



Mechanical aspiration thrombectomy in the treatment of acute intrastent renal artery thrombosis[☆]



Umberto G. Rossi^{a,c,*}, Gian Andrea Rollandi^a, Raffaello Dallatana^b, Maurizio Cariati^c

^a Department of Diagnostic Imaging - Radiology and Interventional Radiology Units, E.O. Galliera Hospital, Mura delle Cappuccine, 14, 16128 Genova, Italy

^b Department of Surgery - Vascular Surgery Unit, ASST Santi Paolo and Carlo - San Carlo Borromeo Hospital, Via Pio II, 3, 20153 Milano, Italy

^c Department of Diagnostic Science - Radiology and Interventional Radiology Unit, ASST Santi Paolo and Carlo - San Carlo Borromeo Hospital, Via Pio II, 3, 20153 Milano, Italy

ARTICLE INFO

Article history:

Received 8 January 2018

Received in revised form 28 March 2018

Accepted 9 April 2018

Keywords:

Thrombectomy

Renal artery

Thrombosis

Elderly patients

Aging

ABSTRACT

Chimney-and-periscope technique for thoraco-abdominal aneurysm repair is a valuable treatment option in selected patients. Acute renal artery occlusion is a serious complication after this technique. We report a case of acute right renal artery occlusion, consequent to a previous chimney-and-periscope technique that was treated urgently by mechanical aspiration thrombectomy.

© 2018 Elsevier Inc. All rights reserved.

Contents

1. Background	344
2. Case presentation	344
3. Discussion	346
References.	346

1. Background

Endovascular Thoraco-Abdominal Aortic Aneurysm (TAAA) repair by chimney-and-periscope technique is a valuable treatment option in selected patients [1,2]. However, acute renal artery occlusion remains one of the most serious complications after chimney-and-periscope technique. It may progress to permanent renal injury if not treated promptly [3,4].

Percutaneous transcatheter aspiration thrombectomy, associate or not with intra-vessel thrombolysis, has been shown to be effective in restoring vessel flow [5,6]. We describe a case of a 78-year old man with an acute right renal artery occlusion, consequent to a previous

chimney-and-periscope technique that was treated urgently by endovascular mechanical aspiration thrombectomy.

2. Case presentation

A 78-year old man, with a previous a type IV TAAA was treated 5 years ago with thoraco-abdominal aortic endovascular stent-grafts and a two-by-two chimney-and-periscope technique (GORE, Flagstaff, AZ, USA) for visceral and renal arteries. Into the renal arteries was deployed a 6 × 100-mm Viabahn stentgrafts (Gore, Flagstaff, AZ, USA). On final angiographic images there were no signs of edge dissections into splanchnic and renal arteries.

He was on life-long mono-antiplatelet treatment (aspirin 100 mg/d) and presented to our emergency department for sudden onset of right-sided loin pain. Analysis of laboratory values indicated acute deterioration in renal function with serum creatinine value of 3.17 mg/dL. Abdominal MultiDetector Computed Tomography showed post-stent focal thrombosis of the right renal artery (Fig. 1a, b). After

[☆] Disclosure of potential conflicts of interest: none for all authors.

* Corresponding author at: Department of Diagnostic Imaging - Radiology and Interventional Radiology Units, E.O. Galliera Hospital, Mura delle Cappuccine, 14, 16128 Genova, Italy.

E-mail address: urossi76@hotmail.com (U.G. Rossi).

