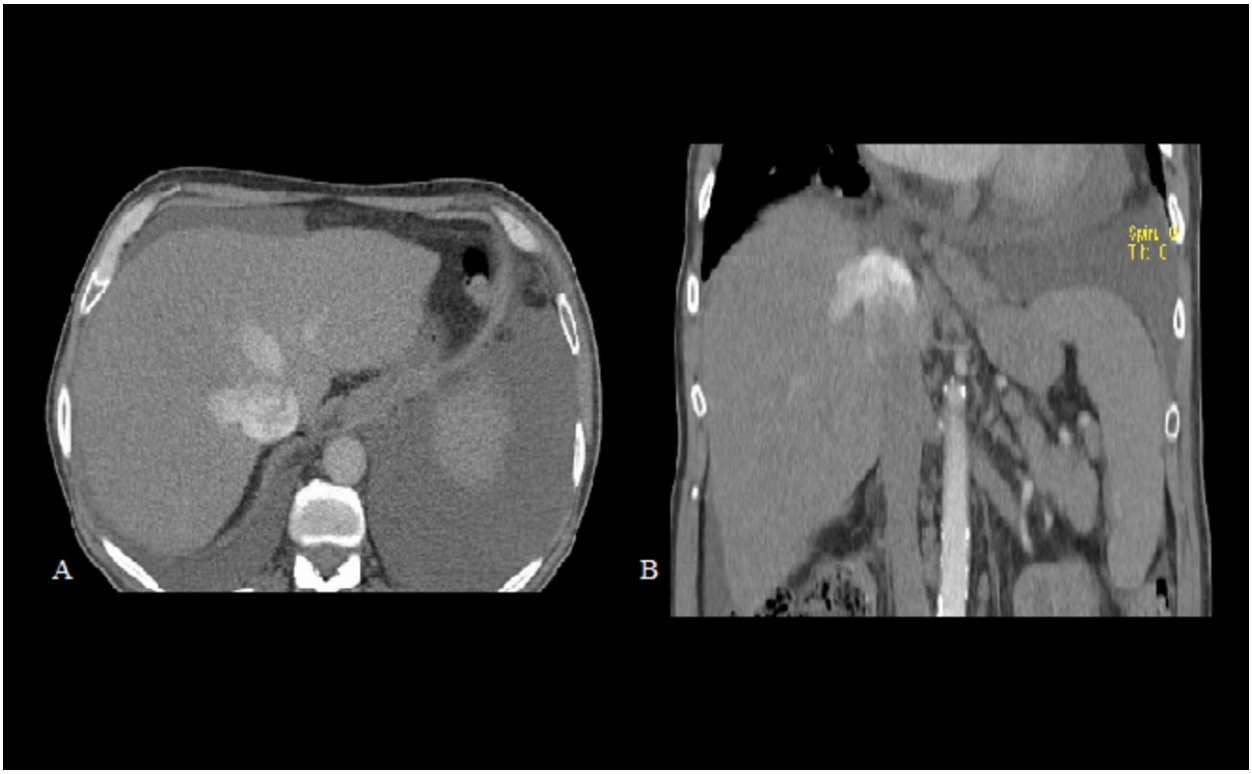


Fig. 13: Retrograde contrast enhancement of the IVC: Axial and coronal enhanced computed tomography reformations (arterial phase) reveal dense undiluted contrast material in the IVC and hepatic veins.

References: Serviço de Imagem Médica, Centro Hospitalar e Universitário de Coimbra, Faculdade de Medicina de Coimbra Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

Fig. 11: Retrograde contrast enhancement of the IVC: Axial enhanced computed tomography reformation (arterial phase) reveal a large amount of undiluted contrast material in the slightly dilated IVC and hepatic veins.

References: Serviço de Imagem Médica, Centro Hospitalar e Universitário de Coimbra, Faculdade de Medicina de Coimbra Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

IVC fistulas

Arteriovenous fistulas or arteriovenous malformations may be suggested by the early enhancement of the IVC (in arterial phase). IVC fistulas are relatively uncommon disorders and potentially life threatening. They may be posttraumatic or rarely originate from a complicated abdominal aortic aneurysm.

Flattened IVC

It is defined as 3:1 diameter ratio, between the transverse and anteroposterior diameters. This sign is associated with hypotension and/or impending shock in trauma patients. However it can also be a normal variant (elderly women).

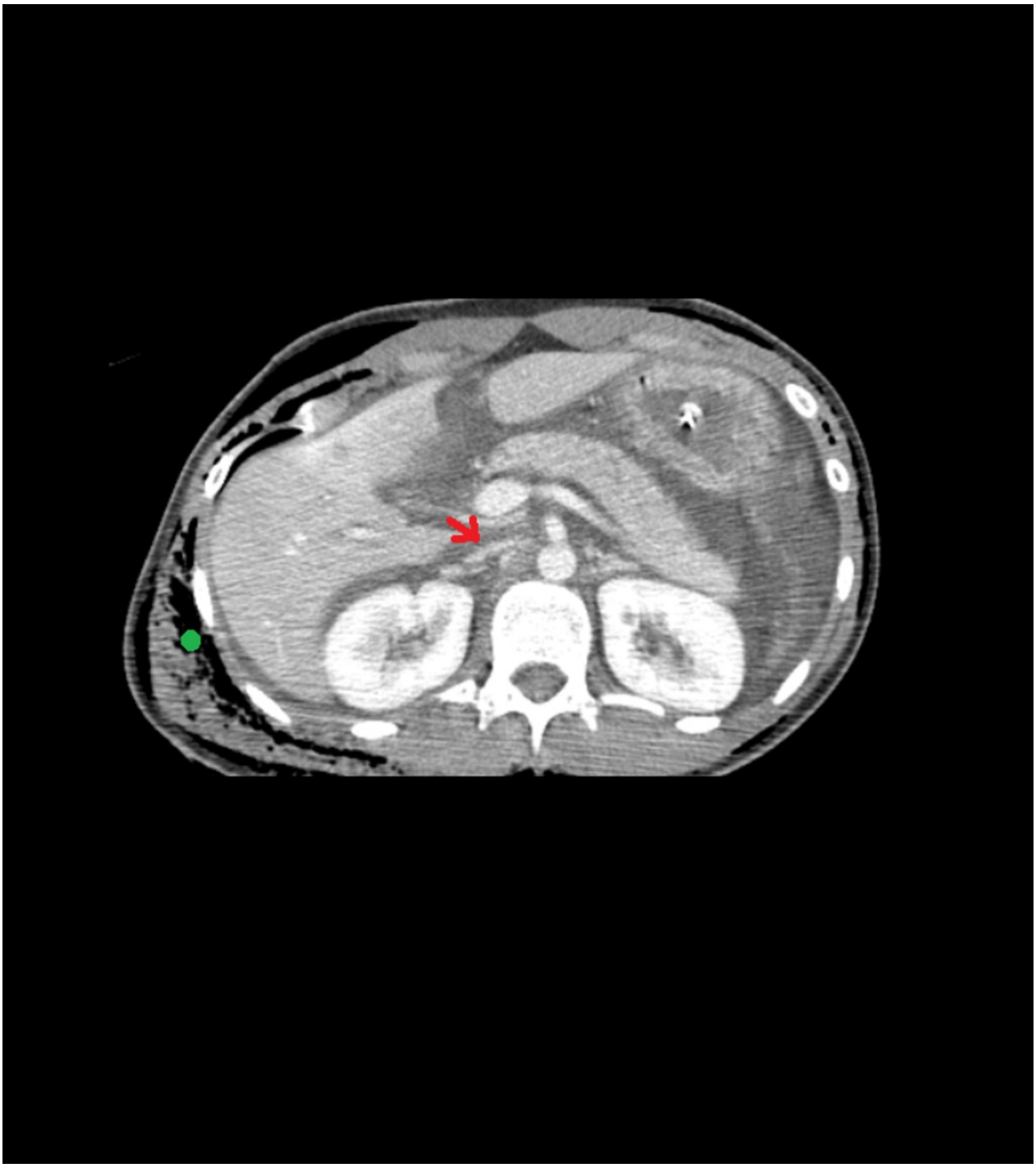
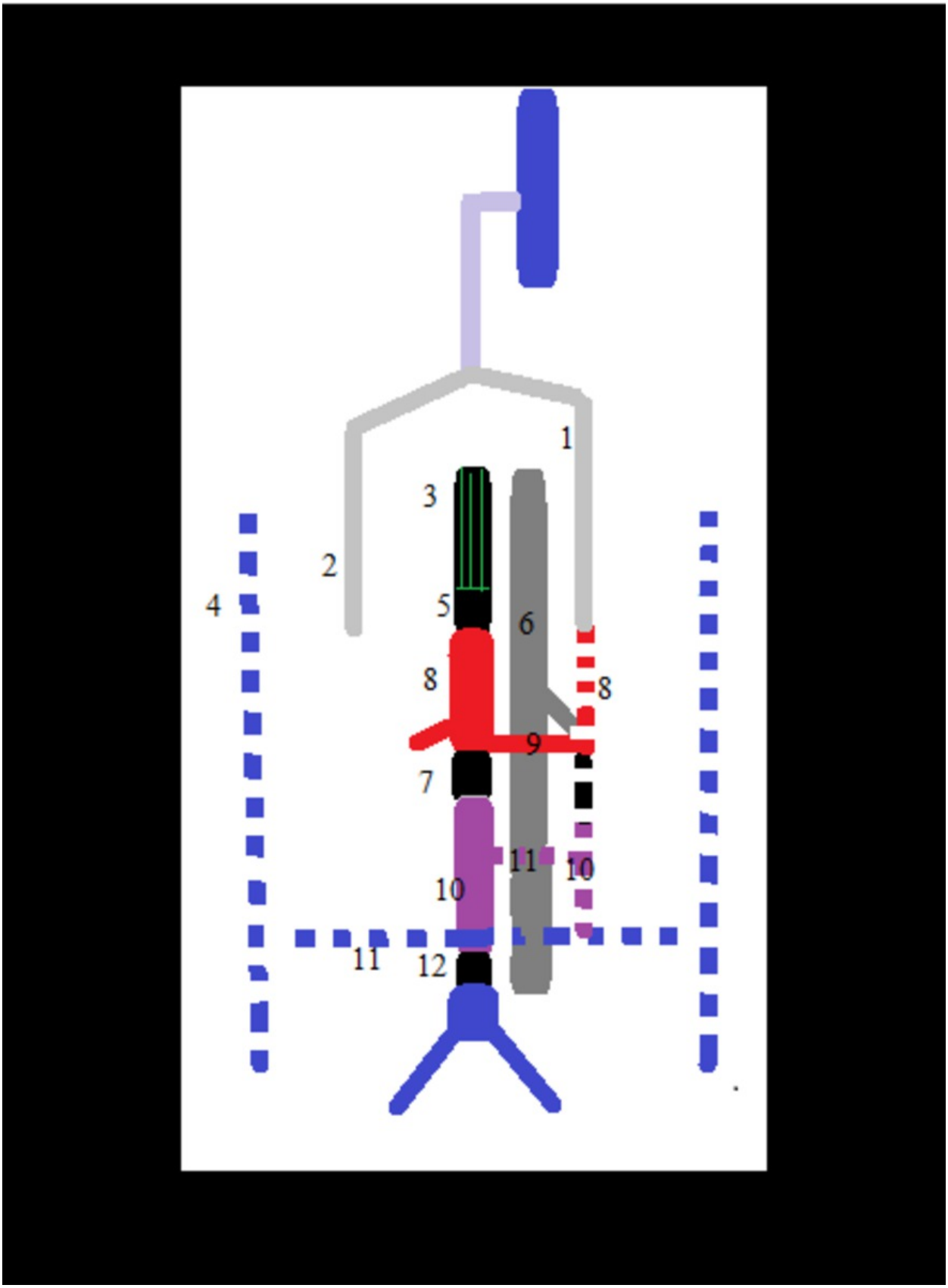


