CAIR Case of the Month

Case Courtesy of Drs. S. Kennedy, A. Common and V. Prabhudesai

UNIVERSITY OF TORONTO
FACULTY OF MEDICINE

St. Michael's
Inspired Care. Inspiring Science.

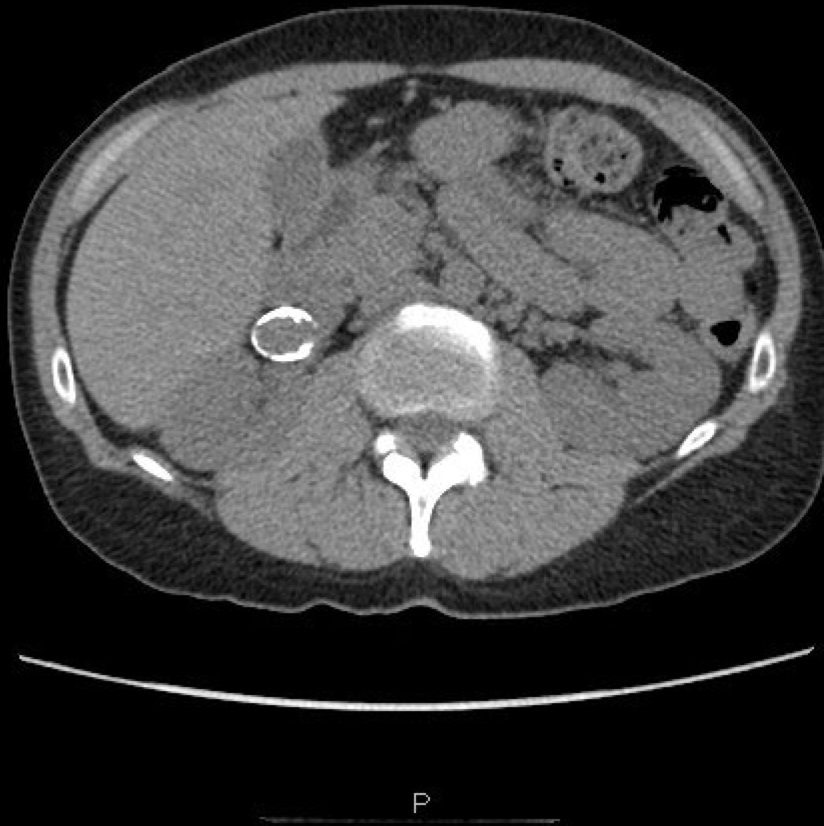
Case Presentation

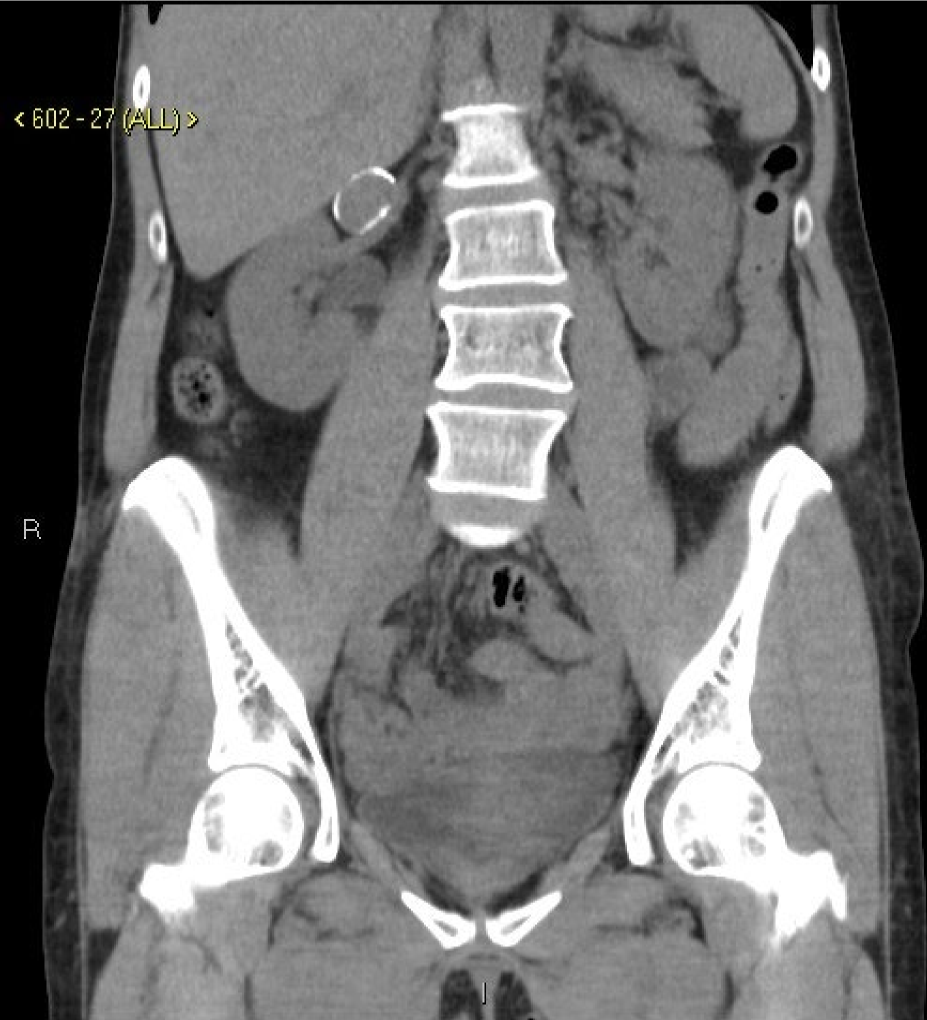
- 56 year old female presents to ER with right flank pain
- Review of systems otherwise negative
- Past medical and surgical history: non-contributory
- Vital signs and physical examination all unremarkable

Case Presentation

- Labwork:
    - CBC, electrolytes, creatinine within normal limits
