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## Pulsatile Mass Sensation with Intense Abdominal Pain; Atypical Presentation of the Nutcracker Syndrome

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### Summary

**Background:**

Patients with Nutcracker syndrome generally present with nonspecific abdominal pain, with the left renal vein (LRV) lodged between the aorta and the superior mesenteric artery. In rare cases this can result in atypical gastrointestinal symptoms, making the diagnosis of Nutcracker syndrome challenging.

**Case Report:**

A 28-year-old female patient presented with complaints of severe abdominal pain and palpable pulsatile abdominal mass located in the left epigastric area. Computed tomography angiography revealed that the LRV was lodged in the aortomesenteric region with a dilated left ovarian vein and pelvic varicose veins. The upper gastrointestinal endoscopy and colonoscopy were normal. The patient was diagnosed as Nutcracker syndrome and discharged to be treated with analgesics.

**Conclusions:**

Nutcracker syndrome can be seen with atypical gastrointestinal and vascular symptoms. Computed tomography angiography is a reliable and robust technique to prove the diagnosis of nutcracker syndrome.

**MeSH Keywords:**

**Abdominal Pain • Aortic Aneurysm, Abdominal • Hematuria • Multidetector Computed Tomography • Renal Nutcracker Syndrome**

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### Background

Nutcracker syndrome, compression of the left renal vein [LRV] due to abnormal course between the aorta, superior mesenteric artery [SMA] or lower thoracic vertebrae, can present with urinary symptoms such as hematuria, proteinuria, and dysuria, and pelvic venous congestion symptoms such as chronic pelvic pain, dyspareunia, or dysmenorrhea [1]. Uncommonly, patients can present with atypical symptoms, which makes the diagnosis difficult [2]. Thus, radiological methods for the diagnosis of Nutcracker syndrome are essential in its management. Here, we report an atypical case of Nutcracker syndrome and emphasize the

role of computed tomography angiography [CTA] in the diagnostics.

