Case Report

Cardiac arrest due to massive hemorrhage from uterine adenomyosis with leiomyoma successfully treated with damage control resuscitation

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Case: A 57-year-old woman was transferred to our emergency department by ambulance with cardiopulmonary arrest caused by massive genital bleeding. Cardiopulmonary resuscitation, including massive transfusion, was carried out and the return of spontaneous circulation was achieved. A giant uterine tumor was considered the source of the bleeding. Although hysterectomy was necessary to achieve definitive hemostasis, the patient was unable to tolerate the operation because of hemodynamic instability, acidosis, and coagulopathy. Therefore, we undertook vaginal gauze packing and uterine artery embolization to attain temporary hemostasis, which resulted in hemodynamic stabilization. Abdominal hysterectomy for definitive hemostasis was carried out 10 h after the embolization.

Outcome: The patient made a good post-surgical recovery without any complications.

Conclusion: In treating hemorrhagic shock due to uterine leiomyoma, damage-control resuscitation may be useful as a bridge prior to definitive hemostasis through hysterectomy.

Key words: Damage control resuscitation, hemorrhagic shock, massive transfusion, uterine artery embolization, uterine leiomyoma

INTRODUCTION

“DAMAGE CONTROL” is a term used in traumatology, and the concept of “damage control resuscitation (DCR)” includes damage control surgery, early initiation of blood product transfusions, and immediate hemorrhagic control by surgery or interventional radiology.^{1–5} This concept is occasionally extended to non-traumatic critically ill patients.³ Here, we report the case of a patient who was successfully treated by DCR after presenting with hemorrhagic shock due to massive genital bleeding originating from a giant uterine tumor.

CASE

A 57-YEAR-OLD WOMAN was transferred to our emergency department (ED) by ambulance following cardiopulmonary arrest (CPA) with massive genital bleed-

ing. Approximately 1 year previously, the patient had been diagnosed with anemia caused by a uterine tumor. Although the patient was offered surgery for the tumor, which was causing abnormal genital bleeding, she had left the tumor untreated and had taken dienogest. The patient was transported to hospital by ambulance after suffering a disturbance of consciousness and massive genital bleeding. During transportation, the patient was initially in a state of shock that progressed to CPA, indicated by pulseless electrical activity on the electrocardiogram monitor. Cardiopulmonary resuscitation (CPR) was initiated immediately by the emergency medical personnel.

At arrival at our ED, the patient was still in CPA with pulseless electrical activity. We continued CPR with endotracheal intubation, mechanical ventilation, and rapid fluid resuscitation. A physical examination revealed a lower abdominal mass and massive genital bleeding. Blood gas analysis yielded the following results: severe metabolic acidosis (pH 6.96; HCO₃, 7.3 mmol/L; base excess, 22.8 mmol/L), elevated lactate level (14.8 mmol/L), and severe anemia (hemoglobin, 6.0 g/dL). The patient was diagnosed with CPA caused by hemorrhagic shock due to bleeding from the uterine tumor.

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She received a type O (+) red blood cell (RBC) transfusion during CPR. Transfusion of fresh frozen plasma (FFP) and platelets was ordered according to the massive transfusion protocols (MTPs). The transfusion was warmed to avoid hypothermia. The patient recovered spontaneous circulation after 20 min of CPR. However, the genital bleeding recurred and her hemodynamic status became unstable. To control the bleeding, the vagina was tightly packed with gauze. Gauze packing was carried out using normal gauze, not some meters of long gauze usually used by gynecologists because this was not available in the ED. The patient's hemodynamic status improved and contrast-enhanced computed tomography of the abdomen and pelvis was performed.

Contrast-enhanced computed tomography revealed a uterine tumor $20 \times 16 \times 22$ cm in size. There were no ascites and no extravasation (Fig. 1). Emergency hysterectomy was necessary to achieve definitive hemostasis; however, the patient was unfit for surgery because of hemodynamic instability, metabolic acidosis, and coagulopathy caused by massive bleeding. Therefore, to obtain hemodynamic stability, we decided to first carry out uterine artery embolization (UAE) as DCR. We embolized the bilateral uterine arteries using gelatin sponge particles, to induce early hemostasis. The patient's hemodynamic status improved significantly after UAE, and she was admitted to our intensive care unit (ICU).

The hemodynamic status, metabolic acidosis, and coagulopathy status of the patient improved after UAE (Table 1).

Fig. 1. Contrast-enhanced axial (A) and coronal reconstruction (B) computed tomographic images of a 57-year-old woman with cardiopulmonary arrest caused by massive genital bleeding. The images show a $20 \times 16 \times 22$ cm uterine tumor. No intra-abdominal hemorrhage or extravasation is seen.

