CLINICAL STUDY

Feasibility and Safety of Prophylactic Uterine Artery Catheterization and Embolization in the Management of Placenta Accreta

Gustavo Izbizky, MD, César Meller, MD, Mario Grasso, MD, Andrea Velazco, MD, Oscar Peralta, MD, Lucas Otaño, MD, PhD, and Ricardo Garcia-Monaco, MD, PhD

ABSTRACT

Purpose: To evaluate the feasibility and safety of prophylactic uterine artery catheterization and embolization in the management of placenta accreta (PA).

Materials and Methods: Retrospective chart review was performed of 95 consecutive patients with prenatal suspicion of PA managed in a 10-year period with a strategy that included prophylactic bilateral uterine artery catheterization, delivery of the baby, uterine artery embolization if indicated, and subsequent surgery. Feasibility was defined as catheterization being possible to perform, technical success as embolization being possible when indicated and complete stasis of the vessels achieved, and clinical success as no maternal death or major blood loss. Median gestational age at delivery was 36 weeks (interquartile range, 24–39 wk).

Results: PA was confirmed in 79 patients (83%). Feasibility was 97% (92 of 95); in three cases (3%), acute early massive hemorrhage forced emergency delivery without catheterization. Embolization was performed in 83 of 92 patients (87%) to the extent of complete stasis; in the remaining nine, it was unnecessary because spontaneous placental detachment was visualized after fetal delivery (technical success rate, 100%). There were several complications, including bleeding requiring blood transfusion (49%) and bladder surgery (37%), but there were no major complications attributable to the endovascular procedures. There was one minor complication presumably related to embolization (transient paresthesia and decreased temperature of lower limb), with uneventful follow-up. Clinical success rate was 86%, with no maternal deaths, but 14% of patients received large-volume blood transfusion.

Conclusions: Prophylactic uterine artery catheterization and embolization in the management of PA appeared to be feasible and safe in this consecutive series of patients.

ABBREVIATIONS

IIA = internal iliac artery, IQR = interquartile range, PA = placenta accreta, PRBC = packed red blood cell, UAE = uterine artery embolization

Placenta accreta (PA) is an increasingly common life-threatening condition. It is associated with maternal mortality and morbidity resulting from massive obstetric hemorrhage and surgical morbidity (1–5). Most experts agree that the perioperative care of patients with suspected PA should be in an institution with the appropriate expertise and facilities to ensure a multidisciplinary approach (3–6). However, the optimal management of these patients remains controversial. The use of endovascular interventional procedures to reduce hemorrhage, thereby improving visualization of the surgical field and allowing a more controlled hysterectomy (when indicated), has been described in the management of obstetric hemorrhage of various causes, but its role in the management of PA is still a subject of discussion (6–10). Actually, several centers do not support its use, even with the availability of the technology. Different approaches have been described, including balloon

From the Obstetrics Service (G.I., C.M., M.G., L.O.), Gynecology Service (A.V.), and Radiology Service (O.P., R.G.M.), Hospital Italiano de Buenos Aires, JD Peron 4190 (C1199ACI), Buenos Aires, Argentina. Received April 11, 2014; final revision received October 12, 2014; accepted October 13, 2014. Address correspondence to R.G.M.; E-mail: ricardo.garciamonaco@hospitalitaliano.org.ar

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occlusion alone as an adjunct for cesarean hysterectomy, a combination of balloon occlusion and embolization, and prophylactic catheter placement and prehysterectomy embolization. Despite being widely practiced, there is no robust evidence to support temporary balloon occlusion of the internal iliac arteries (IIAs) before hysterectomy (11). The efficacy of prophylactic bilateral uterine artery catheterization and embolization to reduce surgical bleeding has shown encouraging results in retrospective series without a control arm, but current literature about its feasibility and safety is still scarce (8,9,11–14). Although there is literature regarding feasibility and safety of embolization of uterine fibroid tumors, the setting of PA is different for many reasons, including the fact that women with PA may need an unscheduled delivery mainly as a result of vaginal bleeding, that embolization in PA frequently involves additional target organs, and the likelihood of higher risk of thrombotic complications because of the prothrombotic state of pregnancy. Therefore, publications of embolization for fibroid tumors may not be adequate to allow extrapolation to the feasibility and safety of embolization in PA.

