The dark side of the guidelines

1st Interventional Radiologist under 40 Meeting

Emergencies in Interventional Radiology

21-23 Novembre 2016

Bologna

Società Medica Chirurgica - Palazzo dell'Archiginnasio

Trattamento delle emorragie renali

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Background

enal artery embolization (RAE) refers to the occlusion of th
nal artery, or some of its branches, by injection of an embo
agent through an endovascular catheter.

- Temporary occlusion
- Permanent occlusion

- PROXIMAL EMBOLIZATION: embolic agents occlude large vessels
- DISTAL EMBOLIZATION: embolic agents induce an occlusion at the arteriolar or capillary level

Background

Since its development in the 1970s, RAE has become a useful minimally invasive therapeutic option for various clinical situations.

RAE may be used as an adjunct or as an alternative to surgery, and has the potential to improve patient management and reduce hospital stay.

The increase in the use of RAE as a therapeutic strategy reflects continuous improvements in endovascular techniques and embolization materials and the increasing experience of interventional radiologists

pecific Scenarios

- Non Traumatic
  - Tumors
  - Chronic Diseases
  - AVM

- Traumatic
  - Blunt/Penetrating Trauma
  - Iatrogenic Lesions

Specific Scenarios

catheter Renal Artery
ization: Clinical Applications and Techniques

Ginat, MD, MS,* Wael E.A. Saad, MBBCh,[†] and Ulku C. Turba, MD[†]

Pathology		Indication	Endpoints		Embolic Material
Major Category	Subclassification		Clinical Endpoint	Technical Endpoint	
Tumor	RCC	■ Palliation (pain) ■ Control hematuria ■ Prenephrectomy ■ Pre-RFA	■ Reduce intraoperative bleeding ■ Devascularize tumor	End artery (arteriolar) embolization Or Devascularizing the arterial bed (tumor)	ETOH PVA MCoils GFoam NBCA
	AML	■ Control retroperitoneal bleeding ■ Reduce risk of rupture/ bleeding	Reduce risk of rupture/ bleeding		ETOH PVA
AVM		■ Hematuria ■ Hypertension ■ Renal dysfunction			ETOH NBCA
Degenerative		■ Reduce risk of bleeding			ETOH PVA MCoils GFoam NBCA
Global Parenchymal disease	Hydronephrosis	■ Hydronephrosis ■ Hematuria ■ Hypertension			ETOH PVA MCoils GFoam NBCA
	Hematuria Hypertension				
Trauma	Bleeding/truncation	■ Retroperitoneal bleeding ■ Hematuria		Obliteration of branch arterial flow	MCoils GFoam
	AVF	■ Hematuria ■ Hypertension ■ Renal dysfunction (transplant)			MCoils
	PsA	■ Retroperitoneal bleeding ■ Hematuria ■ Reduce risk of bleeding			MCoils Stents

asc Interventional Rad 2009, 12:224-239

pecific Scenarios

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ecific Scenarios

Renal cancers

vast majority of renal tumours are treated by surgery alone, using either radical nephrectomy or nephron- sparing s

ng the last decade, minimally invasive alternatives, such as radiofrequency ablation (RFA) or cryosurgery have been posed to treat small tumours.

seldom used but may function in two situations: to facilitate subsequent surgery in large tumours, or to relieve sym in patients under palliative care.

Pathology		Indication	Endpoints		
Major Category	Subclassification		Clinical Endpoint	Technical Endpoint	Embolic Material
Tumor	RCC	■ Palliation (pain) ■ Control hematuria ■ Prenephrectomy ■ Pre-RFA	■ Reduce intraoperative bleeding ■ Devascularize tumor	End artery (arteriolar) embolization Or Devascularizing the arterial bed (tumor)	ETOH PVA MCoils GFoam NBCA

Ginat et al. Tech Vasc Interventional Rad 2009, 12:2

ecific Scenarios

Renal cancers: Adjuvant treatment

Preoperative Embolization

operative RAE of locally advanced tumours has been proposed to facilitate subsequent nephrectomy.

ough there is no clear evidence that preoperative RAE reduces blood loss during nephrectomy, it allows the ligation renal vein before the artery.

approach is particularly useful for patients with hilar tumours or large adenopathies.

onger delay between RAE and surgery might improve the reduction in the size of the tumour thrombus, but imposes ger PES and increases the risk of development of collateral vessels.

recommended delay between RAE and surgery is 24–72

ous embolic agents have been used for preoperative RAE of locally advanced tumours, but microparticles and coils s ticularly well-suited for this indication9 (Figure 5). Proximal vascular plugs are also a common treatment choice, but ntion must be paid to ensure a residual stump of the proximal artery remains to allow for surgical clamping.

Sauk & Zuckerman, *Semin. Intervent. Radiol.* 28, 396–406 (2
Subramanian, V. S. *et al. Urology* 74, 154–159 (2009).
Kalman & Varenhorst, E. *Scand. J. Urol. Nephrol* 33, 162–170

ecific Scenarios

Renal cancers: Adjuvant treatment

Preoperative Embolization

Comparison of preoperative embolization followed by radical nephrectomy with radical nephrectomy alone for renal cell carcinoma.

Am J Clin Oncol. 2000 Feb;23(1

Zielinski H[1], Szmigielski S, Petrovich Z.

Abstract

A series of 474 patients with renal cell carcinoma (RCC), who had radical nephrectomy during a period of 15 years, was studied to assess the prognostic significance of various pathologic parameters (tumor stage [pT], lymph node status, metastasis, tumor grade, venous involvement) and value of preoperative embolization of renal artery. There were: 20 (4%) pT1, 204 (43%) pT2, 245 (52%) pT3, and 5 (1%) pT4 patients. All 474 patients underwent nephrectomy including a group of 118 (25%) patients (24 pT2, 90 pT3, and 4 pT4) who underwent preoperative embolization of the renal artery. To compare treatment outcomes in embolized patients with RCC, a group of 116 (24%) nonembolized patients with RCC was selected. This group was matched for sex, age, stage, tumor size, and tumor grade, with the embolized patients ($p<0.01$). All important prognostic factors were studied as to their influence on survival by the treatment group. The overall 5- and 10-year survival was 62% and 47%, respectively. The 5- and 10-year survival rates were significantly better ($p<0.01$) for patients with pT2 than for those with pT3 tumors (79% vs. 50% and 59% vs. 35%, respectively). Involvement of regional lymph nodes (N+) was an important prognostic factor for survival in patients with pT3 tumors. The 5-year survival for pT3 N+ was 39%, compared with 66% in those with pT3N0 ($p<0.01$). Preoperative embolization was also an important factor influencing survival. The overall 5- and 10-year survival for 118 patients embolized before nephrectomy was 62% and 47%, respectively, and it was 35% and 23%, respectively, for the matched group of 116 patients treated with surgery alone ($p = 0.01$). The most important finding of this study was an apparent importance of preoperative embolization in improving patients' survival. This finding needs to be interpreted with caution and confirmed in a prospective randomized trial.

a significant increase in 5-year survival among patients who underwent pre-nephrectomy RAE, but no prospective data have been published to confirm this finding

ecific Scenarios

Renal cancers: Adjuvant treatment

Preoperative Embolization

perselective RAE of small tumours before surgery or RFA has also been proposed to allo
ro-ischaemia laparoscopic partial nephrectomy, to reduce local blood flow, and to incre
e ablated volume.

owever, the vast majority of patients treated by RFA or cryotherapy do not undergo
eoperative RAE.

Simone et al. *J. Endourol.* 25, 1443–1446 (2011).
D'Urso *et al. Eur. J. Surg. Oncol*. 2014.08.484.
Arima *et al Int. J. Urol.* 14, 585–590; discussion 590 (2007)
Aschoff, A. J. *et al. AJR Am. J. Roentgenol.* 177, 151–158 (2
Woodrum *et al J. Vasc. Interv. Radiol.* 21, 930–936 (2010).

ecific Scenarios

Renal cancers: Palliative treatment

- ✓ RAE can be used in non-operable cases to alleviate severe local pain or recurrent haematuria.
- ✓ Paraneoplasic hypocalcaemia might also regress following RAE.
- ✓ The advantages and drawbacks to palliative RAE must therefore be considered with caution.

Ljungberg, B. *et al.* EAU guidelines on renal cell carcinoma: the 2010 update. *Eur. Urol.* 58, 398–406

ecific Scenarios

Renal cancers: Complications

st Embolization Syndrome (PES) occurs following RAE of the whole kidney, in the majority of patients, gardless of the embolization technique.

e severity of PES depends on the volume of necrosis, and must be treated with corticosteroids and analg at can be initiated 24 h before the procedure.

S can have dramatic consequences in these fragile patients, and can cause tubular necrosis, renal absces en death.

eo-adjuvant anti-angiogenic treatments also decrease the size of locally advanced renal tumours to allow eir surgical resection; therefore, the use of RAE must always be balanced with that of neoangiogenic dru

Ljungberg, B. *et al.* EAU guidelines on renal cell carcinoma: the 2010 update. *Eur. Urol.* 58, 398–406

ecific Scenarios

Renal angiomyolipomas

giomyolipomas are either sporadic or associated with tuberous sclerosis complex (TSC) or pulmonary lyn angioleiomyomatosis (LAM).

od vessels within angiomyolipomas are thought to possess poor elastic layers with predisposition to the mation of aneurysm and spontaneous haemorrhage.

nsequently, angiomyolipomas account for 17–20% of all patients who present with spontaneous perinep emorrhage.

the setting of acute bleeding, conservative surgery is difficult and can lead to haemostasis nephrectomy.

erefore, consensus exists to recommend RAE as a first-line treatment in cases of acute bleeding.

ow failure rate and requirement for a subsequent nephrectomy (<7%) has been reported when RAE is us rst-line treatment.

Halpenny, et al. *Clin. Radiol.* 65, 99–108
Steiner et al. *J. Urol.* 150, 1782–1786

ecific Scenarios

Renal angiomyolipomas

clear consensus exists as to how asymptomatic angiomyolipomas should be treated, a whether preventative treatment should be employed.

e risk of bleeding increases with tumour size and in angiomyolipomas associated with TSC or LAM.

ere is general consensus that angiomyolipomas >80 mm require preventive treatment.

hreshold of 35 mm was been proposed for initiating preventive treatment in Patient with TSC or LAM

Villalta, J et al. *J. Urol.* 186, 921–927 (

Nelson, C. P. & Sanda, M. G. *J. Urol.* 168, 1315–1

ecific Scenarios

Renal angiomyolipomas

hron
al
actice

Clinical Practice: Mini-Review

Nephron 2016;134:51–58

Review of the Tuberous Sclerosis Renal Guidelines from the 2012 Consensus Conference: Current Data and Future Study

J. Chris Kings

ly diagnosed or suspected TSC	Diagnosed with definite or possible TSC
eillance of kidneys	
ain MRI of the abdomen to assess for the presence of angiomyolipoma and renal cysts	Obtain MRI of the abdomen to assess angiomyolipoma progression and renal cystic disease (every 1–3 years for life)
en for hypertension by obtaining accurate blood pressure	
uate renal function by determining GFR	Assess renal function (GFR and blood pressure) at least annu
ical presentation	**Recommendation**
agement recommendations for renal angiomyolipoma	
iomyolipoma with acute hemorrhage	Embolization (followed by corticosteroids for 7 days to mitig post-embolization syndrome) [3]. Embolization should be as selective as technically feasible to preserve renal parenchyma Avoid nephrectomy
mptomatic, growing angiomyolipoma >3 cm in diameter	First-line: mTOR inhibitor Second-line: selective embolization or kidney-sparing resecti

ecific Scenarios

Renal angiomyolipomas

RAE should predominantly target areas of microaneurysms.

A proximal (upstream of microaneurysms) and distal (tumour bed) embolization, using microparticles and coils, is advised for the treatement of microaneurysms

RAE causes shrinkage of treated AMLs (to 20–70% of the initial volume).

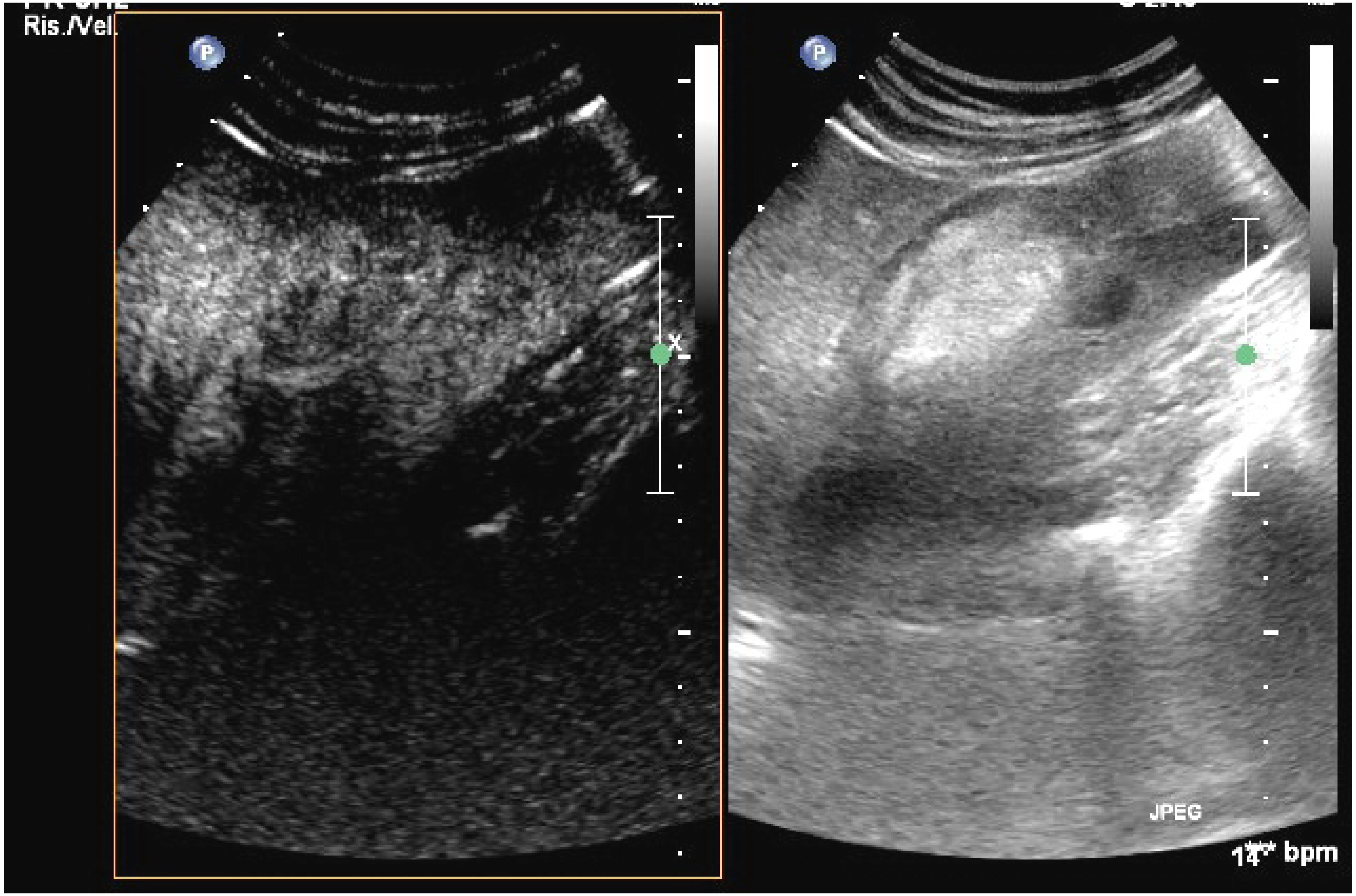
The importance of this shrinkage depends on the relative proportion of vascular and fatty components.