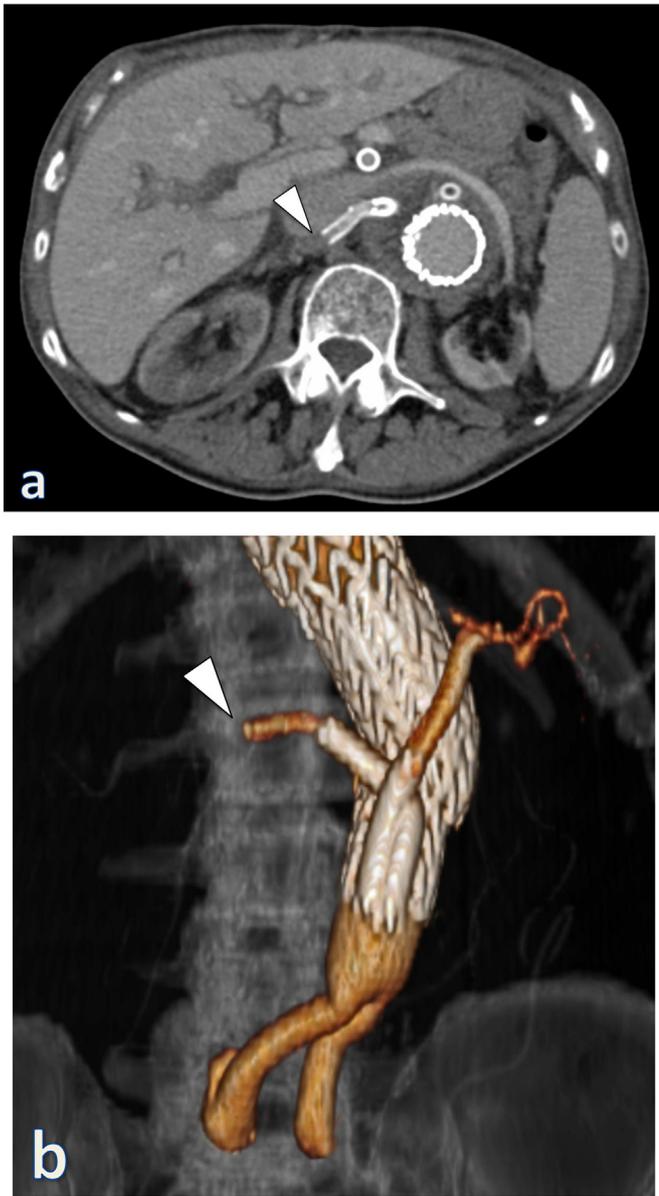


Fig. 1. a) Abdominal contrast enhanced MultiDetector Computed Tomography axial and b) coronal Volume Rendering Technique the shows post-stent focal thrombosis of the right renal artery.

multidisciplinary consultation, patient was candidate urgent to endovascular transcatheter aspiration thrombectomy therapy. Written informed consent was obtained from the patient. He underwent emergency angiography after 3 h from onset of symptoms. Angiography confirmed the diagnosis of post-stent focal thrombosis of the right renal artery with patency of right kidney intraparenchymal artery vessels (Fig. 2a). Mechanical aspiration thrombectomy, was performed into the main right renal artery, using a 8-Fr catheter and aspiration pump system (Penumbra, Alameda, CA, USA). A single passage with the 8-Fr catheter was done (time: 1 min). Clots were aspirated and removed (Fig. 2b) and final angiographic control demonstrated total right renal artery and right kidney intraparenchymal vessels patency, with regular flow and no acute stent angulations (Fig. 2c).

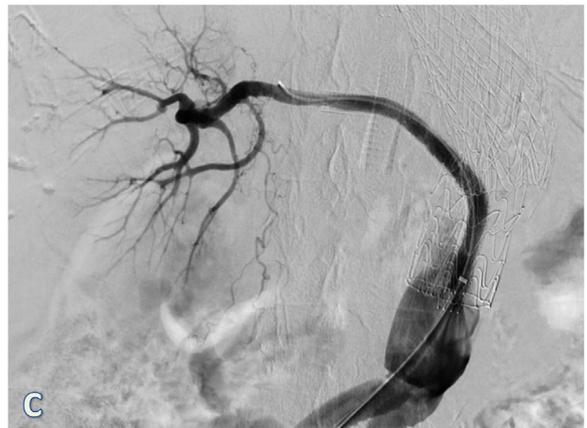
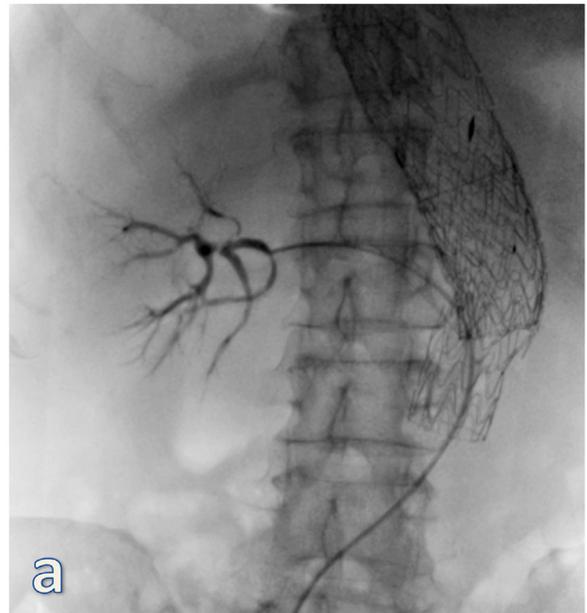


