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ORIGINAL ARTICLE

Endovascular management of postpartum hemorrhage of placental origin

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KEYWORDS

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Abstract *Aim:* To evaluate the potential role, efficacy, and complications of endovascular management of postpartum hemorrhage induced by variable placental abnormalities.
Materials and methods: Ten patients with placental abnormalities underwent pelvic arterial embolization in Assiut University Hospital, because of postpartum hemorrhage. Placental abnormalities were; retained placenta ($n = 4$), placenta accrete vera ($n = 1$), placenta increta ($n = 2$), placenta percreta ($n = 1$), and choriocarcinoma ($n = 2$). Only three patients were embolized on emergency bases, while the other 7 patients were scheduled for embolization.
Results: The mean hemoglobin level before embolization was 6 g/dL (range: 4.5–8 g/dL). Severe coagulation disorders were present in one patient. Postembolization pelvic angiogram showed total devascularization of the pathological arteries in 7(70%) patients, and subtotal devascularization in 3(30%) patients. The clinical success is 100%.
Conclusion: Whatever the placental disease, pelvic embolization with long-lasting embolizing agents is very effective and safe treatment of associated postpartum hemorrhage.

1. Introduction

Placental diseases that may cause postpartum hemorrhage (PPH) include placenta accreta (PA), gestational trophoblastic neoplasm (GTN), and retained placenta and products of conception. PA has been defined as placental penetration into the myometrium. Conventional extirpation management of PA carries out high risk of severe hemorrhage with mortality rates approaching 25% (1). If emergency hysterectomy was performed, mortality rate might be reduced to 6% (1), but the patient will lose her potential for future fertility. To reduce mortality and morbidity and preserve the patient fertility, a conservative method of management, leaving the uterus and the placenta inside, was developed aiming at spontaneous resorption of the placenta (2–4). Pelvic arterial embolization has been shown to be effective in the treatment of PA induced postpartum hemorrhage after extirpative or conservative management (5–10). Uterine hemorrhage might occur in women with GTN, as the uterus is usually enlarged with hypervascular and friable tumor inside. Traditionally, hysterectomy has been

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the main solution to this serious condition. However, selective angiography and transcatheter embolization have become more popular (11–13), because most of these tumors are chemosensitive and usually cured without need for hysterectomy. Accordingly, we report our experience involving 10 consecutive patients with different placental diseases presented by postpartum hemorrhage. We aimed to evaluate the potential role and efficacy of pelvic embolization in the management of these patients and to report any complications of this procedure.

2. Patients and methods

This retrospective study did not require institutional review board approval. Between January 2009 and September 2014, ten patients with placental abnormalities underwent pelvic arterial embolization in Assiut University Hospital, because of postpartum hemorrhage. Their ages ranged from 20 to 38 years with mean age 27.4 years. All but two women were referred from outside of our institution. Six patients presented after normal vaginal delivery, and the other four patients presented after cesarean section (Table 1). When the ultrasound examination showed intrauterine placenta without description of the degree of myometrial invasion, we termed it "retained placenta". Prenatal diagnosis of placenta accreta occurred in only one patient based on typical ultrasonographic and color Doppler findings. The diagnosis of placenta accreta in the other 4 patients occurred when total manual removal of the placenta was impossible ($n = 3$), or when bleeding from the implantation site started just after forced placental extirpation ($n = 1$). Choriocarcinoma ($n = 2$) was diagnosed when the beta-human chorionic gonadotrophin (B-HCG) was very high and raised sequentially for 2 weeks.

In all patients pelvic ultrasonographic examination was the first imaging modality to detect the cause of hemorrhage. MRI was performed for patients with placenta accreta or choriocarcinoma ($n = 6$). Cystoscopy was performed to confirm bladder wall invasion for one patient with placenta percreta invading the urinary bladder on MRI. Only 2 patients had primary postpartum hemorrhage (within 24 h) and the other 8 patients presented after 24 h of delivery (secondary postpartum hemorrhage) (Table 1). The embolization was performed on emergency bases for 3 patients; two presented after suction evacuation of retained placenta, and the third one who underwent placenta accreta extirpation. These procedures were performed with anesthetist and obstetrician supervision. For nonemergent secondary hemorrhage, the decision to perform embolization was made on the basis of active continuing hemorrhage despite appropriate medical and obstetric treatment. All patients received prophylactic antibiotics (amoxicillin clavulanate and metronidazole) just before embolization and continued for 5–7 days after embolization. Informed consent was obtained before the procedure.

2.1. Embolization procedure

Pelvic angiography was performed under local anesthesia through the right common femoral artery approach using a 4–5 F vascular sheath (Cordis Corporation, Europa N.V., the Netherlands). Cobra catheter (Optitorque, Terumo corporation, Tokyo, Japan or Imager, Boston scientific, USA) was used to catheterize the uterine artery, beginning with the left side then the right side by looping the catheter in the abdominal aorta. Microcatheters (2.7/2.9 F Progreat, Terumo, Tokyo, Japan) were used coaxially when the Cobra catheter could not be advanced into the distal uterine artery (beyond the cervico-vaginal artery) or when embolization of another small pelvic artery was required e.g. vesical branch. PVA particles 500–700 μm-followed by 700–1000 particles (Contour; Boston Scientific) were used in all women. NBCA/Lipiodol mixture and steel coils were used in 2 patients with choriocarcinoma to occlude large arterio-venous fistulas.

Table 1 Types of abnormal placentation, mode of delivery and timing and methods of embolization.

Patient no.	Age (y)	Placentation	Mode of delivery and management	Time between delivery and UAE	Embolized arteries	Embolizing materials
1	23	Retained portion	Normal	4 days	Bilateral uterine	PVA
2	28	Retained portion	Normal	7 days	Bilateral uterine	PVA
3	32	Retained portion	Normal and trial of suction evacuation after 12 days	12 days (just after trial of evacuation)	Bilateral uterine	PVA
4	31	Retained portion	Normal and trial of suction evacuation after 16 days	16 days (just after trial of evacuation)	Bilateral uterine	PVA
5	34	Accreta	Cesarean and extirpation	The same day	Bilateral uterine	PVA
6	29	Increta	Cesarean and partial conservation	8 days after	Bilateral uterine	PVA
7	26	Increta	Cesarean and full conservation	15 days after	Bilateral uterine	PVA
8	20	Percreta with bladder invasion	Cesarean and full conservation	The same day	Bilateral uterine, bilateral inferior vesical and left internal pudendal	PVA
9	28	Choriocarcinoma	Vaginal delivery	6 weeks	Bilateral uterine, left inferior vesical, left inferior gluteal right internal pudendal	PVA, NBCA, and coils
10	23	Choriocarcinoma	Vaginal delivery	12 weeks	Bilateral uterine, left inferior vesical, right inferior vesical, right internal pudendal	PVA, NBCA, and coil