Major complications are rare (4.8% of 311 aggregated cases from 13 series) and include complications owing to endovascular manoeuvres (such as dissections and thrombosis), unintended renal infarction and abscesses of the necrotic AMLs.

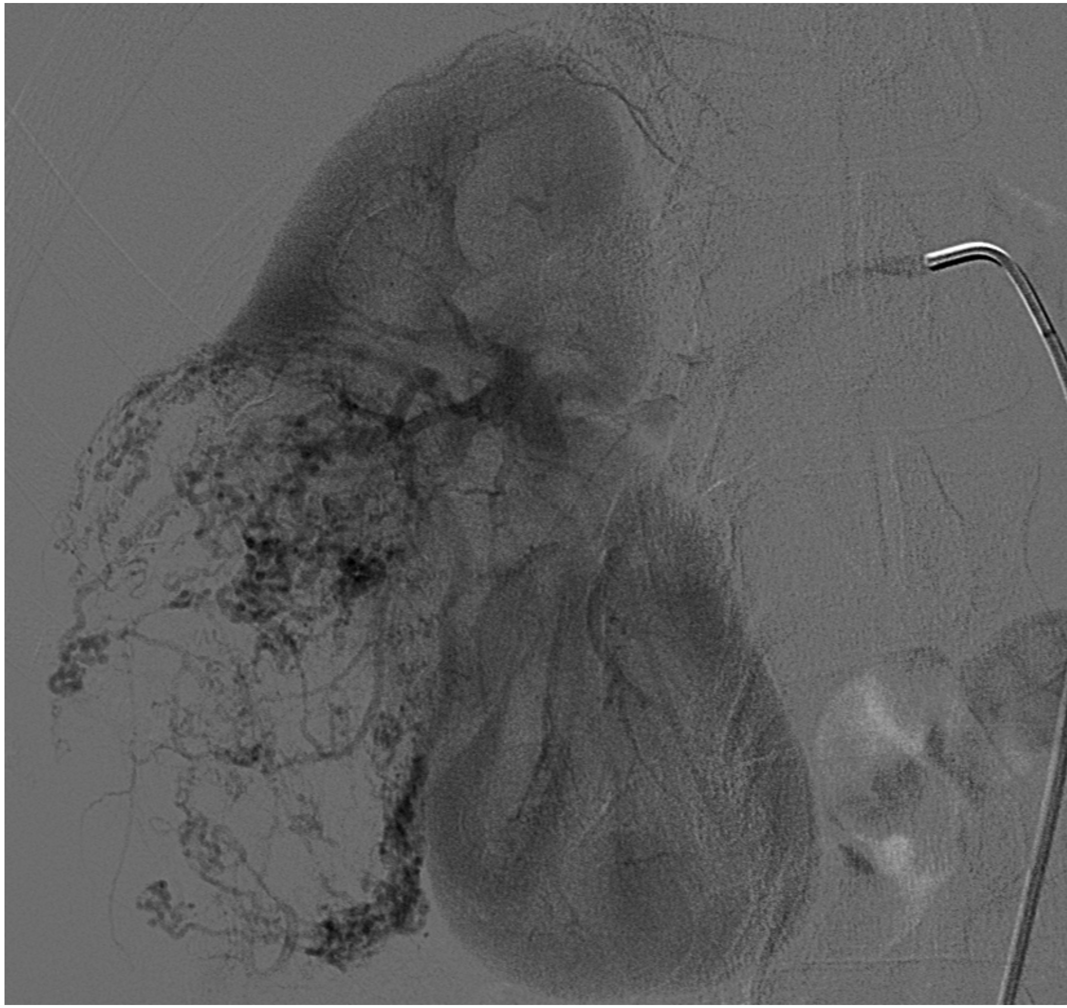
Bleeding can occur following embolization (0–5.3% of all embolized AMLs), but it is usually successfully treated by a second embolization.

Some AMLs may also re-grow following embolization, leading to the need for a repeat preventive procedure.

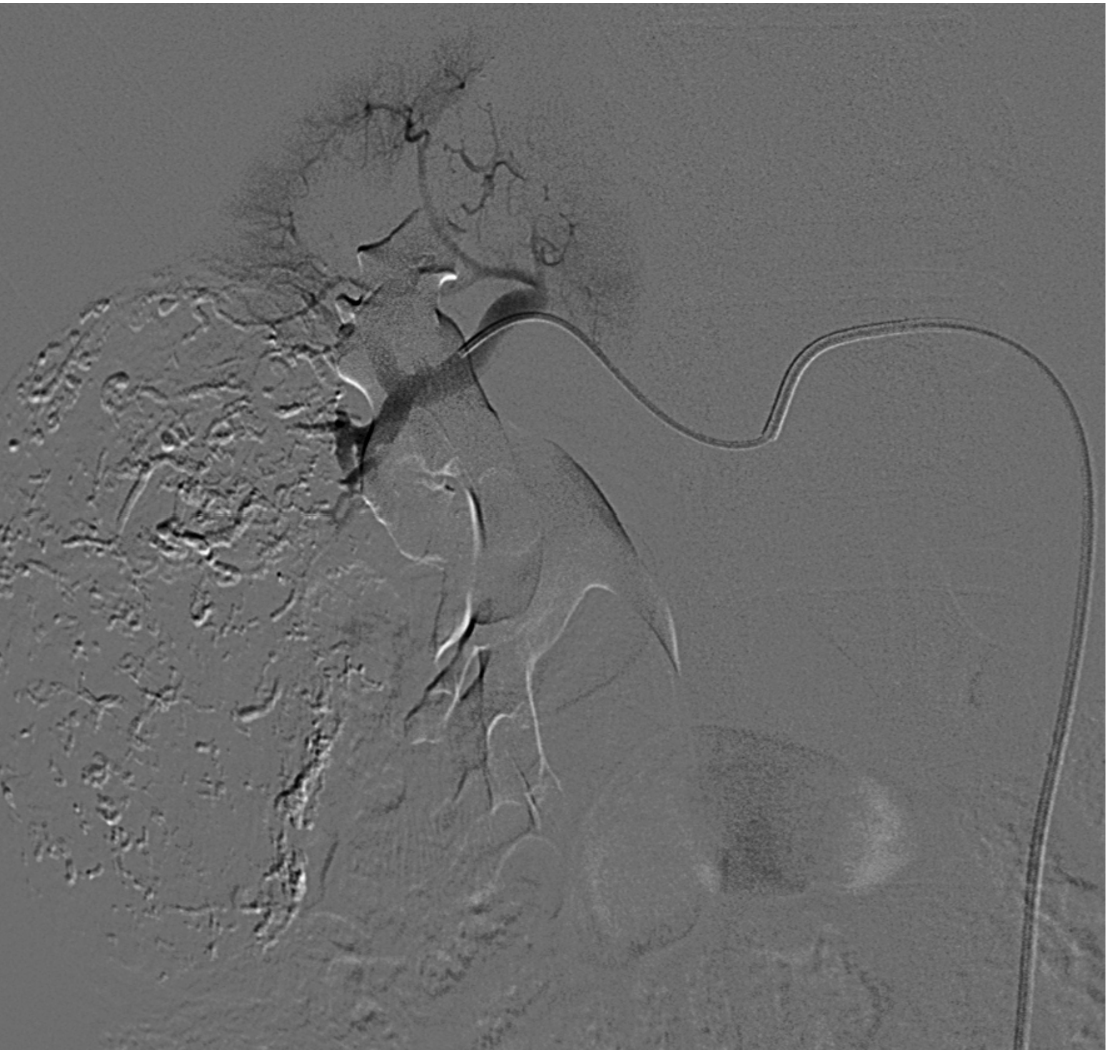
Renal angiomyolipomas



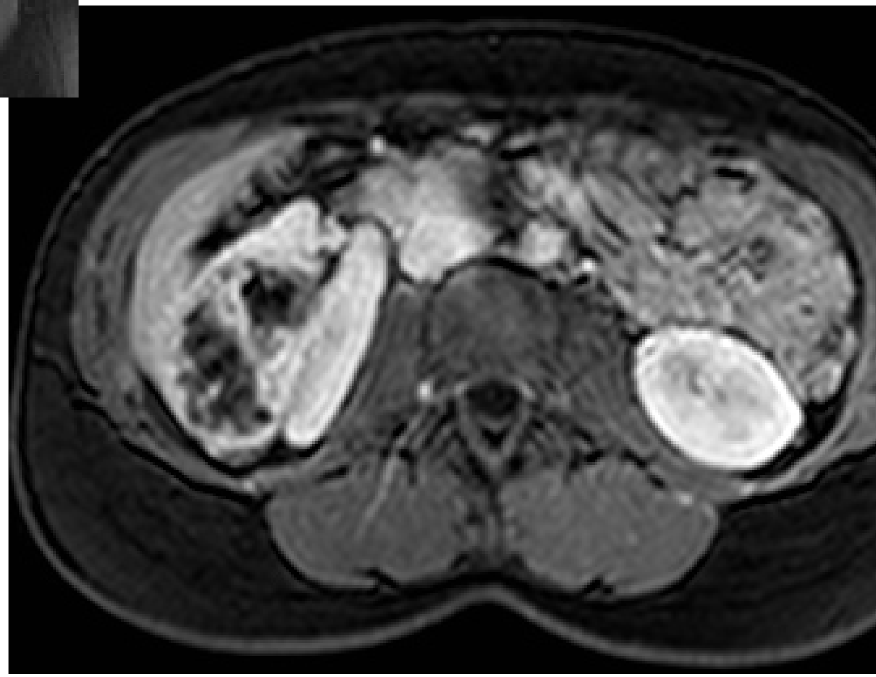
Renal angiomyolipomas



Renal angiomyolipomas



Renal angiomyolipomas



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ecific Scenarios

Polycystic kidney disease

Patients with autosomal dominant polycystic kidney disease (ADPKD) suffer from a nephromegaly that is inversely proportional to renal function. This com- plication can induce pain, abdominal distension, dysphagia, constipation a dyspnoea, and hinders further transplantation owing to the lack of space in the pelvis.

Surgical techniques, including nephrectomy or cyst fenestration, have been proposed to alleviate the symp- toms of ADPKD and to facilitate graft implantation in the pelvis.

However, these techniques carry a 28–66% risk of complication among patients with ESRD.

Percutaneous techniques, such as needle aspiration or cyst ethanol scleropathy are of limited use given the large number of cysts present.

RAE is a potential alternative to surgery. It has been indeed hypoth- esized that, as renal failure progresses, the function of the renal arteries shifts from supporting renal function to supplying fluid to the renal cysts.

RAE has proven to be efficient in alleviating symptoms among patients and inducing a reduction in kidney volume o ~50% at 1 year, with a shorter hospitalization period as compared with surgery.

Ubara, Y. *Ther. Apher. Dial.* 10, 333–341

ecific Scenarios

Polycystic kidney disease

Study	Sample size (*n*)	Indication for RAE	Primary technical success rate (%)	Technical success rate after repeat RAE (%)	Clinical success rate (%)	Definition of clinical success
Ubara *et al.*, 2002[155]	65	Polycystic kidney disease	100	NA	100	Resolution of symptoms
Cornelis *et al.*, 2010[152]	25	Polycystic kidney disease	100	NA	84	Reduction of kidney volume sufficient to allow renal transplantation

ecific Scenarios

Polycystic kidney disease

psomal polycystic kidney disease, nephrectomy
uired before transplantation if kidney volume
essive. We evaluated the effectiveness of tran-
ter arterial embolization (TAE) to obtain suffi-
volume reduction for graft implantation. From
2007 to December 2009, 25 patients with kid-
escending below the iliac crest had unilateral re-
E associated with a postembolization syndrome
ol. Volume reduction was evaluated by CT be-
and 6 months after embolization. The strategy
nsidered a success if the temporary contraindi-
for renal transplantation could be withdrawn
6 months after TAE. TAE was well tolerated
e objective was reached in 21 patients. The tem-
contraindication for transplantation was with-
within 3 months after TAE in 9 patients and
6 months in 12 additional patients. The mean
ion in volume was 42% at 3 months (p = 0.01)
% at 6 months (p = 0.001). One patient required
sclerosis to reach the objective. The absence
icient volume reduction was due to an exces-
asal renal volume, a missed accessory artery
renal artery revascularization. Embolization of
ed polycystic kidneys appears to be an advanta-
alternative to nephrectomy before renal trans-
tion.

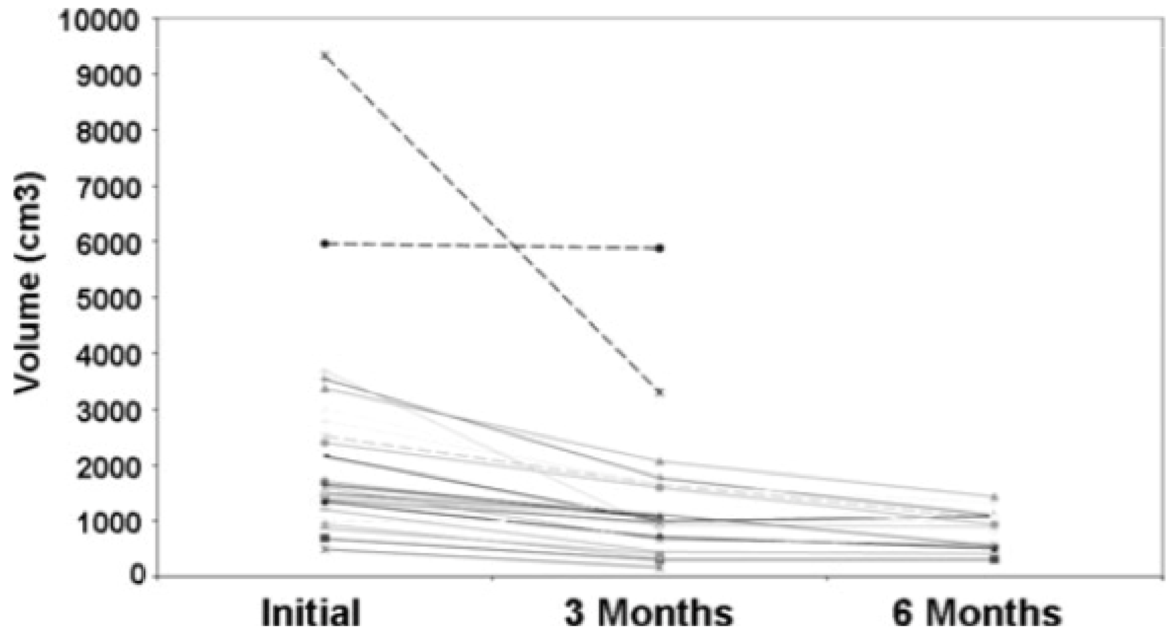
American Journal of Transplantation 2010; 10: 2363–2369
Wiley Periodicals Inc.