    - Urinalysis unremarkable
- CT renal colic of the abdomen performed

Case Presentation: CT Renal Colic





Case Presentation: CT Renal Colic

- No evidence of renal or ureteral calculus to explain patient’s symptom
- Note of 2.6 cm rim-calcified saccular right renal artery aneurysm
- Further evaluation performed with CT angiogram as outpatient

Case Presentation: CT Angiogram

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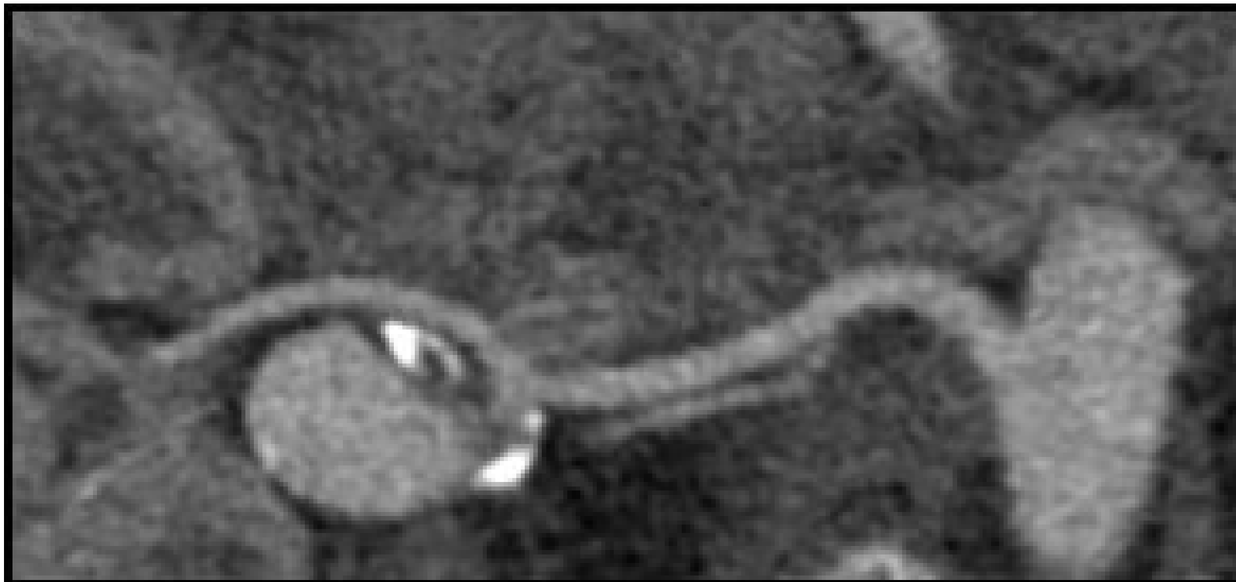
Case Presentation: CT Angiogram Reformats