Fig. 15: Flat IVC in a 25-year-old woman who had been involved in a traffic accident. Contrast-enhanced CT scan reveals a collapsed IVC (red arrow). Note also subcutaneous emphysema (green dot).
References: Serviço de Imagem Médica, Centro Hospitalar e Universitário de Coimbra, Faculdade de Medicina de Coimbra Medical Imaging Department and Faculty of Medicine, University Hospital of Coimbra, Portugal

Images for this section: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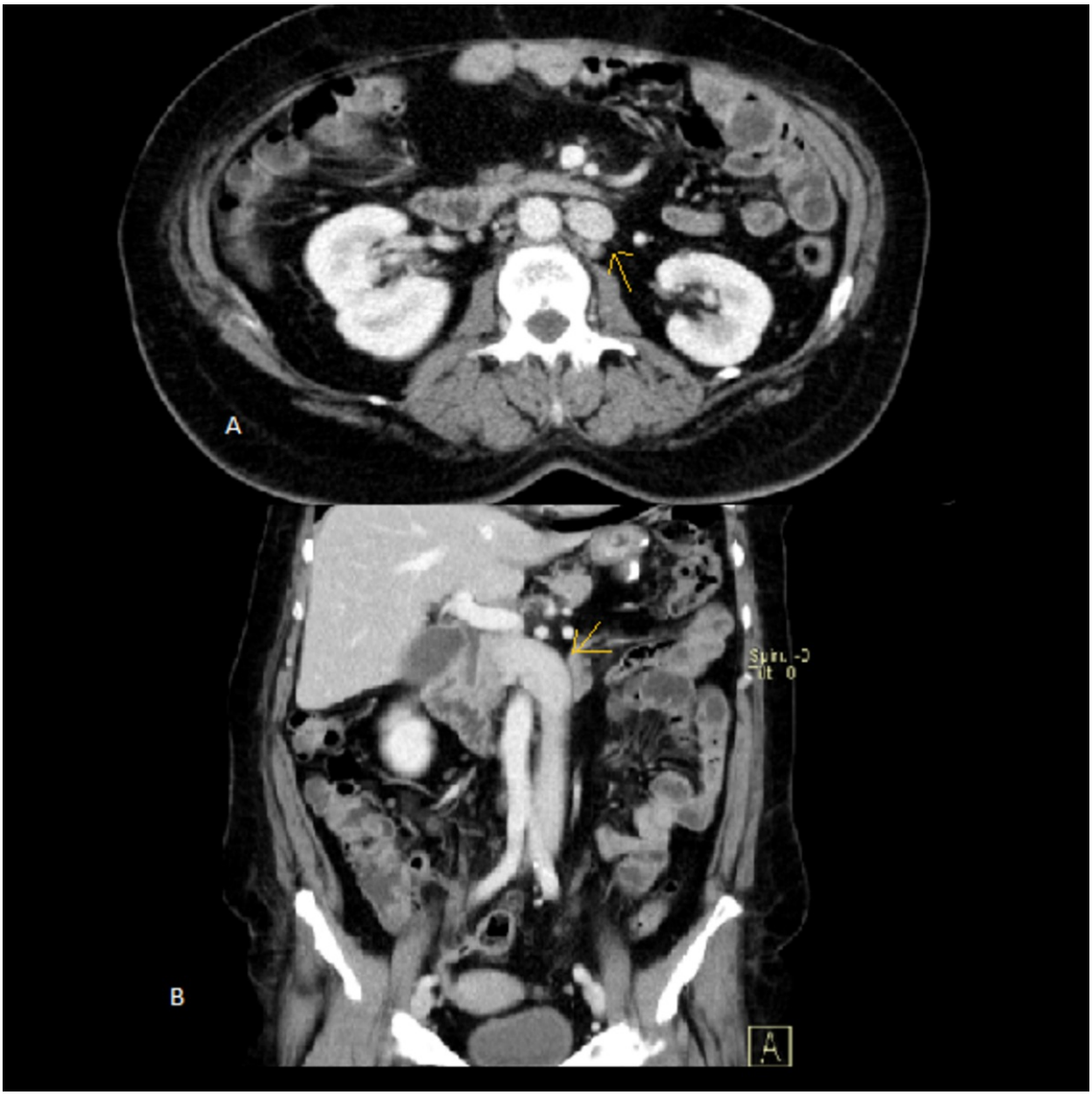

Fig. 2: Left IVC. Axial Computed Tomography reformation (A) images show a large single IVC to the left of the spine at levels below the renal veins (yellow arrow). Coronal

computed tomography reformation (B) of the same patient shows the left IVC crossing to the normal right-sided suprarenal IVC.