Brief Communication

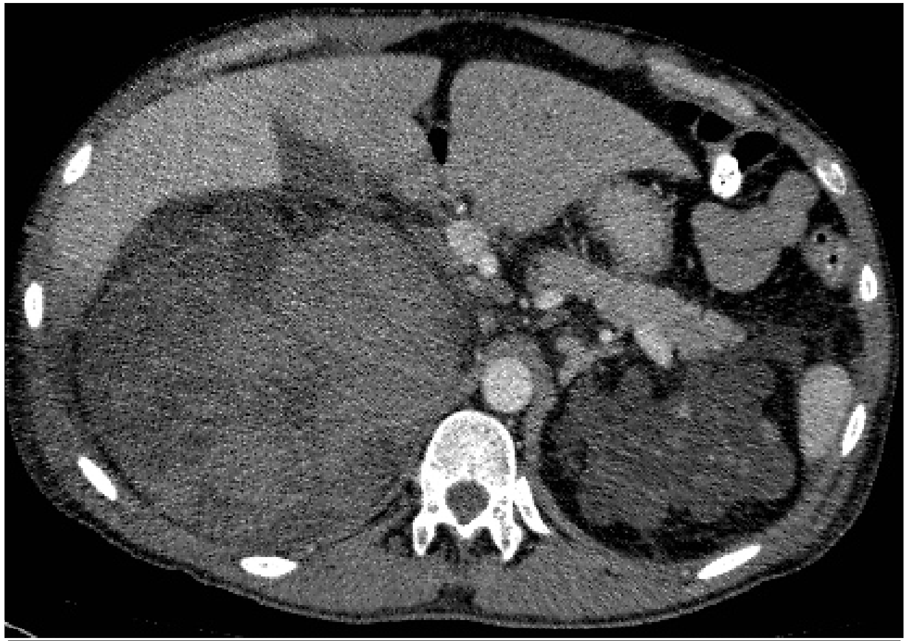
doi: 10.1111/j.1600-6143.2010.03251.x

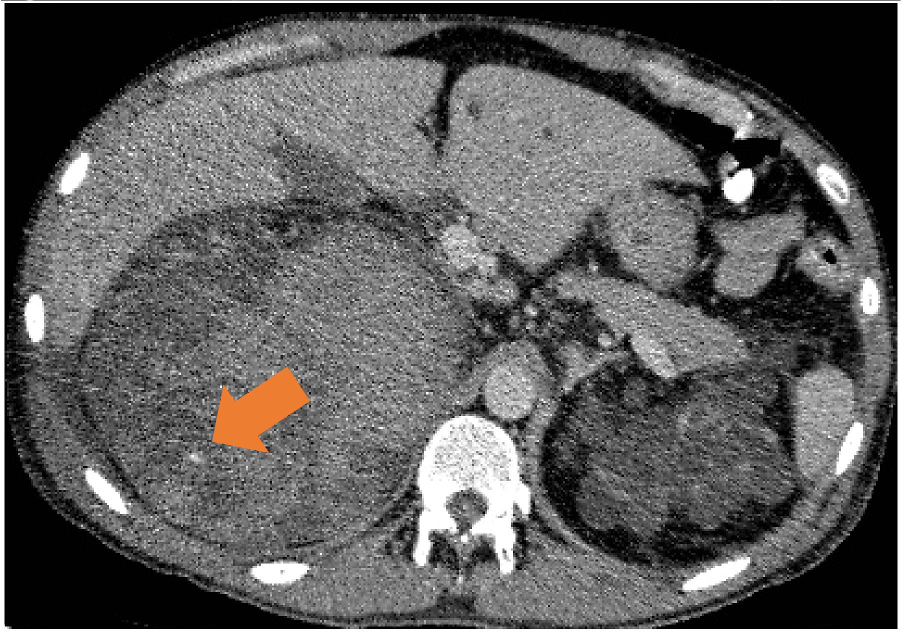
Embolization of Polycystic Kidneys as an Alternative to Nephrectomy Before Renal Transplantation: A Pilot Study

F. Cornelis[a], L. Couzi[b], Y. Le Bras[a], R. Hubre
E. Dodré[a], M. Geneviève[b], V. Pérot[a],
H. Wallerand[c], J. M. Ferrière[c], P. Merville[b]
and N. Grenier[a]

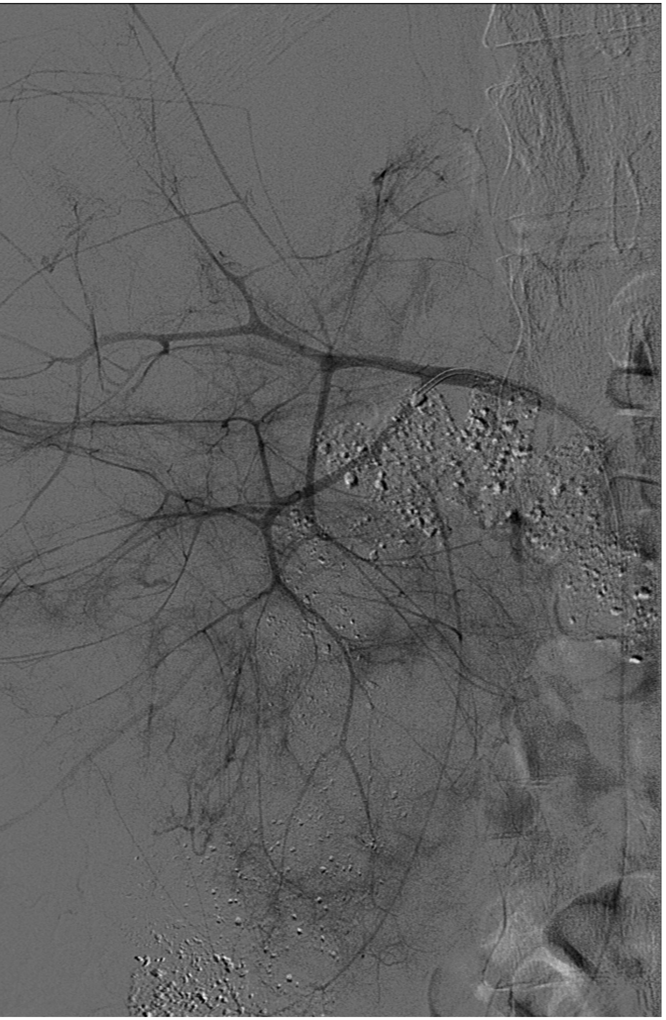
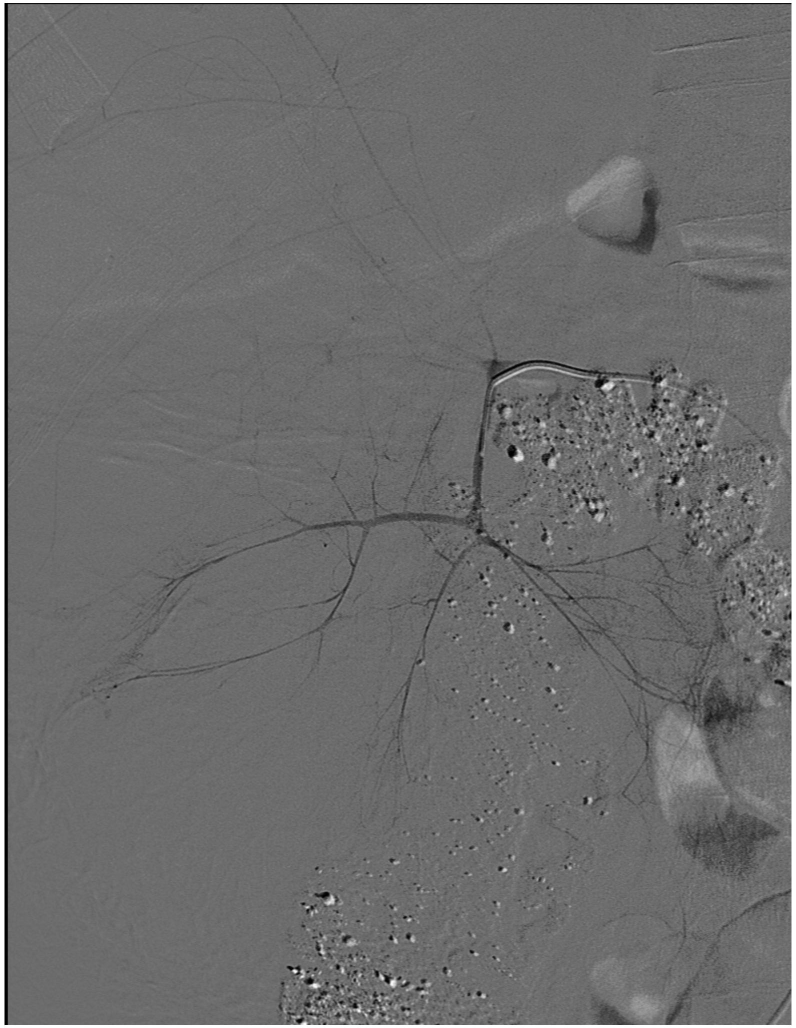
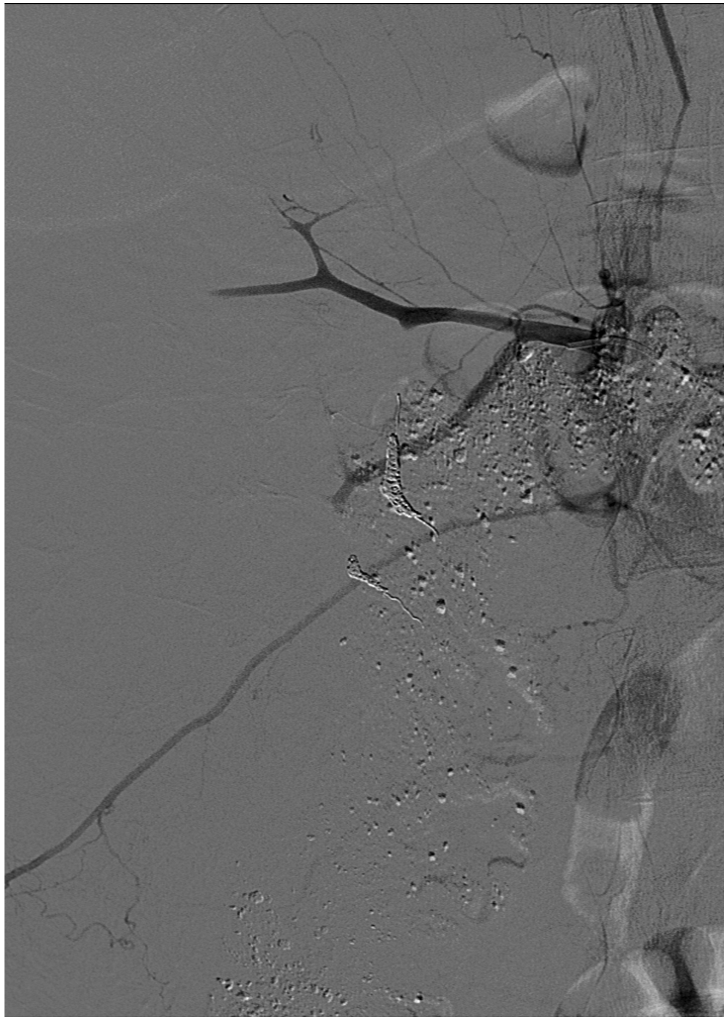


