



Coil embolization of the internal iliac artery in uterine artery pseudoaneurysms and to study the complications: A follow up study.

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ABSTRACT

Uterine artery pseudoaneurysm is a rare cause of secondary postpartum hemorrhage but is potentially life-threatening and can occur after caesarean section (c-section) or a hysterectomy. Angiographic embolization is a safe and effective method for treating postpartum hemorrhage due to pseudoaneurysm in hemodynamically stable patients. Therefore, it should be considered as a treatment option before resorting to surgery, in appropriately selected cases.

Objective: To see the incidence of uterine artery aneurysm and to access the outcome after internal iliac artery embolization.

Methods: From August 2015 to March 2016, 20 patients with uterine artery aneurysm underwent IIA coil embolization. Coils were placed proximal to the first branch of the IIA in 7 patients and distal to the first branch in 13 patients.

Results: Patients included women with mean age of 35 years (range, 28-38 years). Mean diameter of UAA was 20.4 mm and iliac artery was 24.2 mm (range, 15-48 mm). 12 patients (60%) had symptoms of pelvic ischemia after endograft procedures: 1 of 7 patients with IIA embolization had buttock claudication, and 9 of 13 patients with distal IIA embolization had pelvic ischemic symptoms. No colonic ischemia occurred in this series. At 6 month follow-up, 4 patients with distal IIA embolization were symptom-free. At further follow-up to 10 months, 4 patients remained significantly limited with symptoms of claudication

CONCLUSION: Uterine artery pseudoaneurysm should be considered as a differential diagnosis in patients presenting with postpartum hemorrhage, especially if bleeding is significant and recurrent, particularly after an operative delivery. The diagnosis of a pseudoaneurysm can be made by color Doppler ultrasonography, computed tomography, magnetic resonance imaging, and angiography.

KEYWORDS

INTRODUCTION

A pseudoaneurysm is an extra-luminal collection of blood with turbulent flow that communicates with the parent vessel through a defect in the arterial wall. The development of an arterial pseudoaneurysm is a rare but reported complication of pelvic surgery, vascular trauma during c-section or after uterine curettage. After hematoma formation, there is central liquefaction that leaves a cavity with turbulent blood flow, as a result of persistent communication between the parent artery and the hematoma. The absence of a 3-layer arterial wall lining the pseudoaneurysm differentiates it from a true aneurysm, which is less common than a pseudoaneurysm.[1]

Pseudoaneurysm of the uterine artery is an uncommon cause of delayed postpartum hemorrhage following caesarean or vaginal delivery and is potentially life threatening. Typically, the lesions are discovered because the patients have symptoms related to delayed rupture of the pseudoaneurysm, causing hemorrhage.[2] A pseudoaneurysm may be asymptomatic, may thrombose, or may lead to distal painful embolization. The risk of rupture is proportional to the size and intramural pressure. Diagnosis is usually based on both Doppler sonography and arteriography.[3] Transcatheter uterine artery embolization (UAE) has emerged as a highly effective technique for controlling obstetric and gynaecologic hemorrhage, including that from pseudoaneurysms

METHODS

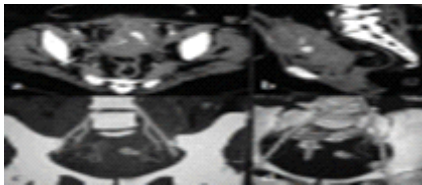
From August 2015 to March 2016, 20 of 133 patients (15%) underwent IIA embolization were the study population of this report. All patients were evaluated with spiral computed tomography (CT) with 2 mm reconstruction interval axial sections. Two coiling systems were used in these 20 patients and choice of coiling type was influenced by many factors, including IIA anatomy, diameter, and investigational device exemption protocols. Coil embolization of the IIA was performed through the contralateral femoral approach in all. Complete occlusion of the IIA was achieved. Preoperative assessment included medical history, physical examination, and CT imaging of the IAA segment. Associated comorbidity was not significantly different between patients who underwent proximal or distal IIA coil embolization. Patients were followed up at 1, 6, and 10 months, and thereafter. Follow-up protocol included office visits, physical examination, and imaging studies, including CT with three-dimensional (3D) reconstruction and plain abdominal radiography. All patients were assessed at each postoperative visit specifically for symptoms of pelvic ischemia.

Statistical analysis. The Fisher exact test was used for statistical analysis to compare comorbidity in patients with proximal versus distal coil placement. The Student t test was used to compare mean diameter values

