

CASE REPORT

Minimally invasive treatment of early post-traumatic renal arteriovenous fistula

Eduardo Villegas-Tovar,^{*,**} Regina Faes-Petersen,^{**} Alejandro Díaz-Girón-Gidi,^{*,**} Daniel Gómez de Segura,^{**} Francisco M. Vélez-Pérez,^{*,**} Ricardo Huacuja-Blanco,^{**} Ramón I. Lemus-Ramírez,^{**} Mario A. González-Chávez,^{**} Manuel Ojeda-Valdés,^{**} Luis G. Vázquez-Lavista,^{**} Alejandro J. González-Aguirre,^{***} Arturo Ramírez-Muciño^{**}

RESUMEN

Hombre de 45 años de edad, sin antecedentes de importancia, que se presentó posterior a accidente automovilístico con dolor en tórax y en región lumbar, así como hematuria. Al octavo día posquirúrgico presentó hematuria macroscópica abundante, por lo que se realizó urotomografía que mostró una probable fistula arteriovenosa (AVF) renal. Se realizó tratamiento con dos coils articulados y embolización selectiva con lipiodol y cianocrilato. El paciente evolucionó favorablemente y sin complicaciones. A un año de seguimiento se mantenía asintomático y sus estudios de laboratorio son normales. La AVF renal postraumática es una entidad poco frecuente. Es importante llevar a cabo un adecuado abordaje diagnóstico y no someter al paciente a procedimientos o cirugías innecesarios que puedan comprometer la funcionalidad del órgano. Con el advenimiento de los procedimientos de mínima invasión, el manejo de esta entidad no ocasiona daño mayor al tejido funcional, además de que su efectividad es muy alta.

Palabras clave. Hematuria. Fístula arteriovenosa. Embolización terapéutica.

ABSTRACT

A 45-years-old man, without relevant history that comes after a car accident with left chest and lumbar pain with hematuria. At 8th post-surgical day presented abundant macroscopic hematuria so urotomography was performed, it showed a probable renal arteriovenous fistula (AVF). Renal arteriography was performed and treated with 2 articulated coils and selective arterial embolization with lipiodol and cyanoacrylate. The patient improved without complications. A one-year follow remains asymptomatic and laboratory studies are normal. The AVF traumatic kidney is a rare entity. It is important to conduct a proper diagnostic approach and not expose the patient to unnecessary surgeries or procedures that could compromise the functionality of the organ. With the advent of minimally invasive procedures, in this case, supported by interventional radiology, the management of this condition does not cause further damage to the functional tissue; in addition its effectiveness it is very high.

Key words. Hematuria. Arteriovenous shunt. Surgical. Embolization. Therapeutic.

INTRODUCTION

The renal arteriovenous fistula is usually secondary to invasive procedures or post-traumatic clinical entity with low incidence, the symptoms are nonspecific so the diagnosis should always be suspected after trauma, management has become increasingly less invasive and with better results. The arteriovenous fistula (AVF) was first described by Varela in 1928.¹ The current prevalence is < 0.04%. It is classified into two types: congenital and

acquired. The first are < 25% and clinically manifest until the 3rd and 4th decade of life. The acquired with 70% are the most common and are of various etiologies such as idiopathic, secondary to percutaneous puncture, surgical procedures, closed or open injuries and even tumors.

CASE REPORT

We present the case of a 45 years old male with no history of importance, who started the day of admission

* Mexican Faculty of Medicine, University La Salle, Mexico City, Mexico.

** Surgical Department Unit, Medica Sur Clinic & Foundation, Mexico City, Mexico.

** Radiology Department Unit, Medica Sur Clinic & Foundation, Mexico City, Mexico.

Correspondence:

Eduardo Villegas-Tovar, M.D.
Surgical Department Unit. Medica Sur Clinic & Foundation.
Puente de Piedra, Núm. 150, Col. Toriello Guerra, Deleg. Tlalpan. C.P. 14050, Ciudad de México, México.
Tel.: (+5255) 5424-7200. Ext. 3500.
E-mail: eduardovillegas9@gmail.com