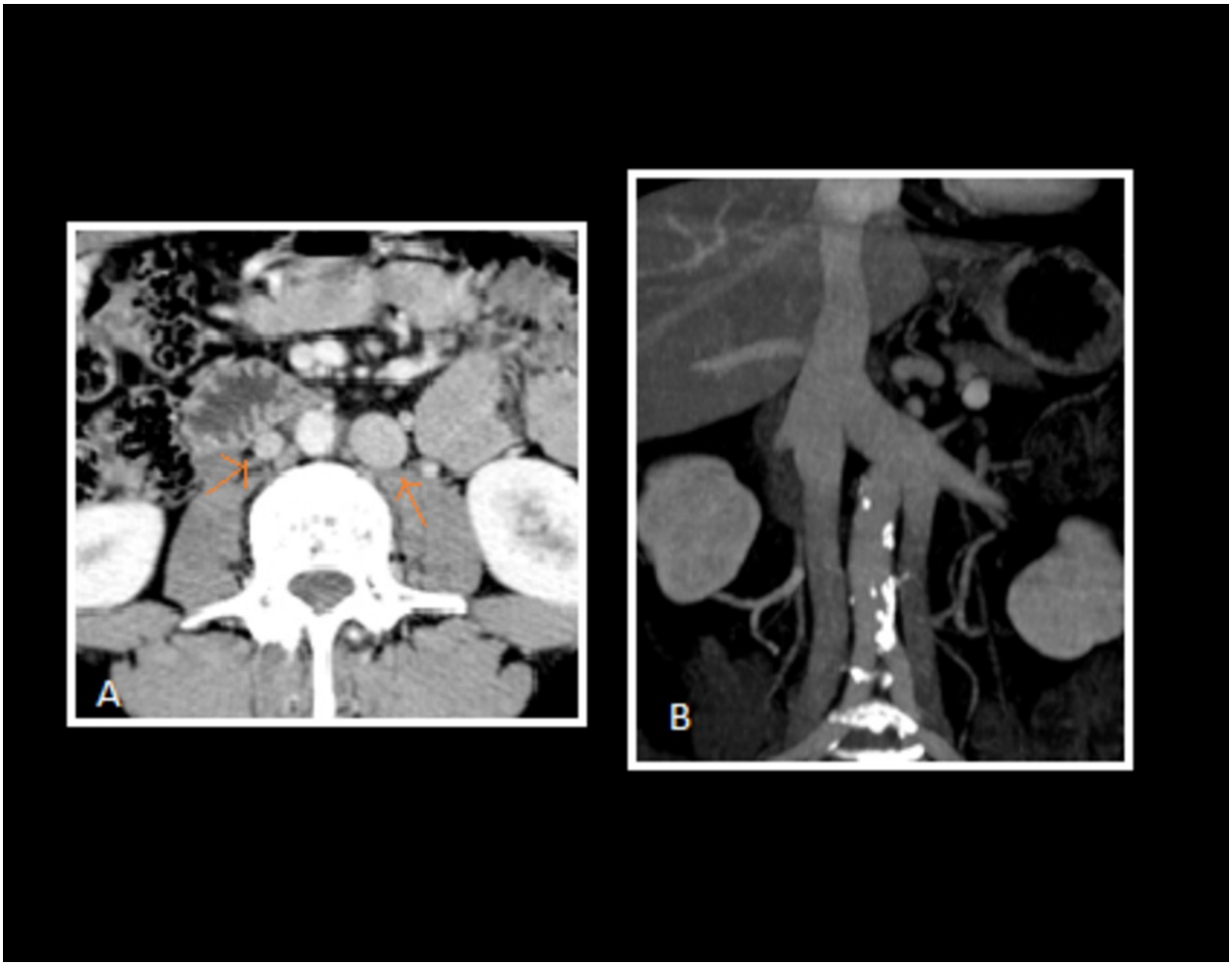

Fig. 3: Double IVC. Contrast enhanced CT (A) shows right and left infrarenal IVCs (orange arrows). The coronal computed tomography (B) shows the left IVC opening into the left renal vein, which crosses anterior to the aorta to form a single right-sided suprarenal IVC.

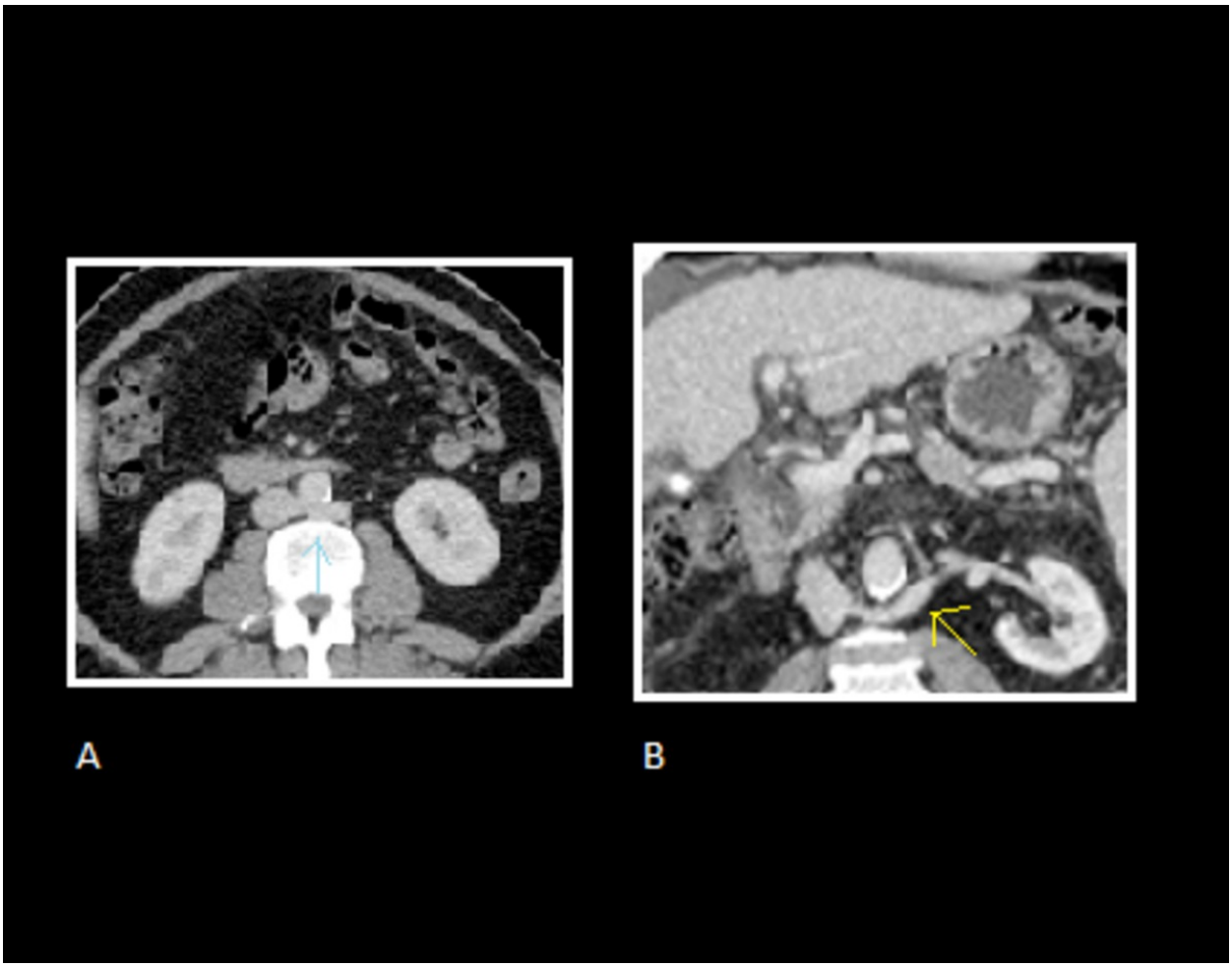

Fig. 4: Retroaortic Left Renal Vein. Contrast-enhanced computed reformations (A, B) reveal a single renal vein passes posterior to the aorta.

Fig. 5: Circumaortic Left Renal Vein. Contrast-enhanced axial computed reformations (A, B) show the left renal vein coursing anterior (red arrow) and posterior (green arrow) to the aorta

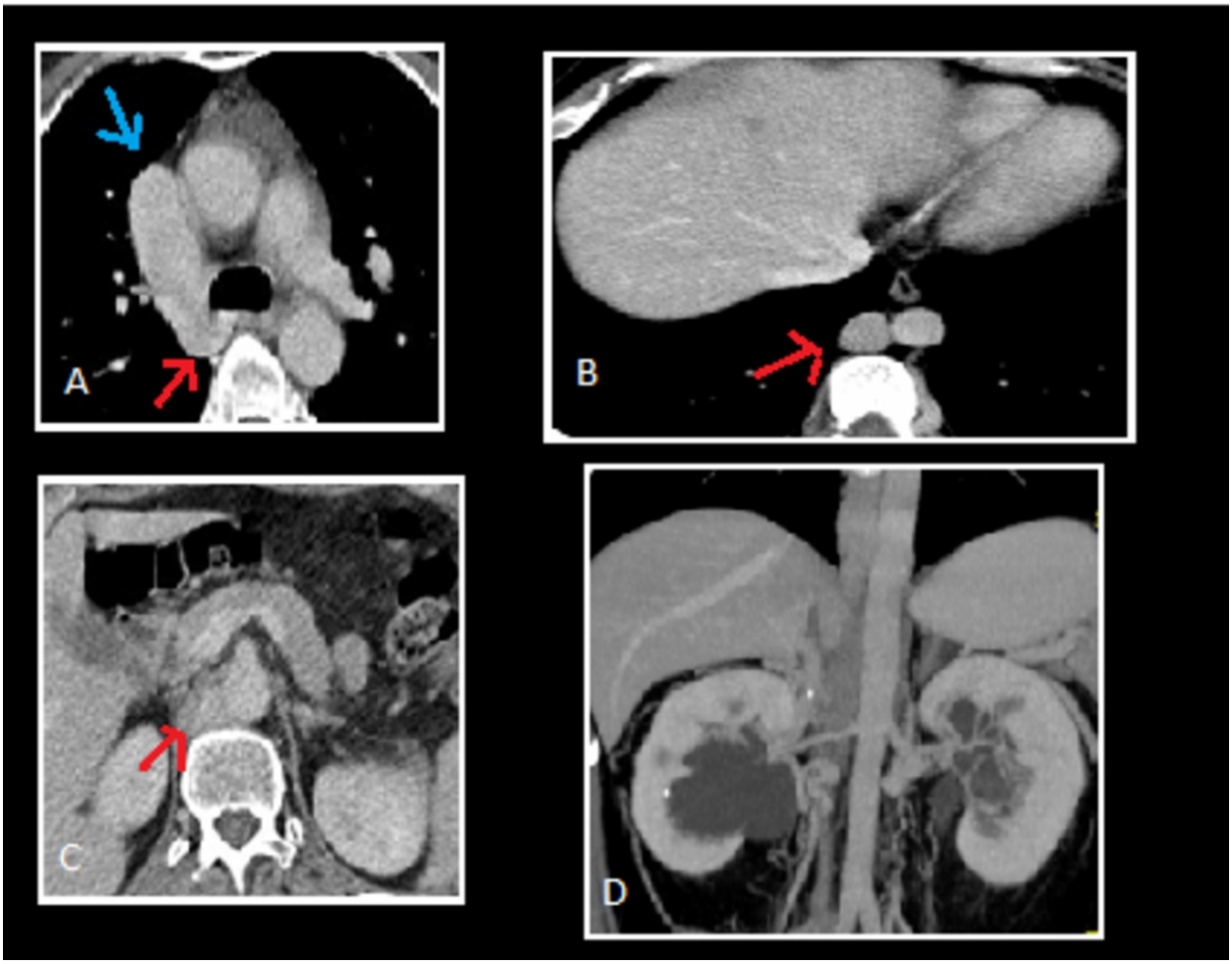

Fig. 6: Interruption of the IVC with azygous continuation. CT images shows: (A) enlarged azygous vein (red arrow) draining into the superior vena cava (blue arrow). (B and C) the vessel parallel to the aorta under the crus is the azygous vein (red arrow). (D) Absence of IVC in its normal location.

