Abdominal Packing for Obstetric Surgical Uncontrollable Hemorrhage

I Gde Sastra Winata and Alit Darma Asmara

ABSTRACT

Postpartum hemorrhage (PPH), which makes up the bulk of the 14 million occurrences of obstetric hemorrhage that happen yearly, is the most prevalent type. Obstetric emergencies must be promptly identified and treated because most PPH-related deaths occur within four hours of delivery and even after hysterectomy. This literature study tries to elucidate abdominal packing in reducing obstetrical bleeding in greater detail. Pads or roller gauze (sterile pads bound by suture threads, wrapped in a sterile bag, or stacked gauze) and balloon pack (Foley catheter or Bakri balloon), and abdominal packs retrieved within 24-48 hours, are two categories of abdominal packing techniques for controlling bleeding after hysterectomy. Due to its ease of use, minimal risk of complications, and usefulness in environments with limited resources, abdominal packing continues to be a valuable technique in the arsenal of the modern obstetrician.

Keywords: Abdominal packing, hemorrhage, obstetric, surgical.

I. INTRODUCTION

According to the World Health Organization, obstetric bleeding accounts for 25% of the 536 000 maternal deaths that occur each year globally, and 50% of those deaths occur in the first few hours following childbirth [1]. Postpartum hemorrhage (PPH), the most frequent type of obstetric hemorrhage that accounts for the majority of the 14 million instances each year, is mainly brought on by uterine atony [2]. According to reports, PPH accounts for between 17 and 40% of maternal fatalities and 40% of maternal morbidities. Hemorrhage is the most significant cause of mortality and morbidity, particularly in developing nations [3], with 140,000 women globally dying from PPH yearly, or once every four minutes [4].

The vast majority of PPH-related deaths occur within four hours of birth, so obstetric emergencies must be promptly identified and managed. Maternal mortality and morbidity have decreased with surgical procedures such as intrauterine balloon tamponade, compression sutures, selective devascularization (including internal iliac artery ligation), and the use of tranexamic acid. However, the pursuit of total primary hemostasis is neither sensible nor realistic in cases where disseminated intravascular coagulation (DIC) has started or where hemorrhage continues from large raw surfaces, venousplexuses, and inaccessible areas. Definitive, aggressive surgery can worsen bleeding, rendering the patient more morbid.

Abdominal packing, which involves applying pressure to bleeding points and compressing them against bony or fascial resistance, may be necessary for these situations to prevent further blood loss and buy time for resuscitation, coagulopathy correction, and hemodynamic stabilization with blood transfusion. Therefore, surgical packing should not be considered a "bail-out" method for controlling hemorrhages by the less experienced obstetric surgeon; rather, this is a specialized skill that, when utilized carefully, complements the other surgical skills necessary when managing significant peripartum bleeding [5], [6]. This research review seeks to clarify abdominal packing's role in reducing obstetrical bleeding in greater detail.

II. TREATMENT OF OBSTETRIC HEMORRHAGE

Obstetric hemorrhage continues to be the leading cause of maternal death in the United States, with reported fatality rates ranging from 1.6 to 4% in high-income nations to 13.6 percent in low-income nations. Severe obstetric hemorrhage is a patient losing 25% of blood volume, or 1500 mL, or more. Exsanguination is a term used in trauma surgery to describe a 40% loss of blood volume linked to injuries to the heart, liver, and significant artery trunks; nevertheless, obstetric patients have not typically had this problem [1].

When the bleeding begins during the pregnancy, obstetric hemorrhage can be divided into three types: during labor and delivery and after delivery. Antepartum hemorrhage is any bleeding from the genital tract that occurs between the start of labor and 24 weeks of gestation (other sources say 20 weeks) (APH). It can cause maternal and fetal morbidity and even death and is linked to low birth weight in newborns. Postpartum hemorrhage can also happen from bleeding

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during the antepartum phase (PPH). The term "4Ts" stands for atony of the uterine (tone), retained placenta (tissue), the trauma of the vaginal tract (trauma), and coagulation problems. PPH is caused by any combination of these four events (thrombin). PPH can be primary (occurring in the first 24 hours) or secondary (occurring in the 24 hours to 6 weeks following childbirth), and it can be minor (blood loss of 500–1000 ml) or substantial (blood loss of more than 1000 ml) [7].

