

CASE REPORT

Treatment of severe hemolysis following Nit-Occlud Lê VSD coil implantation with Amplatzer Duct Occluder II

Nit-Occlud® Lê VSD koil yerleştirilmesini takiben gelişen ciddi hemolizin Amplatzer Duct Occluder II ile tedavisi

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Summary– Hemolysis after percutaneous device closure of ventricular septal defect (VSD) is a rare complication that can be conservatively managed in the majority of cases. However, surgery or transcatheter occlusion may be necessary. Presently described is the successful treatment of hemolysis that developed after implantation of the Nit-Occlud Lê VSD coil, using the Amplatzer Duct Occluder II (ADO II) in a patient with aneurysmatic perimembranous VSD. Systolic murmur and symptoms immediately disappeared after the procedure.

Özet– Ventriküler septal defektin (VSD) perkütan yolla kapatılması sonrası nadiren hemoliz gelişir ve çoğunlukla tutucu yöntemlerle tedavi edilir. Bununla birlikte bazen cerrahi ya da kateter yoluyla tıkama gerekebilmektedir. Burada Nit-Occlud® Lê VSD ile anevrizmatik perimembranöz ventriküler septal defekt kapatılması sonrası gelişen hemolizin Amplatzer® Duct Occluder II kullanılarak tedavi edildiği olgu sunuldu. Sistolik üfürüm ve semptomlar işlem sonrası hemen kayboldu.

The Nit-Occlud Lê VSD coil (Pfm Medical Ag, Köln, Germany) is a safe and feasible option for transcatheter closure of ventricular septal defect (VSD), with low atrioventricular block rates. However, as is true for all intracardiac devices, use is associated with the development of intravascular hemolysis.^[1] Hemolysis due to intracardiac device can be conservatively managed with fluids, sodium bicarbonate, and corticosteroids. However, in some cases surgical removal of the device or transcatheter occlusion of a residual shunt may be necessary.^[2]

Presently reported is transcatheter treatment of hemolysis that developed after implantation of the Nit-Occlud Lê VSD coil device using the Amplatzer Duct Occluder II (ADO II) (St. Jude Medical, Plymouth, MN, USA) in a patient with aneurysmatic perimembranous VSD.

Abbreviations:

ADO	Amplatzer Duct Occluder
LV	Left ventricular
RV	Right ventricular
VSD	Ventricular septal defect

CASE REPORT

A 5-year-old girl weighing 15 kg was admitted to the catheter lab with the aim of performing a transcatheter device closure of perimembranous inlet VSD. Echocardiographic examination revealed aneurysmatic perimembranous VSD 3.2 mm from the aortic valve, with a diameter of 10.7 mm on the left ventricular (LV) side. Two defects of the aneurysm were observed on the right ventricular (RV) side, 5.2 mm and 3.4 mm in diameter, respectively. LV diameter of the defect measured 11 mm on angiography (Figure 1a). Qp:Qs ratio was 2. A 12-mm x 6-mm Nit-Occlud Lê VSD coil device was selected.

The defect was crossed, bypassing the bigger defect on the RV side. The device was deployed, and the described minimal residual leak was confirmed on angiography prior to release (Figure 1b). Immediately after release, the distal cranial part of the device