Fig. 7: Left IVC interruption with hemiazygous continuation. Contrast-enhanced CT scans shows hemiazygous continuation (green arrow) of a left-sided IVC (white arrow). The hemiazygous vein joins the azygous vein (red arrow).

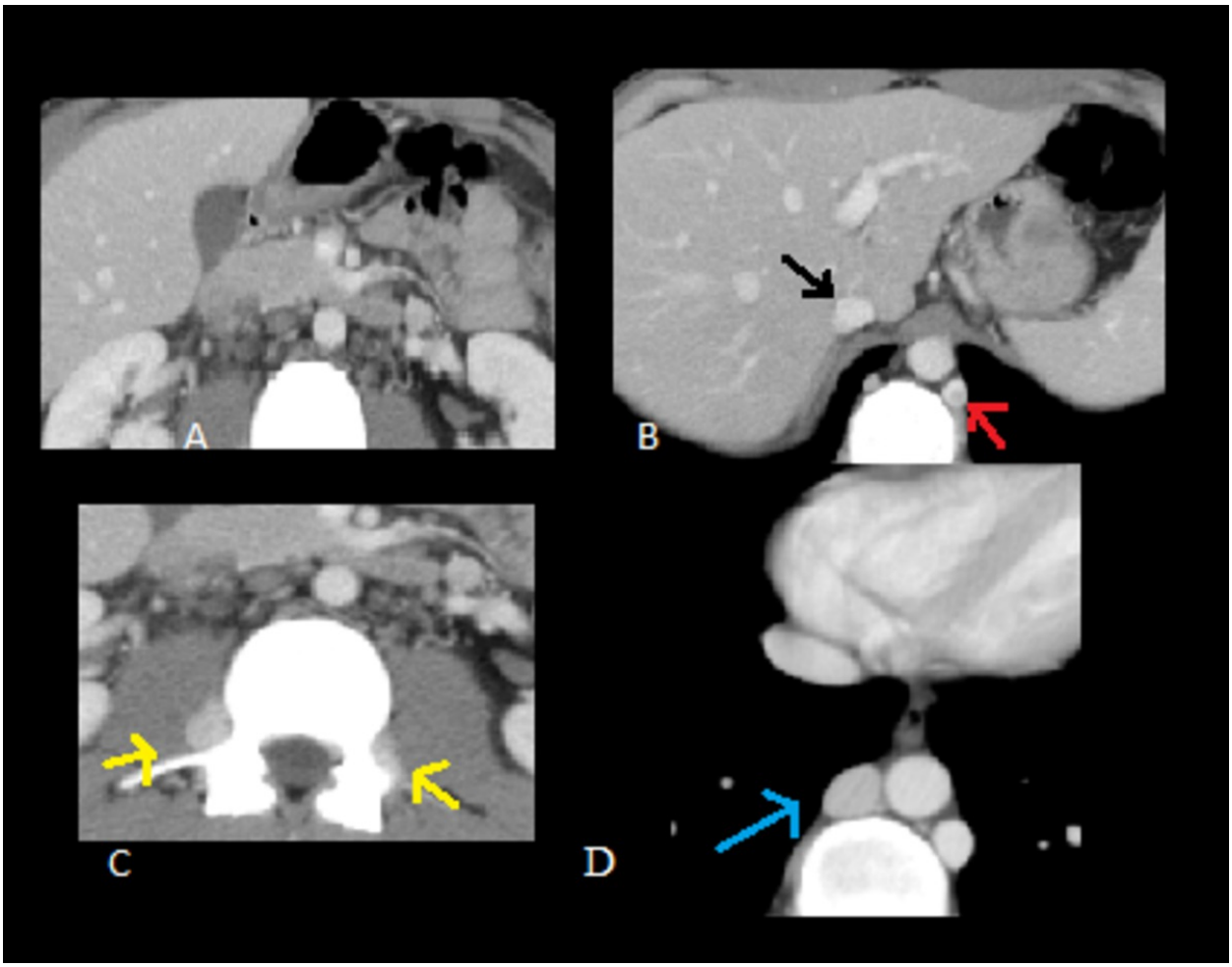

Fig. 8: Absence of the infrarenal IVC with preservation of the suprarenal segment: Axial contrast-enhanced CT scans show absence of the infrarenal IVC (A). Note the prominent ascending lumbar veins (arrows in (yellow arrow) (C) and the patent suprarenal IVC (black arrow)(B) with ectasic azygous and hemiazygous veins(blue and red arrows in B and D)

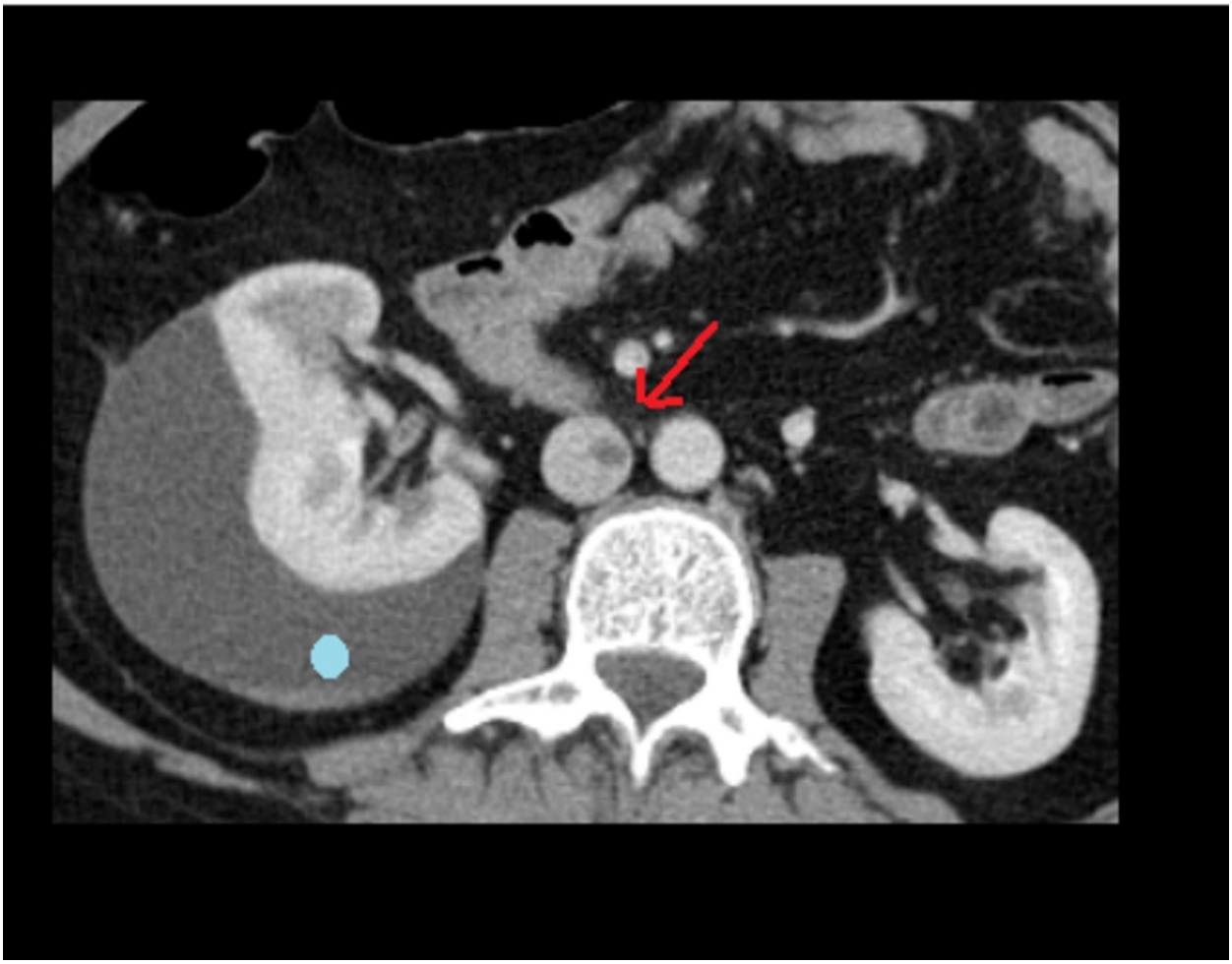

Fig. 9: Infrarenal IVC bland thrombus: Small thrombus in the infrarenal IVC (red arrow). Subcapsular homogeneous collection (blue dot) in the right kidney, compatible with an urinoma in a trauma patient.