The aim of the present study was to evaluate the feasibility and safety of prophylactic selective bilateral uterine artery catheterization and embolization in the management of PA in a consecutive series of patients treated at a single institution.

MATERIALS AND METHODS

The present study was a retrospective chart review of a series of 95 consecutive patients who were suspected prenatally to have PA and were managed with the same multidisciplinary strategy between February 2002 and July 2012 at a university hospital. Inclusion criteria were suspicion of PA based on the presence of ultrasound (US) and/or magnetic resonance (MR) imaging findings and/or the presence of high risk factors such as previous cesarean delivery and placenta previa in the index pregnancy. Patients were identified from a specific electronic database of pregnancies with prenatal suspicion of PA and scheduled for the multidisciplinary management protocol (Excel 2011; Microsoft, Redmond, Washington). The study was approved by the institutional review board.

Abnormal placental adherence was confirmed histopathologically and/or clinically after delivery (15–18). Histopathologic confirmation included the spectrum of accreta (ie, chorionic villi are implanted on the myometrium without intervening deciduas), increta (ie, the myometrium is invaded by the placental villous tissue), and percreta (ie, the villi penetrate the entire uterine wall) (16). Clinical assessment of abnormal adherence of the placenta was defined as placental attachment to the uterine wall without easy separation (15). For the purposes of the present study, we used the term PA for the entire spectrum of abnormal placental adherence.

The management of PA in our institution included the following: prenatal imaging studies (US and MR imaging), preoperative multidisciplinary counseling, scheduled delivery at approximately 36 weeks of gestation, and a staged perioperative protocol including bilateral uterine artery catheterization and angiography, cystoscopy and bilateral ureteral stent placement, midline laparotomy, hysterotomy and delivery of the baby (avoiding the placenta), embolization (unless spontaneous placental detachment was seen with normal bleeding at the placental site immediately after fetal delivery), and elective hysterectomy if the diagnosis of PA was confirmed during surgery. Conservative surgery with preservation of the uterus was reserved for false-positive cases or for patients with a focal or small limited area of accretism, but our standard of care was hysterectomy. Before treatment, all patients received comprehensive counseling and provided written informed consent.

Preoperative pelvic angiography was performed with a 5-F pigtail catheter in the angiography suite (Integris V5000; Philips Medical Systems, Best, The Netherlands) via a percutaneous arterial femoral approach. First, two 5-F Cobra-type catheters (Glidecath; Terumo, Tokyo, Japan) were introduced coaxially through bilateral femoral 5-F introducers (Terumo). Each catheter was placed in the anterior trunk of the contralateral IIA. Then, selective bilateral uterine artery catheterization and angiography were performed with low-osmolar contrast medium (Hexabrix; Guerbet, Roissy, France). The catheters were advanced further and placed at the level of the horizontal portion of each uterine artery. Then, the catheters were fixed to the skin, and the patient was transferred to the operating room, where bilateral ureteral stents were placed under cystoscopy. Immediately before surgery, the position of the uterine artery catheter was checked under fluoroscopy with a mobile angiography system (BV300; Philips Medical Systems) located in the operating room.

A laparotomy through an infraumbilical incision and a hysterotomy (avoiding the placenta) were then performed. After delivery of the baby, if PA was strongly suspected and spontaneous detachment was not visualized, the placenta was left in situ, and free-flow bilateral uterine embolization was performed under fluoroscopy with a mixture of iodine contrast medium and Gelfoam pledgets (Pharmacia and Upjohn, Kalamazoo, Michigan) until complete stasis (**Fig 1**). If preoperative pelvic angiography showed significant uterine vascular supply from the vesical or vaginal arteries, these vessels were also embolized with the same 5-F catheter. Postembolization angiography was not performed routinely but at the operator's discretion. Immediately after embolization, a gynecologist with 10–25 years of experience performed a total or subtotal hysterectomy if PA was strongly suspected and spontaneous detachment was not visualized.