



Renovascular Hypertension due to Median Arcuate Ligament Syndrome Treated by Open Bypass after Failed Endovascular Treatment

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Median arcuate ligament syndrome (MALS) is a rare condition in which the median arcuate ligament compresses the celiac artery (CA) and celiac ganglia, causing abdominal pain [1]. The superior mesenteric artery (SMA) is occasionally compressed because of anatomical variations [2,3]. We

recently experienced a rare case of MALS that compressed the CA, SMA, and right renal artery (RA), resulting in renovascular hypertension.

A 20-year-old male presented with uncontrolled hypertension. Four years earlier, he presented with high blood

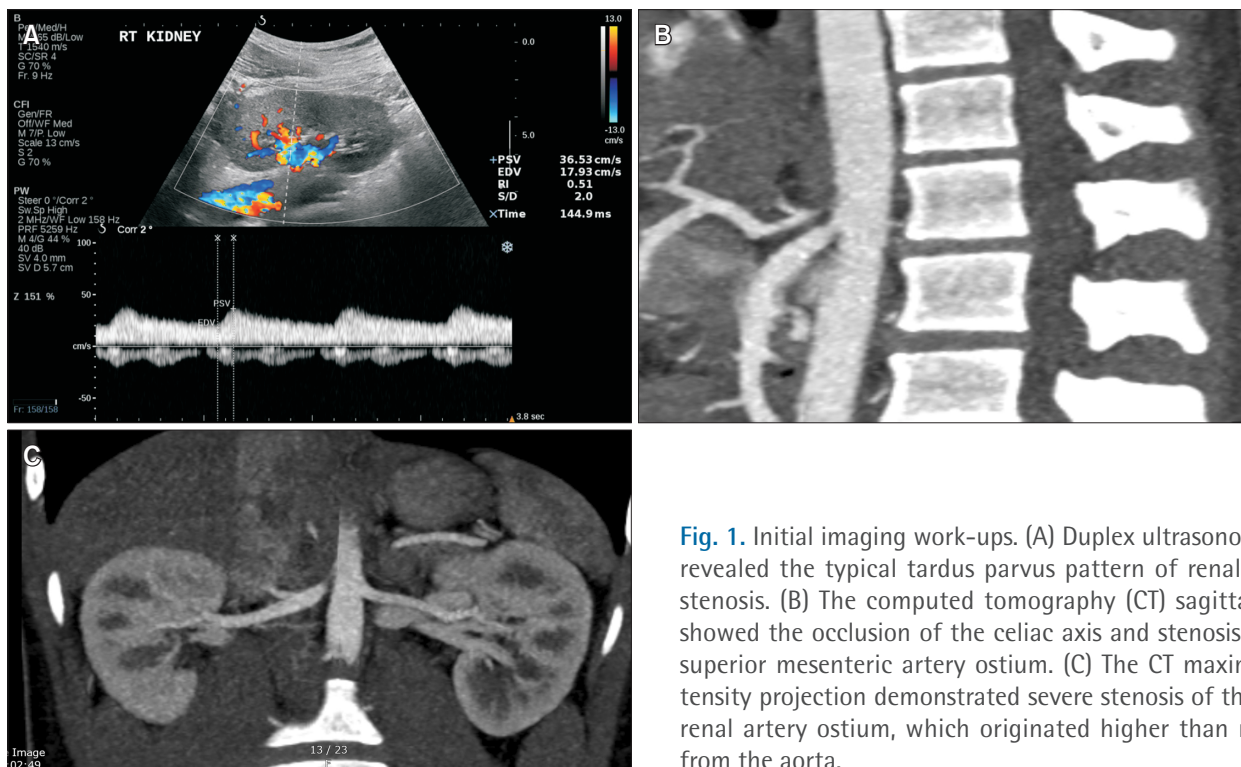


Fig. 1. Initial imaging work-ups. (A) Duplex ultrasonography revealed the typical tardus parvus pattern of renal artery stenosis. (B) The computed tomography (CT) sagittal view showed the occlusion of the celiac axis and stenosis of the superior mesenteric artery ostium. (C) The CT maximal intensity projection demonstrated severe stenosis of the right renal artery ostium, which originated higher than normal from the aorta.

