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Wide-Neck Renal Artery Aneurysm Managed with Neuro-Retrievable Stent-Assisted Coil Embolization

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Abstract

Endovascular management of narrow-necked aneurysms has traditionally been with coil embolization; however, wide-necked aneurysms have been more difficult to treat due to risk of distal coil migration or intrusion into a parent vessel. We describe the case of a 76-year-old female who presented with a left-sided renal artery aneurysm and 11 mm aneurysm neck. Renal arteriography of the superior pole branch was performed, lower pole was stented, and a retrievable stent was placed in the inferior branch for the purpose of stent-assisted coiling. Penumbra detachable coils were deposited through the stent struts to jail them in with successful embolization of the aneurysm. Endovascular treatment of wide-neck renal artery aneurysms has the potential to be a successful treatment alternative in patients where surgical intervention is contraindicated. Additional studies should be performed to determine the versatility and extent of success in coil embolization for wide-neck aneurysms.

Keywords

- aneurysm
- renal artery aneurysm
- stent-assisted coiling
- wide-neck

Introduction

Renal artery aneurysm (RAA) remains a rare diagnosis, with an incidence rate of 0.7%.[1] One classification of aneurysms is wide versus narrow necked, with wide-necked being defined as more than or equal to 4 mm.[2] While endovascular management of narrow-necked aneurysms has traditionally been with coil embolization, wide-necked aneurysms are more difficult to treat as there is increased risk of distal coil migration or intrusion into the parent vessel.[3] This study describes the application of an existing neuro-retrievable stent device to assist in coil embolization of a wide-necked RAA, with subsequent removal of the stent.

Case Presentation

The institutional review board approved the presentation of this case report.

This letter includes a case of a 76-year-old female who presented with a left-sided RAA and 11 mm aneurysm neck, causing diffuse abdominal pain for 3 weeks. Her only presenting complaint was abdominal tenderness to palpation. Her medical history included hypertension managed with losartan 50 mg and amlodipine 10 mg, type 2 diabetes mellitus managed with metformin 500 mg, and hyperlipidemia managed with atorvastatin 40 mg.

A computed tomography (CT) of the abdomen was obtained, which revealed an incidental finding of a 2.4 × 1.9 cm left-sided RAA (►**Fig. 1A**). A diagnostic angiogram of the was subsequently conducted, which confirmed the presence of a left-sided RAA (►**Fig. 1B**). Further angiogram imaging showed a wide-based neck measuring 11 cm, located distal to the main renal artery at the bifurcation of the left hilar artery (►**Fig. 2A**). The decision was made to manage the aneurysm endoscopically due to the patient's multiple comorbidities, deeming her a high-risk candidate for surgical intervention.

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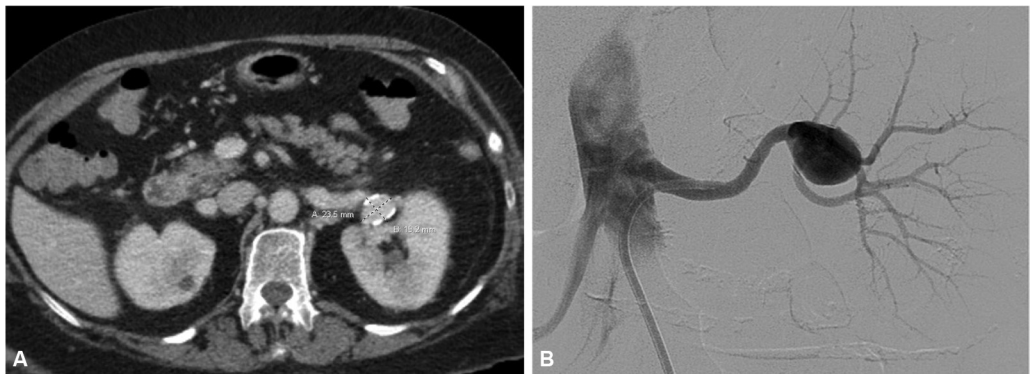

Fig. 1 (**A**) Computed tomography imaging showing renal artery aneurysm with measurements of 2.4 × 1.9 cm. (**B**) Arteriogram of left renal artery showing aneurysm.

The patient's right common femoral artery was accessed with the Micropuncture Access Set (Cook Medical, Bloomington, Indiana, United States) using the Seldinger technique. A 0.035 mm Amplatz wire was directed into the left renal artery under fluoroscopy. A 7-French (Fr) sheath was introduced into the left renal artery, followed by renal angiogram of the superior pole branch with a 2.8-Fr microcatheter that was positioned in the aneurysm. Renal angiogram of the inferior pole branch was also performed using a second 2.6-Fr microcatheter. Both angiograms demonstrated viable blood flow distally to the aneurysm (►**Fig. 2B** and **2C**).

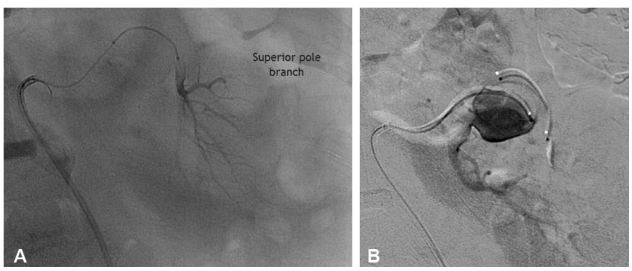

Fig. 2 (**A**) Angiography image of the superior pole branch taken using a 7 French (F) catheter and 2.8 F microcatheter. (**B**) Aneurysm is seen here clearly. (**C**) Angiography image of the inferior pole branch taken via 2.6 F microcatheter.

