

A Rare Case of Renal Hilar Nutcracker Phenomenon Associated With Left Renal Artery Variations

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ABSTRACT

The kidneys also termed as the renes, are the retroperitoneal organs situated in the posterior abdominal wall. The structures entering the hilar region from before backwards are the renal vein (RV), the renal artery (RA), and the renal pelvis (RP). The nutcracker phenomenon is described as the left renal vein

(LRV), compressed between the AA and the superior mesenteric artery (SMA). In this case report we are presenting the renal hilar nutcracker phenomenon (NCP) where RLV was compressed between the antero-inferior renal artery and the posterior renal artery. The comprehension of these sorts of variations is crucial for surgeons, nephrologists, radiologists and anatomists.

Keywords: Nutcracker phenomenon; Nutcracker syndrome; Renal vein; Kidney; Renal artery

INTRODUCTION

The kidneys also termed as the renes, are the retroperitoneal organs situated in the posterior abdominal wall. The structures entering the hilar region from before backwards are the renal vein (RV), the renal artery (RA), and the renal pelvis (RP). The renes receives arterial supply from the RAs, arising from the abdominal aorta (AA). At the hilar region, the RA divides into anterior and posterior divisions. The anterior division gives four segmental arteries and the posterior division gives one segmental artery. The blood from the renes drains into the RV, which drains into the inferior vena cava (IVC) [1]. The nutcracker phenomenon is described as the left renal vein (LRV), compressed between the AA and the superior mesenteric artery (SMA) [2]. In this case report we are presenting the renal hilar nutcracker phenomenon (NCP) where RLV was compressed between the left antero-inferior renal artery (LAIRA), which originated from the left renal artery (LRA) and the left posterior renal artery (LPRA), which originated directly from the AA.

CASE REPORT

During the usual dissection of the abdomen and pelvic region of a 62-year-old male cadaver for the first MBBS students in the Department of Anatomy. Normally, the RA divides into the anterior and posterior divisions. In this case, we found the left renal artery (LRA) was divided into three branches the left upper polar artery (LUPA), the left antero-superior renal artery (LASRA), and the LAIRA. The LRA doesn't give the posterior division. The LUPA was not entered into the renal hilum and supplied to the superior pole of the left rene as shown in [Figure 1]. One left accessory RA originated from the AA

which was continuing as the LPRA as shown in [Figures 2-3]. The IVC was present between the LAIRA and the LPRA which was compressed between these two arteries which was termed as renal hilar nutcracker phenomenon (NCP) as shown in [Figures 1-3]. The arrangement of structures from before backwards at the left renal hilum was the LAIRA, the LRV, the LASRA, the LPRA, and the renal pelvis as shown in [Figures 1-3]. The right RA and the structures at the right renal hilum were normal.

DISCUSSION

The compression of LRV between the AA and the SMA was termed a nutcracker phenomenon (NCP) or nutcracker syndrome (NCS). In 1937, Grant an anatomist [3]. Gave the initial narration about this pathological variation. In 1950, El Sadr and Mina introduced the first clinical presentation of this variation [4]. The term nutcracker was coined by Chait et al. in 1971 as the AA and the SMA are two arms of the nutcracker and the LRV is the nut [5].

According to de Schepper, if the subjects with this pathology are asymptomatic it is termed NCP and if the subjects are symptomatic it is named NCS [6].

According to Basile et al. in their study described other kinds of NCP. The LRV compression between the AA and the vertebrae is termed posterior or retroaortic NCP. They also described mixed NCP where the LRV had two tributaries, anterior and posterior tributaries. The compression of the

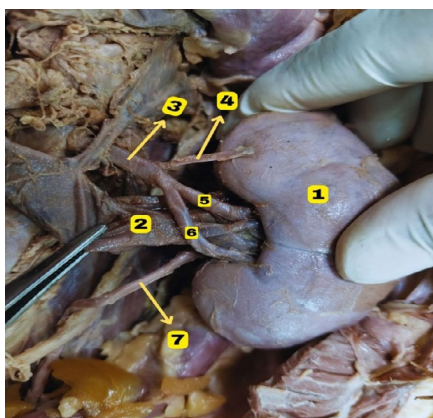


Figure 1) Shows the renal hilar nutcracker phenomenon.