TRATTAMENTO DELLE EMORRAGIE RENALI

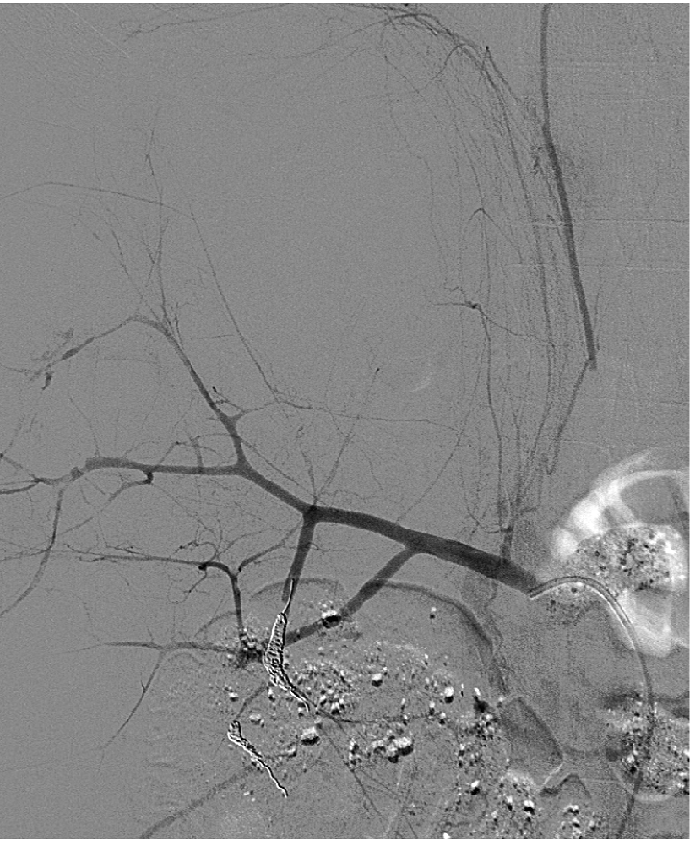


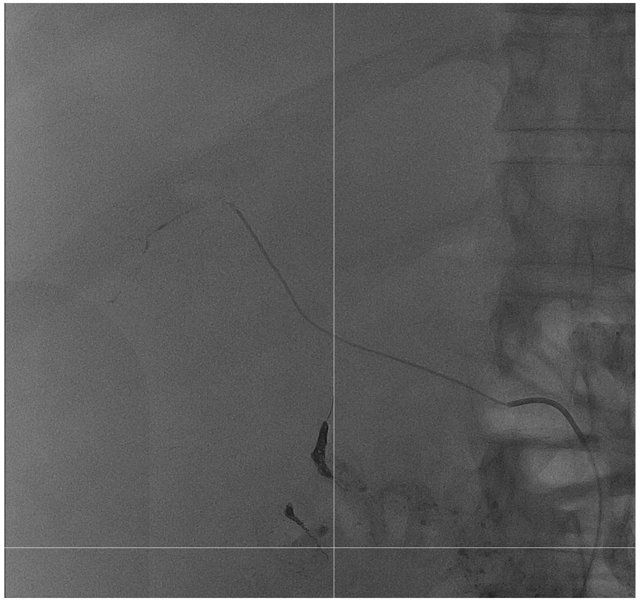


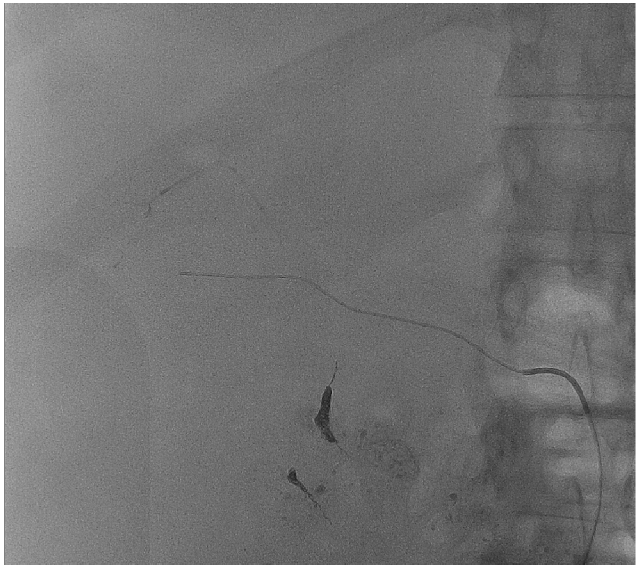
Polycystic kidney disease

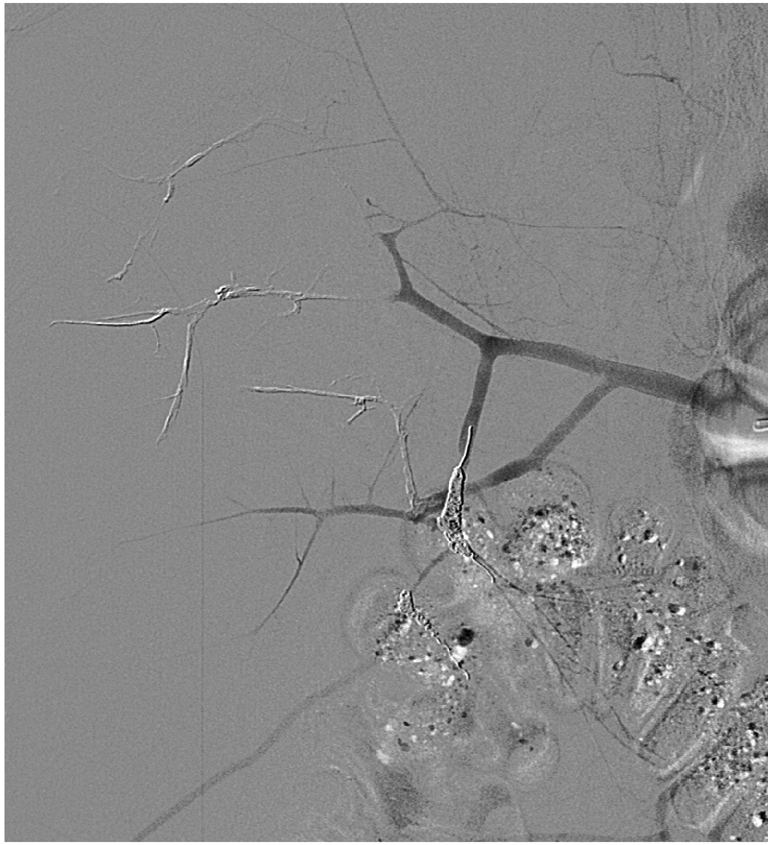




Polycystic kidney disease

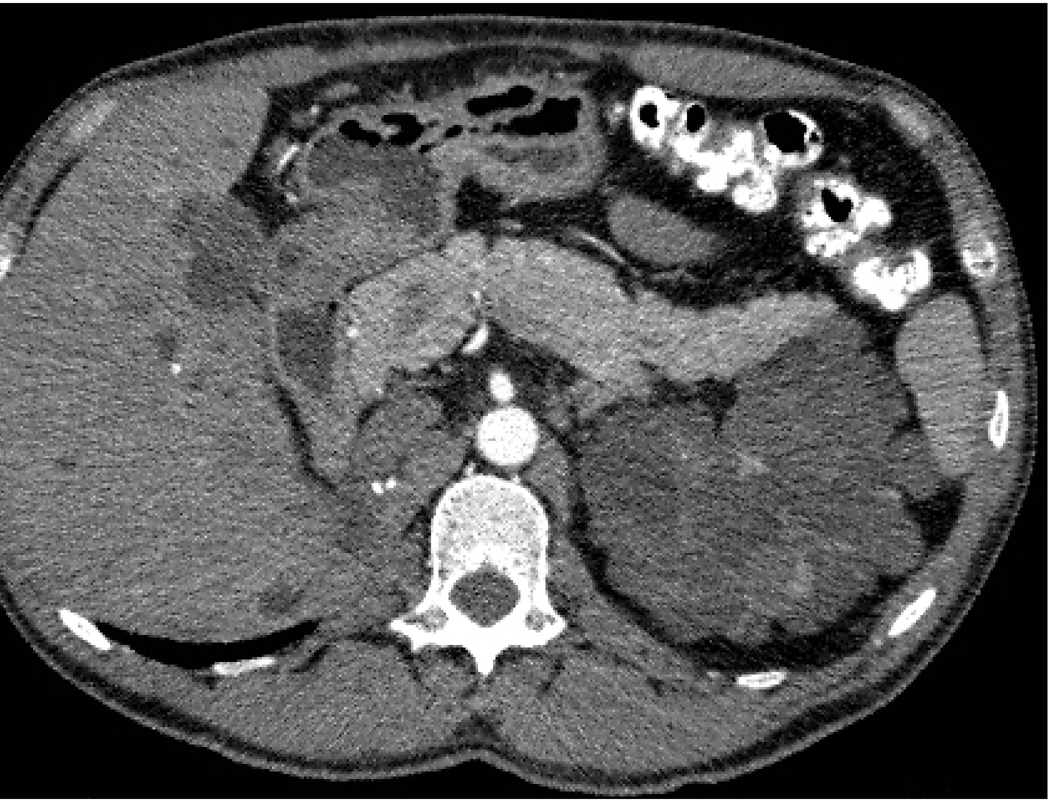


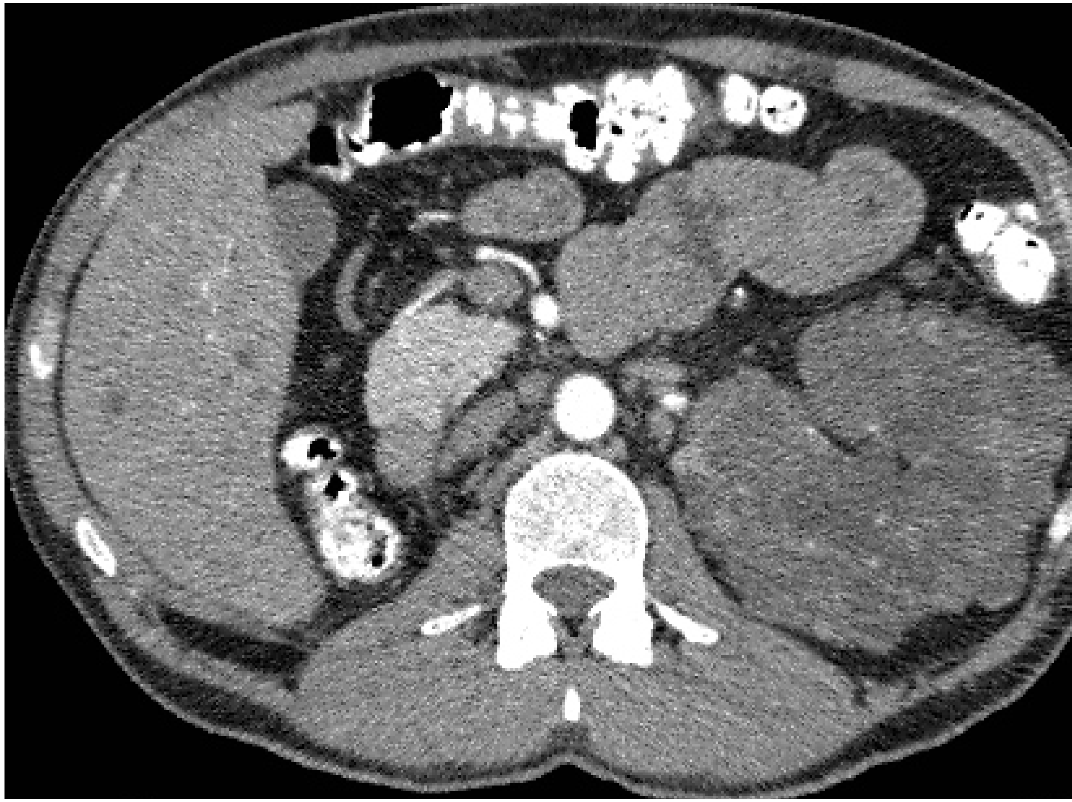






Polycystic kidney disease





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ecific Scenarios

Renal arteriovenous malformations

al arteriovenous (AV) shunts are rare pathologic communications between the renal art and veins without interconnecting capillaries.

- ✓ Renal AVMs can induce gross haematuria, hypertension or high-output cardiac failure.
- ✓ Surgical cure of renal AVMs is difficult to achieve and often results in nephrectomy.
- ✓ RAE remains the best option for symptomatic renal AVMs and the optimum management focuses on destroying the nidus.
- ✓ As a result, proxi- mal RAE is not effective and might even be deleterious, as it can hinder subsequent access to the nidus.
- ✓ Ideally, liquid agents that are able to easily reach the nidus should be used.
- ✓ RAE of these complex lesions remains difficult and should be performed only by experienced radiologists.

ecific Scenarios

Renal arteriovenous malformations

dy	Sample size (n)	Indication for RAE	Primary Technical success (%)	Technical success rate after repeat RAE (%)	Clinical success rate (%)	Definition Of clinical success	Embolic agent
eyne et al. 0	1	cirsoid AVM	100%	NA	100%	Resolution of symptoms	n-butyl 2-cyanoacryla
ata et al. 4	12	renal AVMs	86%	100% (2/14)	100%	Resolution of symptoms	various embolization materials (liqui embolization agents, gelatin sponge, and co

ecific Scenarios

Renal arteriovenous malformations

RadioGraphics 2016; 36:0000–0000

Renal Arteriovenous Shunts: Clinical Features, Imaging Appearance, and Transcatheter Embolization Based on Angioarchitecture[1]

ACHING POINTS

- ecause the angioarchitecture of nontraumatic renal AV hunts does not differ from that of peripheral AV malformaons, we suggest that the classification by Cho would be hore suitable.
- o understand the angioarchitecture of a renal AV shunt and onsider appropriate treatment strategies, certain features hould be evaluated with angiography: *(a)* feeding arteries: umber, size, presence of aneurysms, potential accessibility to he fistulous point, and location of normal renal parenchymal ranches from the feeding arteries; *(b)* fistulous points: numer and size; *(c)* drainage veins: number, presence of saccur dilatation, and accessibility by the transvenous approach; d) intranidal communication for AV malformations; and e) shunt flow (circulation time).

- Successful embolization should involve the complete and permanent occlusion of the shunt while preserving the normal renal arterial branches as far as possible. It is therefore importan to achieve complete occlusion of the fistulous points distally beyond the normal renal arterial branches. The consideratior of the type and angioarchitecture of the shunt is essential fo safe and effective embolization treatment.
- Proximal embolization of the arterial feeder with coils or vascular plugs should be avoided because recruitment of the blood flow via the collaterals can cause recurrence and complicate the angioarchitecture of type III shunts.

Renal arteriovenous malformations

ecific Scenarios

Renal Arteriovenous Shunts: Clini-cal Features, Imaging Appearance, and Transcatheter Embolization Based on Angioarchitecture[1]

Classification of Renal AV Shunts

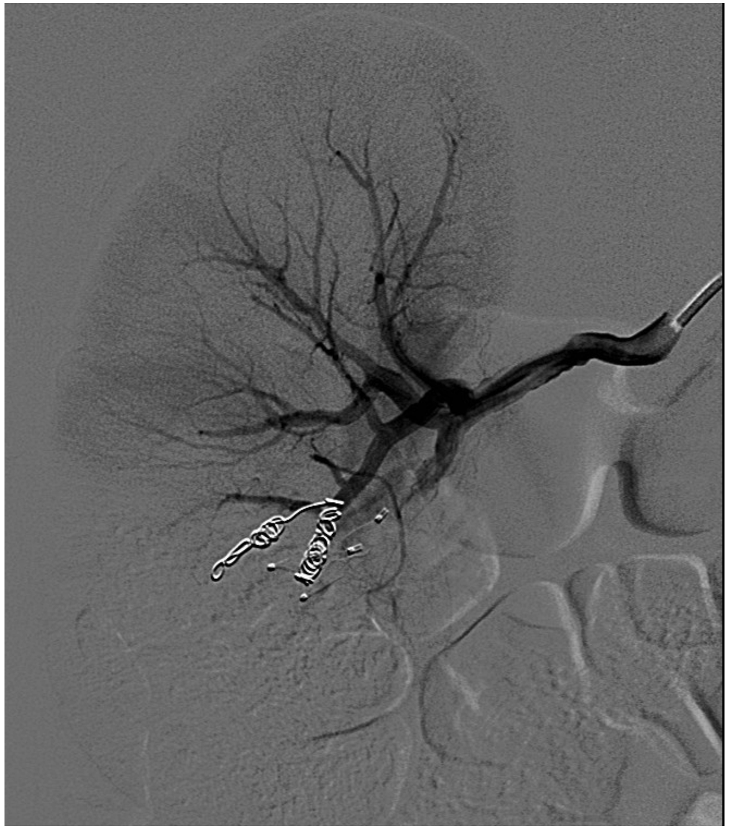
ation	Characteristics at Angiography
ic renal AV shunts	Direct fistulous formation between a single artery and a si coexistence of pseudoaneurysms (often)
matic renal AV shunts	
	A single or a few arteries shunting to a dilated single drain
	Multiple arterioles shunting to a single dilated draining vei
	Multiple shunts between the arterioles and venules, form vascular network

Table 4: Embolic Materials Used for the Occlusion of Renal AV Shunts

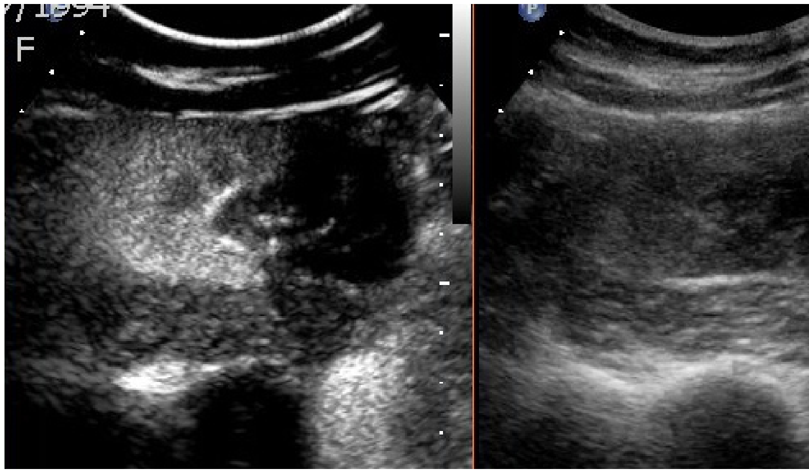
Embolic Materials	Diameter (mm)	Introducing Catheter (F)	Applicable Type of Renal AV Shunts	Limitation and Drawbac
Particles				
Gelatin sponge	1–10	1.7–4	Type III, traumatic renal AV shunt (combined use with coils or plug)	Low rate of complete occlu of type III renal AV shun high rate (>50%) of recu rence, non–target emboli (renal infarction)
PVA	0.1–1	1.7–4	Type III, traumatic renal AV shunt	
Coils				
Pushable coil	2–20	1.9–4	Types I, II, traumatic renal AV shunt (various sizes)	Effective for small and medi sized AV fistulas, risk of m tion for large AV fistulas, i fective for AV malformati
Detachable coil	1–32	1.7–4		
Detachable balloon	7–15	6–10	Type I (medium fistula size)	Risk of spontaneous deflati migration
Vascular plug	3–22	4–9	Type I (medium fistula size)	Large size of guiding cathet relatively stiff delivery sys
Liquid materials				
Absolute ethanol	...	≥1.2	Types I, II, III (medium size)	Toxic effects of alcohol (PH shock), higher risk of ove bolization (renal infarctio
NBCA	...	≥1.2	Types I, II, III, traumatic renal AV shunt (various sizes)	Risk of migration (PE), ove bolization (renal infarctio gluing catheter
Onyx	...	≥1.3, DMSO compatible	Types I, II, III (multiple feeders with small fistula size)	Risk of migration (ARDS), embolization (renal infarc

ecific Scenarios

Renal arteriovenous malformations



A 19 yo young woman with haematuria and flank pain (intraparenchimal AVM)



ecific Scenarios

Renal artery aneurysms

nal artery aneurysms are uncommon, with an estimated prevalence of 0.7% based on computed tomogra
aging in the general population.

