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Successful Endovascular Treatment of Right Renal Vein Aneurysm Secondary to Idiopathic Proximal Arteriovenous Fistula

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Abstract

Renal vein aneurysms are a rare clinical entity but their association with a renal idiopathic arterio-venous fistula can be considered an exceptional event. We report the case of a 60-year-old female with an asymptomatic right renal vein aneurysm secondary to an idiopathic proximal intraparenchymal arteriovenous fistula. The patient underwent transcatheter embolization of the renal vein aneurysm with temporary distal renal vein balloon occlusion. Therapeutic options nowadays available and technical details of the procedure performed are analyzed.

Keywords: Renal vein aneurysm; Renal arterio-venous fistula

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Introduction

A venous aneurysm consists of a focal dilatation associated with thin wall, medial atrophy and may more likely be solitary, usually involving the lower limbs while other localizations are rare. Incidental diagnosis of visceral vein aneurysms is increasing according to the use of accurate and modern imaging; nonetheless, they are extremely rare overall; the most common locations are portal vein, superior mesenteric vein, inferior vena cava and splenic vein; renal vein aneurysms are among the rarest in this subset (<3% of visceral vein aneurysms) [1,2].

Renal vein aneurysms (RVA) are more common on the left side due to hemodynamic (nutcracker phenomenon) and embryologic factors; they are frequently asymptomatic but can be complicated by thrombosis, rupture, compression of adjacent anatomical structures and pulmonary embolism [1].

Up to now, 15 cases of renal vein aneurysm have been reported in the literature, of which only 7 have been surgically treated [2-16].

The presence of a renal intra parenchymal proximal arteriovenous fistula (AVF) has already been reported in the literature in association with a RVA, but only in two cases was it idiopathic [2,12].

Renal AVFs are rare, and only about 200 cases have been reported. In more than 70% a iatrogenic injury is suspected. Non-iatrogenic renal AVFs are mostly related to malignancy or to fibro muscular dysplasia [2].

AVFs have extremely different angioarchitecture and hemodynamic characteristics from each other. The pathologic arteriovenous shunting may cause renal hypertension, flank pain, thrombosis, massive hematuria, pain and heart failure [17-20].

No consensus about the indication for surgical treatment of RVAs has been well established. The proposed treatments were the simple repair of the aneurysm when technically feasible and a partial or total nephrectomy in all other cases [14]. More recently resection of the aneurysm and inferior mesenteric vein transposition to the remaining left renal vein has been described [15].

Endovascular techniques permit in many cases the correction of both renal vein aneurysms and renal AVFs; transcatheter embolization is gradually replacing traditional surgical open repair, lowering the operative risk for these patients [12,15].

In this article we describe a successful endovascular treatment of a right renal vein asymptomatic aneurysm secondary to idiopathic proximal intraparenchymal arteriovenous fistula in a 60-year-old female and analyze the technical details of the procedure performed.

Clinical Case

A 60-year-old woman presented with a CT diagnosis of right renal

AVF and aneurysm of a lower branch of the right renal vein with a maximum diameter measuring 61 mm on the axial plane **(Figure 1A and 1B)**; the lesion was increased compared to a previous CT examination of 5 years earlier, when it had a maximum diameter of 43 mm. The patient was asymptomatic and had no findings at the physical examination related to the RVA or the AVF; other pathological conditions were secondary panipopituitarism (previous intervention for parasellar meningioma), previous left external-internal carotid bypass, visual impairment (left eye blindness, visus reduction in right eye), hypervascularized hepatic nodule, former smoking and familiarity for ischemic heart disease.

Through percutaneous right femoral vein puncture a 7F sheat was placed and the right renal vein was selectively catheterized **(Figure 1C-1E)** while the right renal artery was catheterized after placement of a 4F sheat through right femoral artery access **(Figure 1C)**. The lower branch of the right renal vein was then occluded by a 12x20 mm Mustang (Boston Scientific, Marlborough, Mass, USA) angioplasty balloon inflation **(Figure 2A)** and the RVA was then safely embolized through the arterial access using endovascular coils (Balt, Montmorency, France) and 3 ml of ethylene vinyl alcohol copolymer (Onyx 34 EV3-Covidien, Irvine, Ca, USA), without risk of migration of embolizing materials through the efferent venous vessel **(Figure 2B and 2C).**

Considering the duration and complexity of the procedure we left the AVF untreated **(Figure 2D)**, proposing to address it if clinically necessary in a second step, even if, for the time being, no clinical or morphological factors that prompted us to proceed with AVF occlusion were found during the follow-up.

The postoperative course was uneventful, and the patient was discharged from the hospital on the 2nd postoperative day.

At 12 months follow-up CT showed complete thrombosis of the RVA, patency of renal vessels without any significant change in AVF morphology **(Figure 3A and 3B)**. Twenty-four months after the procedure a duplex-scan examination confirmed these results. No symptoms AVF-related appeared after the procedure and during the follow-up.

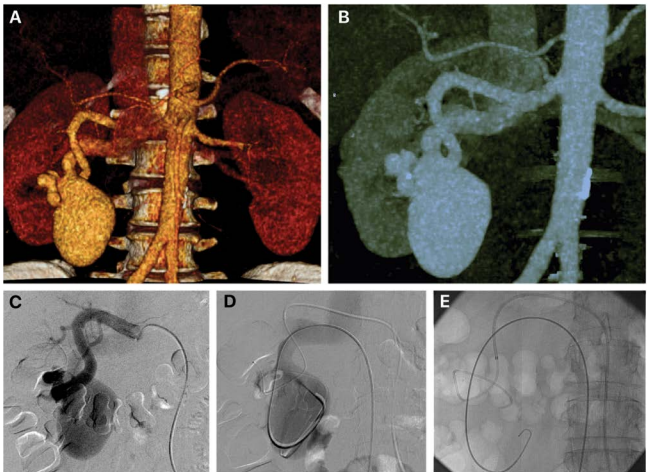

Figure 1 Preoperative contrast-enhanced CT with 3D reconstructions (A, B) showing the right renal AVF and RVA (maximum diameter 61 mm). Intraoperative selective angiography showing the AVF (C) and the RVA (D) and a detail of the contemporary arterial and venous catheterization of the lesions (E).

