

RENAL ARTERIOVENOUS FISTULA: ABOUT A CASE

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Abstract: Arteriovenous malformations, also known as arteriovenous fistulas (AVF), are rare pathologies characterized by abnormal connections between the arterial and venous systems. It has a higher incidence in the right kidney, predominantly affecting women in the third and fourth decade of life. Its clinical manifestations vary according to its size, its etiology, its evolution time, as well as its location, and can be characterized by the presence of micro or macroscopic hematuria, lumbar or flank pain, nausea, vomiting and arterial hypertension. The case is presented of a 39-year-old patient who presented right lumbar pain approximately 96 hours ago, accompanied by hematuria that has increased sharply in the subsequent 24 hours.

Keywords: Arteriovenous malformation, embolizing agents.

INTRODUCTION

Arteriovenous fistulas (AVF) are rare pathologies that present with a higher incidence in women and in the right kidney, they are classified as congenital, acquired and idiopathic, clinically they manifest mainly with hematuria but other signs and symptoms must also be taken into consideration. symptoms such as back or flank pain, nausea, vomiting and high blood pressure.(1)

It is characterized by being an abnormal passage through the capillary bed between an artery and a vein. In 1923, Varela first described a renal artery fistula in a man with heart failure and arterial hypertension. (2) Renal artery fistulas can be classified according to their etiology as congenital or acquired. The first represents a quarter, while the second represents 70%. The latter is usually the result of some type of trauma to the renal parenchyma. Appropriate trauma, closed and open, is the cause of 10 to 15% of renal artery fistulae.(3-6)

Other authors describe three varieties of

renal AVF: congenital, which represents 14-27% of anomalies; idiopathic, which represents 4.8%; and acquired, which represents 70-80%. Acquired and idiopathic renal AVFs are characterized by large arteriovenous communications. The reduction in the venous vascular resistance of these communications causes a decrease in blood flow through the renal parenchyma, which leads to renal ischemia and the consequent activation of the renin-angiotensin system, which favors the appearance of hypertension and renal failure. In addition, this "vascular steal" phenomenon, which occurs due to the AVF, increases venous return and predisposes to high-output heart failure.(7)

Arterial fistulas can be acquired in most cases, after trauma or renal intervention, while congenital forms represent less than 25% of the total, even in the absence of an obvious pathophysiology. They have a wide range of symptoms, often hematuria and high blood pressure, with abdominal pain being a less common symptom. Treatment can be conservative or through invasive procedures. (8)

This condition occurs more frequently in the right kidney (60%), located in the upper pole in 40 to 45%, in the middle in 25 to 30%, and in the lower pole in 20 to 25%. This type of renal AVF is almost always located in the adrenal gland.(3,9)

They can present with a variety of signs and symptoms, ranging from high blood pressure to the presence of a kidney mass. Imaging is valuable in detecting and characterizing these lesions, with the presence of an arterial shunt being a feature.(10)

Diagnosis can be made based on standard diagnostic procedures such as physical examination, Doppler ultrasound, and computed tomography.(8)

Regarding its imaging diagnosis, Doppler echo and renal arteriography are mainly used.

While its treatment of choice is embolization, since it facilitates a highly conservative intervention with a low percentage of complications.(11)

CASE

PATIENT REPORT

A 39-year-old female patient, mestizo, higher education, civil servant, Catholic, blood group O Rh (+), diagnosed with arterial hypertension 2 years ago, treated with Losartan 100 mg every day.

CLINICAL FINDINGS

General physical exam

Patient in active supine position, awake, oriented, with preserved psychomotor activity, weight 62.5 kg, height 155 cm, temperature 36.8

degrees centigrade, heart rate 78, respiratory rate 18/min, blood pressure 125/74 mm. Hg., saturation 92 ambient air.

Regional physical exam

(i) Head

Normocephalic, black hair with normal implantation.

Eyes: Normally reactive isochoric pupils to light, slightly pale sclerae.