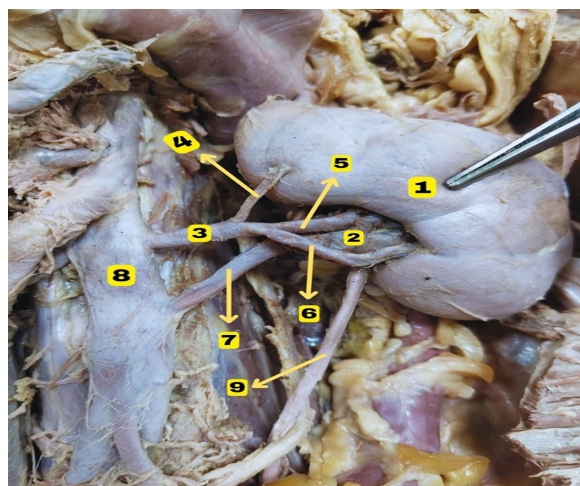


Figure 2) Shows the accessory renal artery continuing as the left posterior renal artery.

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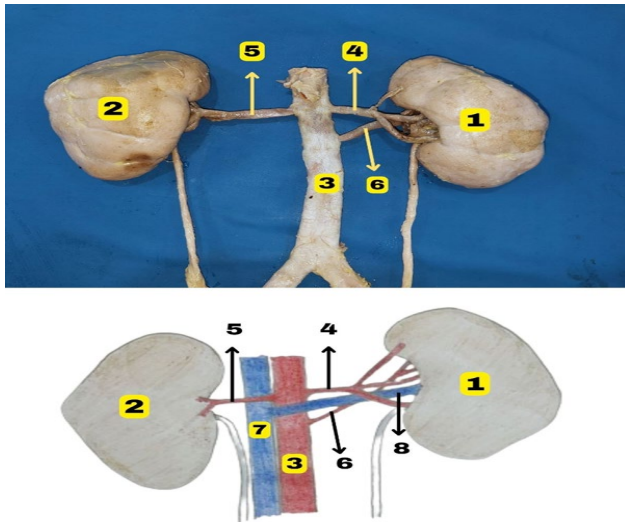


Figure 3) Shows the left renal artery (LRA) variations and a schematic diagram of the renal hilar nutcracker phenomenon.

anterior tributary between the AA and the SMA and the compression of the posterior tributary between AA and the vertebrae is termed mixed NCP [7].

Polgaj et al. reported the compression LRV between the SMA and the right renal artery termed lateral or anterolateral NCP [8].

According to Sawant and Moore [9]. There was a compression of the LRV between the anterior inferior segmental and posterior segmental renal arteries arising from the LRA and named hilar NCP based on the anatomical location. But in the present case, there was a compression of the LRV between the LAIRA, which originated from the LRA and the LPRA originated directly from the AA.

Due to the LRV compression, increased pressure in the proximal segment of the LRV leads to congestion of the left kidney. The varicosities develop in the renal pelvis, the gonadal vein, and the ureter leading to hematuria, flank abdominal pain, irregular menstruation in women, and varicocele in men. Wilkie's syndrome mimics the NCS in which the duodenum was compressed between the AA and the SMA. The primary investigations for the NCS are ultrasound and the MRI but the gold standard diagnostic intervention for the NCS was retrograde venography [2].

Nutcracker syndrome has also been linked to several other clinical conditions, including familiar Mediterranean fever, idiopathic hypercalciuria, membranous nephropathy, IgA nephropathy, and Henoch-Schonlein purpura [10].

CONCLUSION

This was the unique variation of renal hilar NCP, the compression of the LRV between the LAIRA and the LPRA on the left side. The PRA originated from the AA as the left accessory renal artery. In the last few years, renal surgeries and transplants have increased. The comprehension of these sorts of variations is crucial for surgeons, nephrologists, radiologists and anatomists.

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AUTHOR CONTRIBUTIONS

Conceptualization: PR, SG, MC. Data acquisition: PR, SG. Data analysis or interpretation: PR, MC, SG. Drafting of the manuscript: PR, SG. Critical revision of the manuscript: SG, MC, PR. Approval of the final version of the manuscript: all authors.

CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

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