RESULTS

20 women underwent IIA coil embolization. Their average age

was 35 years (range, 28-38 years), mean IAA diameter was 20.4 mm and mean diameter of the common iliac artery was 24.2 mm. 12 patients (60%) had symptoms of pelvic ischemia. Of the 7 patients who underwent proximal IIA coil embolization, 1 patient had buttock claudication. This patient had atheroembolic showering to the left foot after the preoperative IIA coil embolization procedure. Popliteal to common plantar artery bypass grafting was performed to save the foot. This patient also had mild left hip pain after IIA occlusion, which had resolved at 6-month follow-up (9 months after IIA coil embolization). ESG was performed 3 months after IIA coil embolization, with no complications. Of the 13 patients who underwent distal IIA embolization, 9 patients (75%) had symptoms of pelvic ischemia. Four of the 8 patients (50%) with buttock claudication had mild symptoms, and they returned to normal activities during follow-up, 3 patients at 6 months and 1 patient at 10 months after surgery. In the other 4 patients (50%) symptoms persisted for 1 year after the coil embolization procedure. Two of these 4 patients still had substantial symptoms that interfered with activities at 21 year post-operation. No clinical symptoms of colonic ischemia or paraplegia were noted in this series. Symptoms of claudication resolved during mean follow-up of 8 months in the remaining 4 patients. No new symptoms of pelvic ischemia occurred. Mean IIA diameter decreased from 20.4 mm to 18.5 mm] (P .05) over mean follow-up of 11 months. Ipsilateral to the IIA coil occlusion, common iliac artery mean diameter decreased from 24.2 mm (range, 15-48 mm) to 21.4 mm (range, 12-31 mm) (P .02). Ipsilateral common iliac artery diameter decreased by 5 mm or more in 5 patients. No ipsilateral common iliac artery enlargement occurred



(a) Axial and (b) Sagittal MPR CT Angiogram images show contrast filling the pseudoaneurysm (arrow) within the uterus. (c) MIP and (d) VR images show a pseudoaneurysm in relation to the left uterine artery & internal iliac artery.



(a) Embolization coils (arrow) within the pseudoaneurysm. (b) Selective left internal iliac angiogram (Postembolization) using gelfoam and embolization coils show complete obliteration of the pseudoaneurysm. (c) Follow up color Doppler sonography shows coiled artery coiled Arteries.

DISCUSSION

Postpartum hemorrhage remains one of the major causes of maternal mortality. Secondary postpartum hemorrhage is defined as excessive bleeding starting any time from 24 hours after delivery up to 6 weeks postpartum and most commonly occurring between 8 and 14 days postpartum. Common causes include retained products of conception, subinvolution of the placental bed, and endometritis.[4] Rare causes include pseudoaneurysm of uterine artery, arteriovenous malformations, and choriocarcinoma. When the more common causes have been excluded, pelvic angiography may be performed. Uterine artery embolization can be carried out to control hemorrhage. In 1979, Brown et al., reported the first case of selective arterial embolization used successfully to treat an extrauterine pelvic hematoma after three failed surgical attempts to control the bleeding.[5] Since then, arterial embolization has been used successfully to control postpartum bleeding from uterine atony, placenta accreta, and vulvar and vaginal hematomas. The efficacy and safety of selective arterial embolization of uterine arteries was evaluated by Pelage et al., in

women with delayed secondary postpartum hemorrhage. In their series of 14 women, pseudoaneurysms of the uterine artery were found in 2 women.[6] Immediate resolution of external bleeding was observed after embolization. In this series, no complications related to this invasive treatment were found. Other authors have described complications, including muscle pain and bladder necrosis.[7]

A true aneurysm has all three layers of arterial wall, whereas pseudoaneurysm does not have all the three layers of arterial wall. The differential diagnosis of pseudoaneurysm includes acquired arteriovenous malformations (AVMs), arteriovenous fistulas, and direct vessel rupture. AVMs are characterized by multiple communications of varying sizes between arteries and veins, which can be congenital or acquired. Congenital uterine AVMs are due to abnormality in the embryologic development of primitive vascular structures, whereas acquired AVM's consist of multiple small arteriovenous fistulas between intramural arterial branches and the myometrial venous plexus. Acquired AVM's occur more commonly following D and C, uterine surgery, or trauma to the uterus. Color flow Doppler demonstrates to-and-fro sign in the neck of the pseudoaneurysm and yin-yang sign in the body of the pseudoaneurysm. AVM's are characterized by marked aliasing on color flow Doppler and arterialized venous flow on spectral Doppler evaluation.

In a small series of women, who underwent embolotherapy for obstetric hemorrhage, all 3 women who attempted conception after embolization were successful. Of the 3 women, 2 underwent bilateral uterine artery embolization.[8] Our patient developed a pseudoaneurysm after 2 weeks of c-section delivery. Treatment was by angiographic embolization of uterine arteries with embolization coils. In a series of women, Rosenthal et al., observed angiographic arterial embolization was shown to be the most useful clinical tool in the management of post operative vaginal hemorrhage.[9] Angiographic embolization has the advantages of decreased morbidity, ability to localize the bleeding site and provide a more distal occlusion than surgical ligation, and preservation of future fertility compared to hysterectomy. Burchell demonstrated that bilateral internal iliac artery ligation was more effective in reducing the pulse pressure than unilateral ligation.[10] It is possible that the redistribution and redirection of blood or hypoxia-induced neovascularization allows bleeding to occur from the contralateral side after unilateral embolization. Inadequate embolization of a pseudoaneurysm due to extrauterine feeding arteries, such as the internal pudendal artery, ovarian artery, inferior epigastric artery, or contralateral uterine artery leading to embolization failure can occur. Hence, bilateral uterine embolization is safe and more advantageous than unilateral embolization.

We conclude that in a woman with unexplained hematuria after c-section delivery, pseudoaneurysm is a potentially life-threatening complication and should be considered in the differential diagnosis of secondary postpartum hemorrhage. Although data are scant, bilateral uterine artery embolization for obstetric hemorrhage appears to have no increased deleterious effect on future fertility and is more effective when compared to unilateral embolization.

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