

Case Report

Ever Heard of the Obturator Vein?

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We report a complication related to advancement of a large diameter long sheath in the obturator vein. In an adult with a previously thrombosed femoral vein, the obturator vein was inadvertently cannulated. During percutaneous pulmonary valve implantation, the Ensemble[®] delivery system could not be advanced after repositioning attempt. The obturator vein had been perforated and sheath was coiled up in the pelvis leading to a retroperitoneal pelvic hematoma. Continuity of the vein was established using two self-expanding covered stents. The obturator vein runs dorsally and joins the inferior caval vein at a very acute angle posterior in the pelvis, creating a corner in which stiff catheters or sheaths may get entrapped. © 2009 Wiley-Liss, Inc.

Key words: percutaneous valve; perforation; occlusion; femoral vein; complication

INTRODUCTION

The clinician is often challenged in gaining venous access for procedures in patients with congenital heart lesions who had undergone multiple previous cardiac catheterizations. In general, the transfemoral route is preferred, but in up to 30% of patients, this may be impossible because of occlusion [1]. Complications such as thrombosis, hematoma, thrombophlebitis, and, rarely, retroperitoneal hemorrhage have been described [2–5]. We report a case in which the obturator vein was inadvertently cannulated when performing percutaneous pulmonary valve implantation, thereby leading to an unusual complication.

CASE REPORT

The patient, a 21-year-old male with pulmonary atresia and ventricular septal defect, had undergone multiple operations during infancy and childhood. The lesion was repaired at the age of 6 years and a 19 mm homograft was inserted in the right ventricular outflow tract. He presented with significant calcification and obstruction of the homograft (Doppler peak gradient 100 mm Hg) and was referred for a percutaneous pulmonary valve implantation.

As he had multiple previous catheterizations, patency of a femoral vein was first confirmed using a “blind” pencil Doppler probe before cannulation. The right groin was initially cannulated with a 9 F venous and a 6 F arterial sheath and a routine preliminary evaluation was performed. Standard procedure was fol-

lowed for Melody[®] valve (Medtronic, Heerlen, The Netherlands) implantation. After suitability for valve placement was established, three stents were implanted in the right ventricular outflow tract to act as scaffolding for the valve via a 12 F long sheath. The 22 F Ensemble[®] (Medtronic, Heerlen, The Netherlands) delivery sheath was subsequently advanced over a very stiff 0.035” Back-up Meier guidewire (Boston Scientific, MA, USA). The tip of the sheath proceeded smoothly past the pulmonary valve to the level of the distal main pulmonary artery when resistance was encountered (Fig. 1). The usual maneuvers when experiencing resistance in this area were first carried out by pushing, pulling-back, and advancing the Ensemble[®] at different degrees of guide wire tension. It was noticed during screening that there was no motion at the tip

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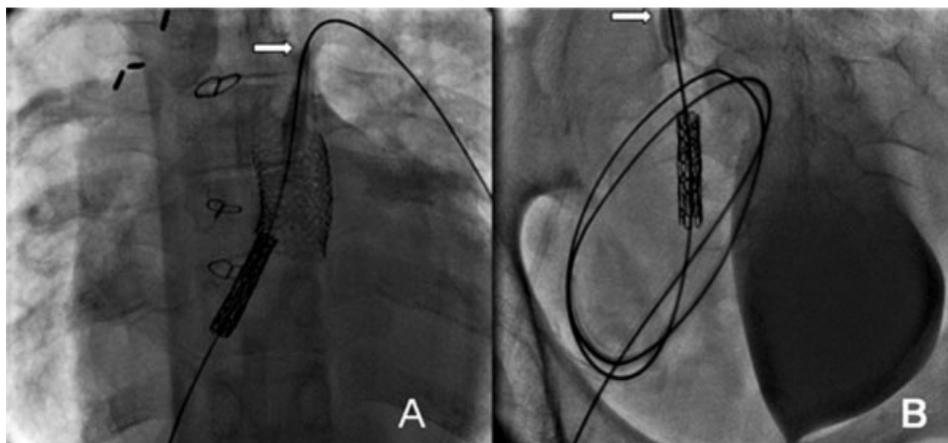


