

Embolisation in the Therapy of Post-Partum Haemorrhage in a Patient with a Massive Myoma

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Abstract

Study background: The world prevalence of post-partum haemorrhage is approx. 10.5% of pregnancies, and it is the leading mortality cause among young women, accounting for approx. 25% of fatalities. Post-partum haemorrhage is defined as over 500 ml blood loss from genitals, occurring within the first 24 hours post partum. The presented case is an example of efficacy of the embolisation procedure in the management of post-partum haemorrhage. A 29-y.o. female patient was referred to the hospital in her third pregnancy. Because of the presence of a massive myoma the patient was qualified for delivery by Caesarean section. The child was delivered. The uterine muscle was sutured. Haemostasis control - no signs of active bleeding. Three hours after the Caesarean section a massive postpartum haemorrhage developed. Oxytocin and Methylergometrin were administered intravenously, and Mizoprostol per rectum. The bleeding from the uterine cavity was still massive, and a decision was made on embolisation of uterine arteries.

Methods: The procedure was performed with access via the right femoral artery, under local anaesthesia. A selective injection of a contrast medium to the left uterine artery was performed, which allowed visualisation of the uterine vascular bed with the myoma, as well as of the site of the active, massive bleeding. First the left uterine artery was embolised with particles, in order to close the vascular bed of the myoma. Then, a part of the vessel supplying the uterine muscle with the bleeding site, was closed with Spongostan gel.

Results: Control angiography indicated a correctly closed left uterine artery, with no filling of the uterine vascular bed. No other sites of bleeding were detected.

Conclusion: The selective embolisation of vessels in course of a postpartum haemorrhage in that case was a safe, minimally invasive and highly effective therapeutic method, that ensures an option of further pregnancies.

Keywords: Post-partum haemorrhage; Embolisation; Myoma; Caesarean section; Pregnancy; Uterine artery; Bleeding

Abbreviations: PPH: Post-p artum Haemorrhage; UFE: Uterine Fibroid Embolization; UAE: Uterine Artery Embolization

Introduction

Nearly half a million women die worldwide because of reasons associated with pregnancy and birth (WHO 2010). One fourth of that mortality is associated with complications of the third stage of labour. The main complication of that stage is excessive bleeding occurring within the first 24 hours post partum, referred to as the primary postpartum haemorrhage (PPH) [1].

PPH is one of the five leading causes of death among pregnant women, both in developing and developed countries. In developing countries it remains the principal cause of death among pregnant women (WHO 2010).

The world prevalence of PPH is approx. 10.5% of pregnancies, and it is the leading mortality cause among young women, accounting for approx. 25% of fatalities [2,3]. It is one of the main world causes of morbidity and mortality among women giving birth. In the US, obstetric haemorrhages are responsible for 13% of perinatal deaths. PPH are the cause of death in over 30% of those cases [4,5].

According to 2009 Guidelines, PPH is defined as over 500 ml blood loss from genitals, occurring within the first 24 hours post partum. There are two categories of PPH: minor (500 ml-1000 ml) and major (over 1000 ml). Additionally, major PPH is divided into categories of: moderate (1000-2000 ml) and severe (over 2000 ml) [6].

Other definitions describe severe PPH as blood loss of over 150 ml/minute, or a sudden blood loss of 1500-2000 ml [7,8]. Some authors classify post-partum hemorrhages according to hematocrit changes over 10% or by a necessity of a blood transfusion [9]. The results of therapy of a massive postpartum haemorrhage with the use of the "HEMOSTASIS" algorithm (help, establish aetiology, massage the uterus, oxytocin infusion and prostaglandins, shift to operating theatre, tamponade test, apply compression sutures, systematic pelvic devascularization, interventional radiology, subtotal/total abdominal hysterectomy) were published in 2011 [10]. Interventional radiology procedures play a significant role in the algorithm. The presented case is an example of efficacy of the embolisation procedure in the management of PPH.

Case Study

A 29-y.o. female patient, P-2, A-0, with a regular menstrual cycle,

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was referred to the hospital in her third pregnancy - 39 weeks and 3 days - for elective Caesarean section because of a large uterine myoma.