Ears: Auricle with normal implantation, patent external auditory canal.

Nose: Normal nasal pyramid, permeable nostrils.

Mouth Moist oral mucosa, teeth in fair general condition.

(ii) Neck

Symmetric active and passive mobility preserved, no enlarged lymph nodes are palpable.

(iii) Thorax

Symmetric expansibility preserved.

Respiratory System Lungs vesicular murmur

Cardiovascular system. Rhythmic heart sounds, no murmurs, no added noises.

(iv) Abdomen

Soft, depressible without signs of peritoneal irritation, pain on superficial and deep palpation in the flank and right iliac fossa

(v) Extremities

Symmetrical, strength and mobility preserved, capillary refill less than two seconds.

(vi) Inguinogenital region

Female external genitalia without pathology.

TIME LINE/CHRONOLOGICAL LINE

A 39-year-old patient referred from a Provincial hospital to a Third Level Hospital who, approximately 48 hours before attending, presented with persistent right lumbar pain, which radiates to the right hemiabdomen and increases with deep breathing, accompanied by fatigue, refers also macroscopic hematuria on repeated occasions. Presented after asthenia decay.

2021/10/12 In a second level hospital, a URO CT is performed on suspicion of Urolithiasis, as well as laboratory tests.

2021/10/13 In the same health home, a renal Doppler echo is performed.

2021/10/17 Patient transferred to tertiary hospital for comprehensive management with results of UROTC and renal Doppler ultrasound

2021/10/18 The admission to the Third Level Hospital is completed, where laboratory tests and AP chest X-ray are performed, where the course of action to follow is decided.

2021/10/20 Renal arteriovenous fistula embolization is performed

2021/10/21 Compliance with the performance of a control renal ultrasound where it is evident that the arteriovenous fistula has been excluded.

DIAGNOSTIC EVALUATION

Laboratory exams

2010/10/12

- Hematic biometry

Hct:42.5%

Hb: 14.2

Leukocytes: 8500

- Blood chemistry

Creatinine 1.5

electrolytes

Sodium: 143mEq/L

Potassium: 4.7 mEq/L

Chlorine :104.2 mEq/L

Imaging exams

Simple UROTC: Axial cut shows a hyperdense image in the right renal pelvis associated with pyelocalyceal dilatation.

Neither nephro nor urolithiasis is observed.