Fig. 1. Angiography. A: Ensemble[®] delivery system in main pulmonary artery, first attempt. The “carrot” cannot take the most cranial curve in the pulmonary artery. B: Ensemble[®] delivery system coiled in pelvis. Note the asymmetric bladder due to large hematoma of pelvis. Arrow indicates tip of Ensemble[®] system (carrot).

despite pushing the Ensemble[®] for several centimeters into the groin. The interventionalist controlling the wire reported that he had to give some wire without any corresponding movement of the tip of the Ensemble[®]. At this stage, fluoroscopy of the abdomen was performed which showed no tension over the abdominal component of the Ensemble[®]. Because of the clutter in theatre and the length of the patient, the pelvis could, however, not be visualized, but because everything was nice and straight, we were confident that no problem existed in this area.

After some more unsuccessful attempts, the tip of the Ensemble[®] was then pulled back well into the inferior caval vein, rotated, and an attempt at readvancement was made. After pushing about 40–50 cm of sheath into the groin, the unit did not appear in the right atrium. The patient was untied, repositioned, and fluoroscopy of the pelvis performed, which showed the sheath had coiled up in the pelvis (Fig. 1).

Mild instability of the patient with lower blood pressure was noticed at this stage, but improved by withdrawing the guidewire into the right atrium. By means of careful manipulation, the whole Ensemble[®] unit could be retrieved. Guidewire position in the right atrium was vigilantly maintained throughout the procedure. Venography was performed via the sheath before removal which showed perforation of the vein and a progressive retroperitoneal pelvic hematoma. The vessel presumed to be the femoral vein appeared smaller than usual and also had multiple venous valves (Fig. 2). Using two self-expanding covered stents (Fluency[®] Plus, Bard, Tempe, USA), continuity of the vein was restored and bleeding controlled.

An abdominal CT scan was performed afterwards which showed that the course of the stented vessel ran

posterior in the pelvis right up against the lumbo-sacral spine, consistent with an obturator vein (Fig. 3).

DISCUSSION

The obturator veins are usually described as branches of the internal iliac veins and the literal meaning of the word is “obtuse-angled.” The obturator vein runs in the upper portion of the thigh and enters the pelvis together with the obturator muscle through the obturator foramen in the obturator canal. It then runs posteriorly and superiorly on the lateral wall of the pelvis and joins the internal iliac vein after crossing the ureter [6]. An anatomical study showed that almost 80% of specimens had obturator veins in unusual positions where it could easily be damaged during groin and hernia surgery [7].

This patient had several previous catheterizations and intensive care unit admissions. Using the classic anatomical landmarks for groin cannulation and after confirming patency of groin vessels with a Doppler probe, the groin vessels were cannulated uneventfully. The right femoral vein was, however, obstructed and led to enlargement of the obturator vein, which we unintentionally cannulated during the procedure. This vein in the pelvis anatomically runs posteriorly toward the sacral spine and makes a very acute angle as it joins the internal iliac vein, potentially creating a tight posterior space up against the sacral vertebrae. The exact time of perforation is unclear, it could have been the first time when the tip of the “Ensemble” got stuck in the main pulmonary artery and we tried advancing it or during readvancement after the unit was pulled back into the pelvis. The tip of the carrot of the Ensemble[®] at that stage got trapped in the narrow posterior space