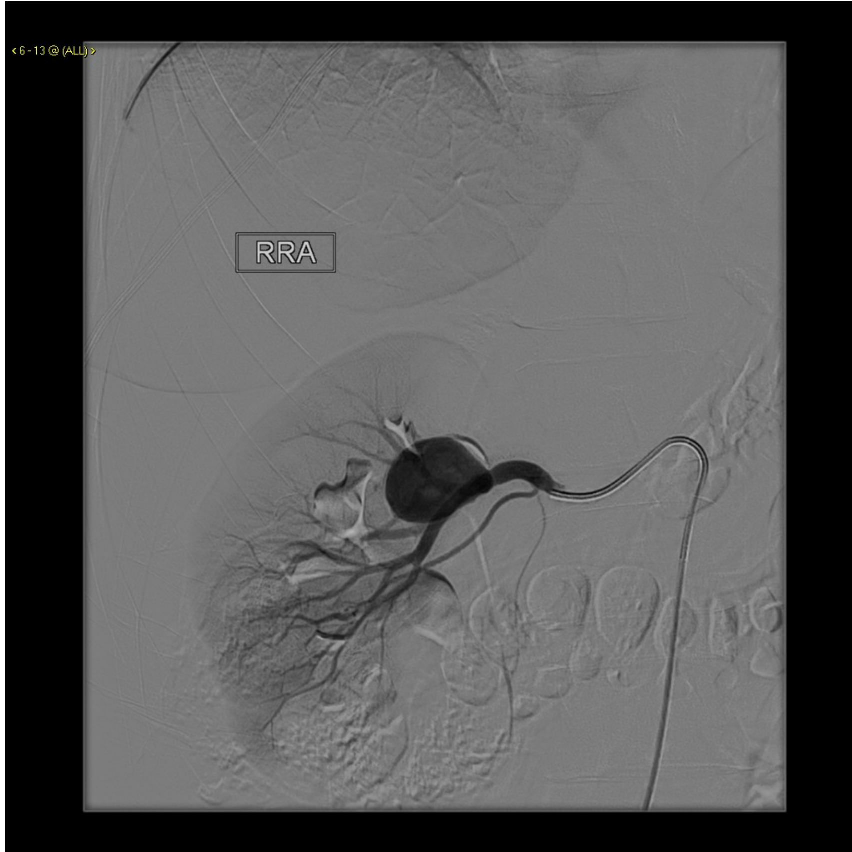


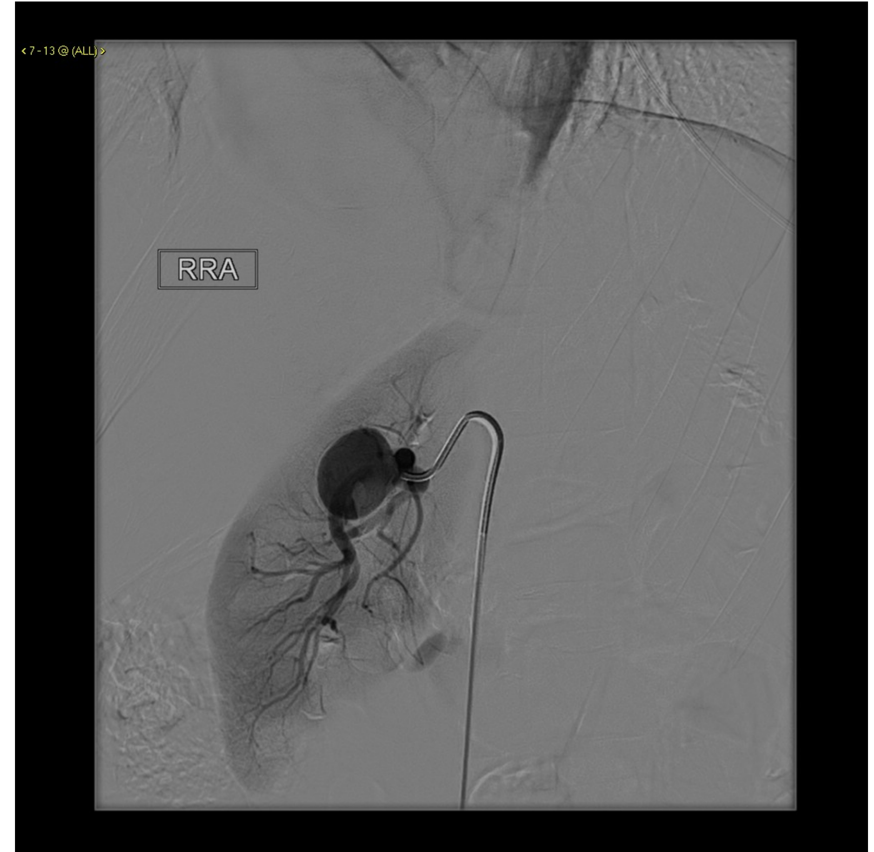
Case Presentation: CT Angiogram

- Rim calcified saccular aneurysm of the right renal artery is seen in relation to the bifurcation of the main renal artery at the hilum
- Measures 26 mm in long axis and about 18 x 20 mm transverse
- Wide mouth communication with the feeding renal artery measuring 8 mm
- Aneurysm lumen is largely patent with a relatively thin irregular mural thrombus present

