Adrenal Tumor Hemorrhage

A Case of Variant Vascular Anatomy and Multidisciplinary Management

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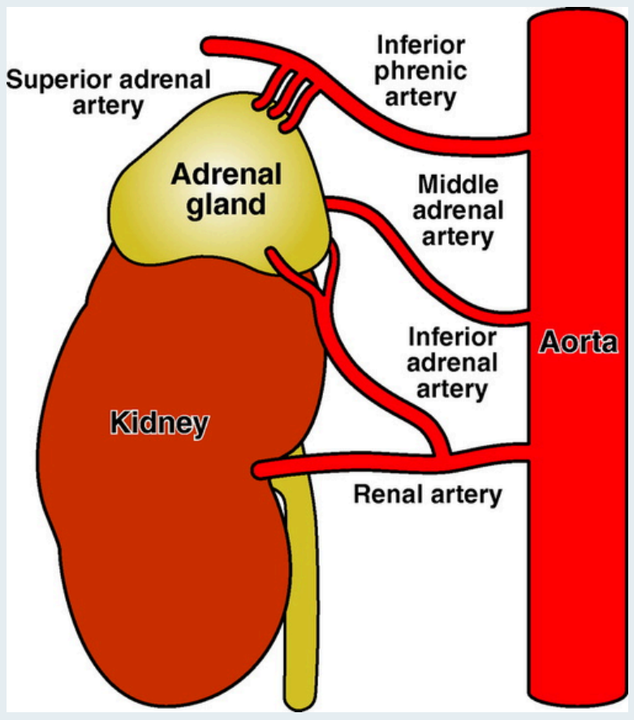
Introduction

Adrenal tumor hemorrhage is a rare yet clinically significant event that can precipitate adrenal insufficiency, shock, and mortality especially if not promptly managed; Haemorrhage may occur spontaneously or secondary to underlying neoplasm (such as phaeochromocytomas, myelolipomas, and adrenal carcinomas), trauma, coagulopathy/anticoagulant use, or systemic conditions such as sepsis.

Emergency management often hinges on embolization, which may serve as definitive therapy or as a bridge to surgery in high-risk cases (e.g. hemodynamically unstable, multiple medical comorbidities, etc).

Variant

- Superior adrenal arteries, which are often multiple, rarely may arise from the aorta, celiac axis, or an intercostal artery.
- The middle adrenal artery can originate from the inferior phrenic artery, renal artery, or celiac axis. Or it is replaced by the superior or inferior adrenal artery.
- Inferior adrenal artery can arise from the aorta, celiac artery, a polar renal artery, gonadal artery or inferior phrenic artery.



Ordinary Anatomy of Adrenal Blood Supply

Anatomy

Right adrenal typically receives blood supplies from 3 major branches, namely superior, middle and inferior adrenal artery, which originate from inferior phrenic artery, abdominal aorta and renal artery respectively; However, variants are not uncommon.

Artery	Typical Origin	Area Supplied	Notable Variants
Superior	Inferior phrenic artery	Superomedial/superior	Direct aortic, celiac, or intercostal origins
Middle	Abdominal aorta	Anteromedial	Inferior phrenic, renal, celiac, or absent
Inferior	Renal artery	Inferolateral/inferior	From aorta, celiac, polar renal, gonadal, or phrenic arteries

Case of Interest

Here present a case of right adrenal tumour haemorrhage, possible due to use of anticoagulants and underlying phaeochromocytoma. The right adrenal tumour received blood supply from the right adrenal arteries which demonstrate anatomical variant.

Background

A 77-year-old gentleman, with a history of diabetes mellitus and hypertension, was admitted for left-sided weakness secondary to a right middle cerebral artery (MCA) territory acute ischemic stroke. Urgent CT Angiogram performed and showed no large vessel occlusion and therefore intravenous tissue plasminogen activator (tPA) was administered. He suffered hemorrhagic transformation of the infarct shortly after tPA use. During his subsequent hospitalization in the acute stroke unit, he developed acute respiratory distress syndrome (ARDS), necessitating intubation and mechanical ventilation. Concurrently, he experienced acute abdominal pain and a significant decline in hemoglobin.

Imaging Findings

Abdominal computed tomography (CT) revealed a 10-centimeter acute hematoma involving the right adrenal gland, with imaging features indicative of active hemorrhage. The hematoma caused mass effect, compressing the liver, displacing the right kidney, and narrowing the inferior vena cava. No discrete adrenal mass could be identified, though a neoplastic etiology could not be excluded. Notably, the arterial supply to the adrenal gland originated from a single variant right adrenal artery arising from the right renal artery, which then trifurcated into three branches. No additional arterial supply was identified.

