

Open Surgical and Endovascular Treatment of Nutcracker Syndrome : Do We Have the Answer Now?

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Disclosure

I have no relevant financial relationships to disclose

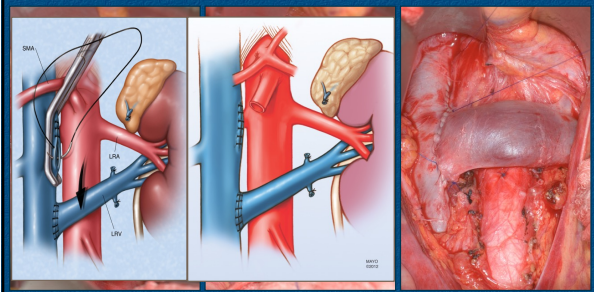


Left Renal Vein Compression:
Compensated
Uncompensated

Relieve Compression



LRV Transposition



Long-term Results

Mean Follow up 37 mths

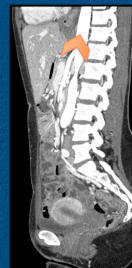
Patients	n=37
Stenosis	7
Thrombosis	1

Secondary Interventions

6 stents	
1 stent migration	Retrieval+Restenting
2 in-stent stenosis	Restenting
2 open	
1 saphenous vein patch	
1 gonadal vein re-implantation	



Nutcracker Phenomenon: Etiology



- Narrow aorto - mesenteric angle
- Low or lateral origin of SMA
- High course of LRV
- Stretching of LRV over the aorta
 - Asthenic body habitus
 - Ptosis of the left kidney
 - Lack of retroperitoneal fat
 - Fibrous tissue aorto-mesenteric angle
- Wasted paraspinal muscles



LRV Transposition: GSV patch

The slide illustrates the GSV patch technique for LRV transposition. It includes a diagram of the retroperitoneal anatomy showing the LRV crossing over the aorta, a diagram of a GSV patch being sutured to the LRV, and a corresponding intraoperative photograph showing the surgical procedure.

LRV Transposition: GSV cuff

The slide illustrates the GSV cuff technique for LRV transposition. It includes a diagram of the retroperitoneal anatomy with a GSV cuff being placed around the LRV, and an intraoperative photograph showing the surgical procedure. Text on the slide indicates: "Improve caliber of small LRV" and "Excise fibro-fatty tissue from aorto-mesenteric space".

Gonadal Vein Transposition

The slide illustrates gonadal vein transposition. It includes a diagram of the retroperitoneal anatomy showing the gonadal vein crossing over the LRV, and two intraoperative photographs showing the surgical procedure to transposition the vein.

Left Renal Vein Stenting

Endovascular Stenting for Treatment of Nutcracker Syndrome: Report of 61 Cases With Long-Term Followup
Shanwen Chen, Hongkun Zhang,* Heng Shi, Lu Tian, Wei Jin and Ming Li

	Chen et al	Wang et al	Wu et al
No of Patients	61	30	75
Technical success	98%	100%	100%
Symptom relief	95%	93%	?
Follow up	66 mths	36 mths	55 mths
Stent migration	1	2	5

patients with nutcracker syndrome

Zhang W, MD, PhD,* Songtao Zhang, MD, PhD,* Tangjun He, MD,* Xia Yang, MD,* Donglin Li, MD, PhD,* Lu Tian, MD,* and Hongkun Zhang, MD, PhD,* Hangzhou and Wuxi, China

Stent Migration

24 yr F s/p 3 days LRV stenting

- Recent flank/ back pain
- h/o pelvic congestion
- Multiple pregnancies
- B/L ovarian vein coiling
- LRV stenting
- Stent thrombosis
- Stent migration

The slide shows two axial CT scans of the abdomen. The left scan shows a stent in the LRV, and the right scan shows the stent has migrated superiorly, indicated by yellow arrows.


Stent Migration

The slide shows four fluoroscopic images of the LRV. The first image shows a stent in place, and the subsequent three images show the stent migrating superiorly, indicated by yellow arrows.

Stent Compression

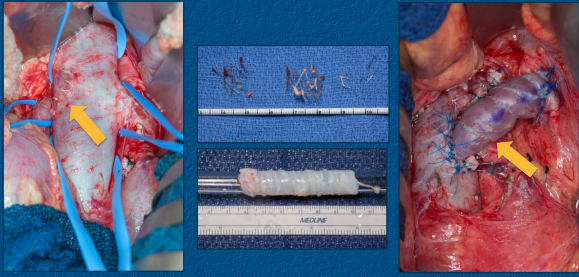
17 yr F 3 years s/p LRV stenting

- Initial excellent relief
- Recurrent flank/ back pain
- PTA for stenosis
- Stent thrombosis
- Mechanical thrombectomy
- Xeralto
- Acute symptomatic PE



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Stent Removal + Reconstruction

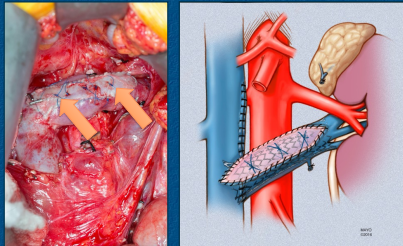


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Hybrid Reconstruction ?