Table 1. Time course of blood parameter measurements in a 57-year-old woman with cardiopulmonary arrest caused by massive genital bleeding

	On admission (0 h)	Post-ROSC (1.0 h)	Pre-UAE (1.5 h)	ICU admission (post-UAE) (5.0 h)	Pre-operation (14 h)
pH	6.96	6.68	6.91	7.26	7.37
Platelets, mm^{-3}	24.2	ND	ND	11.3	7.5
Fibrinogen, mg/dL	319	ND	ND	127	114
Core BT, °C	33.7	ND	ND	35.8	36.8
Hb, g/dL	6.0	6.1	5.6	7.6	8.8
Lactate, mmol/L	14.8	17.0	19.0	7.6	3.4
Total RBCs given, units	0	4	8	20	20
Total FFP given, units	0	0	6	20	22
Total platelets given, units	0	0	0	20	20

BT, body temperature; FFP, fresh frozen plasma; Hb, hemoglobin; ICU, intensive care unit; RBC, red blood cells; ROSC, return of spontaneous circulation; UAE, uterine artery embolization. ND, no data

Fig. 2. Photographs of uterine leiomyoma in a 57-year-old woman. (A) Photograph obtained intraoperatively shows the giant uterine tumor. (B) Macroscopic findings. Photograph of the resected specimen shows solid tumor with some areas of hemorrhagic change within.

Abdominal hysterectomy was carried out 10 h after UAE to achieve definitive hemostasis (Fig. 2). Following surgery, the patient recovered well. Her level of consciousness improved and extubation was carried out 5 days after admission. Renal replacement therapy was required because the hemorrhagic shock had exacerbated chronic kidney disease of unknown etiology; however, her renal function gradually improved and renal replacement therapy was discontinued 15 days after admission. There were no further complications and the patient was discharged from ICU and the hospital 24 and 50 days after admission, respectively. Post-operative pathological investigation of the tumor led to a diagnosis of severe adenomyosis complicated with leiomyoma and no evidence of malignancy.

DISCUSSION

HERE WE DESCRIBE a case of hemorrhagic shock due to massive genital bleeding originating from a giant uterine tumor. The patient was treated with DCR, including a massive transfusion, vaginal gauze packing, and UAE to induce temporary hemostasis. After the patient's hemodynamic status stabilized, and improvements in acidosis, coagulopathy, and hypothermia (the so-called “lethal triad”) (Table 1), hysterectomy was carried out to achieve definitive hemostasis.

Rotond and colleagues are credited with coining the term “damage control” in traumatology in 1993.¹ The concept of DCR includes damage control surgery, early initiation of blood product transfusions, reduced crystalloid administration, permissive hypotension, and immediate hemorrhage control by surgery or interventional radiology.^{1–5} Although the concept of DCR originated in traumatology, its application has been extended to non-trauma emergency surgery in cases of severe sepsis or massive hemorrhage.³

In this case, the patient was in a state of CPA on admission as a result of massive bleeding; consequently, urgent surgery to achieve definitive hemostasis was inadvisable. Therefore, we attempted to resuscitate and stabilize the patient by performing DCR. Red blood cell transfusions were initiated prior to return of spontaneous circulation, which was followed by transfusions of FFP and platelets based on the MTPs. In brief, modern MTPs aim to transfuse RBC, FFP, and platelets in approximately equal amounts to avoid early coagulopathy during trauma. The laboratory data on admission for our patient showed no evidence of coagulopathy (Table 1). Although the levels of fibrinogen and platelets decreased on admission to the ICU and before surgery, coagulopathy was avoided by the massive transfusion (Table 1). The MTP was useful in achieving temporary hemostasis and for stabilizing the patient's hemodynamic status.

To summarize, our patient suffered massive genital bleeding originating from severe uterine adenomyosis with leiomyoma. It was previously reported that uterine bleeding might occur with adenomyosis, especially when dienogest was administered, as in the present case.⁶ The treatment options for uterine bleeding include pharmacological treatment, angiographic embolization, balloon tamponade, gauze packing, and hysterectomy.⁷ If the bleeding cannot be controlled using less invasive procedures, hysterectomy is required to achieve definitive hemostasis. However, critically ill patients are unable to tolerate emergency surgery when they show hemodynamic instability and coagulopathy. Fontarensky *et al.*⁸ reported a case of massive bleeding from a uterine leiomyoma that was hemodynamically stabilized by UAE, which enabled scheduled surgery to be carried out under optimal conditions. In the present case, we used vaginal gauze packing and UAE as DCR to obtain temporary hemostasis. After the patient became hemodynamically

stable in the ICU, definitive hemostasis was then achieved by hysterectomy.

In conclusion, the successful treatment of this patient by DCR shows the effectiveness of DCR for the management of massive hemorrhage in non-trauma situations, as well as in trauma cases.

CONFLICT OF INTEREST

NONE.

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