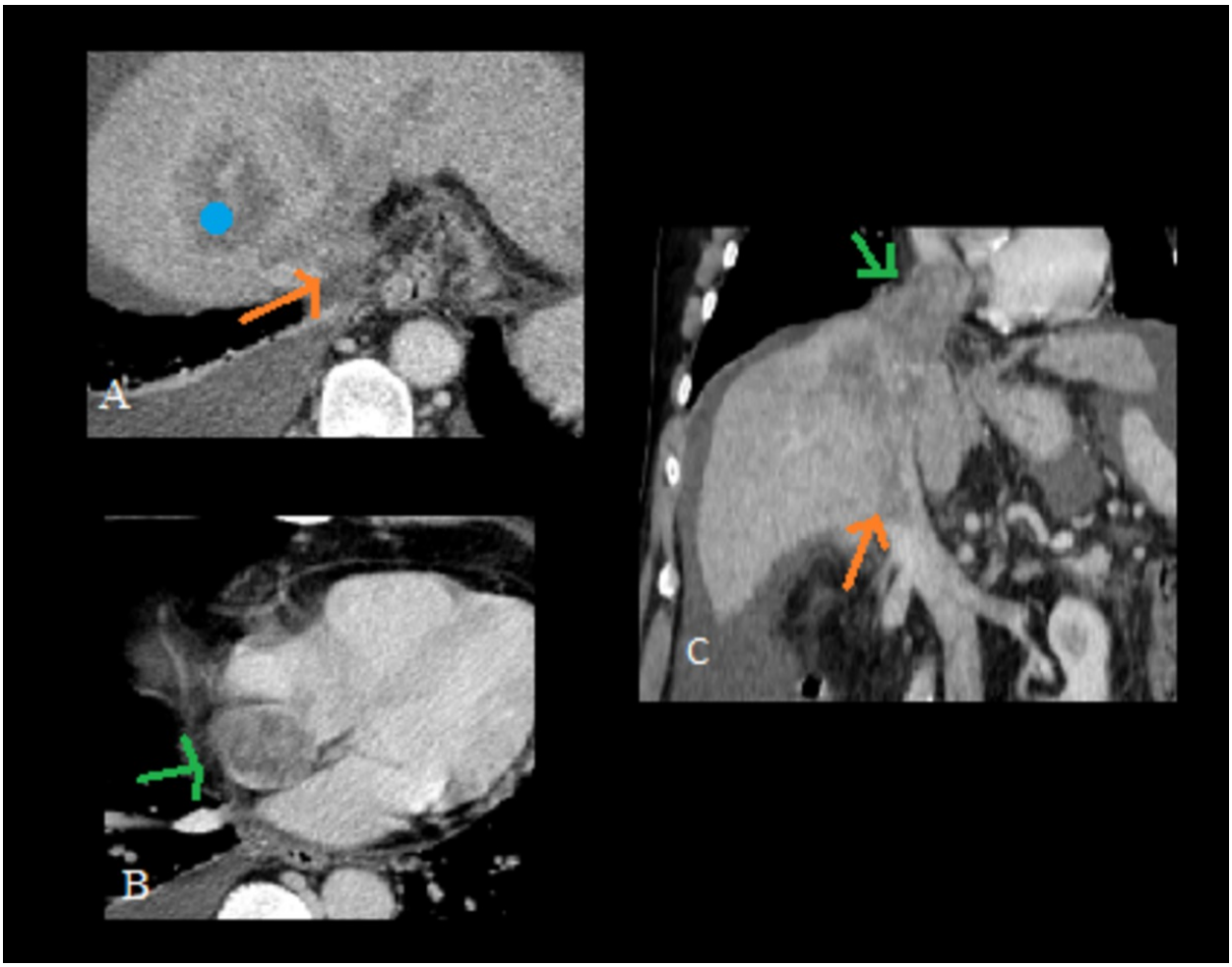

Fig. 10: Malignant IVC thrombosis: Contrasted CT scans reveal a large HCC (blue dot) extending to the IVC (orange arrow) and right atrial appendage (green arrow).

Fig. 11: Retrograde contrast enhancement of the IVC: Axial enhanced computed tomography reformation (arterial phase) reveal a large amount of undiluted contrast material in the slightly dilated IVC and hepatic veins.

Fig. 12: Pseudolesion of the IVC: Axial and coronal enhanced computed tomography show a filling defect with apparent narrowing of the IVC after liver transplant in a patient with dorsal decubitus. Notice also the spleen enlargement and bile duct dilation.

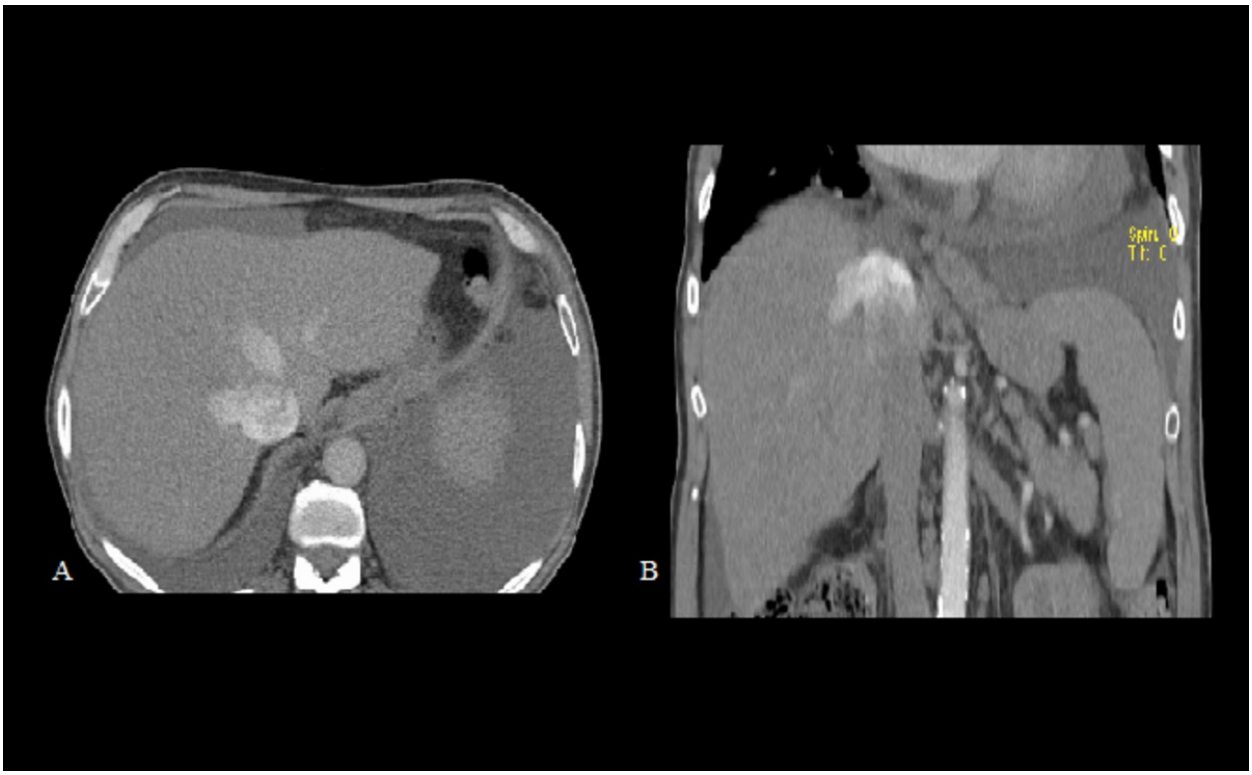

Fig. 13: Retrograde contrast enhancement of the IVC: Axial and coronal enhanced computed tomography reformations (arterial phase) reveal dense undiluted contrast material in the IVC and hepatic veins.

Fig. 14: Malignant IVC thrombosis: Axial enhanced computed tomography in arterial phase show a large malignant thrombus in the IVC (HCC), with heterogeneous arterial enhancement (yellow arrow).(Same patient in figure 10)