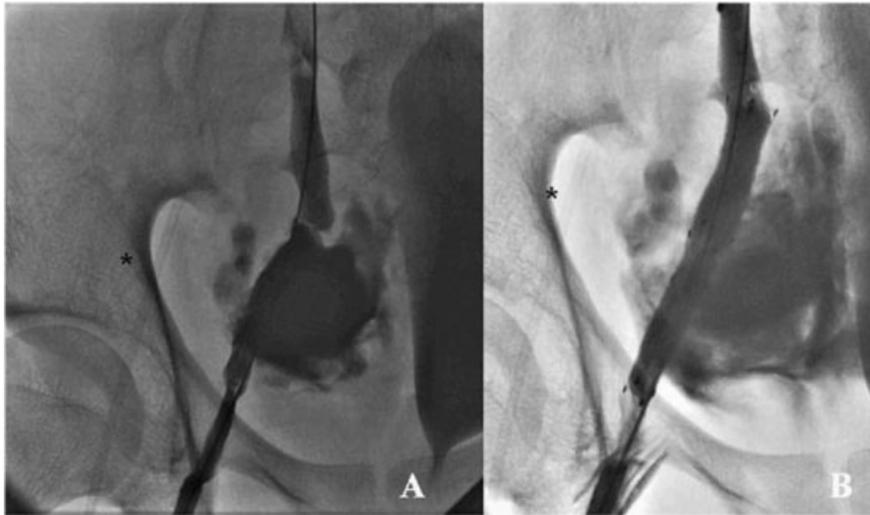


Fig. 2. A: Venogram. Large progressive pelvic hematoma demonstrated. Note the multiple valves and small size of the vein and unusual distance between the cannulated vein and the femoral artery. **B:** Twin stent grafts restoring venous continuity. *Arterial sheath.

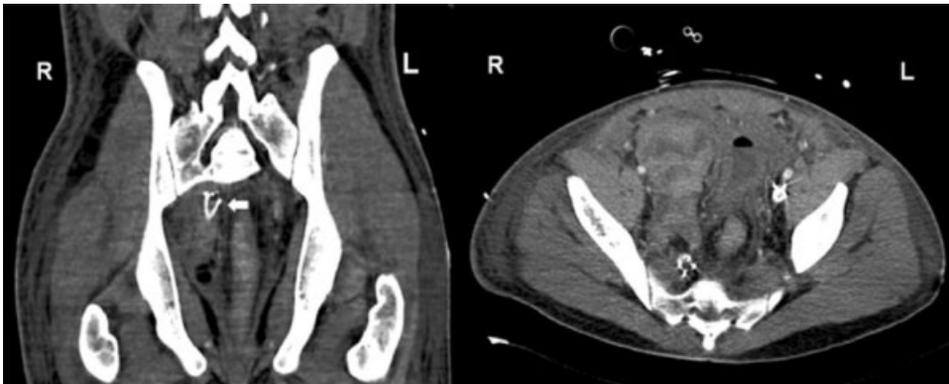


Fig. 3. CT scan of the pelvis. Coronal (left) and axial (right) CT showing stent posterior and superior in the right pelvis. Arrow indicates distal end of venous stent. Notice the narrow space in proximity to sacral spine.

in the pelvis, curled up and perforated the vessel. Looking at the coiled sheath in the pelvis, one can notice the large distance separating the femoral arterial and venous sheaths (Fig. 1), indicating that the vein cannulated is not the femoral vein. The fact that the “wire driver” had to give guidewire without any movement of the tip should alert one of a sheath/catheter coiling up. Inadvertent cannulation of the obturator vein is uncommonly reported in the literature, but anecdotal experience is noted in discussion with colleagues.

Valuable insights were gained by this incident. Firstly, after multiple catheterizations and intensive care unit stays, the femoral veins may have been traumatized and the vein medial to the artery is not neces-

sarily the femoral vein. Venography demonstrating divergence from the femoral artery and multiple venous valves would argue for this being the obturator vein. The sharp posterior pelvic angle of the obturator vein may lead to catheters being entrapped and attempts to advance it may perforate the vein. Secondly, good communication between delivery “sheath pusher” and “wire driver” is essential when doing complex procedures: the wire should never move forward in a stable advancing system. Thirdly, if long sheaths do not advance, the whole course should be visualized.

In conclusion, femoral venous occlusion is possible in some patients following multiple previous catheterizations with the potential of inadvertent obturator vein

cannulation. Operators should be aware of this because cannulating this vessel may lead to entrapment of catheters and devices in the pelvis.

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