Spectrum of Clinical and Radiological Findings in Nutcracker Syndrome: A Four-Case Clinical Series

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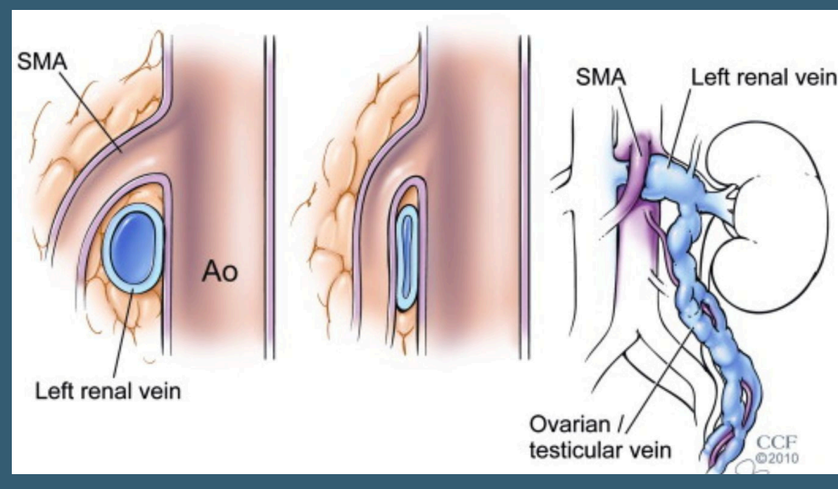
Introduction

Nutcracker syndrome (NCS) is a rare vascular compression disorder caused by entrapment of the left renal vein (LRV) between the superior mesenteric artery (SMA) and the abdominal aorta, resulting in venous hypertension and collateral formation. Its clinical presentation is variable and often underrecognized, ranging from flank or pelvic pain to hematuria and chronic pelvic congestion, sometimes mimicking gynecological or urological conditions. Early recognition is crucial to prevent unnecessary interventions and to guide appropriate therapy. This case series presents four diagnostically challenging cases, illustrating the heterogeneity and complexity of NCS across different clinical backgrounds.



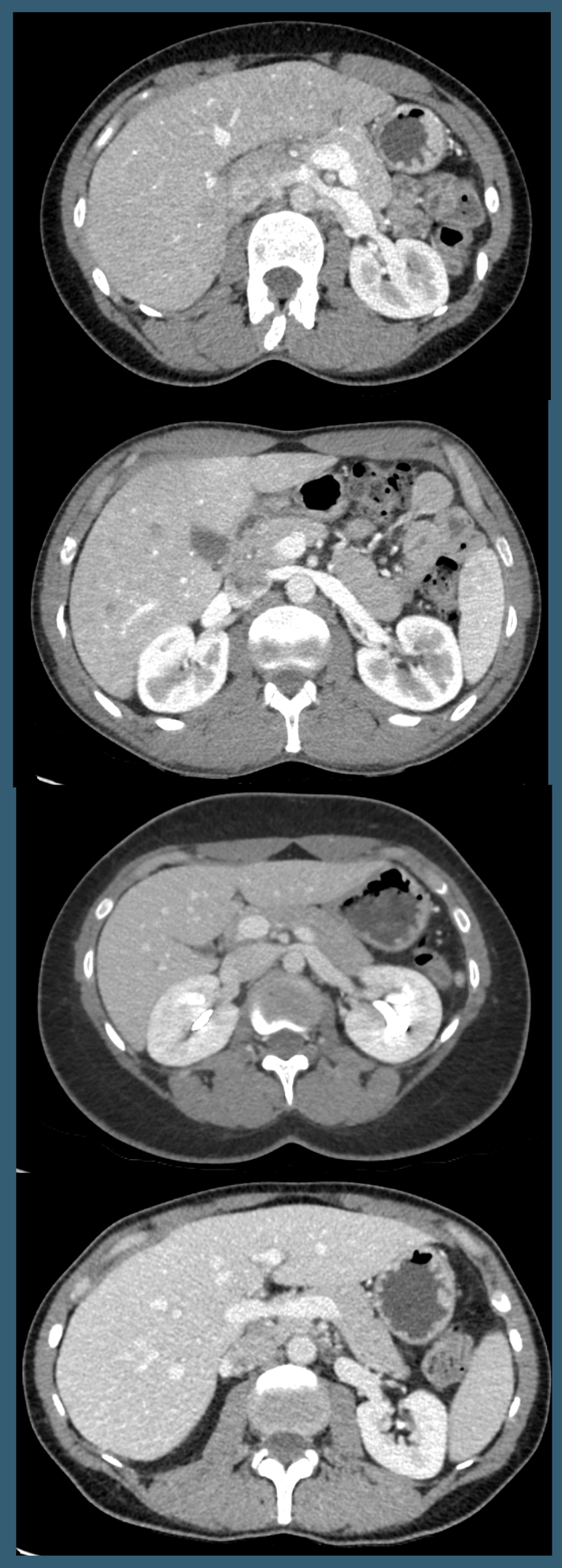
Cases presentation

Patient 1: A 52-year-old woman presented with intermittent left-sided pelvic pain, typically worse in the morning or after prolonged sitting, and exacerbated during menstruation. Past history included endometriosis requiring surgery. CT abdomen-pelvis revealed compression of the LRV at the SMA origin with proximal venous dilation (1.4 cm) and a dilated left ovarian vein (1 cm) causing pelvic congestion—findings consistent with NCS.

Patient 2: A 33-year-old man reported deep left-sided abdominal pain radiating to the back, neck, and leg, aggravated when lying flat, along with constipation and occasional rectal bleeding. He had a history of recurrent varicocele requiring two surgeries. Examination revealed left-sided abdominal tenderness. CT imaging showed LRV compression between the SMA and aorta with an aorto-mesenteric angle of 21° (normal 28–65°), a compression ratio of 2.8 (>2.25 diagnostic for NCS), and a reduced aorto-mesenteric distance of 5.3 mm (normal 10–34 mm). He was referred for venography and possible gonadal vein embolization.

Patient 3: A 23-year-old woman presented with left flank pain and recurrent gross hematuria over three months. She denied infection symptoms but had prior UTIs. Imaging demonstrated a narrowed aorto-mesenteric angle (17°) and distance (5 mm) with LRV compression and collateral formation involving the left gonadal vein, consistent with NCS.

Patient 4: A 44-year-old woman reported bilateral flank pain and episodes of gross hematuria. Past history included endometriosis, IBS, and breast augmentation. Urinalysis indicated infection, but urine cultures were sterile. CT KUB revealed severe LRV narrowing (2 mm at its narrowest; pre-stenotic 11 mm; compression ratio 5.5) with a reduced SMA–aortic angle (16°) and pelvic venous congestion. Venous pressure measurements showed a non-hemodynamically significant gradient (15 mmHg LRV vs 13 mmHg IVC). She is to undergo ovarian and pelvic vein embolization with conservative follow-up.



Conclusion:

This case series underscores the diverse and often deceptive presentations of Nutcracker syndrome, which can mimic a range of urological or gynecological pathologies. Cross-sectional imaging with CT or MR venography remains the cornerstone of diagnosis, with measurement of the aorto-mesenteric angle, renocaval distance, and pressure gradients providing hemodynamic confirmation. Management should be multidisciplinary, involving vascular surgery, interventional radiology, and nephrology, and tailored to symptom severity—from conservative observation to endovascular or surgical decompression. These cases highlight the need for heightened clinical awareness and individualized, symptom-based management in optimizing outcomes for this rare vascular disorder.

SCAN FOR REFERENCES!