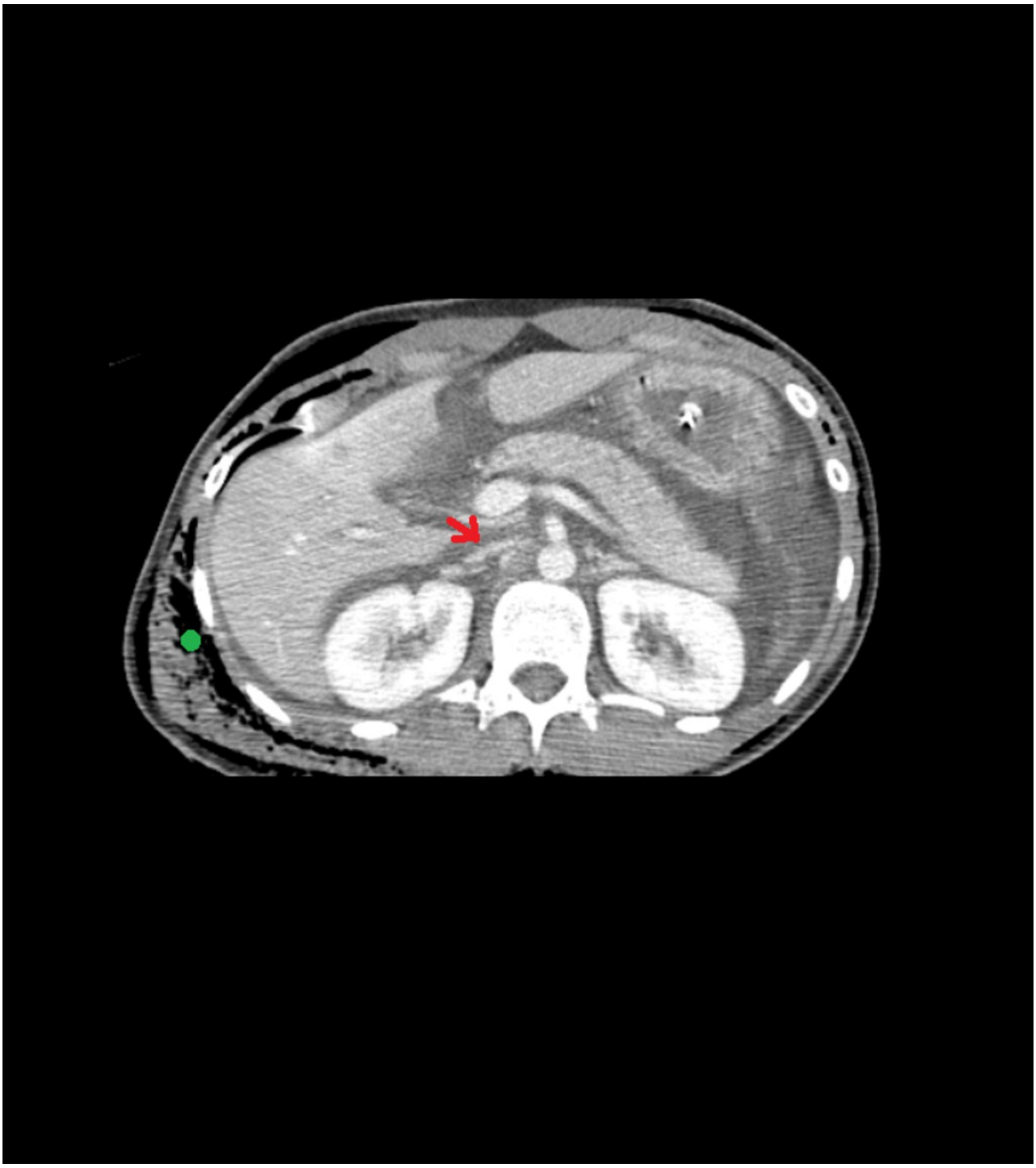

Fig. 15: Flat IVC in a 25-year-old woman who had been involved in a traffic accident. Contrast-enhanced CT scan reveals a collapsed IVC (red arrow). Note also subcutaneous emphysema (green dot).

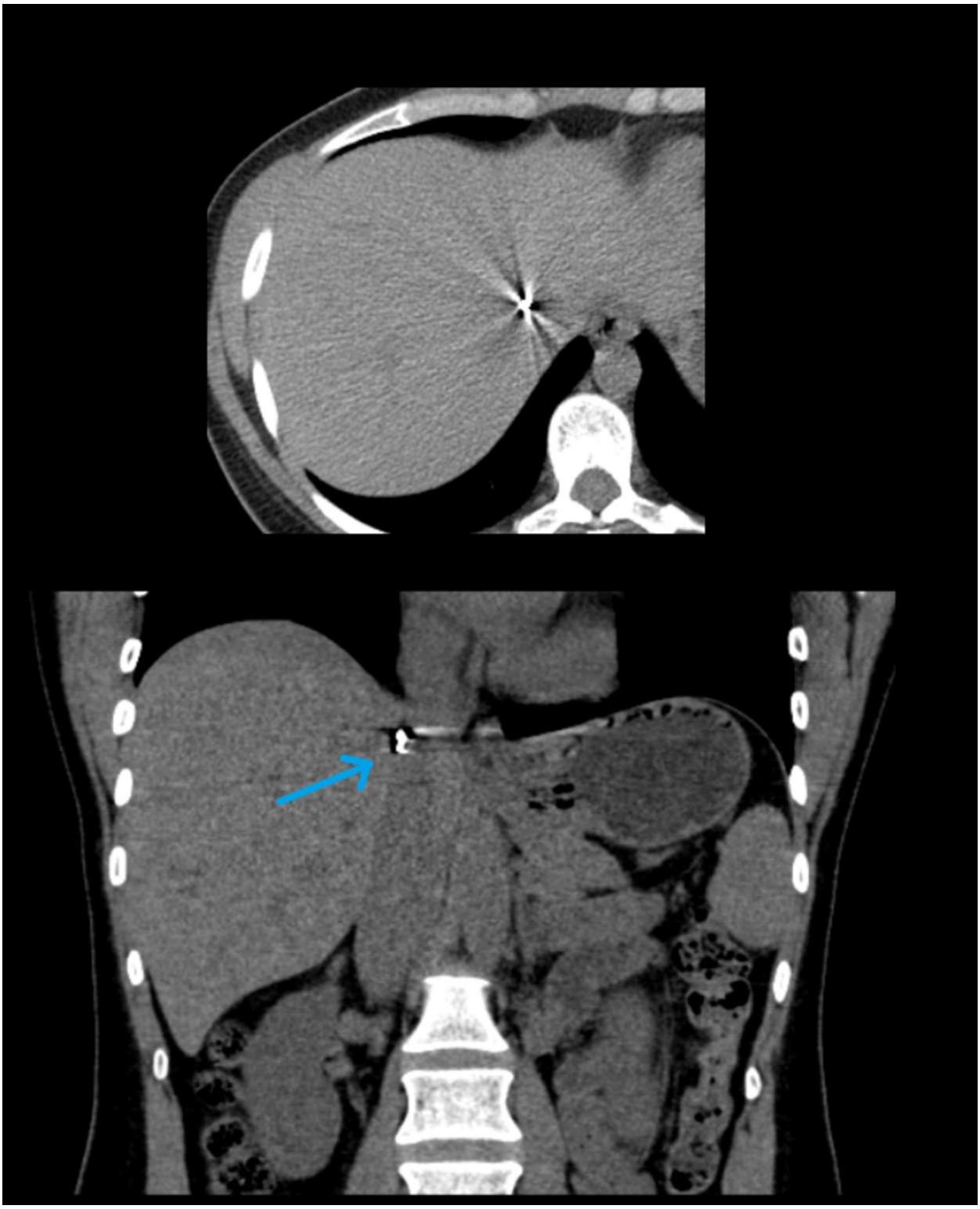

Fig. 16: Foreign body in the intrahepatic IVC (blue arrow in unenhanced CT scans) after a gun shoot accident.

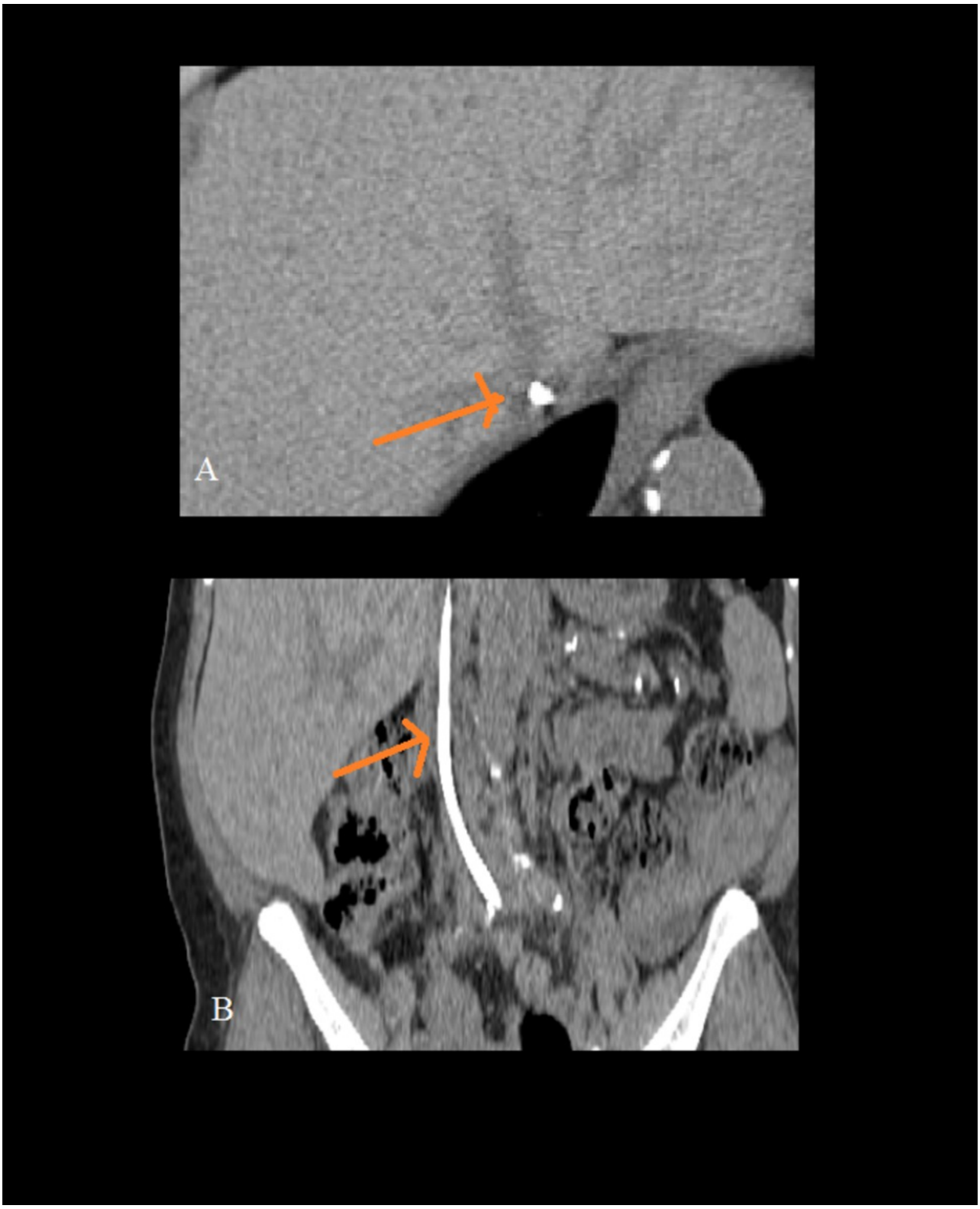

Fig. 17: Dialysis catheter in the IVC: Unenhanced axial and coronal computed tomography reformations show a dialysis catheter in the IVC(red arrow).