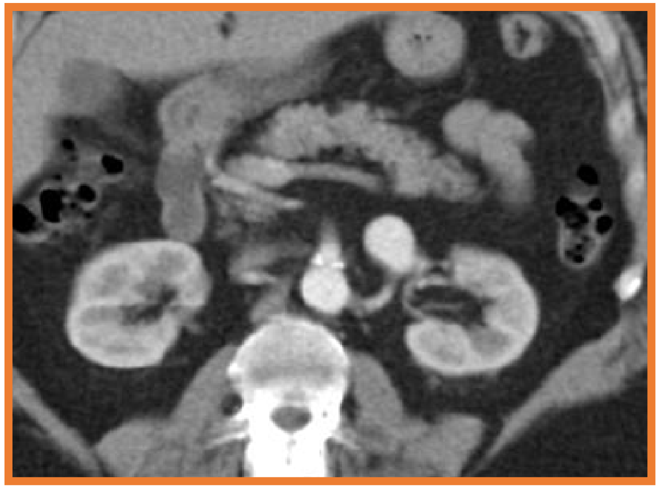
edisposing factors include connective tissue disease (Marfan syndrome, Ehlers–Danlos syndrome, Behcet
ndrome), neurofibro- matosis, atherosclerosis, fibromuscular dysplasia, polyar- teritis nodosa, and tuberc
erosis.

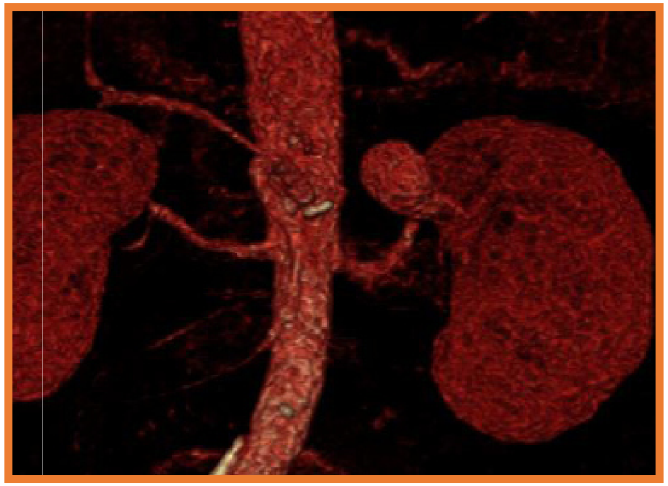
ecise indications for treatment of renal artery aneurysms are not well delineated, although **aneurysm
meter 1.5-2 cm, rupture, associated flank pain or hematuria** .

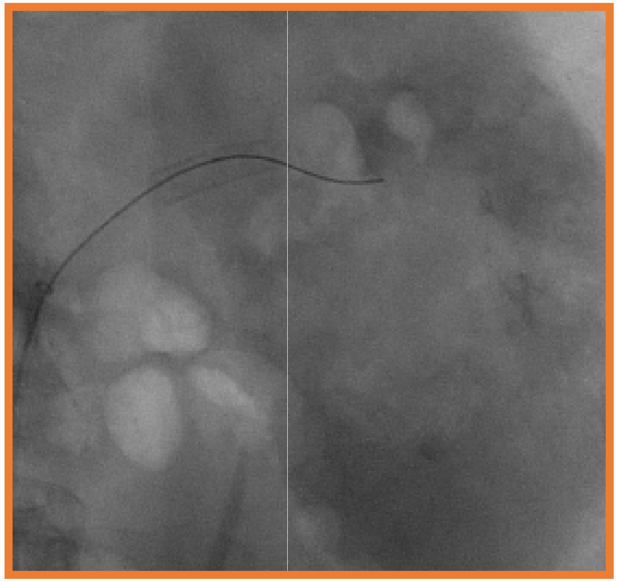
hough rare, perhaps the most feared complication of renal artery aneurysm is rupture, as this carries a
rtality rate of 80%.

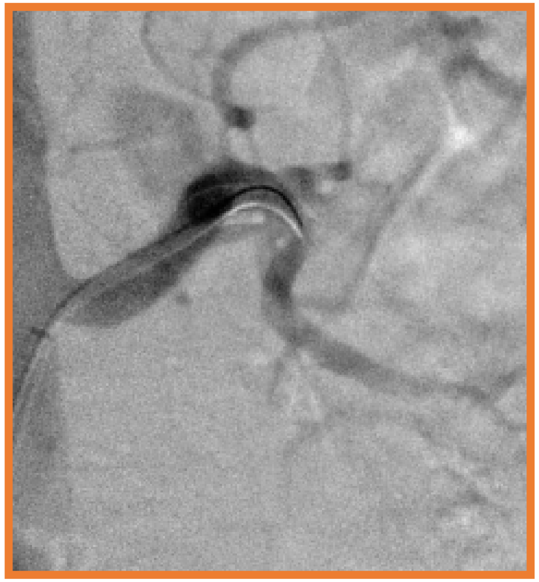
Aranzulla, T et al. *J. Invasive Cardiol.* 19, E246–E253 (

Renal artery aneurysms

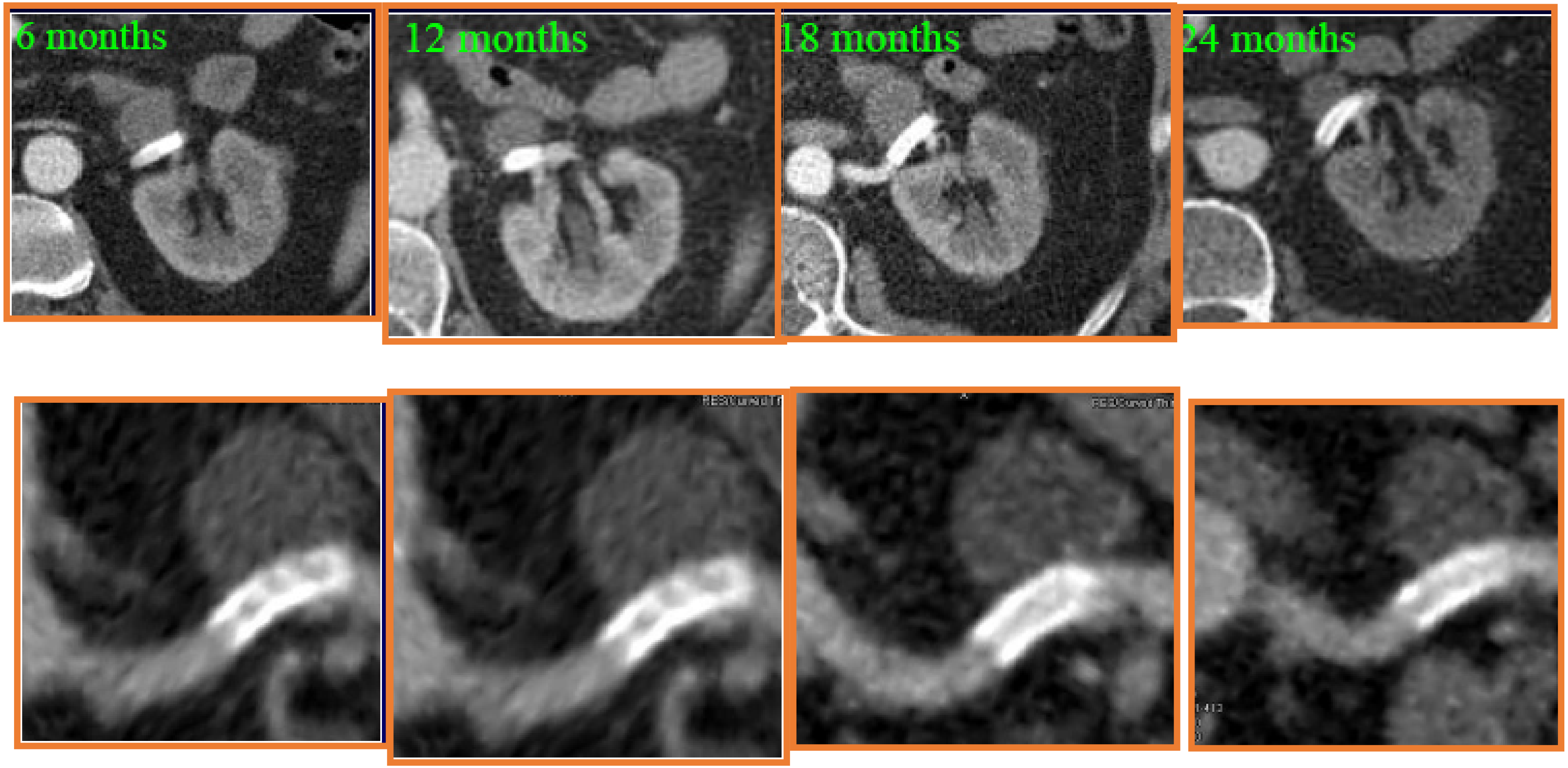








Renal artery aneurysms



pecific Scenarios

- Non Traumatic
  - Tumors
  - Chronic Diseases
  - AVM

- Traumatic
  - Blunt/Penetrating Trauma
  - Iatrogenic Lesions

ecific Scenarios

Traumatisms

e kidney is the third most frequent abdominal organ to be injured, with renal trauma curring in ~1–5% of all trauma cases.
some series, 80–90% of all kidney injuries were secondary to blunt abdominal trauma; t the rate of penetrating injuries can be up to 20% in urban settings.

Although general consensus is that patients with critical haemodynamic instability despite active resuscitation should be admitted to surgery to control the bleeding as quickly as possible, RAE is increasingly used as an adjunct or a minimally invasive alternative to surgery

- ✓ In cases of penetrating or iatrogenic trauma, RAE is mostly used as a first-line alternative to surgery.
- ✓ In blunt trauma, the relative role of expectant management, RAE and surgery, mostly depends on the trauma grade of the lesions and on the presence or absence of active bleeding as assessed by CT.

Morey, A. F. *et al.* Urotrauma: AUA Guideline. *J. Urol.* 192, 327

pecific Scenarios

- Non Traumatic
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ecific Scenarios

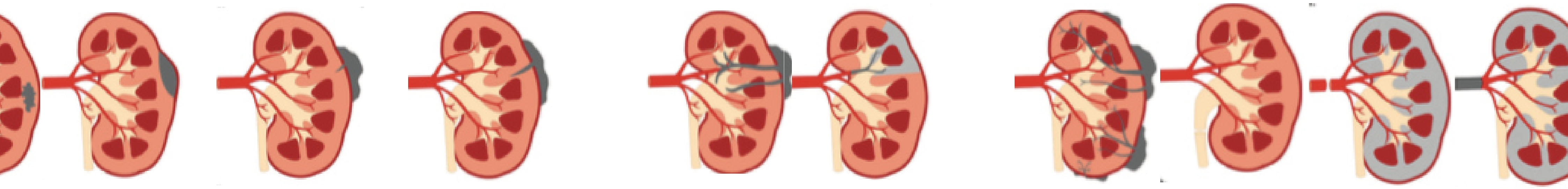
nt traumas are usually caused by mc
idents or assault.

e consequences of blunt renal traum
ulsion of the vascular pedicle.

nal injuries are usually graded by CT s
uma classification that was found to

AAST Renal Injury Scale

Grade*	Type of Injury	Description
I	Normal contusion	Microscopic or gross hematuria with normal urologic finc
	Hematoma	Nonexpanding subcapsular hematomas with no laceratior
II	Hematoma	Nonexpanding perinephric (perirenal) hematomas confi to the retroperitoneum
	Laceration	Superficial cortical lacerations less than 1 cm in depth w out collecting system injury
III	Laceration	Renal lacerations greater than 1 cm in depth without collec system injury
IV	Laceration	Renal lacerations extending through the renal cortex, mec and collecting system
	Vascular injury†	Injuries involving the main renal artery or vein with con hematoma, segmental infarctions without associated l tions
V	Laceration	Shattered kidney, ureteropelvic junction avulsions
	Vascular injury	Complete laceration (avulsion) or thrombosis of the mai renal artery or vein that devascularizes the kidney



I II III IV V

ecific Scenarios

Traumatisms: Blunt Trauma

rade I–II injuries are the most frequent and best treated with observation, transfusions nd bed rest.

hese traumatisms should not be treated routinely with RAE, despite what might be don some centres, owing to the risk of inducing unnecessary renal infarctions.

he management of **Grade III–V** injuries is not currently standardized.

- Surgical exploration was originally considered the method of reference; however, this approach led to nephrectomy rather than repair in up to 64% of cases.
- There has, therefore, been a progressive trend to treat high-grade renal traumas with less invasive methods.
- The majority of practitioners support expectant treatment for haemodynamically stable patients without any active bleeding, to avoid surgical exploration at the acute phase where possible.

Danuser, et al *Eur. Urol.* 39, 9–14
Glass. *et al. World J. Urol.* 32, 821–827
Hotaling,. *et al.. J. Urol.* 185, 1316–1320
Breyer, V. A. *J. Urol.* 179, 2248–2252; discussion 2253

ecific Scenarios

.INE STATEMENTS

'rauma

ians should perform diagnostic imaging with intravenous (IV) contrast nced computed tomography (CT) in stable blunt trauma patients with hematuria or microscopic hematuria and systolic blood pressure < nHG. (Standard; Evidence Strength: Grade B)

ians should perform diagnostic imaging with IV contrast enhanced CT in e trauma patients with mechanism of injury or physical exam findings erning for renal injury (e.g., rapid deceleration, significant blow to flank, acture, significant flank ecchymosis, penetrating injury of abdomen, flank, ver chest). (Recommendation; Evidence Strength: Grade C)

ians should perform IV contrast enhanced abdominal/pelvic CT with ediate and delayed images when there is suspicion of renal injury. (Clinical ple)

ians should use non-invasive management strategies in hemodynamically e patients with renal injury. (Standard; Evidence Strength: Grade B)

urgical team must perform immediate intervention (surgery or embolization in selected situations) in hemodynamically unstable patients no or transient response to resuscitation. (Standard; Evidence Strength: e B)

ians may initially observe patients with renal parenchymal injury and ry extravasation. cal Principle)

Traumatisms: Blunt Trauma

Approved by the Board of Director April 2014

American Urological Association (AUA) Guideline

UROTRAUMA: AUA GUIDELINE

Allen F. Morey, MD; Steve Brandes, MD; Daniel David Dugi III, MD; John H. Armstrong, MD; Benjamin N. Breyer, MD; Joshua A. Broghammer, MD; Bradley A. Erickson, MD; Jeff Holzbeierlein, MD; Steven J. Hudak, MD; Jeffrey H. Pruitt, MD; James T. Reston, PhD, MPH; Richard A. Santucci, MD; Thomas G. Smith III, MD; Hunter Wessells, MD

7. Clinicians should perform follow-up CT imaging for renal trauma patients having either (a) deep lacerations (AAST Grade IV-V) or (b) clinical signs of complications (e.g., fever, flank pain, ongoing blood loss, abdominal distention). (Recommendation; Evidence Strength: Grade C)
8. Clinicians should perform urinary drainage in the presence of complications such as enlarging urinoma, increasing pain, ileus, fistula or infection. (Recommendation; Evidence Strength: Grade C) Drainage sh achieved via ureteral stent and may be augmented by percutaneous urinoma drain, percutaneous nepl both. (Expert Opinion)

ecific Scenarios

Traumatisms: Blunt Trauma

Guideline of guidelines: A Review of Urologic Trauma Guidelines

Bryk, DJ- Darren J. Bryk, BS
Zhao, LC- Lee C. Zhao, MD MS

doi: 10.1111/bju.130

Objective: To review the guidelines released in the last decade by several organizations regarding the optimal evaluation and management of genitourinary injuries (renal, ureteral, bladder, urethral and genital).