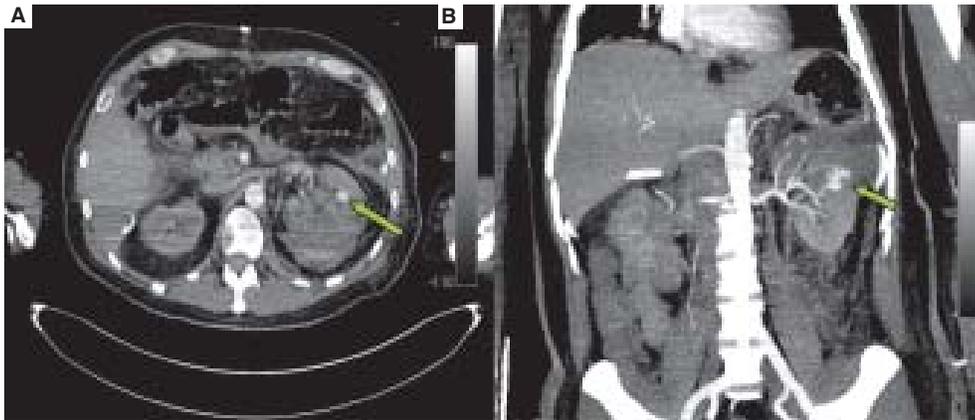


Figure 1. A. Urotomography arterial phase. Renal intraparenchymal pseudoaneurysm (arrow) with early filling of the left renal vein, suggestive of arteriovenous fistula. B. Coronal tomography reconstruction.

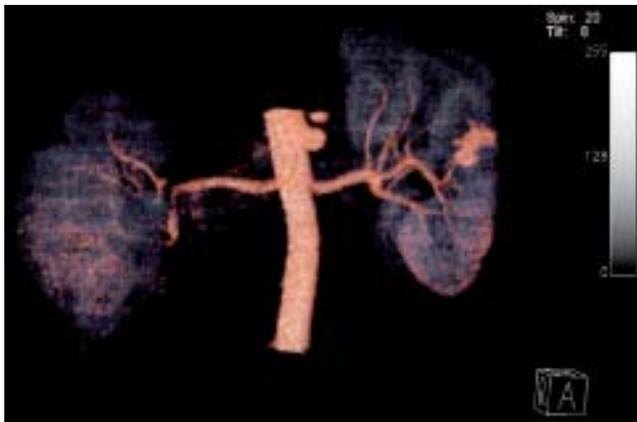


Figure 2. Volumetric reconstruction of urotomography in arterial phase. Pseudo-aneurysm is identified dependent division ventral (anterior) of the left interlobar renal artery, middle branch.

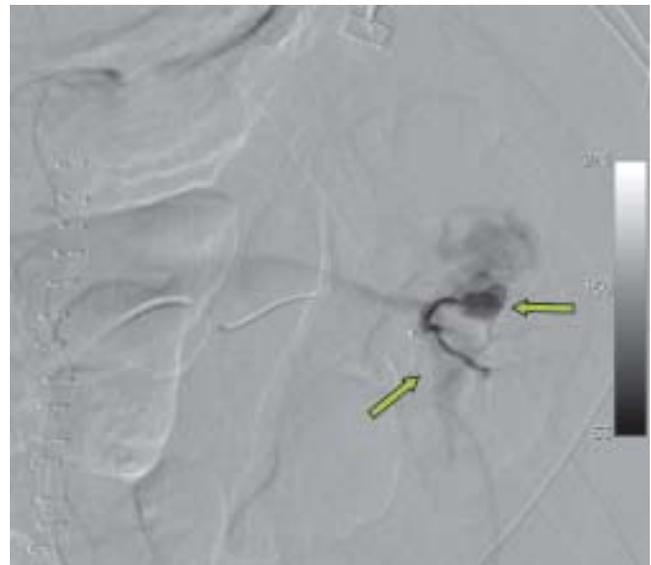


Figure 3. Selective angiography micro catheter. Segmental artery division ventral (anterior), middle branch. The arrow indicates the pseudo aneurysm with early opacification of the renal vein. The arrowhead indicates the opacification of the renal pelvis calyceal arteriovenous fistula.

