Massive Hemorrhage Following a Minimally Invasive TVT Sling: A Case of Anomalous Anatomy

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Incontinence; TVT Sling; Massive Hemorrhage; IR Embolization

Case Presentation
A 72-year-old Caucasian woman presented with three years of bothersome stress urinary incontinence with associated frequency, dribbling, and sensation of incomplete voiding that occurred daily. She underwent management with conservative approaches including behavioral modifications, an incontinence pessary and pelvic floor physical therapy that were unfortunately unsuccessful. Urodynamic testing was performed, demonstrating a genuine stress urinary incontinence with 100cc post void residual. Given the patient’s severe stress incontinence which failed conservative management the decision was made to proceed with a minimally invasive sling, retropubic sling.

The patient’s medical history was significant for two post partum hemorrhages following uncomplicated vaginal deliveries. Her surgical history included a hip replacement and a hysterectomy. She had no family history of bleeding dyscrasias, underwent an evaluation by hematology which was negative for underlying bleeding disorders, and had unremarkable coagulation studies. She had no allergies and was taking no medications.

The patient underwent a routine Gynecare TVT Obturator System® placement and cystoscopy by a Female Pelvic Medicine and Reconstructive Surgeon at a day surgical center. While in the recovery room, the patient developed pelvic fullness and abdominal distention. She was noted to be hypotensive, with systolic blood pressure of 80mmHG and tachycardic with heart rate in the 120s. Given her hypotension resuscitative efforts were begun.

Diagnostic Assessment
On exam a firm, tender mass was noted extending above the pubic symphysis. A complete blood count demonstrated that her hematocrit decreased from 43.5 preoperatively to 30 within the first 2 hours post-operatively, which was concerning for major venous vs arterial hemorrhage. Emergent computed tomography scan of the abdomen and pelvis revealed a 13.5 x 9.5 cm retropubic hematoma (see Figure 1) prompting the patient’s transfer from the day surgical center to a local hospital for access to higher levels of care.

Figure 1. Axial view of pelvis with 13.5 x 9.5 cm retropubic hematoma

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Management and Outcome

Angiographic assessment by interventional radiology (IR) demonstrated a branch of the left obturator artery was found to have dye extravasation, prompting endovascular coiling. Despite coil placement and continued resuscitation, the patient’s hematocrit continued to trend downward prompting transfer to a tertiary care center with an available intensive care unit.

Repeat IR evaluation demonstrated that the coil was located retrograde to the injury site allowing for continued bleeding anterior to the injury site due to collateral blood flow. The repeat angiogram also demonstrated a trifurcation of the internal iliac artery (instead of the typical bifurcation). Her obturator artery arose from the middle branch of the trifurcation of the internal iliac artery instead of from the anterior branch of the iliac as in the majority of people, likely resulting in increased pulse pressure in the obturator artery (see Figure 2). The anterior and middle branches of the internal iliac were embolized bilaterally using Gelfoam® with subsequent stabilization of her hematocrit. Total blood transfusion consisted of 9 units of packed red blood cells and 4 units of fresh frozen plasma over the course of 2 days. She was discharged home on postoperative day 5 in good condition. Her postoperative course was complicated by subsequent urinary retention, which improved as the size of her hematoma slowly decreased over the course of 9 months.

Discussion

Presented by Samantha Pulliam, M.D., FPMRS

The tension-free vaginal tape (TVT) is a minimally invasive retropubic midurethral sling used to treat stress urinary incontinence. Its efficacy approaches 71-97% with a low rate of serious complications [1]. The majority of reported complications include urinary tract infections or voiding dysfunction which account for greater than 90% of reported complications [2]. Structural injuries are less common. Cystotomy occurs in 3% of procedures and requires no intervention other than trocar replacement [3]. Urethral injuries, mesh erosion, and bowel injuries combined occur approximately 1.9 of cases [3].

Vascular injury resulting in blood transfusion or estimated blood loss greater than 500 ml occurs in 0.5-2.5% of cases [3, 4]. Injury to the veins of Santorini in the retropubic space generally causes a self limited, slowly expanding retropubic hematoma which is managed by close observation, pelvic imaging and blood products as needed. Arterial bleeding has only been described by case report and is more difficult to control. Cadaveric dissections demonstrate that the needles used for sling placement travel just lateral to the urethra upon entry, 3.2 cm medial to the Obturator neurovascular bundle, 3.9 cm medial to the superficial and Inferior Epigastric vessels, and 4.9 cm medial to the external iliac vessels on average [11]. Though correctly placed midurethral slings are within centimeters of major pelvic vessels, the incidence of arterial injury is low. Appropriate patient selection, meticulous patient positioning and surgeon experience help mitigate serious complications including ureteral, bowel, nerve and large vessel injury given their close proximity during this type of operation [4].

Anomalous pelvic vasculature cannot be anticipated. In our case, the trifurcation of the internal iliac artery brought the obturator vessel into the path of the trocar of the midurethral sling as was demonstrated on the angiogram. In cadaveric dissections, trifurcation of the internal iliac vessel is the source of the obturator artery in 2% of women [13]. This anomaly has not been previously reported to result in catastrophic hemorrhage following minimally invasive sling placement. In this case, the anomalous middle branch of her internal iliac artery traversed behind the inferior pubic ramus in addition to supplying the obturator artery that was transected during

Figure 2. Arteriogram demonstrating vascular variant along with interventional coil during second embolization.
placement of the TVT sling (see Figure 2). A more common vascular anomaly is the “Corona Mortis” or circle of death which involves an anastomosis between the obturator artery and the external iliac artery or the inferior epigastric artery which can result in laceration during sling placement [12].

As evidenced by case report literature, patients with significant vascular injuries after incontinence sling procedures present with acute decompensation in the hours following surgery. Initial resuscitative efforts include using colloid and crystalloids to maintain perfusion, preparation of blood, and using complementary techniques to minimize further bleeding. These methods include distending the bladder and packing the vagina in order to tamponade a space that is difficult to access [10]. If conservative management is unsuccessful, surgery or interventional radiology procedures can be utilized. Surgical management comprises a myriad of approaches including laparotomy, vaginal decompensation, or laparoendoscopic management with use of intra-op hemostatic agents directly applied into the retropubic space being described in the literature [5, 6, 7, 8]. In our practice, postoperative bleeding is often managed with radiographic embolization, which was the modality chosen in this patient [9].

This case highlights the uncommon, but dramatic possibility of arterial injury during minimally invasive sling placement and highlights the importance of post operative hemorrhage management at a tertiary care center with experienced surgeons and available Interventional Radiology services. Arterial vasculature injury should be included in the differential of an expanding post operative hematoma not responding to resuscitative efforts.

References