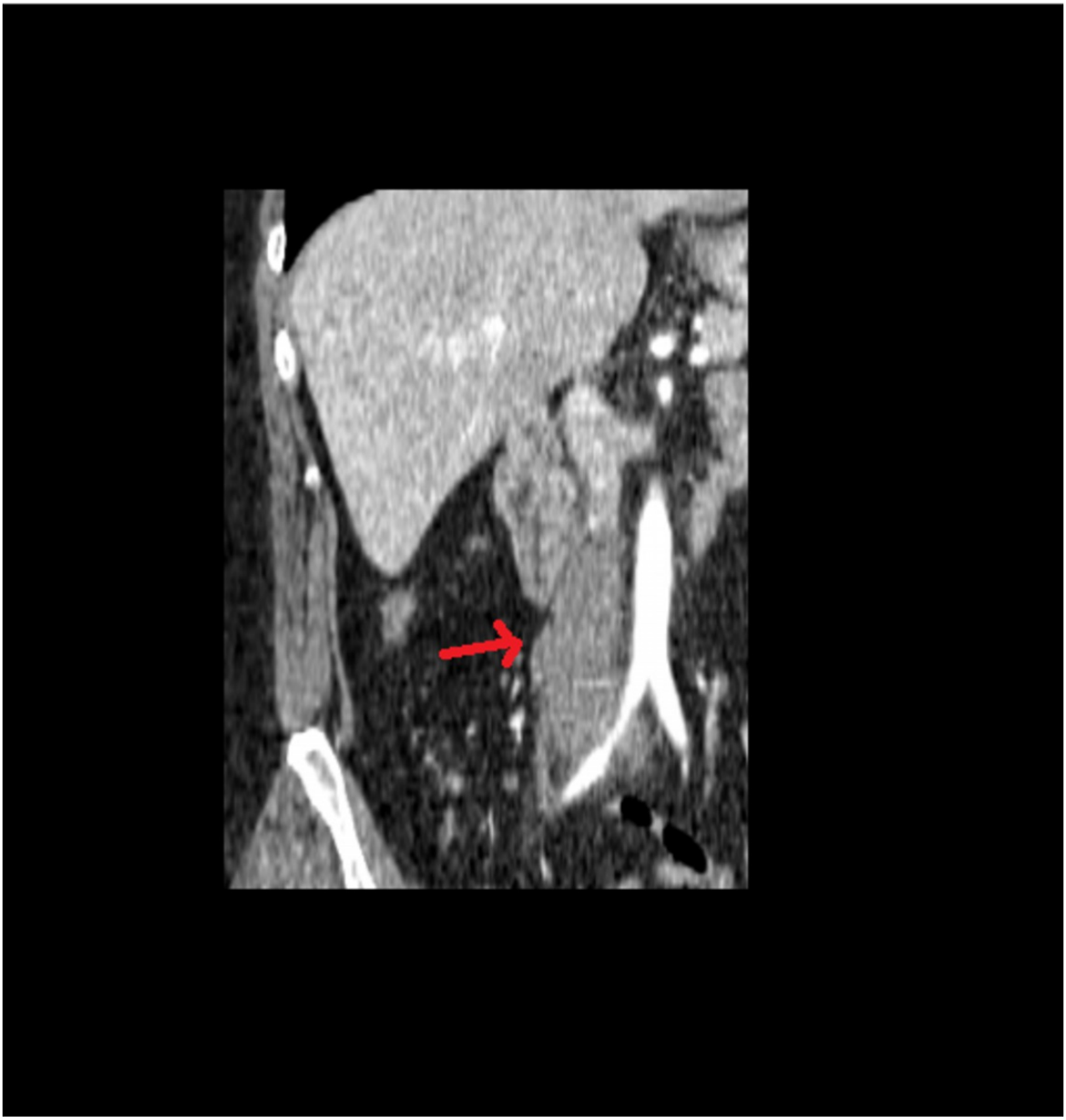

Fig. 18: IVC filter removal complication: This patient had left lower extremity thrombosis and was placed an IVC filter below the renal veins level. Coronal enhanced computed tomography, after the IVC removal, shows a large filling defect in the infrarenal IVC (red arrow), with extension to the common iliac vein, right common and superficial veins.

Fig. 19: Retrograde contrast enhancement of the IVC: Axial enhanced computed tomography reformations show a filling defect in the IVC, due to poor mixing between the unenhanced stream of blood in the IVC and the refluxed contrast material. This filling defect may simulate a thrombus, especially on axial images and in the absence of venous phase images, on which such artifactual lesions usually resolve.

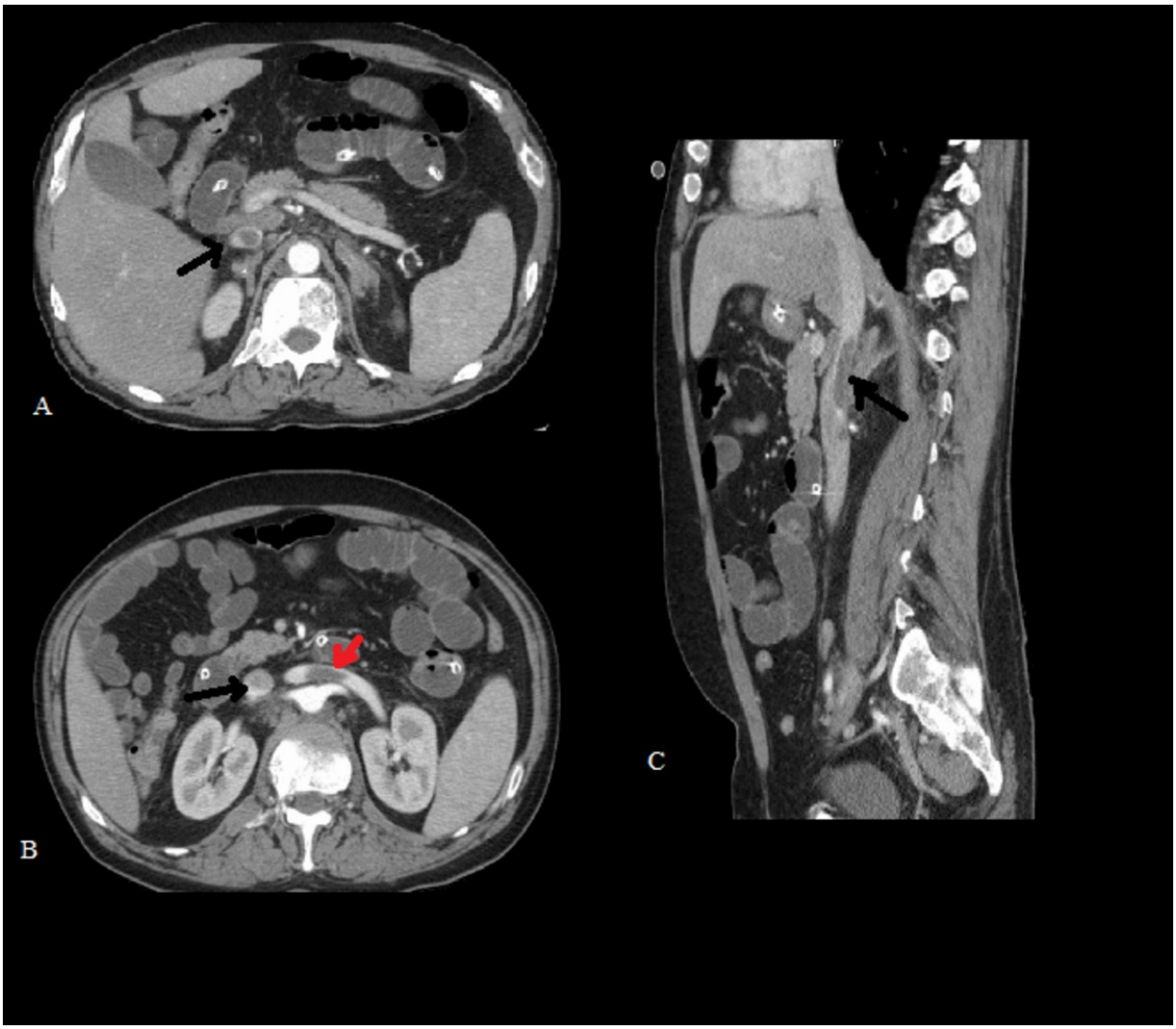

Fig. 20: Bland Thrombosis of the IVC: During the course of a computed tomography enteroclysis (axial (A,B) and sagittal (C) reformations)was revealed a small filling defect, compatible with non-occlusive thrombus, in the IVC (black arrow) and left renal vein (red arrow).