At admission the patient was examined and a good general condition was confirmed: RR -131/78 mm Hg, HR - 98 bpm, Hb - 12.1 mg/dL. The patient felt normal foetal movements, FHR -154 bpm. The uterine muscle reacted with contractions to palpation; the cervix was closed and approx. 2 cm long. The speculum examination revealed a minor adenous ectopy on the vaginal part of the cervix, current Pap test - negative acc. to the Bethesda 2001 classification. Non-stress cardiotocography was normal. Ultrasound examination - a single, viable foetus, cephalic longitudinal lie, normal anatomy, estimated weight of the foetus 3600g. AFI - 5.6. Within the anterior wall of the isthmus of the uterus an uterine myoma, dimensions 132.9×74.3 mm (FIGO - 6, subserosal <50% intramural) was visualized (Figure 1). Because of the presence of a massive myoma in the area of the uterine isthmus the patient was qualified for delivery by Caesarean section. The procedure was performed using the Misgav-Ladach method. A female child was delivered, body weight of 3450 g, APGAR score -10 points. After cutting the umbilical cord, 1 ampoule of Carbetocin - 100 mg was administered intravenously. The uterine muscle was sutured with the double-layer continuous suture. Haemostasis control - no signs of active bleeding. Three hours after the Caesarean section a massive postpartum haemorrhage developed - an estimated blood loss of approx. 1000 ml, Hb - 7.9 mg/dL. 10 IU Oxytocin and 200 mg Methylergometrin were administered intravenously, and 3 tablets (a 0.2 mg) of Mizoprostol per rectum. Despite the achievement of a normal uterine muscular tonus, the bleeding from the uterine cavity was still massive, and a decision was made on embolisation of uterine arteries.

Procedure

The examination and the procedure were performed with access via the right femoral artery, under local anaesthesia with Seldinger technique. A 5 Fr vascular sheath was introduced along with the Pigtail type catheter and aortonephrography was performed. Visipaque 320 contrast was used. The examination revealed a well vascularised mass, approximate diameter of 12 cm, localised under the right kidney and supplied mostly by the left uterine artery, lumbar arteries and the right ovarian artery. With cross over technique and 5 Fr Roberts catheter, a selective injection of a contrast medium to the left uterine artery was performed, which allowed visualisation of the uterine vascular bed with the myoma, as well as of the site of the active, massive bleeding (Figure 2). Due to the large vessel diameter, microcatheter was not advanced. First the left uterine artery was embolised with 700 µm particles, in order to close the vascular bed of the myoma (6 vials). Then, a part of the vessel supplying the uterine muscle with the bleeding site, was closed with Spongostan gel - mixture of spongostan and contrast media repeatedly mixed with 3-way stopcock set at a right angle, then at 45 degrees, to reduce the size of particles. The creation of a suitable suspension allows to control the occlusion. After some time the material becomes re-canalised, which allows maintenance of the primary form of supply to the uterine muscle, at the same time providing a time sufficient for healing of the injury. Control angiography indicated a correctly closed left uterine artery, with no filling of the uterine vascular bed. No other sites of bleeding were detected.

Discussion

Postpartum haemorrhages require rapid diagnostics and urgent intervention, especially when a patient is haemodynamically instable. There are four main causes of postpartum haemorrhages (four T): uterine atonia (Tone), tissue trauma (Trauma), residual tissue (Tissue)

and clotting disorders (Thrombin). The most common cause is the postpartum uterine atony (70% of cases) [9]. All those causes may occur both during a natural labour and the Caesarean section [11]. The treatment of PPH requires an interdisciplinary approach. In majority of cases, postpartum haemorrhages may be stopped with techniques increasing the uterine contraction activity. These include: massage of the uterus, administration of prostaglandin E2 analogues, oxytocin, ergometrin. Those are the first-line drugs. They were introduced for treatment of uterine atony already in the 19th century. In those women who still bleed after the first-line treatment, further lines should be applied [12]. Initially, haemostatics should be used. They are: tranexamic acid and recombinant active factor VII (rFVIIa) [13].

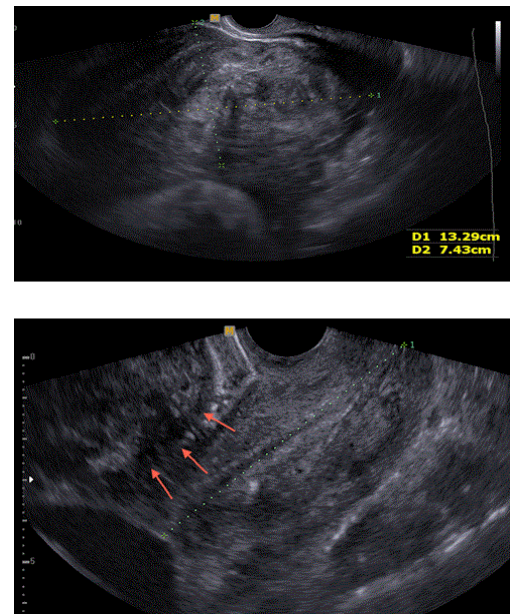


Figure 1: Myoma located within the anterior wall of the isthmus of the pregnant uterus.