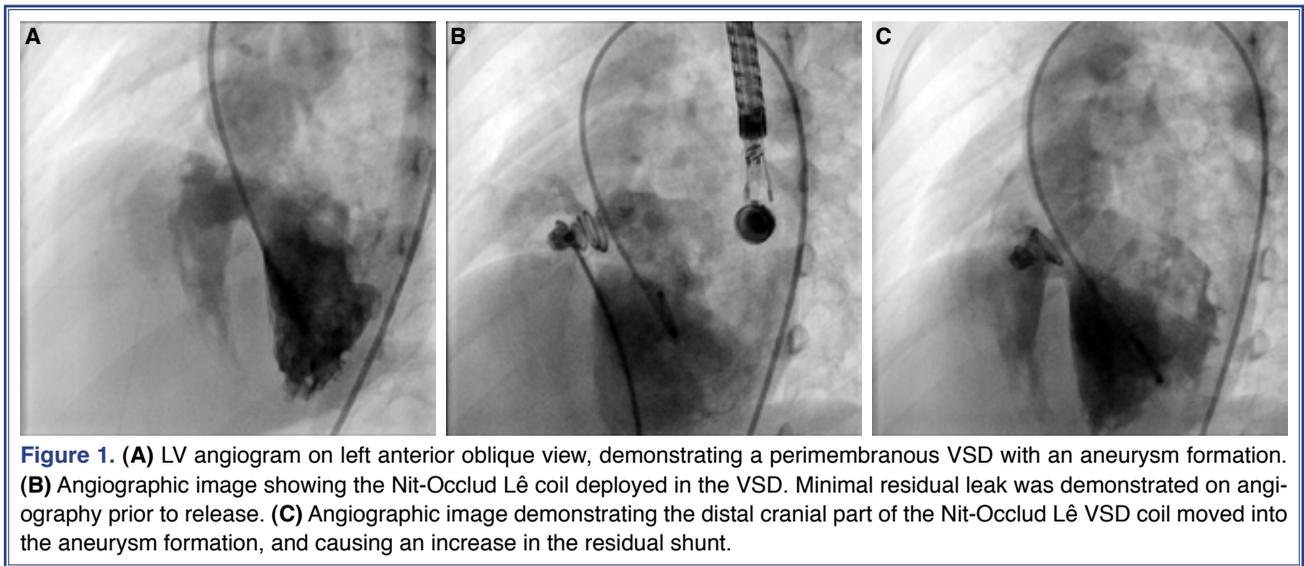
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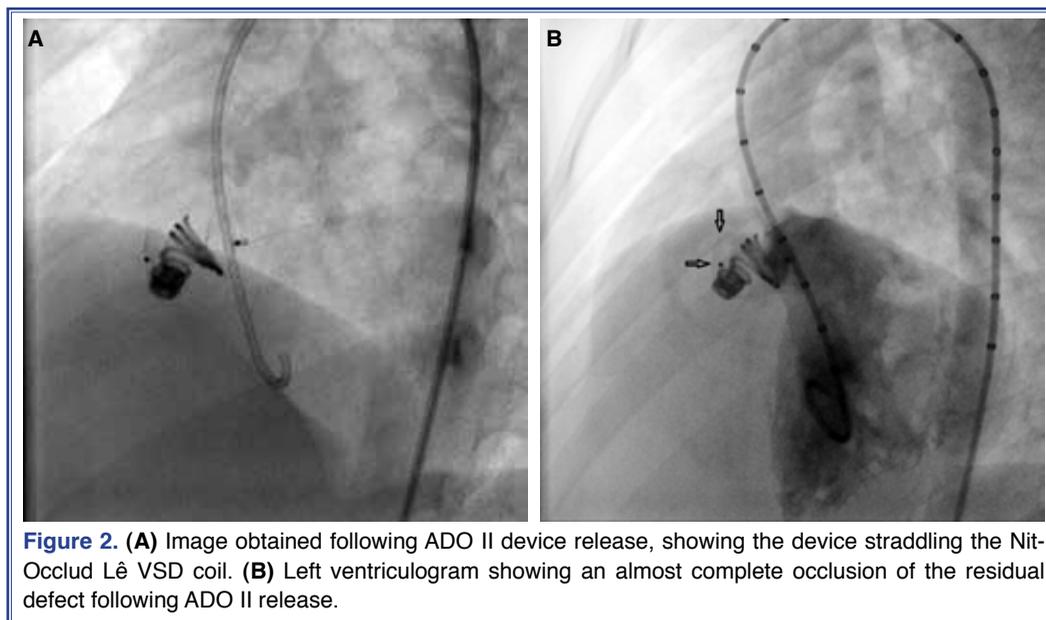




moved into the aneurysm formation, causing increase in the residual shunt (Figure 1c). The first 12 hours were uneventful until dark brown urine and jaundice were noticed on the first day postprocedure. Intravenous fluids, sodium bicarbonate, and prednisolone were commenced after hemolysis was confirmed by hemoglobinuria, and anaemia was determined based on blood and urine test results. On the 6th day of conservative follow-up, hemoglobinuria disappeared, but reappeared on the 8th day.