after being involved in a car accident. He referred pain in the left side of the chest and lumbar region. A physical examination revealed tenderness on the left side of the chest with crepitation, and abdominal tenderness in epigastric, and left lower quadrant with signs of peritoneal irritation and hematuria after Foley catheter placement. Tomography was performed showing 70% left pneumothorax, left pulmonary contusion, abundant free fluid in the peritoneal cavity, 2 x 2 laceration of the left kidney. Laparotomy was performed with hemoperitoneum drainage of 2000 ml, hepatotomy of 2 lacerations and left chest tube placement, also left perirenal non expansive hematoma was found. At the 8th after surgery, the patient presented hematuria, urotomography examination of the abdomen revealed a suspected right-sided renal AVF (Figures 1 and 2). Computer tomographic angiography (CTA) was performed to assess the suspected lesion, and the diagnosis of a renal AVF was established (Figure 3),

performing selective arterial embolization, 2 articulated coils were placed and then a mix of lipidol with cyanoacrylate was administrated. The patient progressed satisfactorily. Control CTU was performed six days after the procedure without evidence of extravasation or AVF (Figure 4). The patient was discharged without complications. A one-year follow the patient remains asymptomatic.

DISCUSSION

We showed the minimally invasive treatment approach of early post-traumatic renal arteriovenous fistula.

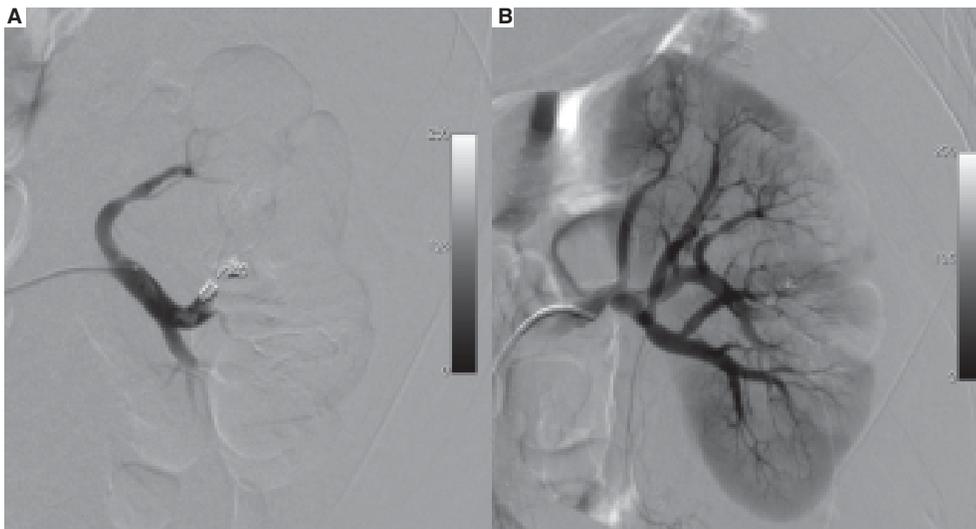


Figure 4. **A.** Selective angiography micro catheter. Segmental artery division ventral (anterior), middle branch. Result after coil embolization and n - Butyl - 2 Cyanoacrylate. **B.** Renal angiography. Result after coil embolization n - Butyl - 2 Cyanoacrylate.

Arteriovenous fistulas are abnormal communications with shunting of blood from an artery to a vein. The prevalence is less than 0.04%, with causes being iatrogenic or traumatic around 70%, congenital 25%, and idiopathic 3-5%. The congenital variety is identified from cirroid configuration and multiple communications between the arterial and venous channels. The acquired variety is secondary to various causes including trauma (20%), inflammation, or neoplasm.² Renal AVFs are usually asymptomatic, but signs and symptoms associated with renal AVFs include hypertension, the common manifestations of RAF are abdominal bruit (100%), hypertension and cardiomegaly (50%), congestive heart failure (32%), and gross hematuria (21%). In idiopathic AVFs, hematuria is less frequent, being observed in approximately half of the patients.^{3,4} The time period between the creation of the fistula and the clinical presentation can be very variable, ranging up to 1 year or even longer. With our patient, the AVF manifested with hematuria was the sign that forced suspect the diagnosis.⁵ In asymptomatic patients, anticipation of spontaneous closure may be the first choice in the management protocol since in a significant percentage of patients AVF occludes spontaneously.⁶

