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## Treatment of nutcracker syndrome with spermatic vein ligation and iliac vein anastomosis: Case report of three cases

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### ABSTRACT

Three patients with nutcracker syndrome (NCS) were enrolled in the study. Their clinical symptoms mainly included proteinuria and serious varicocele. Color Doppler ultrasound and computed tomography showed that the patients had constricted abdominal aortas, reduced superior mesenteric artery angles, and thinned left renal veins. Patients then underwent left spermatic vein ligation and iliac vein anastomosis. They were checked three months after their operation, and results showed that their sperms were improved and their proteinuria disappeared. The color Doppler ultrasound showed new cycle pathways. NCS clinical manifestations are complicated, and need combination diagnosis of symptoms and auxiliary examination to determine surgical indications. Ligation of spermatic vein and vein anastomosis can be used to treat NCS.

## 1. Introduction

Nutcracker syndrome (NCS), also called left renal vein (LRV) entrapment syndrome, is a rare disease. The clinical symptoms include hematuria, albuminuria, and waist pain. These symptoms are usually caused by LRV varicocele at the abdominal aorta and superior mesenteric artery bifurcation in stress. NCS is mainly treated through surgery, which can be classified as intervention operation or open surgery. However, these methods have limitations. Therefore, new surgical procedures are very necessary. Since April 2007, three NCS cases have been treated via spermatic vein ligation and iliac vein anastomosis. It is reported as following.

## 2. Case report

The patients enrolled in the current study were all male and aged 19, 22, and 23 years. All had varicocele without obvious waist pain and hematuria. Color Doppler ultrasound showed that the left varicocele was serious and that the diameter of the left spermatic vein increased from 7.0 mm to 9.0 mm. The LRV diameter increased from 12.0 mm to 15.0 mm, and that across the abdominal aorta and superior mesenteric artery angle was increased from 1.7 mm to 2.5 mm. The blood flow velocity was also increased. Computed tomography (CT) and enhanced CT scans showed normal double renal parenchyma. The LRV diameter across the abdominal aorta was at most 13.5 mm and 2.1 mm in average. Urinalysis showed (+)-(+) proteins and 1.0 mL to 3.5 mL of sperm. Liquefaction was not complete for 30 min to 60 min, and cystourethroscopy/HP showed that sperm count of 0 to 3. The kidney and liver functions were normal, and urine protein was 0.35 g to 0.54 g for 24 h.

Epidural anesthesia was administered to patients in a supine position. The left hip was placed slightly higher,

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and a McIntosh oblique incision was made at the lower left abdomen. The spermatic vein was found outside the peritoneum, and its free portion was long enough. The far end of the vein until the inner mouth was tied and cut off, and the portion near the heart was shut with a vascular clamp, making the intravenous pressure evident. The wall was tight, and the bow-shaped and trimmed ends were in a diagonal line and had an elliptical shape. About 5 cm of the vena iliaca externa was dissected and 2/3 lm was clamped with an auricle clamp. A 7 mm long incision was made in the lateral wall. The closed tube cavity and spermatic vein reserved section distal lumen were washed with 1% lidocaine. Herringbone anastomosis was performed between the spermatic vein end and vena iliaca externa with 5-0 no damage to the blood vessel seam. First, the vascular resistance closed clamp of the spermatic vein was freed, the cavity bubbles were released, the auricle clamp of vena iliaca externa was loosened, and wet gauze was pressed on the operated area for 3 min to apply slight pressure. No significant bleeding was observed, and the incision was closed.

After the treatment, the incisions of the three patients were all restored, the margin I/armor heals. The urine protein rechecking results were negative after one to three months, and varicocele symptoms were significantly alleviated. Three months after surgery, color Doppler ultrasound showed LRV diameters of about 10.0 mm to 12.0 mm. The diameter of the spermatic vein from the renal vein to the vena iliaca externa anastomotic pipe became narrow, which is approximately 6.0 mm to 8.0 mm. Their anastomotic blood flow rates were unobstructed, and no narrow and thrombotic parts were observed. The semen conventional check results showed that the number, liquefied time, survival rate, and vitality of the sperms were more improved than in their preoperative counterparts.

### 3. Discussion

LRV injects the inferior vena cava through the abdominal aorta and superior mesenteric artery angle. Normally, the angle was about 45° to 60°, which was filled with mesenteric fat, lymphoid tissue, and peritoneal tissues, hence reducing the pressure on the LRV[1]. If the congenital or acquired vascular malformation changes the artery angle becomes smaller, resulting in narrower LRVs due to pressure and inducing the clinical symptoms of NCS. The main clinical symptoms include hematuria, albuminuria, waist pain, and left varicocele. The auxiliary examination methods employed are color Doppler ultrasound, CT and MRI, and digital subtraction angiography. Some researchers believe the ratio of LRV expansion to the narrow angle pipe diameter is > 1.5 or more than > 2 times and is related with the body position[2,3]. The NCS diagnosis should exclude tumor, inflammation, stone, high urinary calcium, and renal parenchyma damage, among others and should consider clinical symptoms such as hematuria, albuminuria, left flank pain, and left varicocele. The imaging examination showed a narrow LRV under pressure, and the left kidney blood backflow was affected[4].

The NCS surgical indications are as follows: 1) no symptom alleviation or aggravation was observed two years after the medical symptomatic treatment; 2) complications such as back pain, dizziness, weakness, and obvious varicocele

were observed; and 3) renal impairment was included among other causes[5].

Surgical treatments include surgery and intervention treatment. However, these types of treatment are expensive and have a tendency to fail. The operated area may become narrow again, thrombosis may occur, complications may arise, and the long-term outcome is not clear. Postoperative check-up is still needed to assess the long-term use of anticoagulation drugs[6].

Surgery contains two common procedures: superior mesenteric artery displacement, which involves cutting off the superior mesenteric artery and moving it below the LRV through abdominal aorta end-to-side anastomosis. It easy affects the blood supply and peristalsis. However, clinical reports of this procedure are rare[7]. The second procedure is LRV displacement, which involves cutting off the LRV, moving it down by 5 cm, performing inferior vena cava end-to-side anastomosis, and releasing the original LRV suppression[8,9]. This operation is reliable and has lesser complications[10].

In the current study, the anastomosis of the expanded left spermatic vein and vena iliaca externa was conducted. The results showed that the operation is simple, of little trauma. It uses collateral vessels to establish smoother blood flow as treating varicocele.

### Conflict of interest statement

We declare that we have no conflict of interest.

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