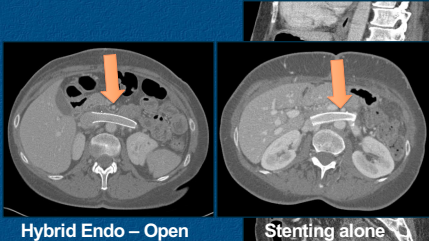
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Hybrid Reconstruction



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Hybrid Reconstruction



Hybrid Endo – Open Stenting alone

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Nutcracker Syndrome

Hybrid Reconstruction

- Provides the best decompression of LRV compression and chance of long-term patency
 - Transposition removes vein from area of maximum compression
 - Patch allows use of large caliber stent ($\geq 14\text{mm}$)
 - Stent prevents LRV compression
 - No stent migration (shorter stents? No IVC protrusion)
- Early patency excellent / Long-term ?
- Longer term results of dedicated venous stents (VICI, Venovo, Zilver Venous, ABRE) awaited

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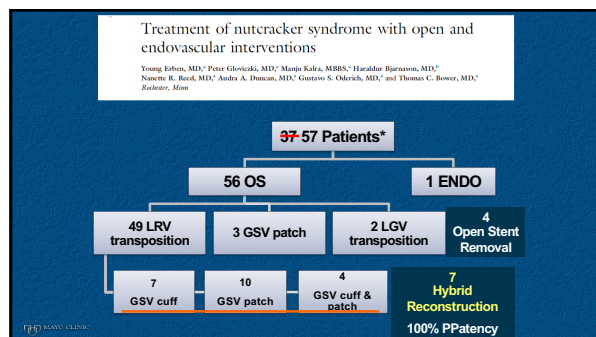
Patient-Reported Outcomes for Robot-Assisted Laparoscopic Extravascular Renal Vein Stent Placements for Nutcracker Syndrome

Jacques J. Fain, MD, MBA, PhD, D. Kromrey, MD, Mithranath A. Anand, MBE, MD, and Jeffrey A. Carstensen, MD

Abstract
Introduction: Nutcracker phenomenon is the compression of the left renal vein between the superior mesenteric artery (SMA) and the abdominal aorta. Nutcracker syndrome refers to the presence of nutcracker phenomenon with symptoms. Between 2010 and 2022, we performed 18 robot-assisted laparoscopic extravascular renal vein stent (EALERV) placements. We sought to assess patient-reported outcomes of EALERV's placement by a survey.

• Survey at 3 months
• 12/18 pts responded to survey
• 10/12 symptomatic improvement

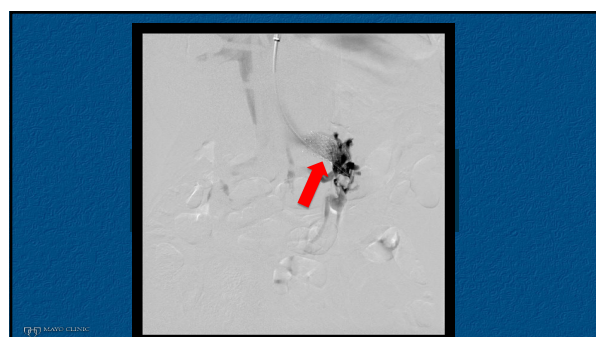
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Late Results

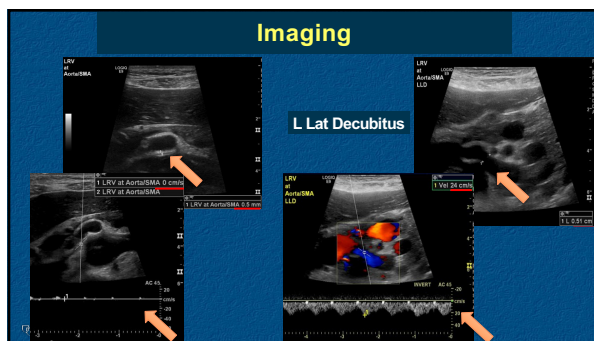
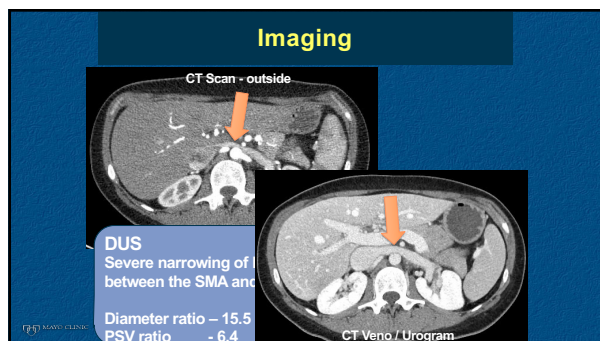
Symptom	% Relief
Left flank /abdominal pain	45 (72%)
Hematuria	25 (96%)
Proteinuria	19 (100%)
Varicocele / pelvic pain	2/5 (40%)

	57 Patients
Mortality	0
Nephrectomy	7
(3/4 stent removal pts)	
Considering nephrectomy	2
LRV thrombosis	1
(no intervention)	



- Nutcracker Syndrome Questions**
- How pathological is the LRV compression?
 - Why do patients with surgical LRV ligation not develop symptoms?
 - LRV compression – incidental finding
 - L Ovarian vein dilatation – incidental finding
 - LRV compression – fixed or dynamic?
 - Are the symptoms really from renal venous hypertension?
 - Why should patients with widely patent LRVs get flank symptoms

- Patient Selection**
- 31 yr F with diagnosis of Nutcracker Syndrome**
- Abdominal and flank/ back pain
 - Pelvic / perineal pain
 - B/L groin and LE discomfort
 - Multiple pregnancies
 - Ovarian vein coil embolization
 - s/p hysterectomy for uterine prolapse
 - Dizziness / presyncope



Do We Have the Answer Now ?

NOT QUITE YET !