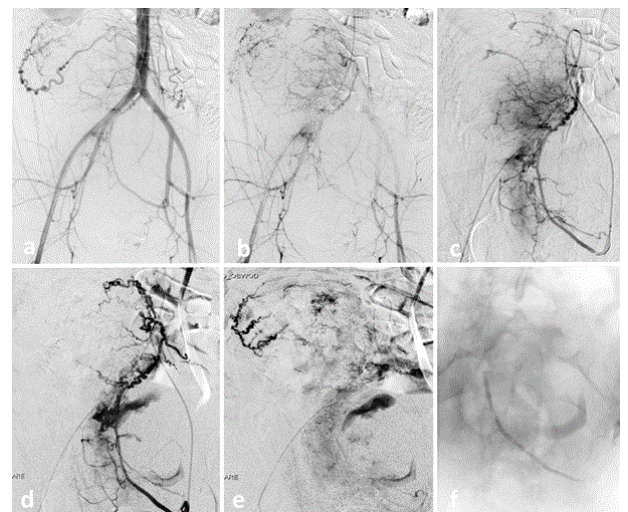


Figure 2: Images: a, b - aortonephrography with the Pigtail catheter, c, d - a selective angiography of the left uterine artery with demonstrated extravasation of the contrast medium, e - a late phase of the angiography with a visible pool of extravascular contrast medium, f - a shadow of the Spongostan gel used for embolisation of the proximal part of the vessel.

Further stages involve a manual and instrumental control of the uterine cavity [14]. If all the above mentioned methods fail, the only applicable options include radiology interventions and surgery as the last resort. Available surgical options include: uterine tamponade, B-Lynch suture, or bilateral ligation of uterine arteries or of internal iliac arteries with hysterectomy and resulting loss of fertility [15,16]. It should be considered that half of blood supplying ovaries comes from ovarian branches of uterine arteries. For that reason, resection of the uterus significantly affects the endocrine function of the ovary, which leads to some negative consequences for both women's physical and mental health. A selective embolisation of vessels in course of a postpartum haemorrhage constitutes one of highly important options, included in the HEMOSTASIS procedure. Centres possessing an interventional radiology unit, besides treatment of haemorrhages may also provide a preventive solution, introducing balloons into internal iliac arteries, and cutting the blood supply to the uterus out in case of a possible haemorrhage [17] (Figure 3). That prevents massive bleeding and gives the surgeon the time necessary to treat the bleeding site, as well as to introduce an immediate selective embolisation [18]. Knuttinen et al. described a group of 38 cases of pre-procedural implantation of balloon catheters in patients with placenta accreta, placenta percreta or placenta increta. That approach allowed reduction of adverse events associated with bleeding [19]. According to Alvarez et al., balloon catheter should be used as a preventive measure in all cases of high bleeding risk. That allows lesser blood loss, and consequently reduces the need for blood transfusion [20].

The embolisation method is associated with both high efficacy and minimum invasiveness. Possible preservation of fertility is another important benefit of the method. It should be noted that in case of non-life threatening bleeding episodes the procedure may be performed under local anaesthesia. Haemodynamic instability does not constitute a contraindication for the procedure [21]. In a 2002 study of 100 patients with obstetric haemorrhage the therapeutic success of embolisation of uterine arteries was achieved in 97% of patients. In the paper published in 2007, Doumouchsis et al. demonstrated the efficacy of emergency embolisations in course of a postpartum haemorrhage at 91%. According to a literature review covering various publications, the therapeutic success rate is estimated to be approximately 90%. In 675 patients with UFE, 91.45% demonstrated restoration of spontaneous menstruation within 6 months of the procedure. 168 women in that group reported a will of getting pregnant again, and 126 of them succeeded (75%) [22]. In a single-center retrospective cohort study



Figure 3: Implanted (not expanded) balloon introduced to internal iliac arteries using the cross-over technique. The procedure is performed simultaneously by two radiologists, thus minimising the dose of radiation. The image taken after a Caesarean section, before the control angiography.

from 2015 with a group of 103 women undergoing PAE for primary PPH and 189 pregnancies with PPH not requiring PAE, outcomes of subsequent pregnancies were checked. Repeat pregnancies were documented in 17 of 103 exposed women (16.5%) and 18 of 189 unexposed women (9.5%) allowing us to draw a conclusion about the safety of this treatment [23].

Summing up, in that case, the selective radiographic embolisation of vessels in course of a postpartum haemorrhage was a safe, minimally invasive and highly effective therapeutic method that ensures an option of further pregnancies.

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