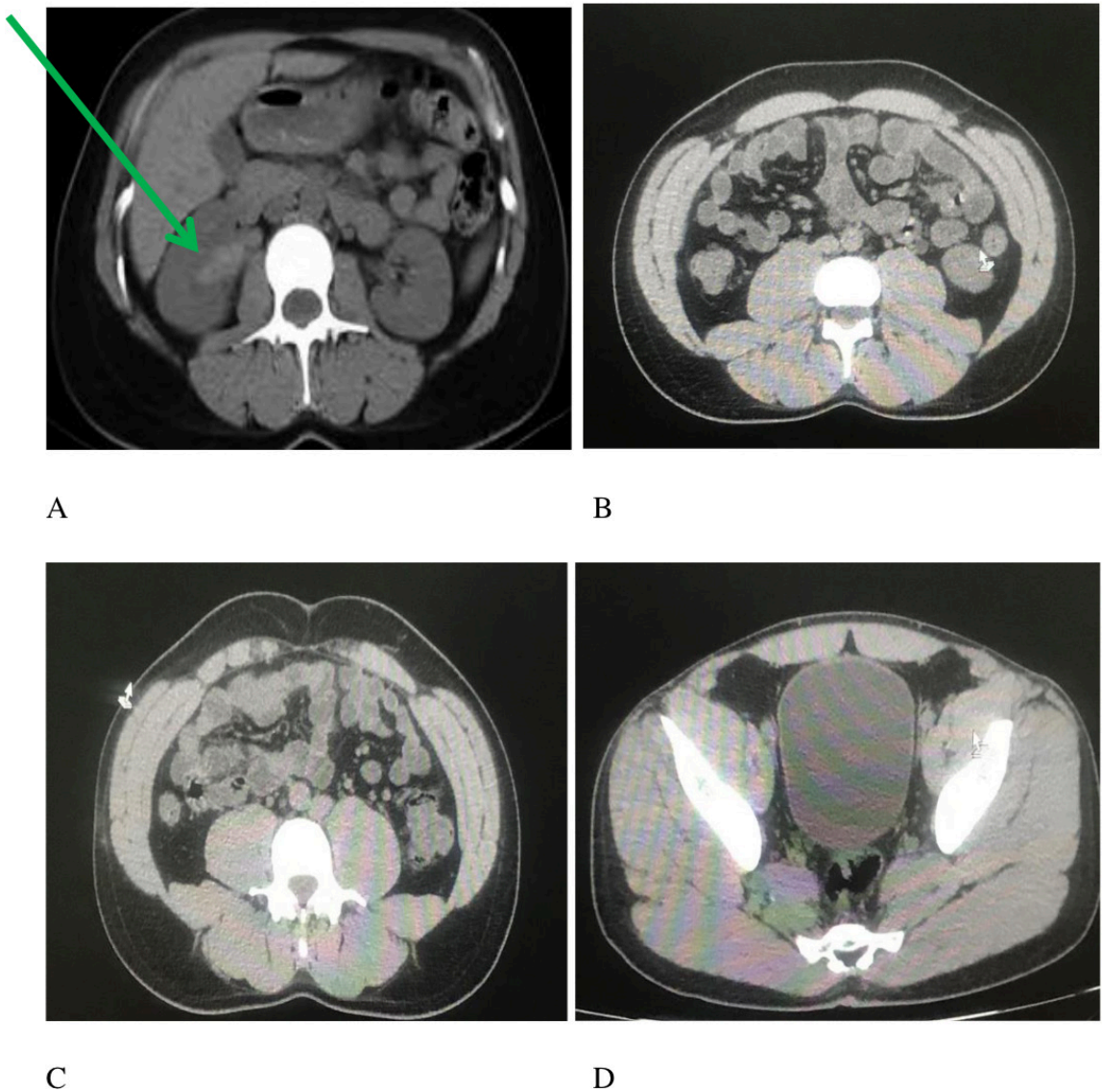
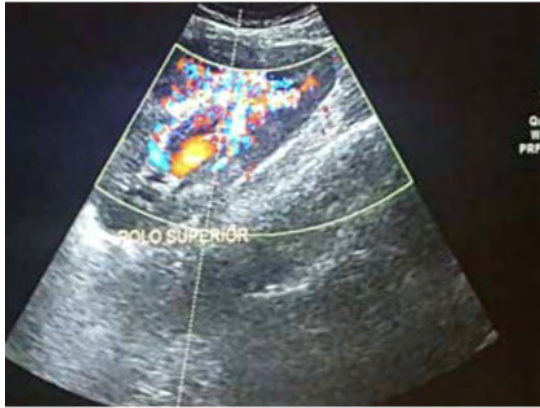
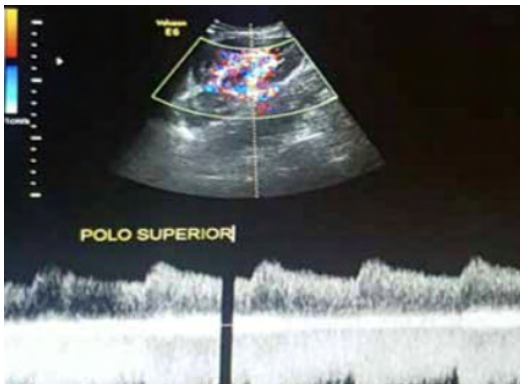


Figure 1 (A) UROTC simple hyperdense image (arrow) in the right renal pelvis associated with pyelocalyceal dilatation (B, C, D). Neither nephro nor urolithiasis is observed.

