

Case Based Urology Learning Program

Resident's Corner: *UROLOGY*

Case Number 10

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A 37-year-old woman has hypertension for 15 years. She recently had headaches associated with blood pressure of 180/105. She now requires 4 anti-hypertensive medications.

What is the differential diagnosis for this patient?

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Given the early age onset and difficulties with control this patient likely has secondary hypertension – not essential hypertension. The possibilities here include renal artery or adrenal disease. The most common form of renal artery disease in women ages 20-50 is fibromuscular dysplasia (FMD). Intimal hyperplasia or aneurysm would be observed less frequently. Atherosclerosis (ASO) at this age is unlikely. Adrenal pathology could include pheochromocytoma, aldosteronoma, or Cushing's disease.

What are the clinical clues for renal artery disease resulting in hypertension?

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Onset of hypertension <30 (FMD) years or > 55 (ASO)

Accelerated, malignant hypertension or hypertensive crisis

Hypertension associated with pulmonary edema

Sudden onset and short duration of hypertension

Smoking (risk factor for ASO)

How can you potentially differentiate between adrenal pathology and renal artery stenosis based on history and exam?

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More detailed history and examination to assess issues such as weight gain, palpitations, Cushingoid appearance (thin skin, easy bruising, abdominal striae) that might suggest Cushing's syndrome.

The presence of bruits would suggest renal artery stenosis.

A low potassium would suggest an aldosteronoma, although there may also be secondary aldosteronism related to renal artery stenosis.

What diagnostic tests should be
done?

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Laboratory testing for renal function, potassium and plasma metanephrines.

A renal artery duplex is a good screening test for renal artery pathology. This examines blood flow velocity. The discriminating feature for renal artery stenosis is a high peak systolic velocity in the main renal artery (>180 cm/sec) and a renal to aortic ratio of peak systolic velocity that is greater than 3.5. A basic principle is that the stenosis is associated with increased velocity through and after this region, accounting for the increased renal artery to aorta ratio for flow values.

Another test that could be considered is angiotensin converting enzyme inhibitor (ACEI) renography. In patients with normal overall renal function and unilateral renal artery stenosis, function in the stenotic kidney is dependent on angiotensin II to increase the pressure in the efferent capillaries. Renal function will diminish in the affected kidney when angiotensin production is decreased by the ACEI. This can be captured by nuclear scintigraphy as decreased function of the affected kidney after an ACEI.

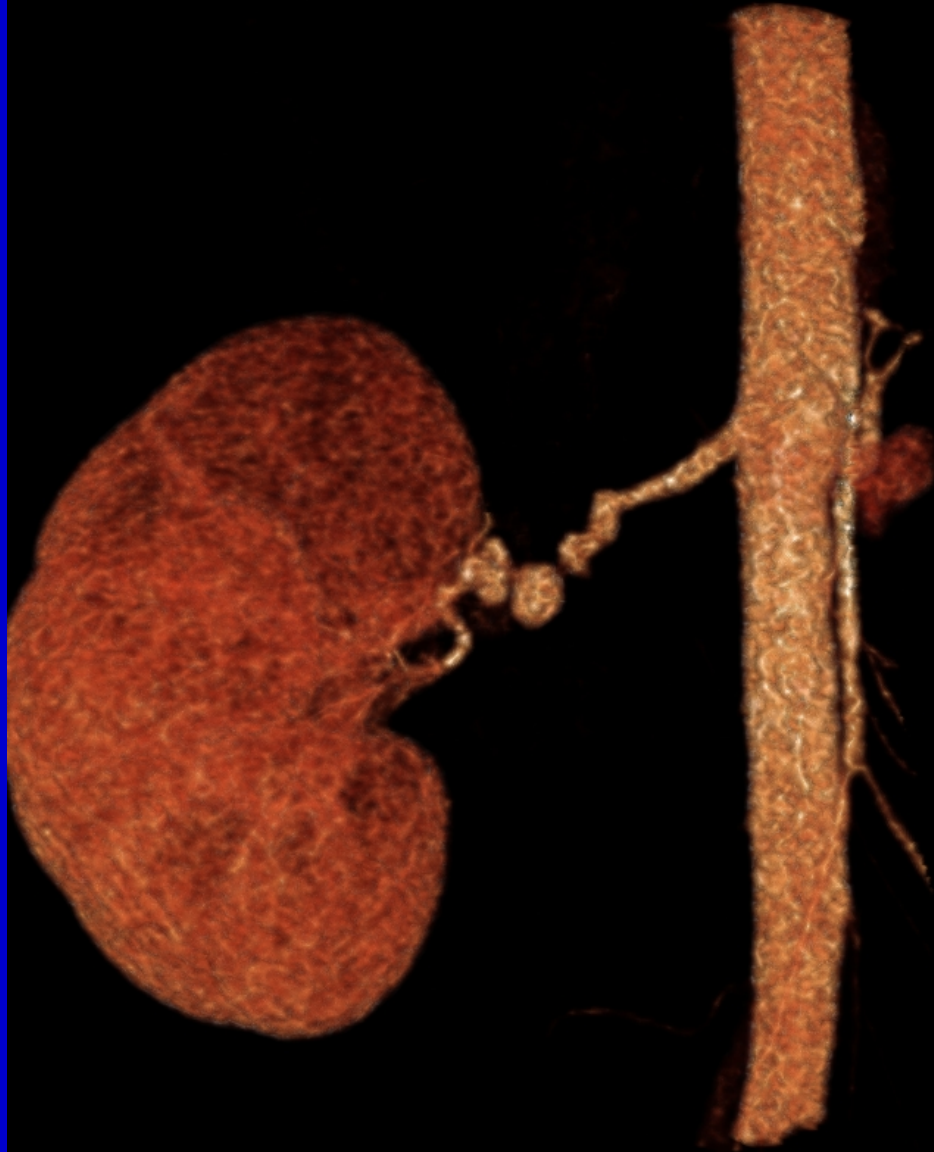
What is the role for angiography?