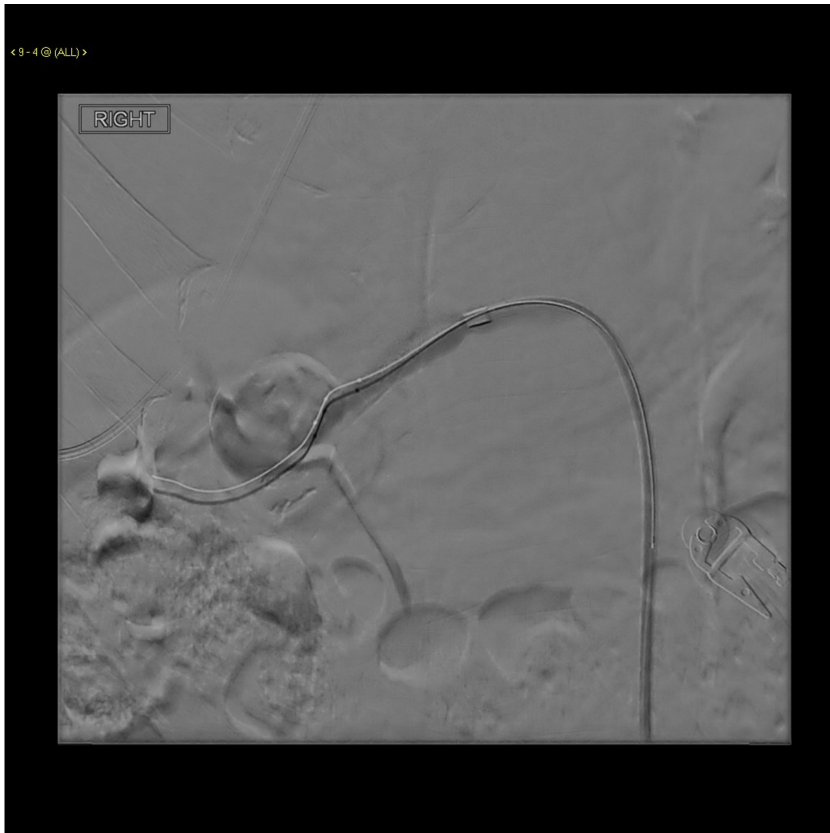
Case Presentation: Management Plan

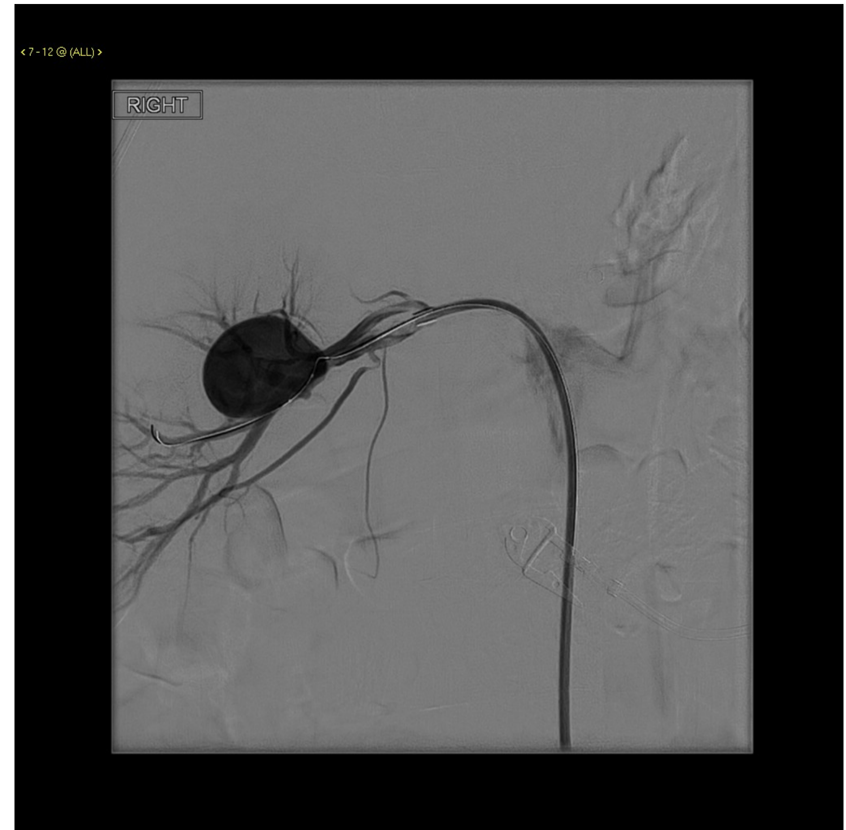
- Right 2.6 cm renal artery aneurysm
- Interdisciplinary discussion between IR and vascular surgery for consideration
- Planning angiogram performed and decision made to proceed with endovascular repair in consultation with patient



