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Role of pelvic packing in massive obstetric haemorrhage with severe coagulopathy: a case report

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ABSTRACT

Background. Massive obstetric haemorrhage (MOH) frequently causes disseminated intravascular coagulation (DIC). MOH with DIC often become fatal, especially in developing countries. We report pelvic packing as a successful treatment for this condition.

Case presentation. A 29-year-old female, who gave abdominal birth to a term infant 9 hours ago in another institute, presented to us due to unconscious (Glasgow coma scale (GCS): 3) and immediately after she had a cardiopulmonary arrest. Ultrasound revealed massive intraabdominal bleeding, and thus exploration laparotomy was done. Laparotomy revealed a posterior uterine tear with broad ligament and retroperitoneal haematoma: emergency hysterectomy with bilateral internal iliac ligation were performed. Because of the severe DIC, oozing persisted after the procedure; thus, trans peritoneally 5 gauze towels was inserted as a gauze packing deep into her pelvis and removed after 48 hours. We also performed anti-DIC treatment. Haemorrhage was controlled and the patient was discharged without complications after 23 days.

Conclusions. Pelvic packing is a lifesaving strategy for MOH complicated by severe DIC, especially in developing countries.

INTRODUCTION

The primary global cause of maternal mortality and serious morbidity is postpartum haemorrhage (PPH). Despite significant progress in obstetric care, more than a quarter of the 2,443,000 maternal deaths documented between 2003 and 2009 were due to obstetric haemorrhage [1].

Caesarean delivery (CD) is one of the most popular abdominal operations in the world [2]. The incidence of caesarean delivery (CD) is increasing, and thus the standard blood loss during CD (1,000 mL) is double the amount lost during vaginal delivery (500 mL) [3]. CD rate as high as 25-30% in many areas of the earth [4]. Despite the numerous techniques to stop excessive haemorrhage following CD, PPH continues

to be the foremost common complication seen in around one-fifth of the cases and is associated with approximately one-quarter of maternal deaths worldwide, resulting in increased maternal morbidity and mortality [1, 5].

Massive obstetric haemorrhage (MOH) is one of the most common leading causes of maternal morbidity and mortality in the world, particularly in developing countries [6].

MOH is defined as a blood loss > 2 L and/or a blood volume loss of 30% to 40% and/or $> 10\%$ drop in the haematocrit value. It is generally associated with the need for obstetric hysterectomy, development of Consumption Coagulopathy, and admission to intensive care unit. A woman dies from MOH approximately every 4 minutes, which represents approximately 27% of maternal mortality cases [7-9].

Surgical interventions are often required to treat MOH starting by uterine compression sutures up to pelvic vessel ligations and hysterectomy [10]. However sometimes still not enough. Although pelvic backing is a common lifesaving management in acute pelvic trauma, reports on it for MOH are very lacking as our patient.

CASE PRESENTATION

A 29-year-old female, who gave abdominal birth to a term infant 9 hours ago in another institute, presented to the Emergency Department (ED) of King Fahd hospital in Saudi Arabia due to unconscious, severe pallor with multiple ecchymosis patches all over the skin, bleeding from orifices, pulseless, and with Glasgow coma scale (GCS): 3 (totally unresponsive). In a few minutes she had a cardiopulmonary arrest and Code Blue was alarming. The Emergency Medical Services (EMS) team immediately did cardiopulmonary resuscitation using the advanced cardiac life support algorithm. Return of spontaneous circulation was achieved after 4 minutes of resuscitation. The intensive care unit doctors inserted endotracheal intubation with mechanical ventilation, then rapid fluid resuscitation was done. At that time the patient had severe metabolic acidosis pH: 6.732, PCO_2 : 45.7, HCO_3 : 4.9. As the patient was undergoing caesarean delivery (CD) in a private hospital 9 hours before coming to ED so the on call obstetric team was called to evaluate the patient. The patient was gravida 5 para 3, two vaginal delivery and last delivery was by CD according to the patient request. No medical

or surgical history of clinical importance. By examination, severe pallor, multiple ecchymosis all over the body, bleeding from canula site, surgical wound, nose, gums, vagina and subconjunctival haemorrhage, pulse 138/min, respiratory rate 36/min, temp 36 °C, blood pressure 70/30, and diffuse abdominal enlargement was noticed. By investigation, initial haemoglobin was 3.1 g/dl, transabdominal ultrasound showed large amounts of free fluid in abdominal cavity so massive internal haemorrhage with severe disseminated intravascular coagulation (DIC) was suspected. Rapid transfusion of packed red blood cell (RBC) was done. Also, transfusion of fresh frozen plasma (FFP), platelets and cryoprecipitate were ordered according to the massive transfusion protocols (MTPs) and immediate exploration laparotomy was decided.

