

Nutcracker Syndrome를 위해 왼쪽팔정맥에 삽입한 스텐트의 우심실 이동

— 1예 보고 —

김재범* · 최세영* · 박남희* · 금동윤* · 박 훈* · 황은아**

Intracardiac Migration of a Renal Stent from the Left Renal Vein to the Right Ventricle during the Treatment of Nutcracker Syndrome

— A case report —

JaeBum Kim, M.D.*, Sae-Young Choi, M.D.*, Nam-Hee Park, M.D.*, Dong-Yoon Kum, M.D.*, Hoon Park, M.D.*, Eun Ah Hwang, M.D.**

We report her on a rare case of a renal stent that migrated into the right ventricle in a patient with nutcracker syndrome. A 29-year-old woman was admitted to the hospital and she was suffering from flank pain. The computed tomography of the abdomen demonstrated that the left renal vein was compressed between the abdominal aorta and the superior mesenteric artery (nutcracker syndrome). A self expandable stent was placed across the left renal vein for treating her nutcracker syndrome. The next day after the procedure, the follow up chest radiograph showed that the displaced stent had migrated into the right ventricle. After percutaneous endovascular stent removal had failed, the stent was ultimately removed by performing cardiac surgery. At the 6th postoperative month, there have been no abdominal or cardiac symptoms.

(Korean J Thorac Cardiovasc Surg 2010;43:100-103)

Key words: 1. Stents
2. Prosthesis failure
3. Vascular disease
4. Blood vessel prosthesis

CASE REPORT

Stent migration into the right ventricle is a potentially fatal complication of stenting in the venous system[1], and is rarely likely to occur during the treatment of nutcracker syndrome. We present a case of migration of left renal vein stent into the right ventricle in a patient with nutcracker syndrome.

A 29-year-old woman presented with flank and upper abdominal pain, sweating with intermittent macroscopic hematuria. Her physical examination revealed tenderness over the entire abdomen. Results of laboratory examination was within normal limits. Computed tomography scan of abdomen demonstrated that the left renal vein (LRV) was compressed between the abdominal aorta and superior mesenteric artery

*계명대학교 의과대학 동산의료원 흉부외과학교실

Department of Thoracic and Cardiovascular Surgery, Keimyung University Dongsan Medical Center, College of Medicine, Keimyung University

**계명대학교 의과대학 동산의료원 내과학교실

Department of Internal Medicine, Keimyung University Dongsan Medical Center, College of Medicine, Keimyung University

논문접수일 : 2009년 8월 19일, 논문수정일 : 2009년 9월 14일, 심사통과일 : 2009년 9월 28일

책임저자 : 최세영 (700-712) 대구시 중구 동산동 130번지, 동산의료원 흉부외과

(Tel) 053-250-7370, (Fax) 053-250-7307, E-mail: sy56218@dsmc.or.kr

본 논문의 저작권 및 전자매체의 지적소유권은 대한흉부외과학회에 있다.

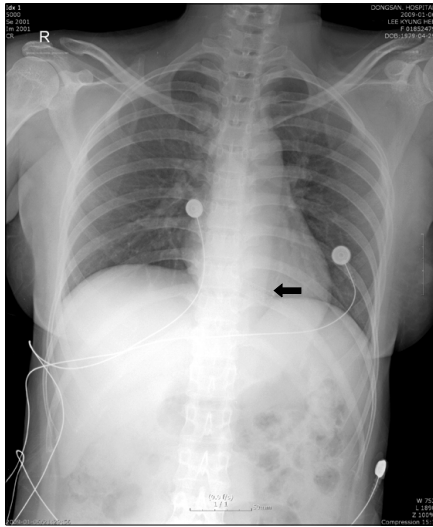


Fig. 1. Chest radiograph showed that the displaced stent (arrow) had migrated into the right ventricle.

(SMA) and had become narrowed with dilation of the distal renal vein. For treatment of nutcracker syndrome, a self-expandable Smart Control stent (Cordis, Johnson & Johnson, USA) was placed across the LRV by radiologist.