Several images of the upper and lower poles were obtained from various angles, and the decision was made to protect the lower pole with a retrievable stent for the maintenance of vessel patency and distal blood flow. A Medtronic Solitaire Neuro (Medtronic Inc, Mansfield, Massachusetts, United States) retrievable stent was deployed in the inferior branch for stent-assisted coiling (►**Fig. 3A**). Three sets of distal markers (3 mm, 4 mm, and 6 mm) were on the stent to aid in visualization. Following stent placement, detachable coils (SMART; Penumbra Inc., Alameda, California, United States) were deposited through the stent struts to jail them in (►**Fig. 3B**). A total of 4 complex-shaped coils were deployed (Penumbra Coil 400 19 mm x 52 cm, 19mm x 52 cm, 17 mm x 48 cm Complex Standard and 12 mm x 42 cm Complex Soft; Penumbra, Inc.). Digital subtraction angiogram was performed to ensure adequate placement of coils and to confirm no change in blood flow. Once adequate placement of coils was confirmed and adequate blood flow was verified, the stent was retrieved. Angiographic imaging was performed following stent retrieval to further confirm successful embolization of the aneurysm without compromising blood flow distally (►**Fig. 3C**).

Follow-up CT imaging was obtained 24 hours postprocedure, which showed that the coils were stationary (►**Fig. 4A** and **4B**). Postprocedure laboratory findings showed stable hemoglobin of 11.5, similar glomerular filtration rate

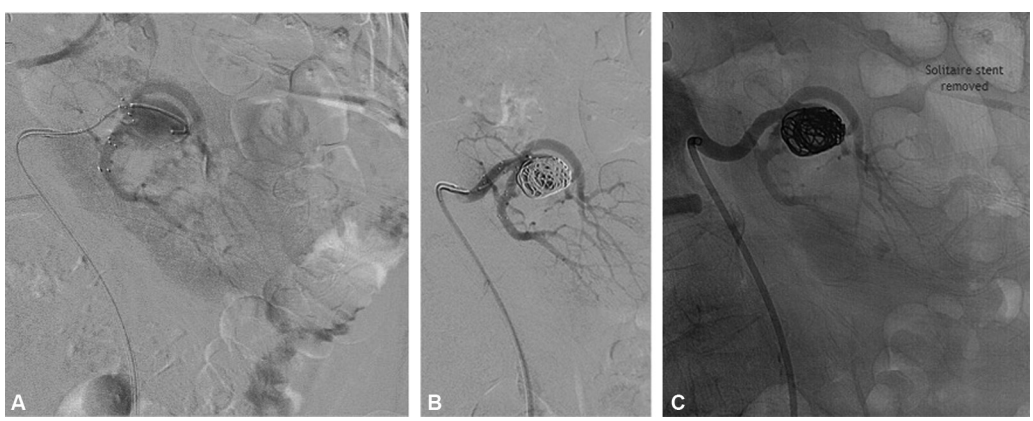

Fig. 3 (**A**) The Medtronic neuro stent is deployed in the lower pole. (**B**) Penumbra detachable coils deposited in aneurysm. (**C**) Medtronic stent has been removed.

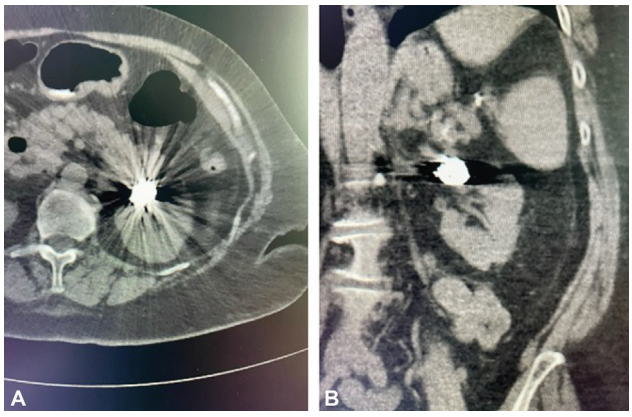

Fig. 4 (**A** and **B**) Axial and coronal view.

compared to preprocedure (91 mL/min preprocedure and 97 mL/min postprocedure) and stable vital signs. The patient was maintained on her medication regimen at discharge 48 hours postprocedure. No oral anticoagulation was added to the patient's regimen postprocedure. The patient did not follow up for her scheduled 1 month postprocedure evaluation for additional CT imaging.

Discussion

This case demonstrates successful endovascular intervention of a wide-neck RAA, specifically with the aid of a retrievable stent. Existing literature on other methods to perform coil embolization using a retrievable stent, such as the "waffle cone" technique, has shown successful technical and clinical outcomes. The waffle cone technique is performed by deploying the retrievable stent into the artery of interest, with the proximal end of the stent positioned into the renal artery and the distal end at the proximal portion of the aneurysm. The waffle cone technique was not used in our patient due to the stent used in our patient. Waffle cone techniques often utilize the closed-cell enterprise stent, which has flared ends that can remodel the aneurysm neck by conforming got the shape of the aneurysm neck. Additionally, the utilization of covered stents for aneurysm exclusion was not possible due to the proximity of bifurcation to the aneurysm.

Overall, endovascular treatment of wide-neck RAA with neuro-retrievable stents has the potential to be a successful treatment alternative in patients where surgical intervention is contraindicated. Additional studies should be performed to determine the versatility in coil embolization specifically using retrievable stents.

Ethical Approval Statement

Institutional Review Board approval was obtained for this manuscript.

Conflict of Interest

None declared.

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