

Uterine Artery Embolization Following Internal Iliac Arteries Ligation in a Case of Post-Partum Hemorrhage: A Technical Challenge

Singhal Manphool · Gupta Pankaj ·
Sikka Pooja · Khandelwal Niranjana

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About the Author



Manphool Singhal is currently working as Assistant Professor of Radiodiagnosis and Imaging at Postgraduate Institute of Medical Education and Research, Chandigarh. His keen areas of interest are cardio-vascular imaging and interventional Radiology. He has published more than 50 articles in peer-reviewed journals and about 7 chapters in various books, and brought many laurels for the institute. He is a regular invitee and speaker at national and international conferences and CMEs

Introduction

Postpartum hemorrhage (PPH) is defined as a blood loss of more than 500 ml following vaginal delivery and more than 1 l following cesarean section. The definitive procedure for severe PPH is hysterectomy. Due to its high morbidity and impact on fertility, it is undesirable in

majority of patients. Fertility preserving procedures include internal iliac artery ligation (IIL), uterine artery ligation (UAL), and selective uterine artery embolization (UAE). The former two surgical procedures require laparotomy. Moreover, there are high failure rates and morbidity of IIL. Bilateral UAL has been shown to carry high success rates and relatively low complication rates. UAE is a less invasive technique that has success rates similar to UAL [1]. The advantage of utilisation of UAE early in the management protocol of severe refractory PPH has been well documented. In case of failure, surgical techniques (arterial ligation/hysterectomy) can be undertaken without any hindrance. In contrast, if the surgical ligation procedures are performed without consideration of UAE, the application of latter becomes extremely challenging (as in the present case) should the ligation procedures fail [2]. Thus, there should be low threshold for UAE in the setting of severe refractory PPH.

To the best of our knowledge, there are no reports of UAE through the ligated internal iliac artery and as such,

Singhal M. (✉), Assistant Professor ·
Gupta P. · Khandelwal N.
Department of Radiodiagnosis and Imaging, Post Graduate
Institute of Medical Education and Research, Chandigarh, India
e-mail: drmsinghal@yahoo.com

Gupta P.
e-mail: pankajgupta959@gmail.com

Sikka P.
Department of Gynaecology and Obstetrics, Post Graduate
Institute of Medical Education and Research, Chandigarh, India
e-mail: dr.poojasikka@yahoo.com

Khandelwal N.
e-mail: khandelwaln@hotmail.com

our case emphasises that even arterial ligation does not preclude UAE, if the patient continues to worsen.

Case Report

A 27-year-old primigravida was admitted in labor at 38 weeks in a private clinic. After 4 h of labor, oxytocin infusion was started and a male child was delivered 2 h later through the vaginal route following episiotomy. Uterine contractions were documented as good and placenta expelled spontaneously. Episiotomy was sutured in layers. During repair of episiotomy, fresh bleeding was noted from the vagina. On exploration, multiple tears were noted in lateral and posterior vaginal walls. The tears were adequately repaired and vagina packed. Simultaneously, the patient was started on intravenous hydration and intravenous antibiotics. There was transient cessation of vaginal bleeding. However, an hour later, patient again complained of vaginal bleeding. Examination revealed pallor, tachycardia (pulse rate 102/minute) and blood pressure of 90/50 mm Hg. Fresh vaginal bleeding was noted. Blood transfusion was started and patient was referred to our institute.

At presentation, vital parameters of the patient and vaginal bleeding continued to deteriorate. Total blood loss was calculated at 3.5 l. Blood transfusion was continued. A diagnosis of traumatic PPH was made and patient was immediately taken to operating room (OR) for vaginal exploration under general anesthesia. On examination, large clots were removed from vagina and bleeding sites were identified on the right lateral vaginal wall and fornices. The lacerations were repaired and balloon (Bakri™, Cook® Medical, Bloomington, Indiana) tamponade achieved. Patient received a total of 30 U of packed red cells, 30 U of platelet concentrates and 40 U of fresh frozen plasma. Following transient recovery, bleeding again started and patient worsened. Bilateral IIAL was planned and patient shifted to OR. Following IIAL, bleeding decreased, however, cessation of bleeding was not achieved and patient still worsened. Finally, hysterectomy was performed. Vaginal cuff bleeding was noted following hysterectomy. Radiology consultation was obtained and UAE was considered.