Variant Anatomy of Right Adrenal Artery Detected on CT

Pre contrast Phase of the CT, showing large retroperitoneal hematoma involving right adrenal

Arterial Phase of the CT, showing an arterial enhancing focus within the hematoma

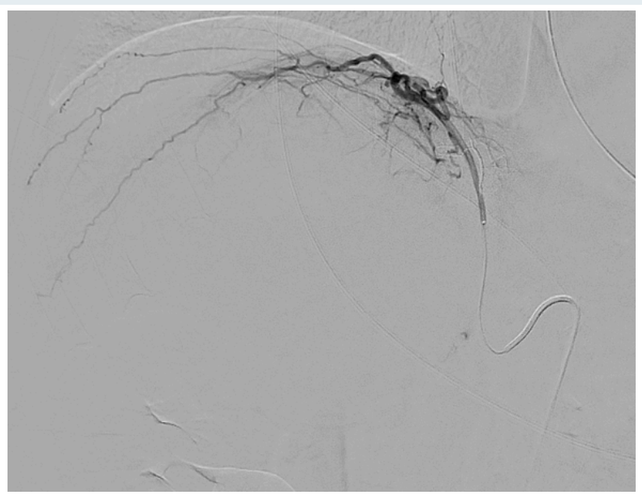
Venous Phase of the CT, which demonstrates contrast pooling, originating from the arterial enhancing focus

Embolization

Digital subtraction angiography was subsequently arranged, showing:

- Presence of a single right adrenal artery, arising from proximal right renal artery.
- The right adrenal artery trifurcates into superior, middle and lower branch
- No ongoing active extravasation nor pseudoaneurysm formation demonstrated.

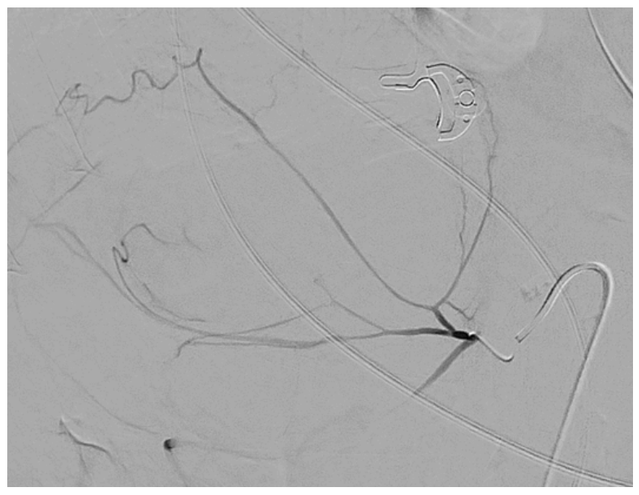
Right Renal Artery Angiogram: Confirming the CT findings of all adrenal arteries arising from right renal artery



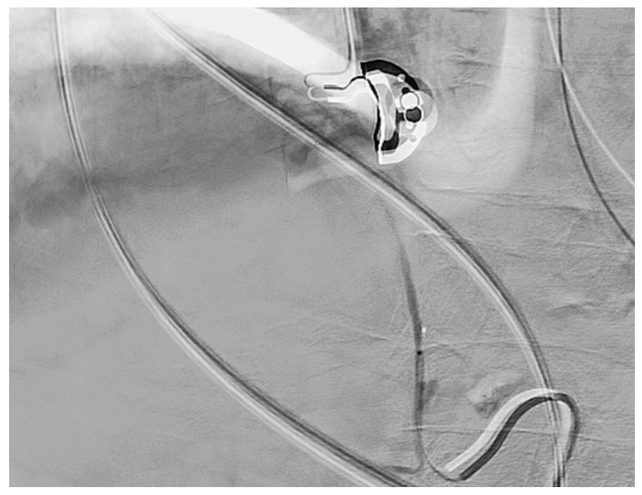
Superior Branch of Single Right Adrenal Artery (prior to embolization)

Embolization of the right adrenal artery branches was performed using a combination of gelatin sponge (Gelfoam) and microparticles (Embosphere). Both technical and clinical success achieved:

- Post-embolization angiogram showed occluded right adrenal artery with no obvious non-target embolization.
- No further hemoglobin decline and the patient's respiratory status improved sufficiently to permit extubation.



Middle and Inferior Branch of Single Right Adrenal Artery (prior to embolization)



Superior Branch of Single Right Adrenal Artery (after embolization)

Middle and Inferior Branch of Single Right Adrenal Artery (after embolization)

Further Workup

Biochemical assessment, prompted by indirect clinical suspicion of a functional adrenocortical tumor, revealed elevated serum metanephrine and normetanephrine levels, raising the possibility of an underlying pheochromocytoma. Confirmatory evaluation is pending.

Conclusion

This case highlights the critical role of prompt imaging in diagnosing adrenal hemorrhage, especially in the context of anticoagulant use, and emphasizes the utility of endovascular techniques in the acute management of life-threatening hemorrhage. Recognition of vascular anatomic variants is essential for procedural planning.

Reference

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