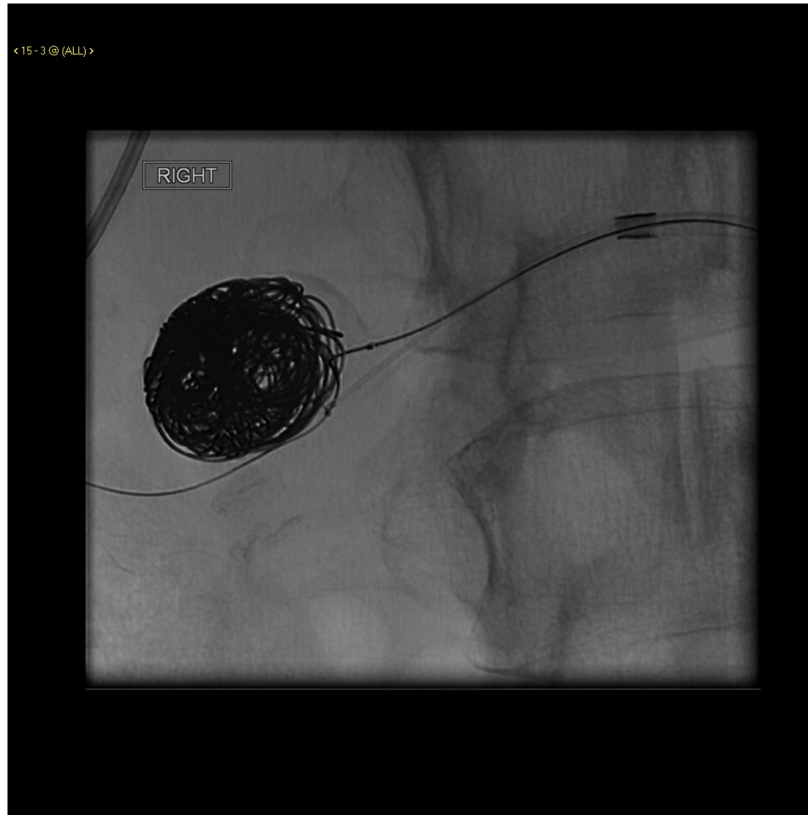


A) Anatomy delineation - Planning angiogram performed via a Sidewinder 1 catheter in right renal artery

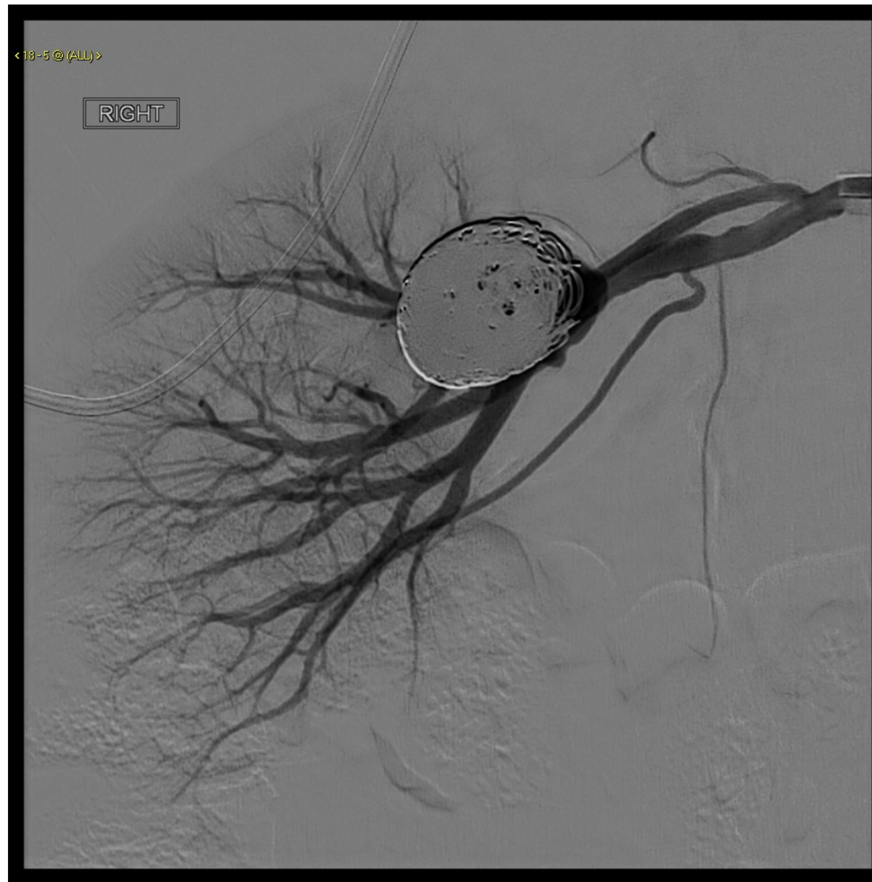




B) Left femoral approach used to achieve better geometry. A 6 French Abraham sheath was positioned in the main right renal artery. A 4x11 mm Scepter XC X-tra compliant balloon catheter was positioned at the origin of the right renal artery posterosuperior ramal branch



C) Through a Prowler Plus microcatheter, a total of 20 3-dimensional and helical microcoils were used to pack the aneurysm. These included diameters 8, 9, 10, 14, 16, and 18 mm and lengths of 20, 30 and 40 mm