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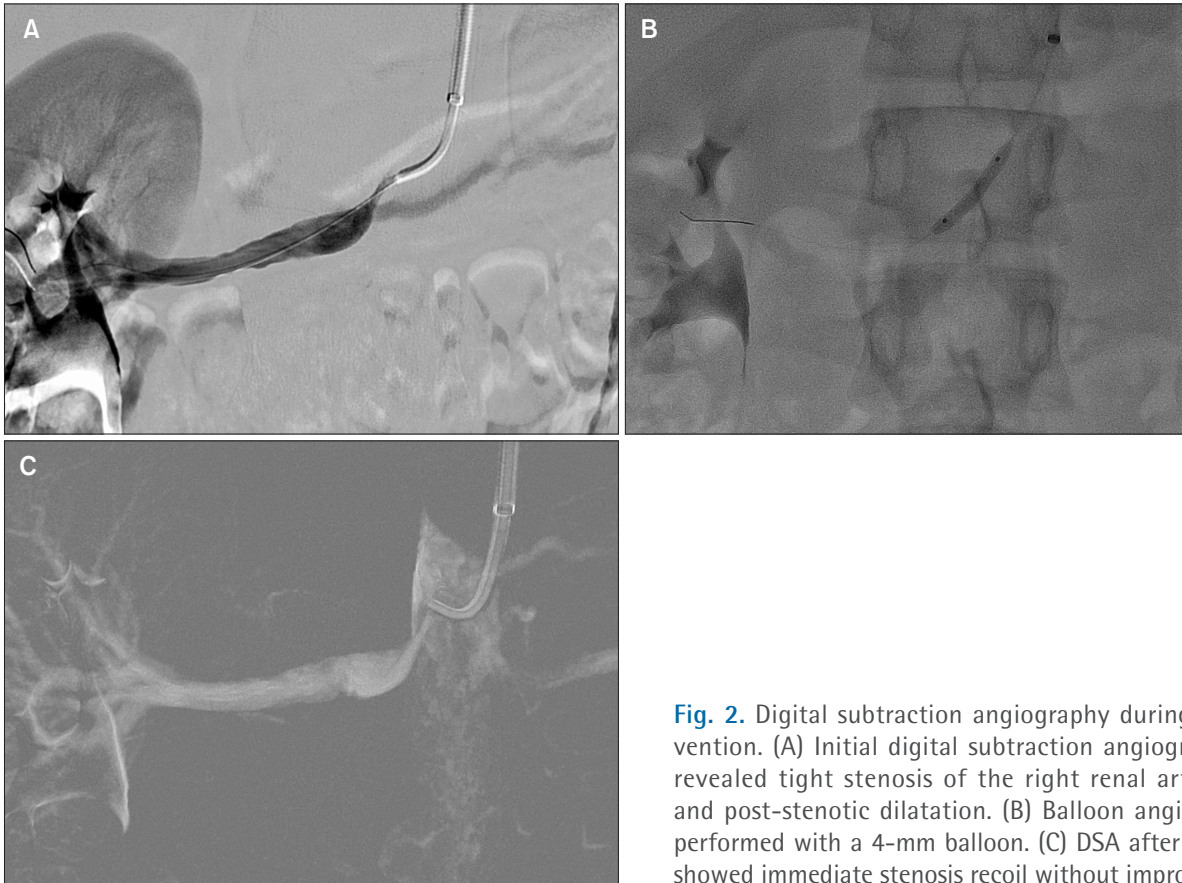


Fig. 2. Digital subtraction angiography during the intervention. (A) Initial digital subtraction angiography (DSA) revealed tight stenosis of the right renal artery ostium and post-stenotic dilatation. (B) Balloon angioplasty was performed with a 4-mm balloon. (C) DSA after angioplasty showed immediate stenosis recoil without improvement.

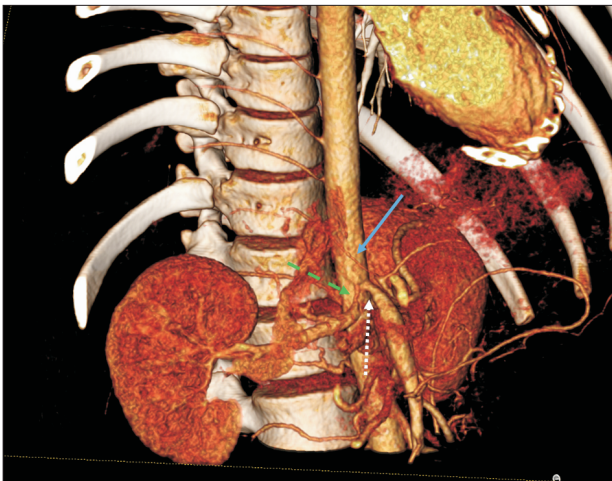


Fig. 3. Computed tomography 3D reconstruction depicted median arcuate ligament syndrome with celiac axis occlusion (blue arrow), 50% stenotic superior mesenteric artery (white dotted arrow), and tight stenosis of the right renal artery ostium (green dashed arrow).