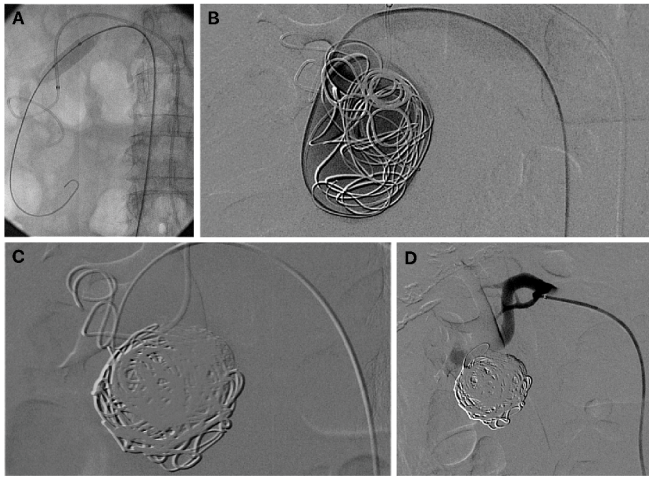

Figure 2 Intraoperative angiography showing the lower branch of the right renal vein occlusion by a 12 x 20mm angioplasty balloon inflation (A), the RVA coiling (B), the ethylene vinyl alcohol copolymer injected in the RVA (C) and the final result of the procedure (D).

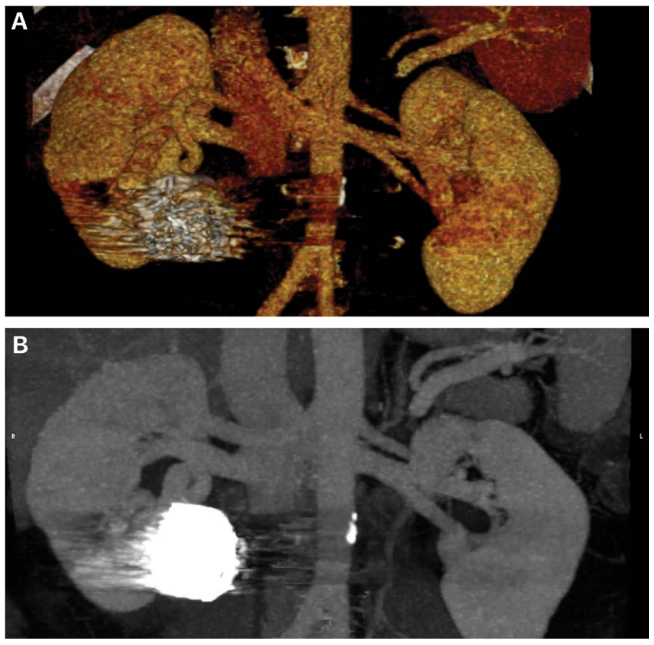

Figure 3 The 12 months follow-up contrast-enhanced CT with 3D VR (A) and MIP (B) reconstructions showing complete thrombosis of the RVA and patency of the renal vessels.

Discussion

Open repair with surgical exclusion is considered the gold standard for treatment of renal vein aneurysms; however, it is associated with an increased procedure-related mortality and with the not negligible risk of unplanned nephrectomy [19,21].

Endovascular option is associated with lower operative risk, shorter hospital stay and decreased mortality rates compared with open repair, but it is a kind of treatment not yet widely described in the literature and of which the results are not known in the long term [21].

Several endovascular techniques are considered in this field, also in association with each other: stenting, thrombogenic liquid injections, embolization with coils or plug. Every technique has disadvantages and should be considered according to anatomical situation, presence of fistula, risk of major renal artery branch occlusion and consequently loss of functioning renal parenchyma, with a 14% incidence of such an event reported in the literature [22].

The concomitant presence of a proximal AVF can make the endovascular treatment of the RVA far more complex. Most studies reflect the difficulty in achieving complete embolization of multiple AVF feeders while attempting to preserve renal parenchyma. In addition, the use of coils and thrombogenic liquids in fistulas could carry the risk of pulmonary embolisms [20,23,24].

Total occlusion of AVF abnormal vessels is recommended in order to prevent recurrence; however, in large and complex lesions partial occlusion may be sufficient for a good clinical result without severe loss of renal functionality, especially in elderly, mono-renal patients or when renal insufficiency is present [25].

In the case presented the main technical notes of the procedure were the contemporary arterial and venous catheterization of the lesions **(Figure 1E)**, which allowed the temporary distal renal vein balloon occlusion through the venous access and the subsequent safely embolization through the arterial access of the RVA by coils and ethylene vinyl alcohol copolymer.

In addiction, it is crucial to underline that the introduction of smaller catheters and more precise delivery of embolic materials have drastically reduced the morbidity associated with this technique (maximal preservation of functioning renal parenchyma), including eventually open nephrectomy.

Conclusion

Our result supports the feasibility, safety, and efficacy of transcatheter embolization of RVAs. Since the long-term results of endovascular treatment of this rare clinical entity are not known, careful follow-up is essential to reduce the risk of late failures.

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