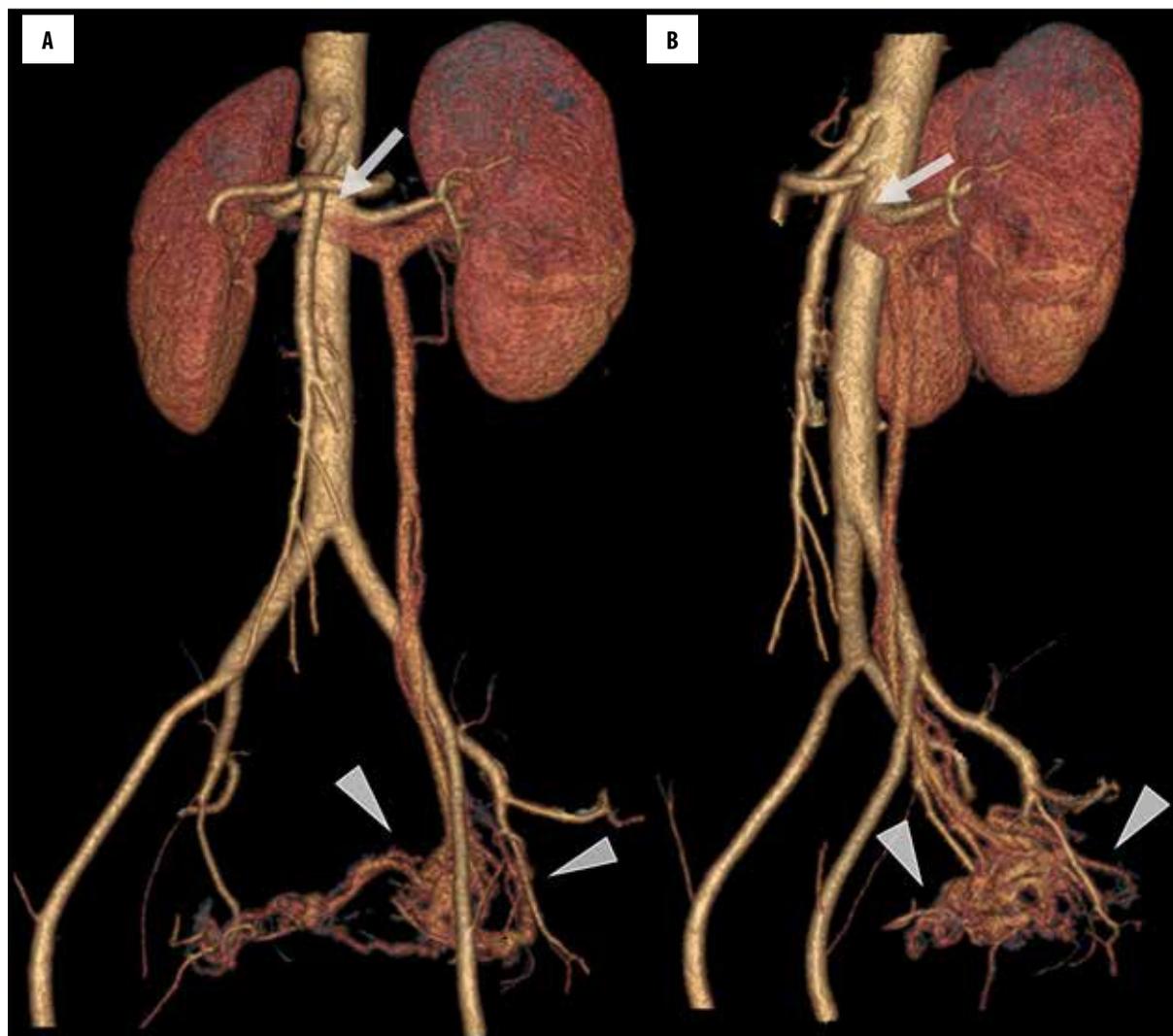
### Case Report

A 28-year-old female patient presented to our emergency clinic with complaints of a pulsatile mass located in the left upper quadrant for two weeks, and associated intense intermittent abdominal pain. The patient had no hematuria or pelvic congestion symptoms. Urinalysis, complete blood cell count, serum creatinine, alanine and aspartate aminotransferase, and alkaline phosphatase levels were all within normal ranges. The patient was not pregnant,



**Figure 1.** Abdominal axial CTA image in the mesoaortic region showing that the left renal vein was compressed and narrowed (black arrow). The proximal segment of the left renal vein was larger than the post-stenotic segment (arrowheads).

which was verified by measuring serum human chorionic gonadotropin level. An abdominal aortic aneurysm with or without dissection was suspected and abdominopelvic multi-detector computed tomography angiography [CTA] was performed. On CTA examination, calibration of the abdominal aorta at the suprarenal level was 18 mm and the aortomesenteric angle was twenty degrees. In the meso-aortic region the LRV showed a beak shape (Figure 1). The ratio of LRV was 2.9, the left renal and ovarian veins were enlarged, and the pelvic veins were congested (Figure 2A, 2B). The abdominal aorta and major branches, spleen, stomach, pancreas, both kidneys, mesentery, duodenum, small bowels and colon, and vertebral column were morphologically normal on CTA images and there was no intra-abdominal free fluid or air, or a sign of abdominal aortic dissection. Color Doppler sonography, performed one day after admission to hospital, showed that she had no vulvar varicosities or lower extremity venous insufficiency but enlarged vessels around the uterine. On the basis of CTA and clinical findings, the patient was diagnosed with anterior Nutcracker syndrome and was planned to treat



**Figure 2.** Coronal and slightly left oblique (A) and sagittal (B) 3D volume rendered CTA images. The left renal vein was stuck between the abdominal aorta and the SMA after the confluence of the enlarged left ovarian vein (arrow). Note the varicosities in the pelvic veins (arrowheads). The left renal vein course through a narrowed space between the aorta and SMA was clearly seen on sagittal image (B).