Materials and Methods: This is a review of the genitourinary trauma guidelines from the European Association of Urology (EAU) and the American Urological Association (AUA) and renal trauma guidelines from the Societe Internationale D'Urologie (SIU).

Results: Most recommendations are guided by the American Association for the Surgery of Trauma (AAST) organ injury severity system. Grade A evidence is very rare in genitourinary trauma, and most recommendations are based on Grade C evidence. The findings of the most recent urologic trauma guidelines are summarized. All guidelines recommend conservative management for low-grade injuries. The major difference is for high-grade renal trauma, where the SIU and EAU recommended exploratory laparotomy for Grade 5 renal injuries, while the more recent AUA guideline recommends initial conservative management in hemodynamically stable patients.

Conclusion: There is generally consensus among the three guidelines. Recommendations are based on observational or retrospective studies as well as clinical principles and expert opinions. Large-scale prospective studies can improve the quality of evidence, and direct more effective evaluation and management of urologic trauma.

ecific Scenarios

Traumatisms: Blunt Trauma

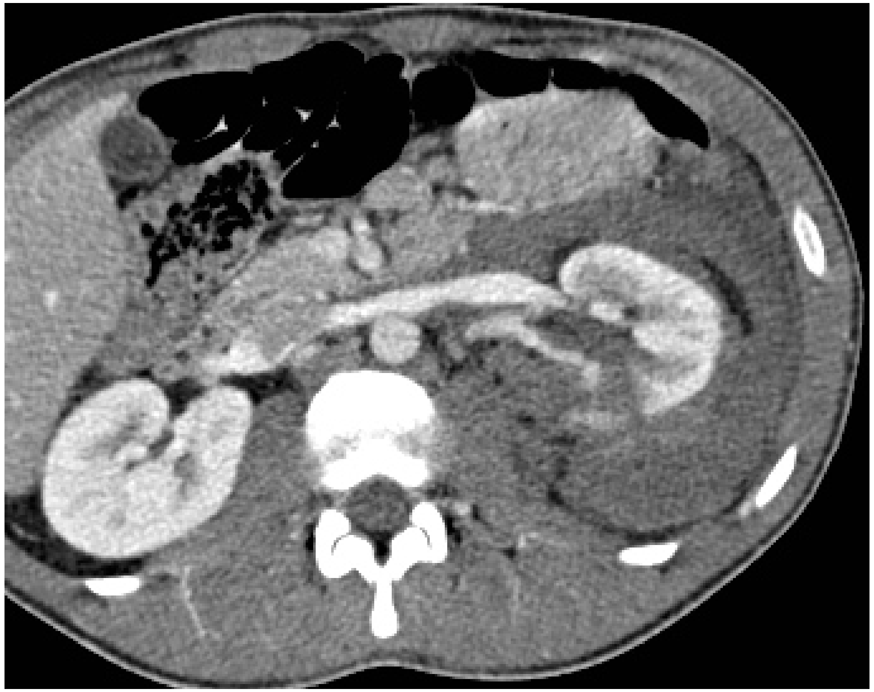
Guideline of guidelines: A Review of Urologic Trauma Guidelines

Bryk, DJ- Darren J. Bryk, BS
Zhao, LC- Lee C. Zhao, MD MS

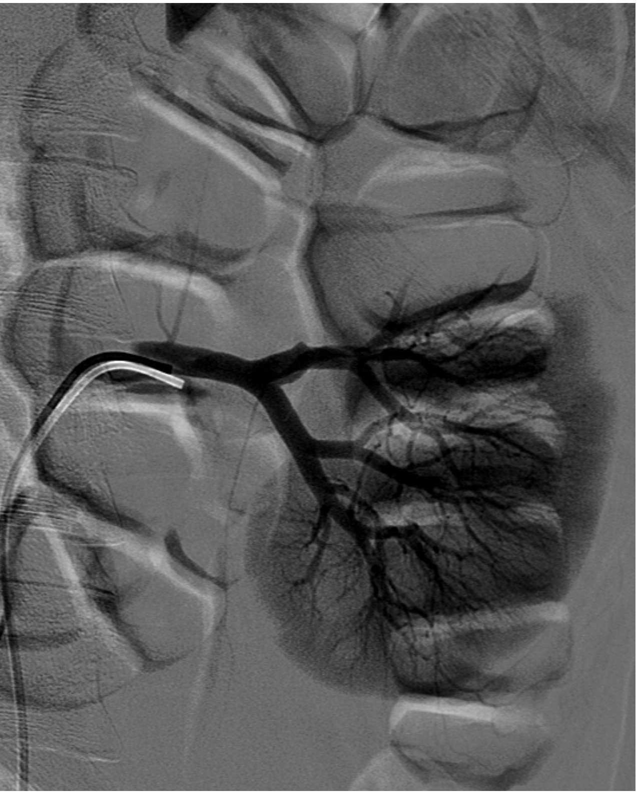
doi: 10.1111/bju.130

	Recommendation	Level of Evidence	Organization
Renal			
	Patients with gross hematuria should undergo abdominal/pelvic CT with IV contrast with immediate and delayed images.	Grade C	SIU, EAU, AUA
	Stable Patient: Conservative management for grades 1, 2 injury.	Grade B	SIU, EAU, AUA
	Initial conservative management for high grade renal injury	Grade B	AUA
	Surgical repair if already undergoing laparotomy for grades 3, 4. Exploratory laparotomy for grade 5.	Grade C	SIU
	Unstable patient: Exploratory laparotomy. Consider angioembolization in experienced centers.	Grade B	SIU, EAU, AUA
	Renovascular injury- Attempt revascularization only in patient with solitary kidney or with bilateral renal injury.	Grade C	SIU
	Follow-up CT for grade 4 or 5 renal injuries 36-72 hours after presentation.	Grade C	SIU, AUA
	Renal trauma patients should have periodic blood pressure monitoring.	Grade C	SIU, EAU, AUA

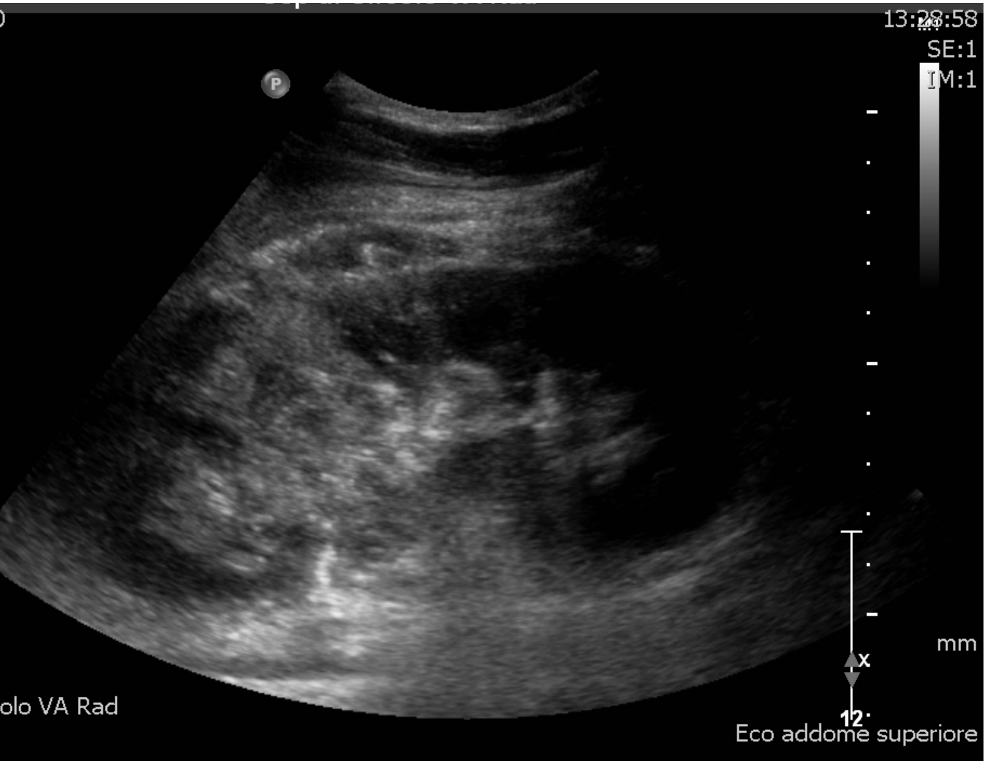
Traumatisms: Blunt Trauma

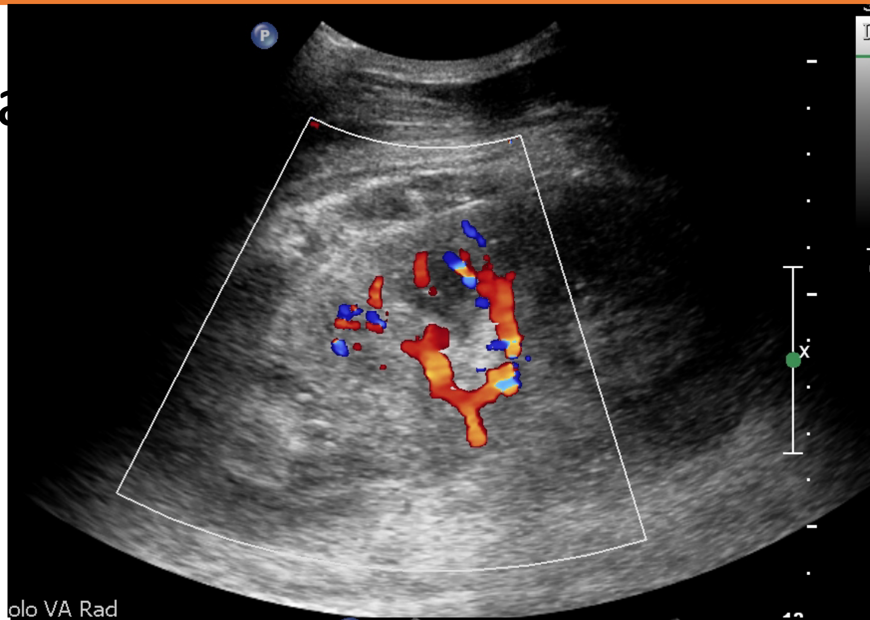


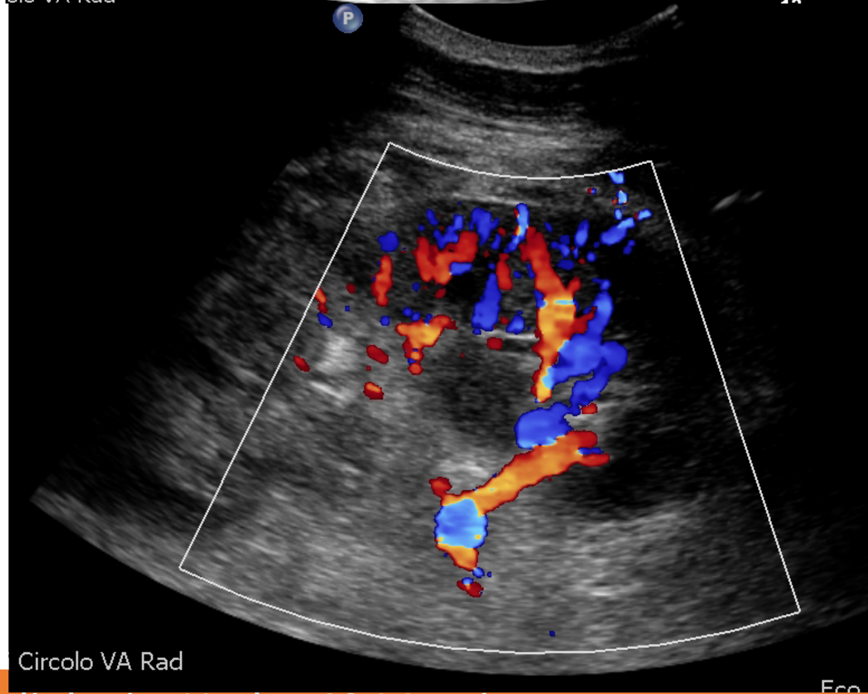
Traumatisms: Blunt Trauma



Traumatisms: Blunt Tra







pecific Scenarios

- Non Traumatic
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  - Blunt/Penetrating Trauma
  - Iatrogenic Lesions

ecific Scenarios

Traumatisms: Penetrating Trauma

Penetrating trauma can occur as a result of stab or gunshot wounds

Penetrating trauma can induce three types of vascular injury: direct bleeding in the subcapsular or perirenal space or in the collecting system (arteriocalyceal fistulas); arterial pseudoaneurysms; and AVFs.

Surgical repair of vascular lesions is difficult and carries a high risk of nephrectomy. Consequently, these lesions are usually managed conservatively by transfusion or RAE.

Morey, A. F. *et al.* Urotrauma: AUA Guideline. *J. Urol.* 192, 327 (2014).

Traumatisms: Penetrating Trauma

LUINO

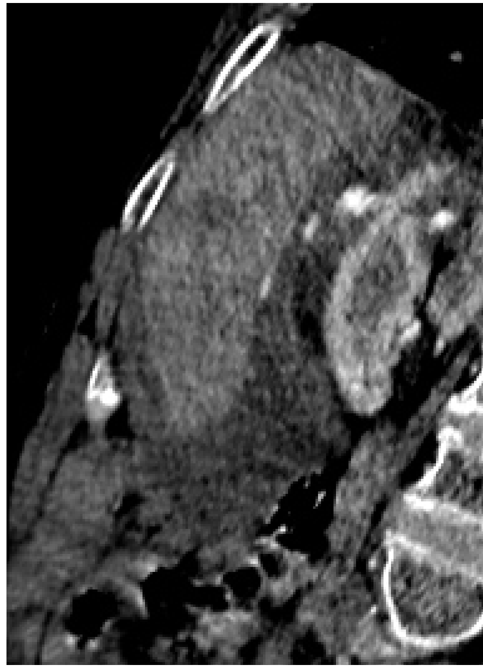
Settantenne accoltellato all'addome

Il fatto avvenuto a Luino nella serata di lunedì. L'uomo raggiunto da un fendente: indagano i carabinieri