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In patients with a compelling history and either an abnormal duplex or functional study such as an ACEI renal scan, angiography should be pursued. Conventional angiography could be done for diagnosis but has largely been replaced by CT angiography because it is non-invasive and offers sufficient resolution to direct further therapy.

The main reason to pursue catheter based angiography would be with the anticipation of a concomitant treatment such as angioplasty or stenting. Some experts have recently advocated the use of intravascular ultrasound (IVUS) to clarify the diagnosis. IVUS is more sensitive than angiography for determining the extent of disease.

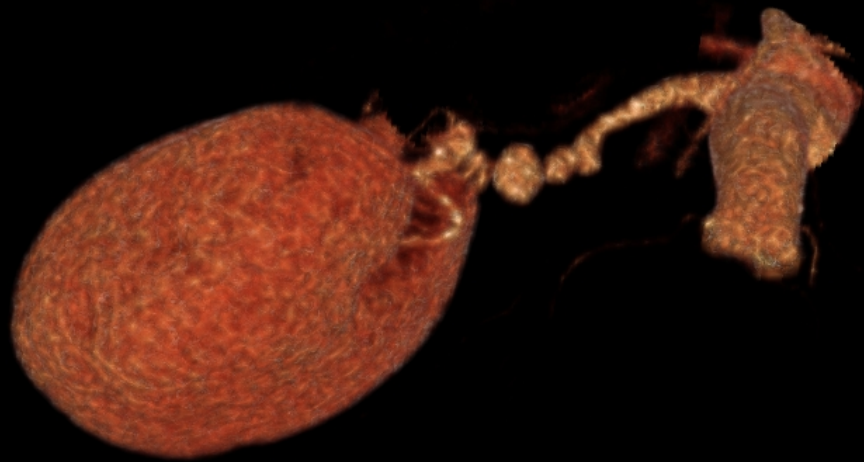
The following images demonstrate the essential CT angiographic findings in this patient.



Spin: 32
Tilt: 13



Spin: 3
Tilt: -66



What is your interpretation of these
images?

What is your interpretation of these images?

The CTA here shows the typical findings of fibromuscular dysplasia with beading of the renal artery. Note that the disease here extends into the distal branches and this complex distribution of disease will have impact on choice of therapy.

What are the management options
and what are the limitations of each?
What is your final recommendation?

What are the management options and the limitations of each? What is your final recommendation?

Medical management: She is now on 4 medications with poor control. This option is no longer effective and the longstanding hypertension will be associated with cardiovascular morbidity over time.

Endovascular management: For disease restricted to the main renal artery angioplasty is the preferred treatment for fibromuscular dysplasia because it provides effective and durable resolution of the hypertension. In this case the complex branch disease is inaccessible for endovascular management.

Surgical intervention: Simple main renal artery renal revascularization offers no advantage over endovascular management. In this case renal autotransplant with backtable vascular reconstruction is required to eliminate all diseased vessels, and preserve kidney tissue. Alternatively, nephrectomy is another option but may predispose to chronic kidney disease.

This patient will require renal reconstruction and autotransplantation.

How can the renal artery be
reconstructed?

How can the renal artery be reconstructed?

The best graft material is autogenous artery. The hypogastric artery and branches can be used provided it is free of disease.

Alternative graft material is saphenous vein.

Selected Reading

Olin JW, Sealove BA: Diagnosis, management, and future developments of fibromuscular dysplasia. *J Vasc Surg* 2011;53:826-36.

Topic:

Renal Physiology/HTN/Renal Artery Stenosis/
Other Nephrologic Considerations

Subtopics:

Renal Vascular HTN, Fibromuscular Dysplasia