pressure, and a medical work-up detected his right renal artery stenosis (RAS) (Fig. 1). Laboratory tests revealed elevated levels of renin (12.38 ng/mL/h) and aldosterone (122.3

ng/dL). Duplex ultrasonography revealed a tardus parvus pattern with a delayed acceleration time and a low resistive index (0.41-0.52) due to RAS. A computed tomography angiography (CTA) showed proximal CA occlusion, 50% stenosis of the SMA origin, and severe focal stenosis of the right RA ostium due to MALS. The right RA's origin was unusually high and passed through the diaphragmatic crus.

Renal angioplasty was initially performed using Savvy 3 mm×20 mm and 4 mm×20 mm balloon catheters (Cordis, Warren, NJ, USA). However, there was an immediate recoil, raising the possibility of extrinsic compression (Fig. 2). Anti-hypertensive medication was prescribed instead of surgical revascularization as the patient and his parents objected to the operation. Nonetheless, he was transferred to vascular surgery due to recent aggravation of renal function and uncontrolled hypertension despite three antihypertensive medications (amlodipine, losartan, and carvedilol). Preoperative CTA revealed similar steno-occlusion of three visceral arteries (Fig. 3).

Open surgery for MALS release and RA reimplantation was planned. However, celiac flow was not restored following the MALS release. As a result, a supraceliac aorto-hepatic bypass with a 6-mm expanded tetrafluoroethylene graft was performed. An infrarenal aorto-right renal bypass

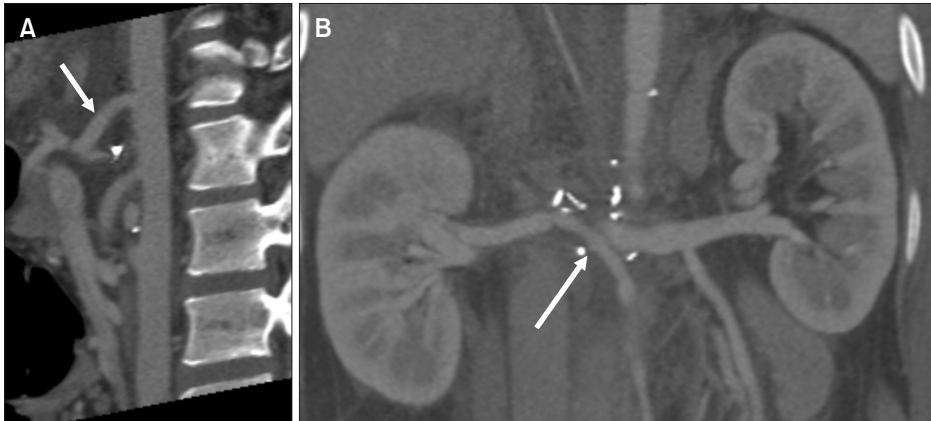


Fig. 4. Postoperative computed tomography images. (A) The sagittal view showed the patent aorto-common hepatic artery bypass graft (arrow). (B) The coronal maximal intensity projection image showed the patent aorto-renal bypass graft (arrow).

with a reversed saphenous vein graft was done because it was difficult to execute RA reimplantation without tension. A follow-up CTA showed patent bypass grafts (Fig. 4). The

patient is in good health without any anti-hypertensive medication.

REFERENCES

- 1) Goodall R, Langridge B, Onida S, Ellis M, Lane T, Davies AH. Median arcuate ligament syndrome. *J Vasc Surg* 2020;71:2170-2176.
- 2) Shao T, Kang N, DeAmorim H, Rey J, Bornak A. Staged treatment for an unusual case of median arcuate ligament syndrome caused by compression of the celiac and superior mesenteric arteries. *Ann Vasc Surg* 2020;66:672.e5-672.e7.
- 3) Ben Abdallah I, Cerceau P, Pellenc Q, Huguet A, Corcos O, Castier Y. Laparoscopic surgery in chronic mesenteric ischemia: release of the superior mesenteric artery from the median arcuate ligament using the transperitoneal left retrorenal approach. *Ann Vasc Surg* 2019;59:313.e5-313.e10.