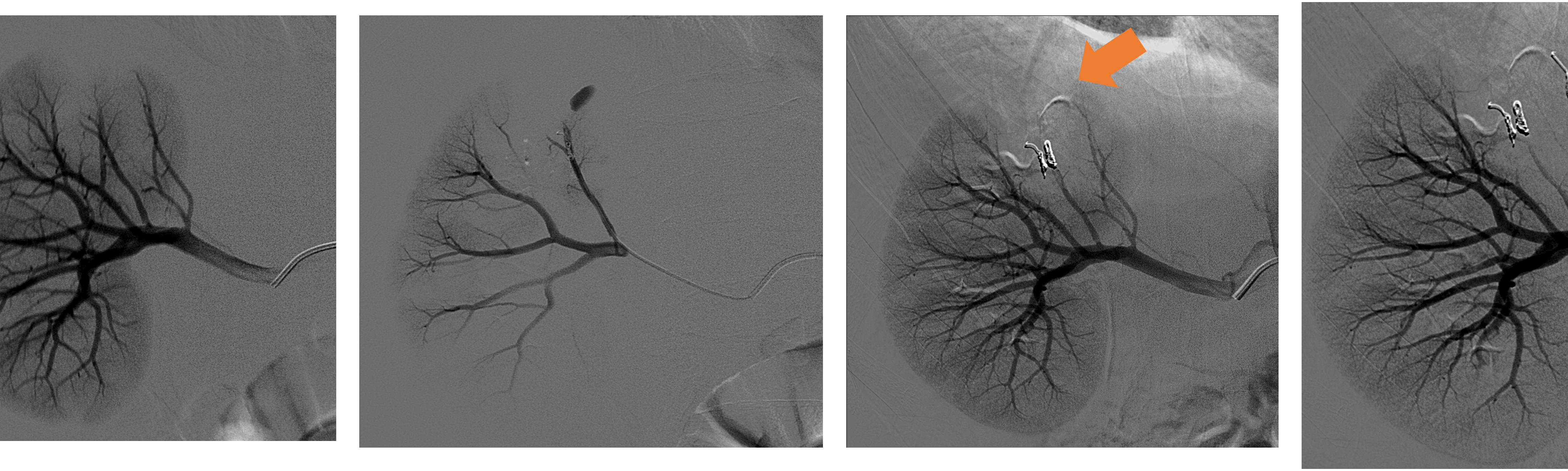
di Redazione redazione@varesenews.it

23 febbraio 2016 - 9:06

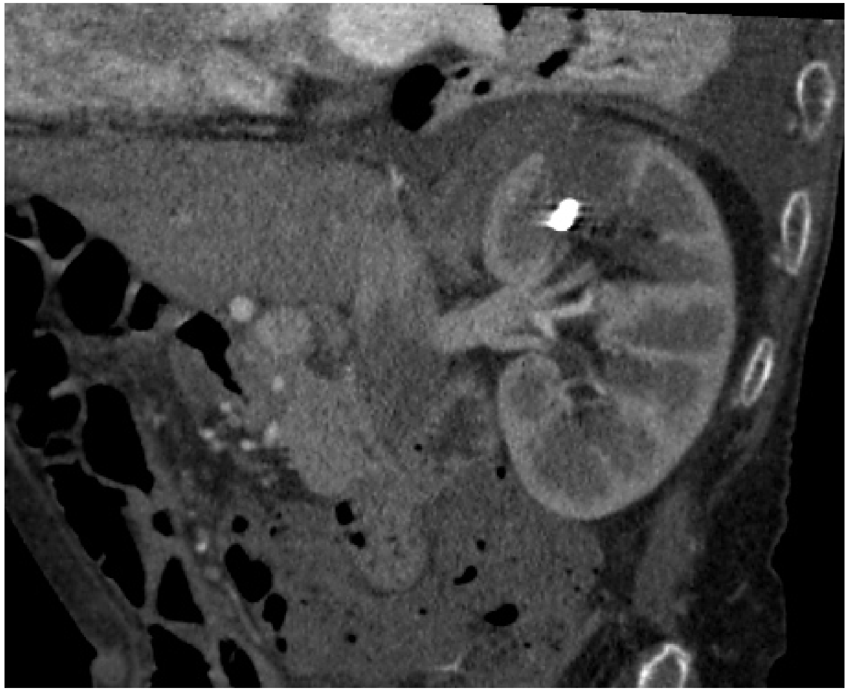
Un uomo di 70anni è stato accoltellato nella serata di ieri a Luino. Un solo fendente avrebbe raggiunto l'uomo all'addome.



Traumatisms: Penetrating Trauma



Traumatisms: Penetrating Trauma



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ecific Scenarios

Traumatisms: iatrogenic Injuries

atrogenic injuries following renal biopsy, placement of a nephrostomy tube, or percutaneous, laparoscopic or open urgical procedures.
he incidence of vascular lesions following biopsy of native or transplanted kidneys is 8.0%, with only 0.2–2.0% patie equiring intervention.
he incidence of severe bleeding complications requiring intervention is 0.6–1.4% following percutaneous renal surg nd 0.0–9.5% following open or laparoscopic nephron-sparing surgery.

Study	Sample size (*n*)	Indication for RAE	Primary technical success rate (%)	Technical success rate after repeat RAE (%)	Clinical success rate (%)	Definition of clinical success
Srivastava *et al.*, 2005[50]	27	Iatrogenic vascular injuries	81	89	89	Control of bleeding without need for surgery
Sam *et al.*, 2011[16]	50	Iatrogenic vascular injuries	98	NA	94	Control of bleeding
Zeng *et al.*, 2013[59]	117	Iatrogenic vascular injuries	90	99	99	Control of bleeding without need for surgery

ecific Scenarios

uries

Radiol med (2014) 119:261–268
DOI 10.1007/s11547-013-0343-2

VASCULAR AND INTERVENTIONAL RADIOLOGY

Transcatheter embolisation of iatrogenic renal vascular injuries

Anna Maria Ierardi · Chiara Floridi · Federico Fontana · Ejona Duka · Antonio Pinto · Mario Petrillo · Elias Kehagias · Dimitrios Tsetis · Luca Brunese · Gianpaolo Carrafiello

Abstract

Purpose The aim of our study was to review our experience and long-term follow-up in the treatment of iatrogenic renal vascular injuries using transcatheter embolisation.

Materials and methods Our retrospective analysis of cases collected in two interventional centres consists of a total of 21 patients who underwent renal arterial embolisation (RAE) for iatrogenic arterial kidney bleeding. Biopsy ($n = 4$), percutaneous nephrolithotomy ($n = 4$), nephron-sparing surgery ($n = 4$), guidewire-induced arterial perforation during coronary angiography or renal stenting ($n = 3$), percutaneous nephrostomy ($n = 3$), renal endopyelotomy/pyeloplasty ($n = 2$) and surgical nephrectomy were the iatrogenic causes. Seven patients presented with haemodynamic instability requiring blood transfusion (33.3 %), the remaining were haemodynamically stable
(66.7 %). Diagnostic renal angiography revealed 9 activel
bleeding vessels, 6 pseudoaneurysms, 4 arteriovenous fis
tulas and 1 arterio-calyceal fistula. In one patient selectiv
renal arteriography was negative probably because th
bleeding observed at CT angiography was self-limite
Twenty-one embolisation procedures were performed in 2
patients; one patient required a second embolisation 3
after the first one. Embolisation was performed with m
crocoils, polyvinyl alcohol particles, embosphere
spongostan emulsion and vascular plug.

Results The technical success rate was 100 %. Th
overall clinical success rate was 95 %. Apart from a patie
who died due to disseminated intravascular coagulation, n
major complications requiring intensive care treatme
were encountered during or after the procedures. No patie
required emergency surgery or subsequent surgical trea
ment. No statistically significant differences in eGFR o
renal function stage appeared after RAE.

Conclusions Percutaneous treatment can be proposed as
first-line treatment in iatrogenic renal arterial injurie
resulting in a safe and effective procedure.

ecific Scenarios

Traumatisms: iatrogenic Injuries

EUROPEAN UROLOGY 62 (2012) 628–639

ble at www.sciencedirect.com
l homepage: www.europeanurology.com

au
an Association of Urology

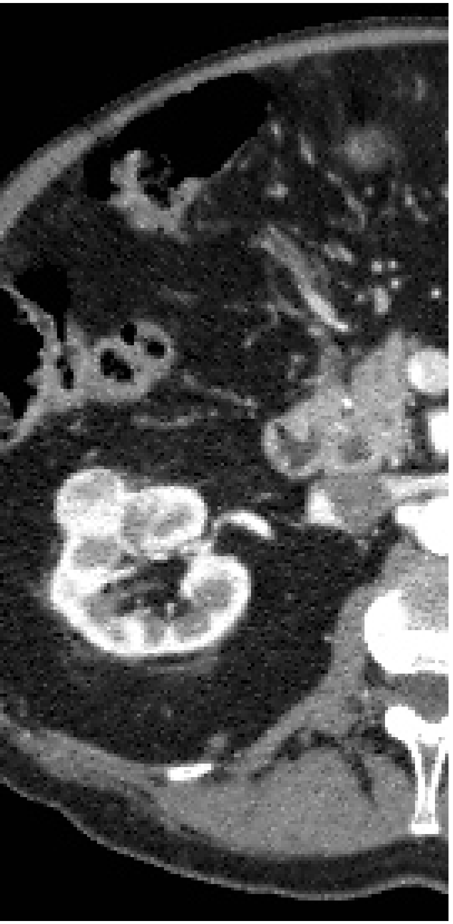
elines

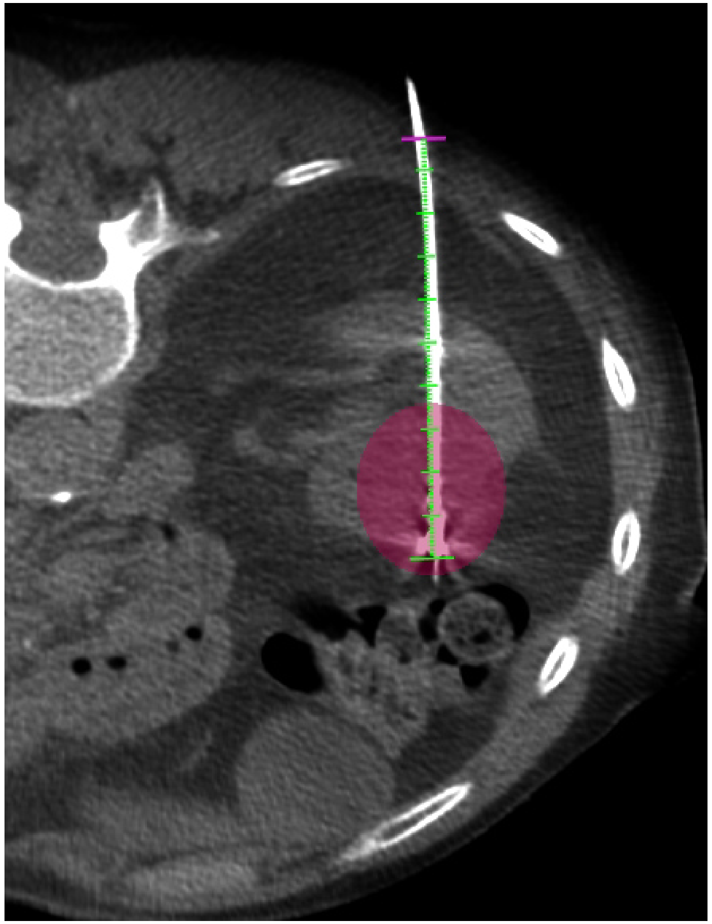
J Guidelines on Iatrogenic Trauma

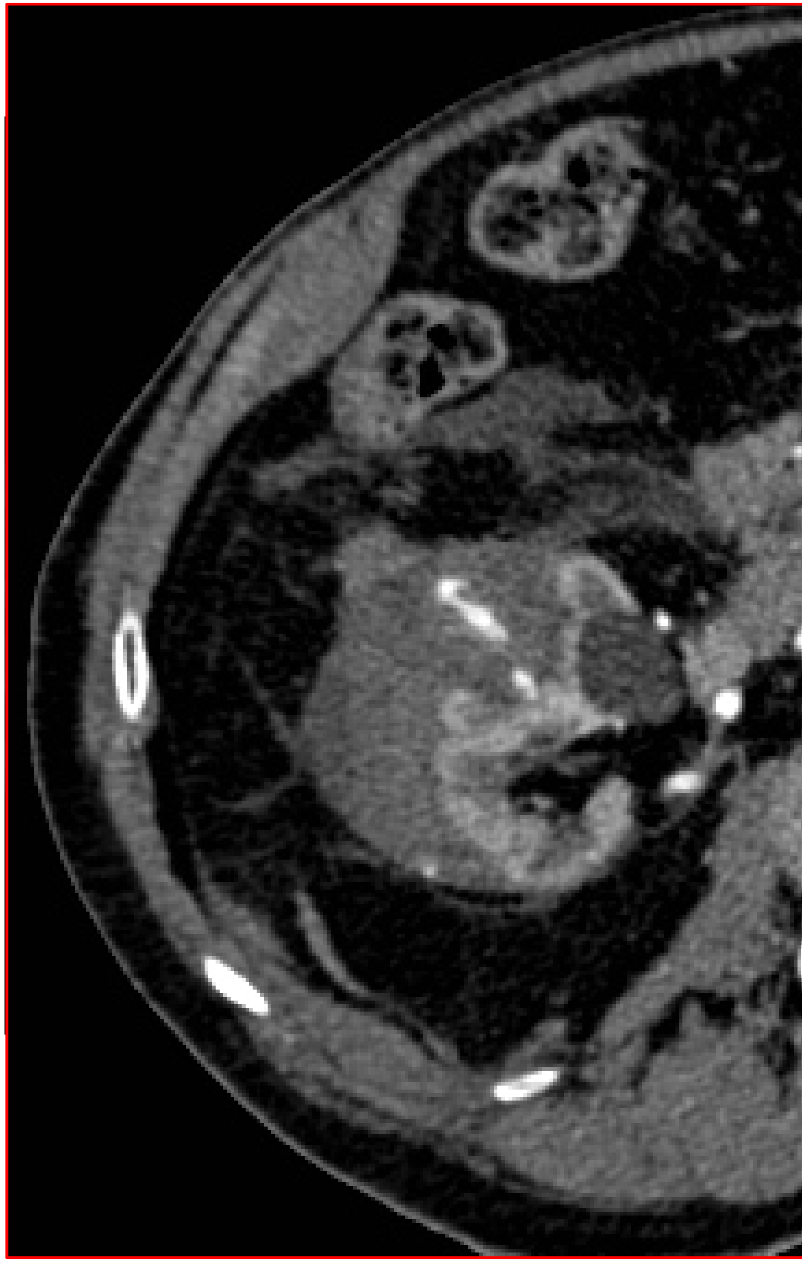
an J. Summerton[a,*], *Noam D. Kitrey*[b], *Nicolaas Lumen*[c], *Efraim Serafetinidis*[d],
d Djakovic[e]

Statements
• IRT is procedure dependent (1.8–15%).
• Significant injury requiring intervention is rare.
• Most common injuries are vascular.
• Renal allografts are more susceptible.
• Injuries occurring during surgery are rectified immediately.
• Symptoms suggestive of significant injury require investigation.
Recommendations
• Patients with minor injuries should be treated conservatively.
• Severe or persistent injuries require intervention with embolisation.
• In stable patients, repeat embolisation should be considered for failure.