Before the surgery, there was a lack of information about DIC. This can be because there was no time to verify the test results due to the urgent situation. The patient was opened by two senior obstetric consultants through sub umbilical midline incision with presence of a complete multidisciplinary team. The laparotomy findings indicated massive internal haemorrhage, the abdomen contained about 5,000 ml of clotted and not clotted blood and a big deep spiral tear in the posterior surface of the uterus extended to the left broad ligament with a large left broad ligament haematoma extending to retroperitoneum space was observed. Hysterectomy and bilateral internal iliac artery ligation were done.

After that, multiple diffuse areas of bleeding related to DIC persisted all over the pelvis. Many trials to control oozing blood through diathermy, gel foam and ligatures were done but all failed. So, five radiopaque gauze towels were inserted in her pelvis to control bleeding. One compresses the presacral space and four compress the pararectal space both right and left, medial and lateral. The towels are aimed toward the internal iliac vessels with its branches and the venous plexus located at this area. All towels were inserted cephalad/caudal direction and after displacement of intestine to ensure their placement under the intestine and directed deep in the spaces which already exposed through trans peritoneal dissection while ligation of both sides of the internal iliac artery. Then closure of abdomen was done after inserted intraabdominal drain and for planned reopening for removal of the towels 24 to 48 hour later.

During this time the patient received 15 units of packed red blood cell, 10 units of fresh frozen plas-

ma (FFP), 5 units of platelets, and 4 unit of cryoprecipitate. Then, the patient was transferred to the intensive care unit (ICU) with mechanical ventilation, inotropic drugs to maintain her blood pressure, and antibiotics. 48 hours later the patient was shifted to operation theatre for removal of the 5 towels, which all removed without bleeding, then trimming to skin edges and closure of abdomen were done, then the patient shifted again to ICU. The patient improved gradually, extubated after 9 days, discharged from ICU after 13 days and discharged from hospital after 23 days without complications apart of mild brain insult in hippocampal region with recent events memory loss which improved after a few weeks. Both motor and sensory response were intact. Along that time, in hospital the total amount of blood transfusion was: 27 units of packed red blood cell, 38 units of FFP, 33 units of platelets, and 25 unit of cryoprecipitate. Her laboratory workup is shown in **Table 1**.

DISCUSSION

A disorder in the blood coagulation system known as coagulopathy increases the propensity for bleeding. The most likely reason for it to happen is MOH. This happens because clotting factors are used up (DIC) or because excessive blood loss has dilution effects on clotting factors, platelets, and fibrinogen (the “washout phenomena”). Once 80 percent

of the blood volume has been lost, or about 4.5 L in a woman of average size, acquired coagulopathy is likely. Therefore, it is crucial that all medical personnel receive training in the identification and management of MOH. It is imperative to have protocols for the multidisciplinary, systematic management of MOH during a Code Blue situation [11, 12]. While rarely performed, pelvic packing is still a crucial procedure in the emergency therapy of the haemodynamically unstable large pelvic trauma patient. The key to this manoeuvre is to pack predominantly the real pelvis (below the pelvic brim) and not the false pelvis, which results in a physical tamponade inside the bony bones of the pelvis itself (above the pelvic brim). The latter has a negligible tamponade effect since the actual pelvis’ internal arteries are usually where the majority of bleeding originates [13]. This approach emphasises the importance of prompt resuscitation to normal physiological parameters because the risk of developing what is known as the “triad of mortality” – coagulopathy (International normalized ratio (INR) > 1.5), acidosis (pH 7.2), and hypothermia (to 35 °C) – are all related to the risk of potentially fatal PPH [14]. In case series, pelvic packing was performed in 7 patients, each of the women underwent caesarean sections, with the median estimated blood loss being 5521.4 mL (IQR 4475) and the median number of transfusions being 6.9 (IQR 4.75). In every case, including three women who experienced ongoing

Table 1. Laboratory work up during hospital admission.