After interventional radiotherapy (IVR), the pressure gradient between the left renal vein and the inferior vena cava had disappeared. Flow through these vessels was adequate. Immediately after procedure, flank pain was improved. The next day after procedure, follow up chest radiograph showed that the displaced stent had migrated into the right ventricle (Fig. 1). An attempt of percutaneous endovascular removal of the stent using the femoral approach failed.

Next day, T-shape lower sternotomy was performed that revealed slight effusion but no adhesion between the pericardium and the heart. The right atrium and ventricle were normal sized. The patient was placed on cardiopulmonary bypass, and after cardioplegic arrest, the right cardiac space was exposed through a right atriotomy incision. No fossa ovalis or atrial septal defect was detected in the atrial septum. A vascular stent was coiled and fixed by chordae of tricuspid valve and trabeculation of right ventricle with attached to the tricuspid posterior leaflet. The posterior leaflet chordae of tricuspid valve was ruptured (Fig. 2). After intracardiac vascular stent was removed (Fig. 3), tricuspid valvuloplasty was performed with chordae creation of posterior leaflet. After stent was re-

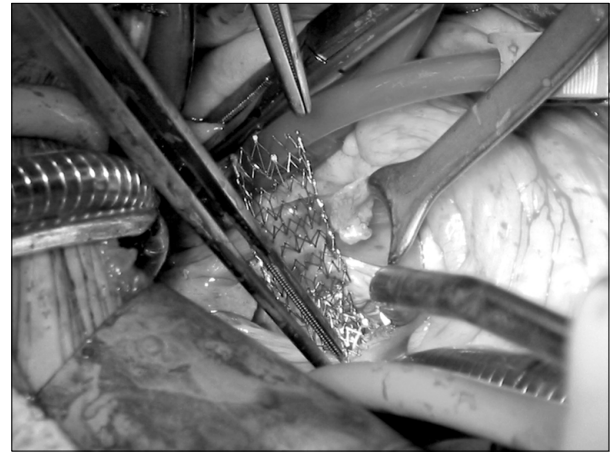


Fig. 2. The stent was removed from the right ventricle via tricuspid valve through a right atriotomy, under cardiopulmonary bypass.

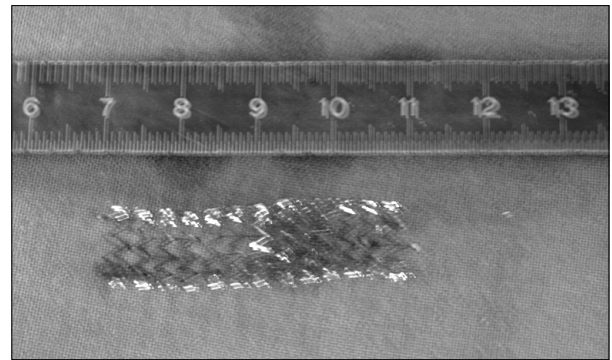


Fig. 3. The stent length was about 4 cm.

moved, another procedure was not performed because patient's symptom was relieved. We think that the reasons were band released or band ruptured. The patient had an uneventful postoperative recovery.

DISCUSSION

Nutcracker syndrome is rare entity caused by extrinsic compression of the left renal vein by the superior mesenteric artery (SMA) as the vein crosses between it and the aorta. It is relatively more common in women and the resultant increase in pressure within the left renal vein can cause hematuria, flank pain, hypertension, and even ureteral obstruction due to the formation of secondary collateral venous varicosities[2]. Additional clinical findings may include symptoms

of pelvic venous congestion, including dyspareunia, dysmenorrhea, and dysuria. The phenomenon may result in varicosities in the vulva and gluteal regions[3]. Numerous treatment modalities have been described, including left renal vein transposition, nephropexy, renal vein stenting, and renal autotransplantation, with varying degrees of success. Except for endoluminal venous stenting, all of these procedures have involved a traditional open surgical approach with the associated disadvantages of incisional discomfort. So endovascular stenting is very appealing because of the minimal invasive nature of procedure.