KIDNEY DOPPLER ECO: Given the creatinine value of 1.5, they decided not to request a contrast study and proceeded with a renal echo Doppler, in which low-resistance arterial flow, arterialized venous flow, highly suggestive of arteriovenous fistula, were observed.



A



B

Figure 2 (A, B): **Kidney echo Doppler** shows low-resistance arterial flow, arterIALIZED venous flow.

Based on the clinical analysis, cabinet and laboratory tests, the patient is diagnosed with arteriovenous fistula.

Differential Diagnosis

Taking into consideration its main symptomatology and taking into account that hematuria is one of the main reasons for urological consultation, it is necessary to take into account both its nephrological and non-

nephrological causes.

Non-nephrological causes

Thus, within the non-nephrological etiology in this patient we must think of kidney tumors, kidney stones, urinary infection, urological trauma, renal vascular processes.

Nephrological causes

These pathologies must be classified into primary and secondary

Primaries

Glomerulopathies and glomerulonephritis

Secondaries

Regarding the secondary renal causes we have: systemic lupus erythematosus, Schonlein-Henoch purpura, Goodpasture syndrome, vasculitis, Fabry syndrome, thrombotic microangiopathy, endocarditis, sepsis and amyloidosis.

THERAPEUTIC INTERVENTION

In the tertiary hospital, laboratory tests are performed again with the following results:

- INR 1.15, TP 12.6, TTP 27.5
- GLUCOSE 85, UREA 22.7, CREATININE 0.9
- CL 100 K 4.2 NA 140

An AP chest X-ray was also performed, reporting Grade II cardiomegaly and no evidence of active pleuropulmonary injury.



Figure 3 PA chest X-ray without active pleuropulmonary lesion.

Subsequently, embolization of the arteriovenous fistula was performed, under general anesthesia, by means of a right femoral Seldinger (introducer 10 f), abdominal aorta catheterization (aortogram), and selective catheterization of the right renal artery (multipurpose pig tail catheter 5fr, Teflon-coated guide 0.035), angiographic injections were performed in AP and oblique projections.

Using a coaxial system (c2 cobra 5 fr catheter, mikaelson 5f, carrier contra 8f, microcatheter 18, echelon 14 microcatheter, and traxcess 0.014 microguide), superselective catheterization of an arteriovenous fistula identified in the upper renal segment was performed. The following microcoils were placed: 18: 22mmx63cm (x3), 20mmx65cm (x2), 20mmx48cm (x2), 24mmx68cm, 18mmx50cm (x2), 4mmx10cm (x2) and system 10: 16mmx40cm (x3), 16mmx30cm. Embolizing fluid (onyx 18, 4 bottles, 6ml in total) and gealfoam compound were used. Final angiographic controls were performed in AP and oblique projections.

The procedure was carried out without complications.

Describing as findings:

Arteriovenous fistula at the emergency level of the right upper renal artery with an aneurysmal-varicose component, embolization was performed using coiling, embolizing liquid (onyx 18) and gealfoam paste.

CONCLUSION

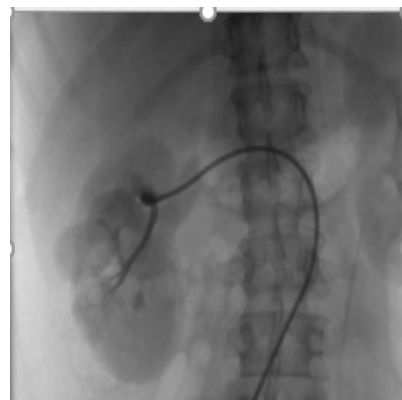
- Acquired renal arteriovenous fistula, with aneurysmal component - varicose and total embolization of it.



A



B



C

Figure 4 (A, B, C) Angiographic projections. Acquired renal arteriovenous fistula, with aneurysmal component - varicose and total embolization of it.

MONITORING AND RESULTS

The day after the angiographic procedure, a control renal echo is performed, in which normal vascular flow is observed in the lower pole of the right kidney. AV fistula excluded.