	1 st day	2 nd day	3 rd day	4 th day	5 th day	12 th day
PT (sec)	33.4	29.1	17	14.4	14.7	-
INR	2.8	3.1	1.7	1.4	1.4	-
APTT (sec)	-	> 180	42	40	40	-
WBCs (mu/10 ⁹ er)	6.87	7.56	7.4	11.1	12.9	15.1
RBCs (× 10 ¹² /L)	2.69	3.2	2.97	5.07	5.55	5.26
PCV (%)	22.9	27.9	25	40	44.6	43
Haemoglobin (g/dL)	7.7	9	8.1	13	14.8	14
Platelets (× 10 ⁹)	30	43	46	50	85	587
Creatinine (Umol/L)	155	262	267	221	202	64.86
ALT (U/L)	33	143.4	147.9	267.8	170	36.5
AST (U/L)	48.3	186.6	178.6	164.9	75	31.8
Albumin	19.3	25	26	24.5	21	31.5
Urea nitrogen (mmol/L)	4.5	9.3	9.7	10.2	13	9.3
Sodium (mmol/L)	151	155	152	147	145	141
Potassium (mmol/L)	4.8	3.9	3.48	3.5	2.9	3.5
Chloride (U/L)	109.6	116.7	114.4	111.8	110	114
Calcium (mmol/L)	1.7	1.84	1.96	2.15	1.9	2.2
Magnesium (mmol/L)	0.92	1.17	1.05	0.78	0.73	0.80

PT: prothrombin time; INR: international normalized ratio; APTT: activated partial thromboplastin time; WBC: white blood cell; RBC: red blood cell; PCV: packed cell volume; ALT: alanine aminotransferase; AST: aspartate transaminase.

bleeding following a peripartum hysterectomy, abdominal-pelvic packing was effective. In the remaining four, packing was able to control the bleeding and preserve the uterus. The median shock index at the time of the decision to pack was 0.98, and the median number of packs placed was 6.1. The median length of stay after removal was 48 hours, while the median pack dwell time was 30.8 hours [14].

Either a Pfannenstiel skin incision or an infra-umbilical midline incision can be used to accomplish pelvic packing. However, the midline approach is advised in a damage control scenario because it enables quick extension to a full laparotomy if necessary. It is essential to pack in order to catch up on blood resuscitation and assess the amount of haemorrhage management; as a result, the packs shouldn't be prematurely disrupted in order to prevent haemostasis. It is crucial for the surgeon to be ready for the possibility of doing haemostatic manoeuvres and inspecting the pelvis for abnormalities.

Chasing bleeding points in the surgical field can be counterproductive and lead to more blood loss. A second-look surgery should be planned for between 24 and 48 hours following pelvic packing [15, 16]. Monitoring the patient's physiology is essential, especially if haemodynamic instability is present, as suspicion of continuous or recurrent haemorrhage must be kept in mind [17].

Pelvic packing was first described by Logothetopoulos as a method of reducing severe pelvic bleeding in 1926 [18]. By making a Pfannenstiel, paramedian, or infraumbilical incision, several authors examined the trans-peritoneal technique as a tamponade for pelvic haemorrhage; nonetheless, packing was frequently utilised as a salvage manoeuvre and early attempts at direct control of pelvic bleeding were abandoned [19, 20]. The Denver group and Totterman *et al.* [21- 23] have most recently reported the procedure, which Pohlemann refined in 1995 to use a preperitoneal approach.

Like our case, Keisuke Yoshida *et al.* reported a case in 2020 in which a 30-year-old woman underwent an emergency hysterectomy because to atonic haemorrhage brought on by uterine rupture. Oozing remained after the hysterectomy and she experienced haemorrhagic shock and severe DIC (platelet count: $6 \times 10^9/L$; fibrinogen: 65 mg/dL); thus, intraperitoneal gauze packing was done as damage control operation (DCS). She was released without incident after the coagulopathy was treated, and the gauze was removed on the second postoperative day [24].

Given the common coagulation problems that are seen in this specific patient population, gynaecologic haemorrhage can be serious and even lethal. According to earlier studies [25-27], packing is a successful therapy for haemorrhages originating from iliac or retroperitoneal arteries that are resistant to standard surgical treatments.

According to a meta-analysis by Haltmeier *et al.* [28] in 2021, there was no statistically significant difference in mortality between patients receiving non-traumatic damage control surgery (DCS) and conventional surgery (CS). However, the DCS group showed a significant drop in the observed death rate relative to the anticipated mortality rate, indicating a benefit of the DCS method.

CONCLUSIONS

Pelvic packing is a lifesaving strategy for MOH complicated by severe DIC, especially in developing countries. The use of surgical packing should not be considered a "bail out" for less experienced obstetricians who are unable to control obstetric haemorrhage with standard methods. Instead, this should be considered in cases of coagulopathy or when bleeding continues from venous plexuses, or inaccessible places.

COMPLIANCE WITH ETHICAL STANDARDS

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Data sharing

Data are available under reasonable request to the corresponding author. The data are not publicly available as it could compromise the privacy of the patient.

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