However, stent migration into the right ventricle can have potentially serious complications including endocarditis and sepsis, cardiac arrhythmias, myocardial perforation with cardiac tamponade, and heart failure due to severe tricuspid regurgitation that may require surgical or endovascular management[1]. When the stent is located in the right ventricle, the procedure is more difficult and usually fails[4]. In our patient, an attempt of percutaneous endovascular removal of the stent using a femoral approach failed. The stent in the heart was therefore removed by open cardiac surgery. The patient had an uneventful postoperative recovery. At nutcracker syndrome, endovascular stenting procedure was performed about 100~150 cases at world up to now. This complication was not reported at our country and one case was reported at world so far[5].

This complication was mainly caused by the anatomy of the left renal vein and the size of the stent. If the length on the left side of the superior mesenteric artery is too short to put the stent in while staying in its trunk, the stent is not stabilized on both sides of the stenosis, and moves. To avoid stent migration, stent oversizing is advisable. It is recommended to oversize the stent by 20% on the basis of the di-

ameter of the LRV in the renal hilum measured in the ultrasonic examination and magnetic resonance angiography. Hartung et al[6] suggested that the 16 mm diameter, 60 mm long stent should be considered as the basis of sizing for left renal vein stenting. In addition, the lack of barbs to stabilize the deployed Smart Control stent is also a factor in migration. A patient's early activity as well as friction between the pulsating aorta and the stent may cause stent migration. Although endovascular stent placement for the treatment of nutcracker syndrome is an effective and minimally invasive treatment modality, the possible occurrence this quite severe complication has to be kept in mind.

REFERENCES

1. Linka AZ, Jenni R. *Migration of intrahepatic portosystemic stent into right ventricle: an unusual cause of tricuspid regurgitation.* Circulation 2001;103:161-2.
2. Hohenfellner M, Steinbach F, Schultz-Lampel D, et al. *The nutcracker syndrome: new aspects of pathophysiology, diagnosis, and treatment.* J Urol 1991;146:685-8.
3. Scultetus AH, Villavicencio JL, Gillespie DL. *The nutcracker syndrome: its role in the pelvic venous disorders.* J Vasc Surg 2001;34:812-9.
4. Dubois P, Mandieau A, Dolatabadi D, et al. *Right ventricular migration of a stent after endovascular treatment of a superior vena cava syndrome.* Arch Mal Coeur Vaiss 2001;94:1180-3.
5. Chen S, Zhang H, Tian L, et al. *A stranger in the heart: LRV stent migration.* Int Urol Nephrol 2009;41:427-30. Epub 2008 Oct 22.
6. Hartung O, Grisoli D, Boufi M, et al. *Endovascular stenting in the treatment of pelvic vein congestion caused by nutcracker syndrome: lessons learned from the first five cases.* J Vasc Surg 2005;42:275-80.

=국문 초록=

저자들은 nutcracker syndrome을 치료하기 위해 삽입한 스텐트가 심장내 우심실로 이동하는 드문 합병증을 경험하였기에 보고하고자 한다. 29세 여자환자가 측복부 통증을 주소로 내원하였다. 복부 컴퓨터단층촬영에서 좌공팔정맥이 복부대동맥과 상장간막동맥 사이에서 눌리는 것(nutcracker syndrome)이 발견되었다. Nutcracker syndrome을 치료하기 위해 자가확장 스텐트를 좌공팔정맥에 삽입하였는데 다음날 스텐트가 심장 내 우심실로 이동된 것을 발견할 수 있었다. 경피적 스텐트 제거를 시도하였으나 실패하여 심장수술로 제거하였다. 수술 후 6개월째 아무런 복부나 심장 증상없이 외래 추적관찰 중이다.

- 중심 단어 : 1. 스텐트
2. 보철물실패
3. 혈관질환
4. 혈관보철물