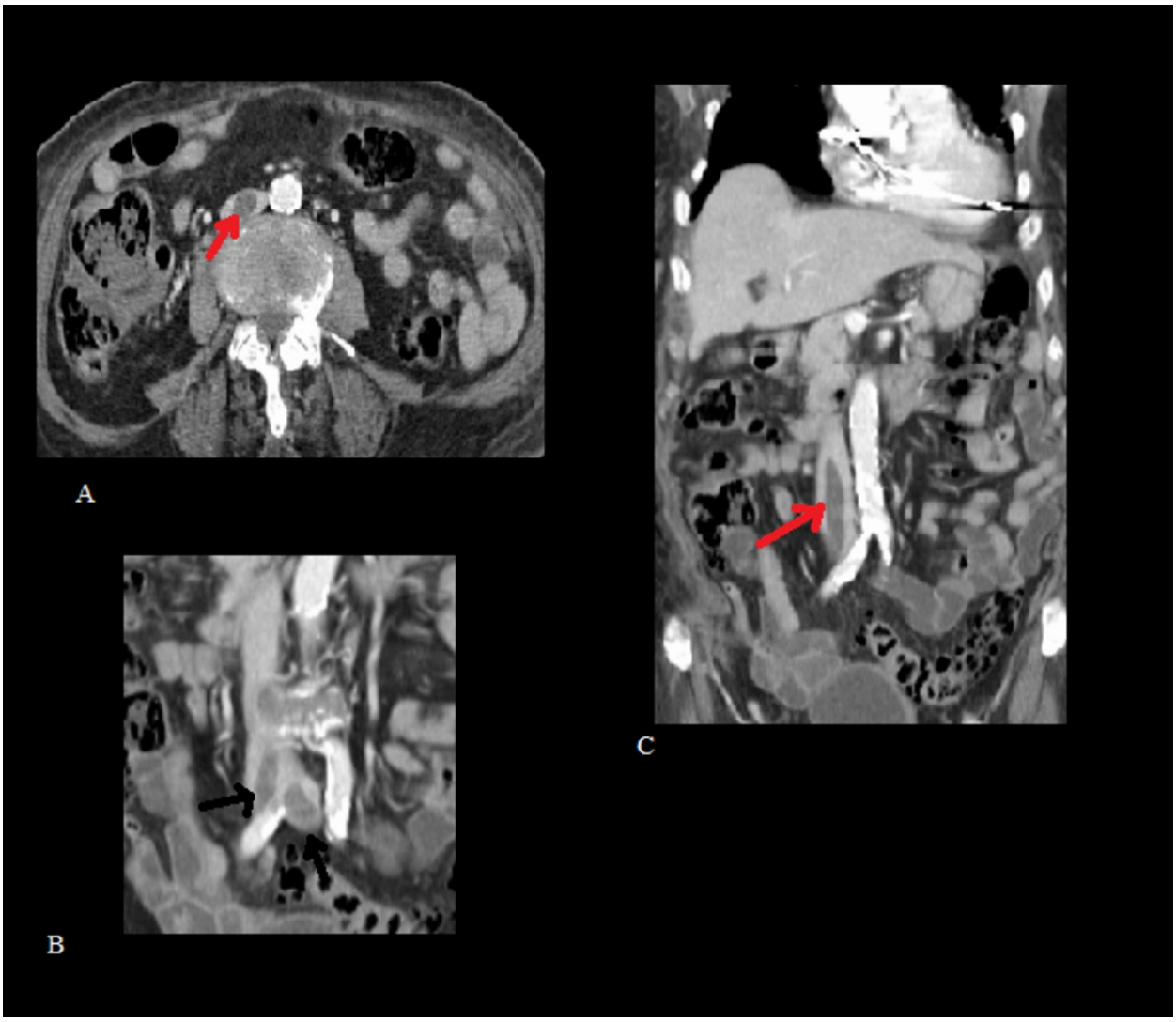

Fig. 21: Infrarenal IVC bland thrombus:Axial and coronal enhanced computed tomography reveal a large filling defect of the IVC (red arrow)in a patient with lower extremitie trhombosis.

Fig. 22: IVC filter: Axial unenhanced computed tomography reformations show a spontaneously hyperdense annular structure inside the IVC compatible with an IVC filter, located below the renal veins.

Fig. 23: Malignant IVC thrombosis: Axial enhanced computed tomography (arterial phase (A,B), venous phase (C) and delayed venous phase (D)) show a large thrombus in the IVC, with heterogeneous arterial enhancement with wash-out on venous and delayed venous phase. This patient had a left radical nefrectomy for a renal cell carcinoma.

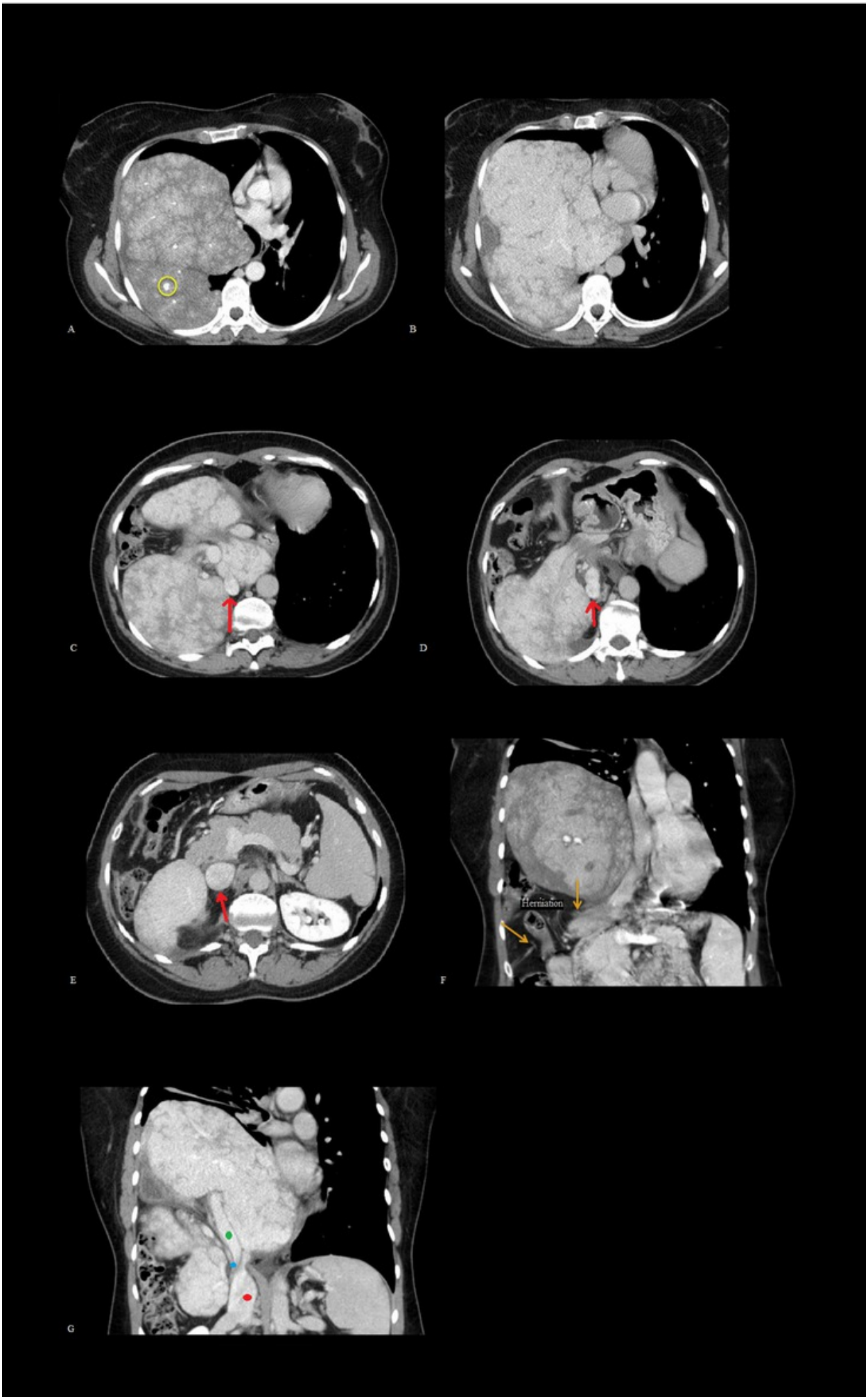
A
B
C
D
E
F
Herniation
G

Fig. 24: Hepatic herniation secondary Budd-Chiari: Axial and coronal enhanced computed tomography show a chronic Budd-Chiari, with patchy enhancement areas (portal venous phase - figures B-F) and regenerative nodules (hypervascular in arterial phase - figure A). IVC is compressed by the abnormal intrathoracic hepatic location, without thrombosis.

Conclusion

MDCT has a great value in detecting pathologic conditions affecting the IVC. Radiologists should be familiarized with the congenital anomalies of the inferior vena cava on MDCT findings, in order to avoid diagnostic pitfalls and surgical complications.

Personal information

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