DISCUSSION

Arteriovenous malformations or also called arteriovenous fistulas are rare pathologies that are caused by abnormal connections between the intrarenal arteries and veins.

They are classified as idiopathic, congenital and acquired, the latter being the most frequent and generally presenting in patients who have suffered some iatrogenic trauma such as biopsy, lithotripsy or surgery.

Its clinical manifestations are varied depending on its size, location, etiology and evolution time, with hematuria present in 75% of cases, although other symptoms such as nausea, vomiting, lumbar or right flank pain, as well as also signs such as high blood

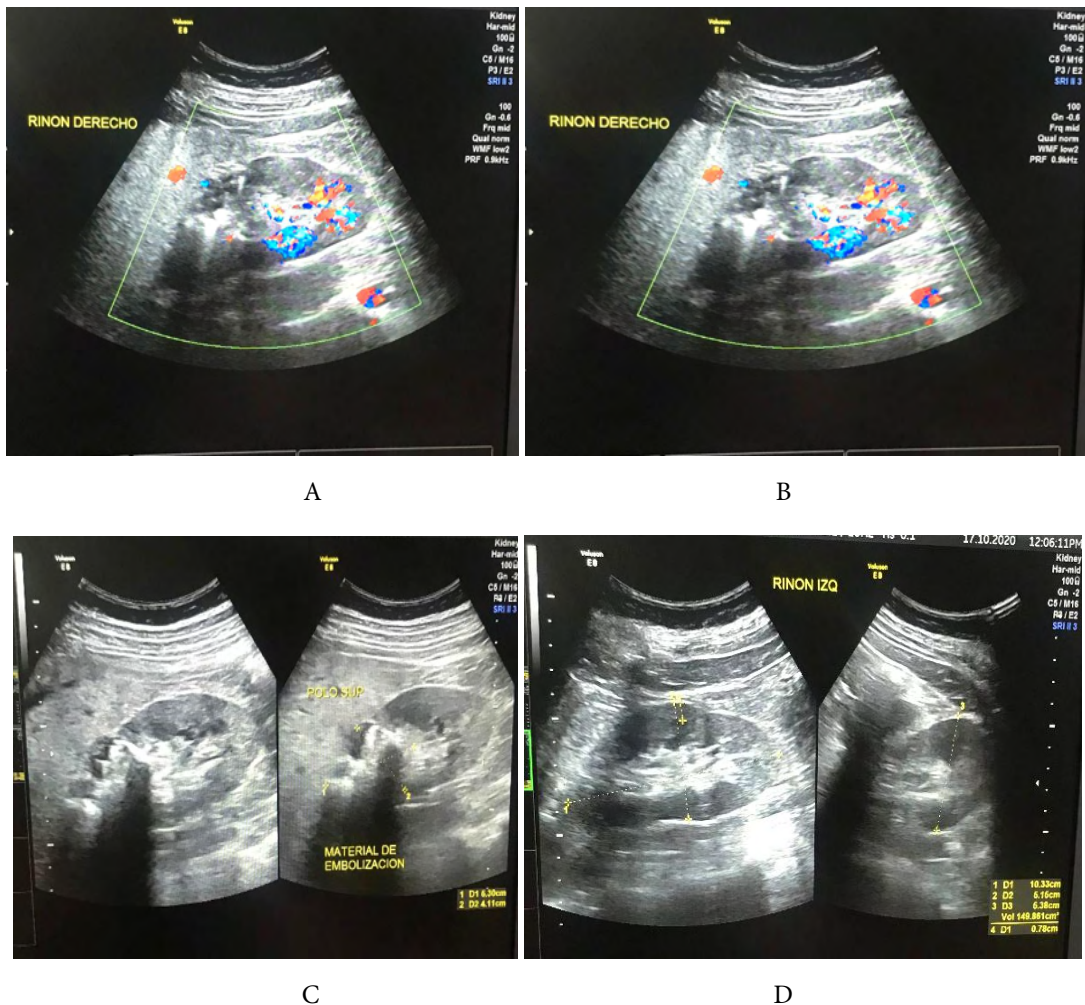


FIGURE 5 RENAL ECO (A, B, C) right kidney of normal size and location. In the upper pole, hyperechoic embolization material is observed in an area of 5 x 4 cm. which casts a posterior acoustic shadow. The lower pole shows normal corticomedullary differentiation. Doppler shows preserved vascularity up to arcuate arteries in the lower pole. the inferior segmental artery presents a preserved flow with RI of 0.67. and VPS of 28cm/sec. no vascularity is identified in the upper pole, AV fistula excluded. (D) left kidney with normal size and echostructure. Pyelocaliceal ectasias are not identified. No perirenal fluid.

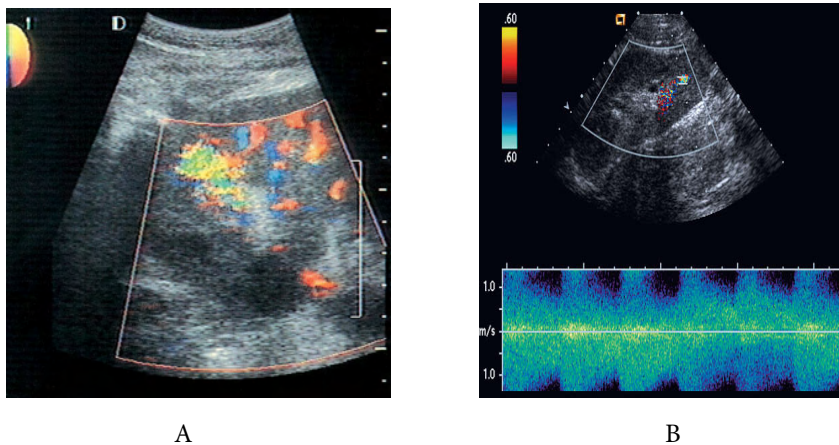


FIGURE 6 (A) Arteriovenous fistula. Color flow Doppler image demonstrating a focal increase in intrarenal flow, with a colored tissue murmur outside the renal vessels caused by vibration of the adjacent renal parenchyma. (B) Spectral Doppler tracing obtained at the site of the fistula, showing reveals a high-velocity, turbulent arterial tracing.

pressure or the presence of a palpable flank mass.