conservatively. On follow-up, five months after the initial diagnosis, her complaints were still continuing and she did not respond well to the conservative treatment consisting of pain killers. Complete blood count, serum creatinine, alanine and aspartate aminotransferase, urea and electrolyte levels, and urinalysis were re-evaluated and were all in normal ranges. To exclude functional gastrointestinal disorders, upper gastrointestinal system endoscopy and colonoscopy (all colon segments) were performed and were normal. Because of her laboratory, clinical and imaging findings, it was planned to treat the patient with pain-killers with an annual control for anemia, hematuria, and proteinuria.

## Discussion

The LRV can get stuck between the vertebral body, the aorta or the SMA. All of these situations result in dilatation of the renal veins and consequently a patient can present with hematuria and proteinuria, which is termed Nutcracker syndrome [4,5]. Female patients can present with enlarged ovarian veins with intermittent lower abdominal pain, while male patients present with varicocele and scrotal pain. Moderate lower abdominal pain is a common presentation of Nutcracker syndrome, but patients may complain of atypical abdominal pain [2]. There is limited data on Nutcracker syndrome simulating an abdominal aorta aneurysm with intense abdominal pain and on the pathogenesis of this atypical presentation. The sympathetic nervous system can be activated by the dilated veins, which might have an effect on the paravertebral nerve plexus [2]. The LRV can become lodged between the vertebral body, the aorta and the SMA. Also, the LRV lying over the abdominal aorta and the acute angle in the aortomesenteric region may also explain the feeling of a pulsatile mass [4]. In our patient, left ureteral colic,

acute gastroenteritis or only gastritis, acute pancreatitis, acute diverticulitis, and omental infarct could also have been included in the differential diagnosis. However, CTA showed no morphological abnormalities to explain these pathologies and both upper gastrointestinal system endoscopy and colonoscopy for all segments were normal.

Proteinuria and hematuria can display the severity of the disease and renal venography and pressure measurements can be used for further evaluation. Patients can be treated by interventional procedures such as stenting or surgical correction in severe abdominal pain and impaired renal function, with a good response to therapy [1,5,6].

## Conclusions

Precise diagnosis of Nutcracker syndrome is required for deciding on the type of treatment. However, without imaging methods it is often complicated in patients presenting with atypical clinical findings. CTA is a reliable and robust technique for proving the diagnosis of Nutcracker syndrome by imaging the entire gastrointestinal, genitourinary and vascular systems.

## Statement

The computed tomography angiography and color Doppler ultrasonography were performed at Dr. Siyami Ersek Thoracic and Cardiovascular Surgery Training and Research Hospital, while upper gastrointestinal endoscopy and colonoscopy were performed at Göztepe Training and Research Hospital.

## Conflict of interest

The authors declared no conflicts of interest.

## References:

1. Kurç E, Barutca H, Kanyılmaz M et al: Nutcracker sendromu. *Türk Gogus Kalp Dama*, 2013; 21: 146-50
2. Hilgard P, Oberholzer K, Hohenfellner R, Gerken G: The patient with intermittent abdominal pain and no renal disease. *Nephrol Dial Transplant*, 1999; 14: 2953-56
3. Kim KW, Cho JY, Kim SH et al: Diagnostic value of computed tomographic findings of nutcracker syndrome: Correlation with renal venography and renocaval pressure gradients. *Eur J Radiol*, 2011; 80: 6486-54
4. Wendel RG, Crawford ED, Hehman KN: The "nutcracker" phenomenon: An unusual cause for renal varicosities with hematuria. *J Urol*, 1980; 123: 761-63
5. Gulleroglu K, Gulleroglu B, Baskin E: Nutcracker syndrome. *World J Nephrol*, 2014; 6(3): 277-81
6. Reed NR, Kalra M, Bower TC et al: Left renal vein transposition for nutcracker syndrome. *J Vasc Surg*, 2009; 49: 386-93