After 12 days, and after 2 packs of blood transfusion had been administered, the patient underwent

catheterization for transcatheter closure of the residual shunt. Residual shunt was found to be increased on LV angiogram. VSD was retrogradely crossed using a 5-F Judkins right coronary artery catheter and hydrophilic guidewire. After exchanging for a 5-F delivery catheter, a 6-mm x 6-mm ADO II was advanced to the tip of the delivery catheter. The distal disc was deployed on the RV side. The entire assembly was pulled back through the defect, and the proximal disc was deployed on the LV side (Figure 2a). Minimal residual shunt was observed on control LV angiogram (Figure 2b). No aortic insufficiency was observed. Systolic murmur disappeared immediately after the



procedure, and hemolysis resolved thereafter. Minimal residual shunt was found to have completely disappeared at 6-month follow up.

DISCUSSION

Hemolysis after percutaneous VSD closure is caused by residual high-velocity blood flow past the device, resulting in mechanical fragmentation of red blood cells.^[2,3] It is a rare complication that can cause significant sequelae. Rate of hemolysis following transcatheter VSD closure ranges from 0.7–15%.^[1,2] A total of 15 patients that had developed hemolysis due to transcatheter closure of VSD were presently reviewed, sourced from 8 reports. Hemolysis was found to have resolved spontaneously with conservative management in 13 of these patients. Two patients required surgical removal of the device and underwent surgical patch closure of the VSD. Attempted coil embolisation of the residual shunt failed in 1 such patient.^[1,2,4–9] Percutaneous implantation of an ADO II device was the treatment of choice in the present case.

In a comparison study in which results of Amplatzer device and Nit-Occlud Lê VSD coil use were reviewed, the rate of immediate residual shunt occurrence was higher in the Lê coil group, and tended to remain at the same degree.^[10] In a report on the results of transcatheter closure of VSDs using Lê coil in 20 patients, Odemis et al. suggested that patients tended to develop residual shunts if the diameter of the defect on the RV side was larger, with a mean of 5.4 mm in the residual shunt-positive group, and 3.8 mm in the negative group, and/or if the measurement of the left-to-right shunt was greatest, with a mean Qp:Qs ratio of 2.16 in the residual shunt-positive group and 1.58 in the negative group.^[1] El Said et al. emphasized that patients with multiple defects of the aneurysm were found to be more likely to develop residual shunts after closure of VSDs using ADO I.^[4] In the present patient, 2 defects of the aneurysm were observed. Their sum was relatively large and Qp:Qs ratio was 2. However, residual shunt was caused by unexpected movement of the device into the aneurysm formation.

The location of the defect and coil was delicate due to proximity to the aortic and tricuspid valves, and to the conduction system. For this reason, a low-profile, flexible device was needed to avoid further damage to the surrounding structures. ADO II is a low-profile device manufactured for patent ductus arteriosus clo-

sure. However, off-label use in perimembranous and muscular VSDs has been reported several times, and the results were promising in selected patients, particularly in cases of aneurysmatic VSD.^[11,12]

ADO II has 2 symmetrical retention discs, is delivered through 5-F sheaths, and does not require an arteriovenous loop. Taking advantage of these features, the device was implanted in retrograde fashion without an arteriovenous loop, which reduced the risk of embolization of the coil, as well as fluoroscopy time. ADO II was easily anchored onto the coil in the aneurysm, and an immediate, satisfactory occlusion was achieved.

Conclusion

Hemolysis after transcatheter device closure of VSDs is a rare but potentially hazardous complication. Although this complication is generally managed conservatively, surgery or transcatheter intervention is required in some patients. ADO II is a safe and effective option for closure of residual shunts in patients with aneurysmatic VSD, due to its low profile and flexible design.

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Keywords: Coil implantation; hemolysis; transcatheter closure; ventricular septal defect.

Anahtar sözcükler: Hemoliz; koil implantasyon; transkateter kapama ventriküler septal defect.