Selective renal arteriography is the diagnostic study of choice, the hallmark being a demonstration of an abnormal arterial communication with a vein. Therapeutic intervention is indicated in those fistulas that cause cardiac imbalance, progressive kidney failure, intense pain, high blood pressure (especially when uncontrollable) and refractory hematuria. There is also clear intervention indication when fistulas are secondary to tumor or when, after initial watchful approach, they become larger or be-

gin to manifest symptoms.⁷ The goals of surgical therapy are to close the fistula and to reestablish or maintain the vascular continuity. Since the 1970s, until percutaneous interventional methods were available, only surgical methods were the treatment of choice which included partial and total nephrectomy or resection of only the AVF. In the last two decades, it has been shown that percutaneous interventional therapy of AVFs is a safe treatment option and that selective occlusion of the feeding artery or the fistula itself preserves the surrounding renal parenchyma, which is not possible to that extent with surgical methods. Different agents were used such as Gianturco stainless steel coils, autogenous clot, gelfoam, and wall-stents transversing the fistula.^{8,9} A common complication is postembolization syndrome characterized by lumbar pain, fever, and leucocytosis. This condition is uncommon in superselective embolization.¹⁰

In conclusion, renal trauma may result in the formation of renal AVF. The angiography is the study of choice for diagnostic and treatment. Due to the period of onset of symptoms is a disease that must be ruled out in patients with a history of renal trauma or instrumentation. The current therapeutic can offer minimally invasive therapy, although there is a lack of large series comparing non-invasive treatments.

REFERENCES

1. Varela MC. Aneurisma arteriovenoso de los vasos renales y asistolia consecutiva. *Rev Med Lat Am* 1923; 14: 32-44.
2. Chen-Hsiang Shih, Po-Chin Liang, Fu-Tien Chiang, Chuen-Den Tseng, Yung-Zu Tseng, Kwan-Lih Hsu. Trans-catheter emboli-

- zation of a huge renal arteriovenous fistula with Amplatzer Vascular Plug. *Heart Vessels* 2010; 25(4): 356-8.
3. Perkov D, Novačić K, Novosel L, Knežević. Percutaneous embolization of idiopathic renal arteriovenous fistula using Amplatzer vascular plug II. *Int Urol Nephrol* 2013; 45(1): 61-8
 4. McAlhany Jr JC, Black HC, Hanback Jr LD, Yarbrough 3rd DR. Renal arteriovenous fistulas as a cause of hypertension. *Am J Surg* 1971; 122: 117.
 5. Guzmán Martínez-Valls PL, Hita Villaplana G, Miñana López B, Fernández Aparicio T. Lower massive hematuria deferred by arteriovenous fistula following percutaneous nephrostomy. *Arch Esp Urol* 2003; 56(10): 1158-60.
 6. Hans-Peter Dinkel, Hansjörg Danuser, Jürgen Triller. Blunt Renal Trauma: Minimally Invasive Management with Microcatheter Embolization-Experience in Nine Patients. *Radiology* 2002; 3(223): 723-30.
 7. Kawashima A, Sandler CM, Ernst RD, Tamm EP, Goldman SM, Fishman EK. CT evaluation of renovascular disease. *RadioGraphics* 2000; 20: 1321-40.
 8. Zulkif Bozgeyik, Huseyin Ozdemir, Irfan Orhan, Mutlu Cihangiroglu, Ziya Cetinkaya. Pseudoaneurysm and renal arteriovenous fistula after nephrectomy: two cases treated by transcatheter coil embolization. *Emerg Radiol* 2008; 15: 119-22.
 9. Guz G, Yuksel A, Onal B, Onaran M, Derici U, Sindel S. Selective embolization in the management of arteriovenous fistula after renal allograft biopsy preserves renal allograft function. *Int Urol Nephrol* 2005; 37(1): 207-8.
 10. Osawa T, Watarai Y, Morita K, Kakizaki H, Nonomura K. Surgery for giant high-flow renal arteriovenous fistula: experience in one institution. *BJU Int* 2006; 97: 794-8.