Traumatisms: iatrogenic Injuries (1)

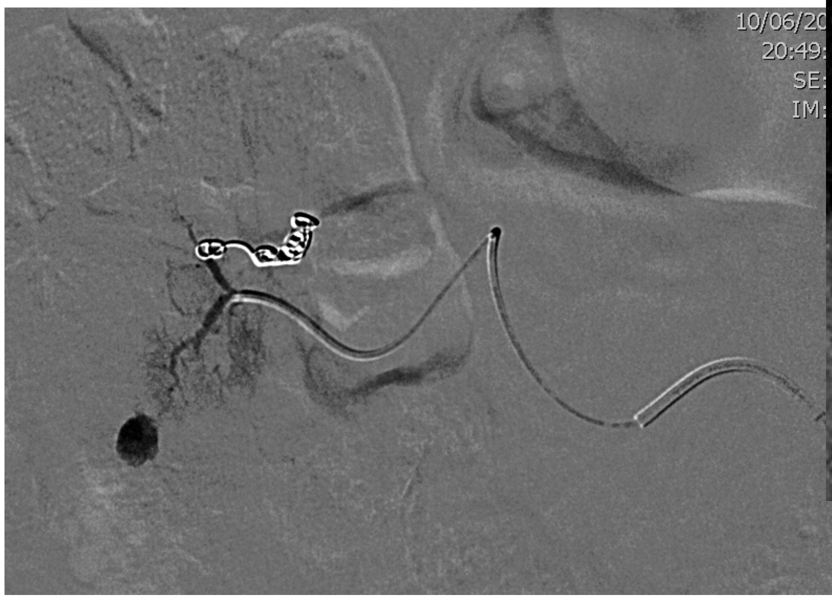


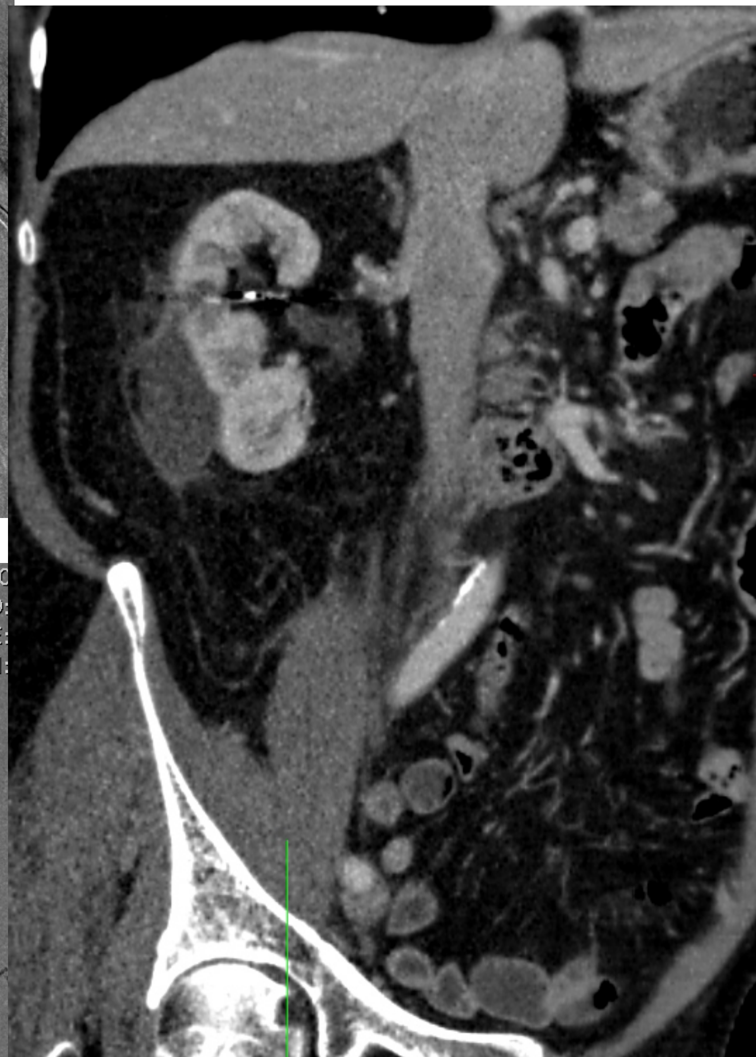




Traumatisms:

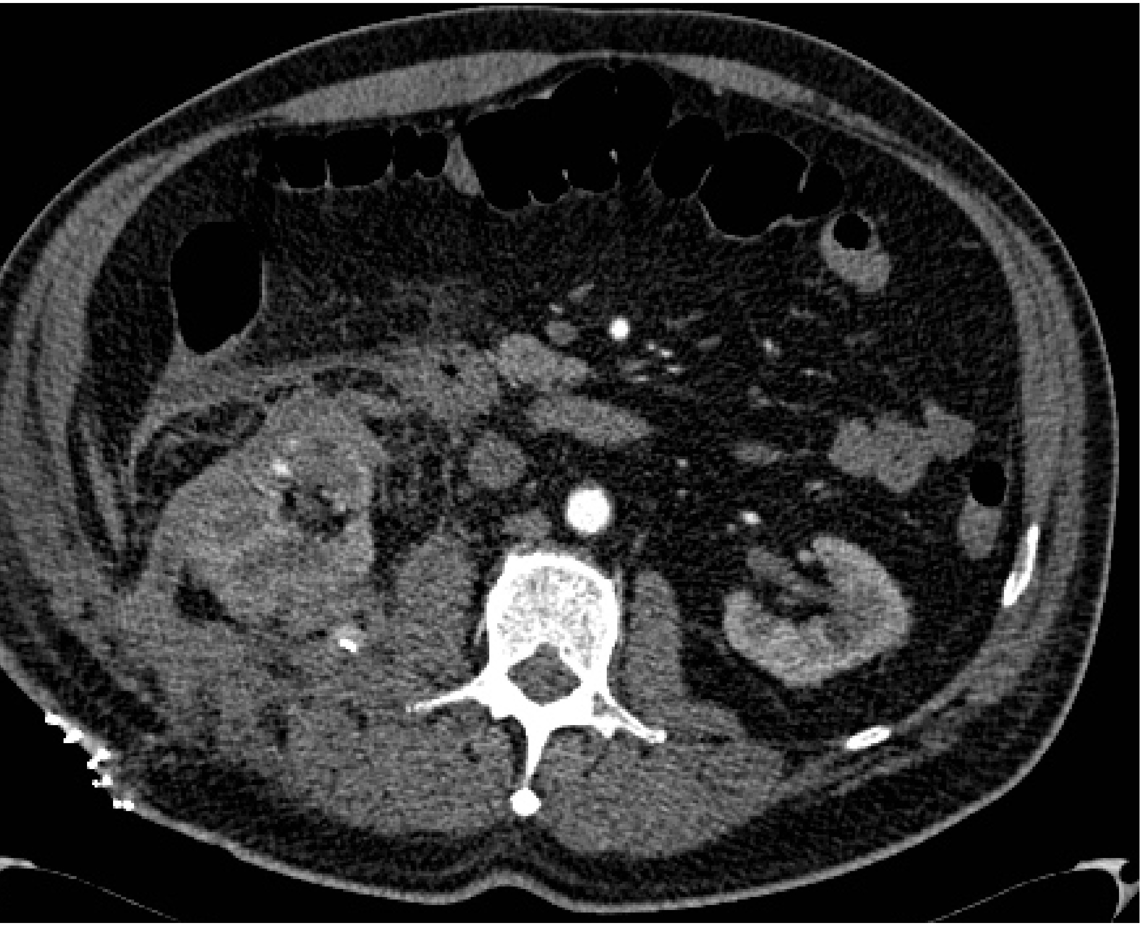
trogenic Injuries (1)

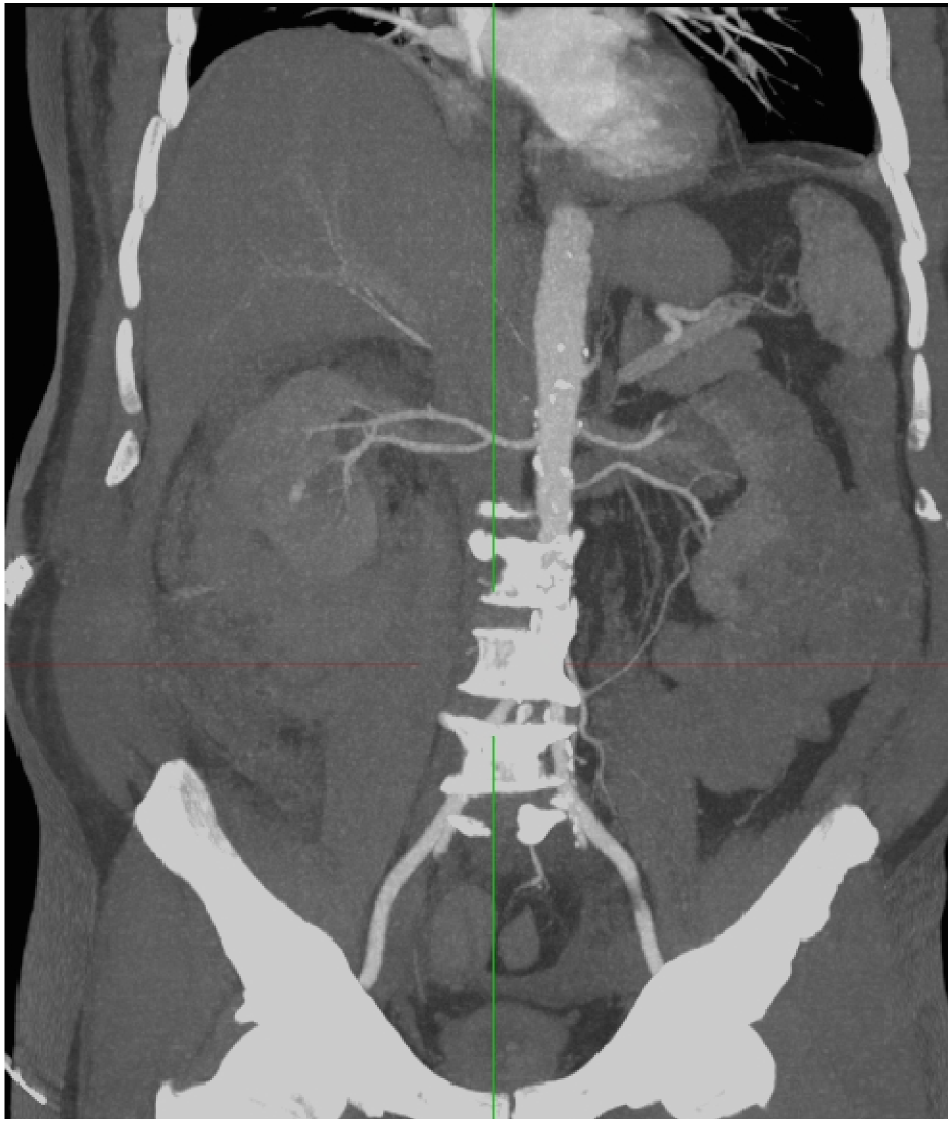




Traumatisms:

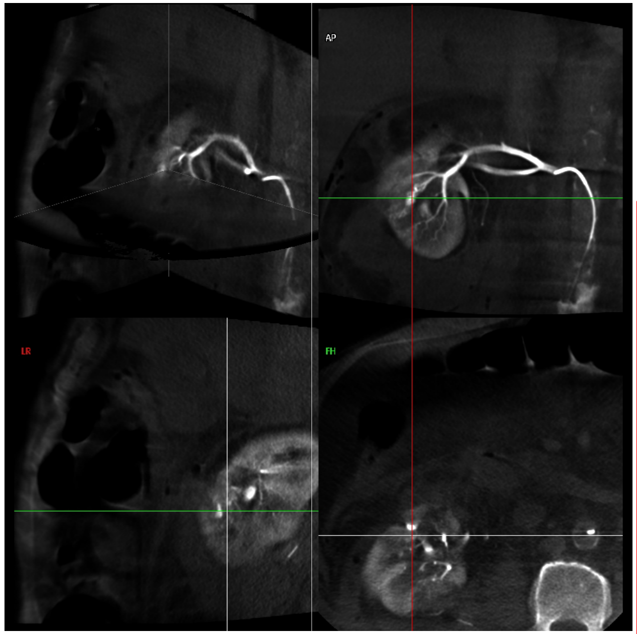
trogenic Injuries (2)

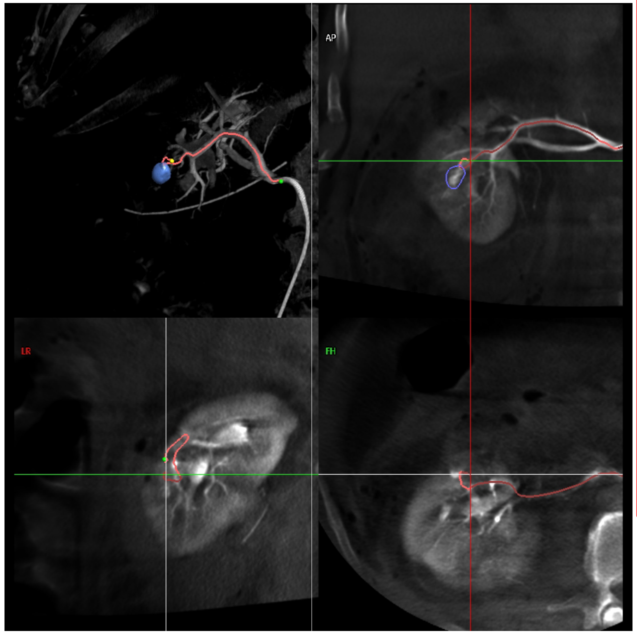




Traumatisms:

trogenic Injuries (2)





CONCLUSIONS

can be used to treat various uro- logical and nephrological conditions, as an alternative or complemen approach to surgical procedures.

he indications are consensual:

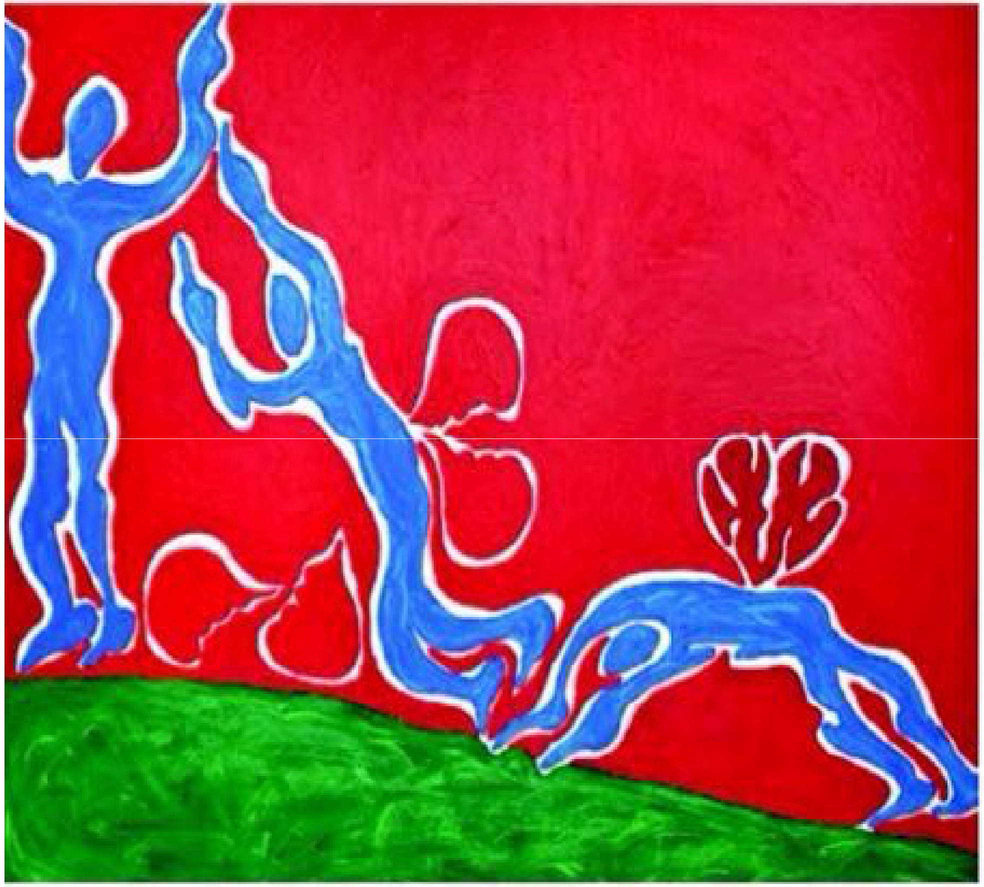
RAE is the first-line option in penetrating or iatrogenic trauma when conservative treatment has failed in case of bleeding angiomyolipoma.

In grade III–IV blunt traumas with active bleeding, RAE is also a well-accepted method that can, in association with conservative management, reduce the need for difficult surgical exploration and avoid unnecessary nephrectomies.

er indications are more controversial:

the use of RAE as an adjuvant therapy before surgical or percutaneous treatment of cancers remains debated and its respective role as compared to anti- angiogenic therapies must be clarified.

rdless of the indication, RAE should always be considered and discussed among a multidisciplinary tea clinical staff.



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