D) Post embolization angiograms confirmed an excellent result, with virtual exclusion of the aneurysm and no compromise of flow into posterosuperior or anteroinferior renal rami

Outcome and Follow-up

- Satisfactory angiographic result immediate post-embolization
- Patient asymptomatic post-procedure
- Patient placed on ASA 81 mg x 1 month
- Creatinine unchanged and within normal limits post-procedure
- 6 month MRA follow-up pending

Treatment Guidelines

- Joint ACC/AHA/SIR/SVS guidelines recommend:
  - *"Class I Open repair or catheter-based intervention is indicated for visceral aneurysms measuring 2.0 cm in diameter or larger in women of childbearing age who are not pregnant and in patients of either gender undergoing liver transplantation. (Level of evidence: B)"*
  - *"Class IIa Open repair or catheter-based intervention is probably indicated for visceral aneurysms 2.0 cm in diameter or larger in women beyond childbearing age and in men. (Level of evidence: B)"*

Morphology and Natural History

- Largest series to date 865 renal artery aneurysms in 760 patients in the US (Klausner et al. 2014)
  - 75% asymptomatic
  - 25% symptomatic (10% difficult to control hypertension, 8% flank/abdominal pain, 4% hematuria, other 3%)
- Saccular 87%, fusiform 11%, bilobed 2%
- Unilateral 96%
- Diameter 1.5±0.1 cm
- Most common location main renal artery bifurcation (42%)

Klausner et al. 2014

	Number of Aneurysms	Mean Diameter (cm)	Mean Followup/Time to Repair (mo)
Symptomatic - Observation	77	1.3±0.1	40±0.1
Symptomatic-Treatment	128	2.3±0.1	3±1
Asymptomatic-Observation	547	1.3±0.1	57
Asymptomatic-Treatment	113	2.4±0.1	6±3

Klausner et al. 2014

- No ruptures
- Growth rate: 0.086 ± 0.08 cm/y (calculated from 454 aneurysms with serial exams)
- 65% did not grow
- Calcifications did not affect growth rate
- Aneurysms >2 cm and ≤2 cm that were observed did not show a significantly different growth rate (*P* = .083)

Management Options

- Observation

- Interventional:
    - Unassisted, balloon-assisted or stent-assisted embolization
        - Various embolic materials (coils, glue, plugs)
    - Stent-graft (covered, pipeline)

- Surgical:
    - Surgical (aneurysmectomy, ex-vivo reconstruction, bypass)
    - Partial/complete nephrectomy

Surgery vs Interventional

- Recent systematic review (Kok et al. 2016) of endovascular repair of 665 visceral and renal artery aneurysms (true and pseudoaneurysm)
  - 93.6% technical success
  - 99.1% visceral preservation
  - 3.7% major complication rate
  - 4.4% reintervention rate

- Klausner et al. 2014
  - 168 open repair, 43 stent-graft, 30 coil embolization
  - Hospitalization 2 vs 8 days ($P<0.001$) favoring endovascular
  - No difference in complications or mortality

Conclusion

- Case of right renal artery aneurysm meeting size criteria for therapy for which balloon-assisted embolization performed to minimize risk of renal injury
- Multiple approaches exist including stent or balloon-assisted to reduce risk of visceral injury
- Controversy over when to treat persists

References

- Hirsch AT et al. ACC/AHA 2005 Practice Guidelines for the management of patients with peripheral arterial disease (lower extremity, renal, mesenteric, and abdominal aortic). Circulation. 2006 Mar 21;113(11):e463-654.

- Klausner JQ et al. The contemporary management of renal artery aneurysms. J Vasc Surg. 2015 Apr;61(4):978-84. Epub 2014 Dec 20.

- Kok HK et al. Systematic Review and Single-Center Experience for Endovascular Management of Visceral and Renal Artery Aneurysms. J Vasc Interv Radiol. 2016 Nov;27(11):1630-1641. Epub 2016 Sep 28.