Arterial access was obtained via right transfemoral route using 6F vascular sheath (Avanti; Cordis, Bridgewater, New Jersey). Internal iliac artery (IIA) angiograms were obtained using 5-F Roberts uterine catheter (Cook® Medical, Bloomington, Indiana). Left IIA angiogram revealed delayed retrograde filling of the left IIA to the site of surgical ligation. No abnormal blush or active contrast extravasation was noted. Right IIA angiogram followed. There was relatively rapid filling of the IIA distal to the

ligation site. Delayed images revealed abnormal globular contrast out pouching from the distal uterine artery. Attempts to cross ligation site using Progreat microcatheter (Terumo Corporation, Tokyo, Japan) succeeded. Selective cannulation and right uterine artery angiograms revealed frank active contrast extravasation (Fig. 1). Embolization was done using 0.5 ml 1:1 mixture of NBCA (*N*-butyl cyanoacrylate, Nectaryl, Dr Reddy laboratories, India) and iodophendylate (Lipidol, Laboratories Guerbet, France) (Fig. 2). Gel foam slurry was also instilled in various branches of anterior division of right IIA.

Bleeding from the vaginal introitus diminished markedly. Patient's vital signs and hematocrit stabilized. She was discharged after a week in a stable condition.

Discussion

Postpartum hemorrhage is an important cause of maternal morbidity and mortality. When faced with a situation of uncontrolled PPH, clinicians have few options. These include pelvic arterial ligation (including IIAL, UAL), UAE, and hysterectomy. While the former three are fertility preserving, hysterectomy is a more radical and definitive procedure, if the hemorrhage remains uncontrolled despite all possible measures.

Bilateral IIAL has a variable success rate ranging from 40 to 100 % [4]. UAL, on the other hand, has a success rate of more than 90 % and a very low complication rate. Thus, UAL has become the most popular arterial ligation procedure. Notwithstanding this, the choice of a ligation procedure may be dictated by the underlying PPH mechanism. While UAL performs quite favorably in uterine atony, in uterine trauma, the avulsed uterine artery may retract into the broad ligament forming a hematoma. Under such circumstances, UAL is technically challenging. IIAL achieves decreased pressure and flow distal to the ligation. It facilitates localisation and ligation of bleeders.

Since its first description for control of PPH in 1979, UAE has emerged as an extremely effective technique with high technical success rates and good clinical outcomes for both primary and secondary PPH. Ganguli S et al. [3] reported the clinical efficacy and safety of UAE in treatment of PPH (primary, secondary and that associated with cesarean section). In 66 females who underwent UAE, the overall success rate was around 90 % and a complication rate of 4.5 %. Authors recommended that the threshold for UAE in women with PPH should be low, considering its high clinical effectiveness and a low complication rate. Kirby et al. [4] reported the results of their multi-institutional study for UAE in primary PPH comprising 430 women. This study described high clinical success rates

Fig. 1 **a** Angiogram of internal iliac artery after negotiation of site of ligation with microcatheter catheter reveals contrast filled out-pouching with extravasation from uterine artery consistent with ruptured pseudoaneurysm. **b** Selective angiogram of anterior division with microcatheter in the uterine artery demonstrates the pseudoaneurysm with frank extravasation of contrast consistent with rupture



Fig. 2 **a** Fluoroscopic image during injection of cyanoacrylic glue and lipiodol mixture. Note glue cast in the uterine artery (arrows). **b** Post embolization angiogram shows complete non-opacification of anterior division of internal iliac artery and uterine artery pseudoaneurysm



and low complication rate. However, despite all the benefits of UAE, it remains an underutilized procedure. The reasons for low utilization of UAE for PPH cited in the study include lack of awareness of the referring clinician, limited availability of modern angiography units, lack of trained, skilled team and the risk of transferring unstable patient to the angiography suite.

Heaston et al. [2] reported transcatheter arterial embolization for control of persistent massive PPH after bilateral surgical hypogastric artery ligation. In this case, the distal IIA was reformed by collaterals from profunda femoris and

embolization was achieved via cannulation of collateral channels. However, to the best of our knowledge, our case is the first to report successful embolization of uterine artery pseudoaneurysm and active contrast extravasation through the ligated IIA.

This highlights the potential role of UAE even in the setting of arterial ligation. Authors suggest that the threshold for UAE in the setting of PPH should be low as arterial ligation may be technically inadequate allowing microcatheter access. This may be a life-saving procedure as in the present case.

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Compliance with ethical requirements and Conflict of interest This is to declare that the authors have no conflict of interests and the manuscript has been scrutinized by the department ethical committee before submission. Further no ethical issues have been compromised to the best of our knowledge and understanding. All the authors declare that they do not have conflicts of interest and this manuscript has not been sent for publication anywhere else.

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