Fig. 2. a) Selective right renal angiography that confirms the post-stent focal thrombosis of the right renal artery with patency of intraparenchymal vessels. b) Clots that were removed after mechanical aspiration thrombectomy. c) Final angiographic control that demonstrates total right renal artery and right kidney intraparenchymal vessels patency.

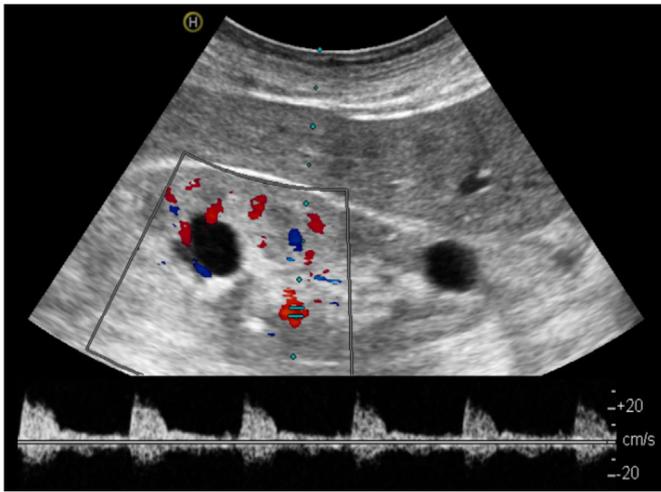


Fig. 3. Duplex sonography that demonstrates patency with regular arterial flow of intraparenchymal arteries of the right kidney.

The postoperative course was uneventful, and the patient was discharged on day 2 with anticoagulated with clopidogrel (75 mg/d) and life-long mono-antiplatelet treatment (aspirin 100 mg/d). Post procedure creatinine was 3.36 mg/dL, but in the first month his renal function gradually improved (serum creatinine value of 1.38 mg/dL). Patency of right renal artery and right kidney intraparenchymal arteries were confirmed by duplex sonography (Fig. 3).

3. Discussion

Experience with complete endo-debranching of visceral arteries has gained increasing favour for this indication using chimney and periscope techniques [1,2,7]. These techniques allow us to treat urgent “off-label” TAAA patients (generally aged ones) with complete exclusion of the aorta aneurysm and regular blood flow into the aortic branch arteries [1,2]. Although, this technique is associated with an increased risk of occlusion of branch vessel stents [7]. This is due to anatomic and hemodynamic changes associated with impending visceral stents: extension of the vessel (stents of 5–10 cm), vessel rigidity, changes in physiological vessel angles and retrograde revascularization (for periscope technique). Furthermore, these procedures are typically performed in elderly patients who may not be compliant with medical therapy.

So, patients treated with this technique need an accurate clinical and imaging follow up with the aim to prevent possible acute occlusion of stented branched vessel. When this pathological clinical situation happened, a prompt treatment to re-establish blood flow to abdominal aorta branch arteries has to be done as early as possible [5]. Published data from renal artery papers define revascularization up to 24 h as maximum time from the event [4] in presence of collaterals. This time is limited to 1–2 h in presence of complete ischemia with normothermia [4,8].