Regarding imaging methods, one of the most used is renal Doppler ultrasound, in which special attention must be paid to ultrasound findings such as the presence of colored rays or sounds, with the murmur being visible in the parenchyma. With spectral Doppler, the presence of high-velocity, low-resistance arterial flow in a feeding artery, while in a draining vein there will be turbulent and variable flow, i.e. arterial.

Another imaging method used to detect arterial fistulas is dynamic contrast-enhanced computed tomography (CT), which can differentiate between arteries and AVF branches, as well as changes in blood flow. Computed tomography angiography (CT angiography) is also sensitive for the detection of renal arteriovenous malformations, since it reveals the vascular components and their hemodynamics.

Regarding treatment, there are three therapeutic options among which we have:

- Follow-up, used in the absence of symptoms, a considerable percentage (70%) of AVFs resolve spontaneously,
- Selective embolization, it is aimed at the

treatment of symptomatic AVF, more used due to its conservative characteristics, however, it is not exempt from complications, although in a small percentage it can cause pulmonary embolism or renal infarction

- Surgical treatment, generally used in case of failed embolization, or refractory hypertension, trying to preserve as much of the parenchyma as possible.

PATIENT PERSPECTIVE

Selective embolization of the renal arteries is an effective and efficient method for the treatment of arteriovenous fistulas and its complications are rare, so the patient has an excellent prognosis.

THANKS

We express our undying gratitude to the patient for her collaboration in carrying out this work.

The researchers have no conflict of interest

INFORMED CONSENT

The informed consent was obtained from the patient directly because she was a person of legal age.

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