To guarantee renal perfusion in acute thrombosis, endovascular or surgical revascularization is required to achieve renal function preservation. Open surgical revascularization includes embolectomy and/or aorto-renal bypass [9]. This approach has significant morbidity and mortality compared to the endovascular one [9]. Based on the last recommendations, endovascular approach has become the first-line therapeutic approach in the management of renal artery injuries [10]. This is based on two modalities: percutaneous intra-arterial thrombolysis and mechanical thrombectomy. Both percutaneous modalities are effective to treat renal artery thrombosis [9,10]. Mechanical aspiration thrombectomy, started for acute ischemic stroke, is now used in abdominal visceral and upper/lower limbs arteries [5,6,8–12]. Its advantages compared to percutaneous intra-arterial thrombolysis are: less time to guarantee artery revascularization and reduced risks of possible bleeding.

There are only few previous cases reported published on endovascular aspiration thrombectomy in acute thrombosis of renal artery. To our knowledge, this is the first report done with the 8-Fr Penumbra system, and confirms that prompt endovascular intervention is necessary for renal salvage.

References

- [1] Lachat M, Frauenfelder T, Mayer D, Pfiffner R, Veith FJ, Rancic Z, et al. Complete endovascular renal and visceral artery revascularization and exclusion of a ruptured type IV thoracoabdominal aortic aneurysm. *J Endovasc Ther* 2010;17:216–20.
- [2] Cariati M, Mingazzini P, Dallatana R, Rossi UG, Settembrini A, Santuari D. Endovascular treatment of a symptomatic thoracoabdominal aortic aneurysm by chimney and periscope techniques for total visceral and renal artery revascularization. *Cardiovasc Intervent Radiol* 2014;37:251–6.
- [3] Karakaş MS, Korucuk N, Kemalöglü C, Altekin RE, Demir I. Renal artery occlusion in the late postoperative period managed with renal artery stenting after endovascular abdominal aortic aneurysm repair and renal function salvage. *Turk Kardiyol Dern Ars* 2017;45(5):462–5.
- [4] Jahangiri Y, Ashwell Z, Farsad K. Percutaneous renal artery revascularization after prolonged ischemia secondary to blunt trauma: pooled cohort analysis. *Diagn Interv Radiol* 2017;23:371–8.
- [5] Rossi UG, Rigamonti P, Dahmane M, Cariati M. Endovascular manual aspiration thrombectomy of acute superior mesenteric artery thromboembolic occlusion: the good, the bad, and the ugly. *Diagn Interv Radiol* 2013;19:518–20.
- [6] Ferro C, Rossi UG, Bovio G, Dahamane M, Centanaro M. Transjugular intrahepatic portosystemic shunt, mechanical aspiration thrombectomy, and direct thrombolysis in the treatment of acute portal and superior mesenteric vein thrombosis. *Cardiovasc Intervent Radiol* 2007;30:1070–4.
- [7] Tricarico R, He Y, Laquian L, Scali ST, Tran-Son-Tay R, Beck AW, et al. Hemodynamic and anatomic predictors of renovisceral stent-graft occlusion following chimney endovascular repair of juxtarenal aortic aneurysms. *J Endovasc Ther* 2017 [Epub ahead of print].
- [8] Navaravong L, Ali RG, Giugliano GR. Acute renal artery occlusion: making the case for renal artery revascularization. *Cardiovasc Revasc Med* 2011 Nov–Dec;12(6):399–402.
- [9] Tan TW, Todd Bohannon W, Mattos MA, Hodgson KJ, Farber A. Percutaneous mechanical thrombectomy and pharmacologic thrombolysis for renal artery embolism: case report and review of endovascular treatment. *Int J Angiol* 2011 Jun;20(2):111–6.
- [10] Loffroy R, Chevallier O, Gehin S, et al. Endovascular management of arterial injuries after blunt or iatrogenic renal trauma. *Quant Imaging Med Surg* 2017;7(4):434–42.
- [11] Law Y, Chan YC, Cheng SW. Aspiration thrombectomy of acute atrial fibrillation-related renal artery thromboembolism in a patient with horseshoe kidney. *Ann Vasc Surg* 2016;36:289.e5–289.e10.
- [12] Syed MI, Shaikh A, Ullah A, Akhter TS, Ranginwala S, Mohammed MI, et al. Acute renal artery thrombosis treated with t-PA power-pulse spray rheolytic thrombectomy. *Cardiovasc Revasc Med* 2010 Oct–Dec;11(4):264 [e1–7].