Regardless of the method of delivery, the American College of Obstetricians and Gynecologists (ACOG) revised the definition in 2017 to include blood loss of more than or equal to 1000 ml as well as blood loss that occurred within 24 hours of birth and was accompanied by signs or symptoms of hypovolemia. In contrast, PPH is classified as either minor (500–1000 ml) or substantial (>1000 ml) by the Royal College of Obstetricians and Gynecologists (RCOG) [8].

PPH is a leading cause of death for new mothers and calls for prompt resuscitation. After ruling out retained placental tissue and vaginal tract abrasions, efforts focus on inducing the uterus to contract by bimanual compression and oxytocin. If they fail, one must turn to surgical procedures such as hysterectomy or the closure of the uterine, ovarian, or internal iliac arteries [3]. Anemia, breastfeeding failure, hypovolemic shock, hypotension, unconsciousness, and the necessity for surgery are all effects of postpartum hemorrhage. These can be risk factors for adverse physical health outcomes and mental side effects, such as sadness, anxiety, exhaustion, and post-traumatic stress disorder.

Teamwork is necessary for the management of PPH, which includes keeping the woman's hemodynamic stability while concurrently locating and addressing the source of blood loss. Active management of the third stage of labor and the prevention and treatment of postpartum hemorrhage are crucial for saving the mother's life [3]. PPH guidelines typically advise a multidisciplinary strategy for achieving efficient early bleeding control. The precise etiology of PPH (uterine atony, genital trauma, retained placenta, and/or coagulopathy) should be treated, and treatment measures should progress from the least invasive to the most difficult and extreme course of action. The majority of guidelines also appear to agree on a set of first actions, which include maintaining two large IV lines, supplementing with oxygen, closely monitoring women, infusing crystalloids, taking precautions to prevent hypothermia, and determining the origin of PPH [8].

The aggressive strategy and the hypotensive resuscitation approach are the two methods for fluid resuscitation in bleeding patients. Aggressive resuscitation is a term used to describe a method of resuscitation that relies on the rapid normalization of blood pressure and restoration of adequate circulating blood volume. In the early stages of a hemorrhagic shock, restrictive crystalloid resuscitation is used to sustain organ perfusion while systolic or mean blood pressure is kept lower than usual. This technique is known as permissive hypotension or hypotensive resuscitation [9], [10].

The administration of crystalloids in tiny boluses of 500 ml is advised as one of the earliest reanimation techniques. Due to the possibility of hyperchloremic acidosis and the impairment of renal function with chloride-rich fluids, scientific research suggests using balanced crystalloid solutions such as Ringer's lactate (saline solution). This is crucial for LMICs because they frequently use saline-based solutions. Following the administration of each bolus, medical professionals must evaluate their patients' clinical condition, seeking a reduction in shock-related signs and symptoms [11], [12].

The application of numerous units of blood products may be linked to a higher incidence of transfusion-related problems even while early transfusions can save lives and, in theory, aid in establishing hemostasis faster, reducing the number of blood products supplied. These side effects include hyperkalemia, hypocalcemia, citrate toxicity, immunomodulation related to transfusions, circulatory overload due to transfusions (TACO), kidney damage, acute lung injury due to transfusions (TRALI) (0.1 per 1000 units transfused), febrile nonhemolytic reactions due to transfusions (0.8 per 1000 units transfused), and acute hemolytic transfusion reaction (0.19 per 1000 units transfused). Infectious illnesses linked to transfusions are rare (less than 1/100,000–1,000,000) [13], [14].

The use of uterotonicos, uterine massage, selective devascularization (angiographic embolization or suture ligation), uterine compression sutures (B Lynch sutures), and intrauterine packing are all methods of treating obstetric bleeding. A hysterectomy is still the last resort in situations of severe PPH when all other options have failed [1]–[3]. "Damage control surgery" has been established in the last 20 years to treat hemorrhage. It is carried out in three stages: the initial laparotomy, the resuscitation stage, and the concluding operation. Pelvic packing is a clinical remedy frequently utilized during the surgical phase and is an option following hysterectomy and in the presence of coagulopathy.

III. ABDOMINAL PACKING FOR OBSTETRIC HEMORRHAGE

The simplest way to stop recurrent uterine bleeding is through abdominal or pelvic packing [4]. Low-pressure veins and capillaries in the abdominal vault are compressed by the abdominal packing, which helps to lessen or halt bleeding. Disseminated intravascular coagulation can coexist with hypothermia, acidosis, and hypovolemic shock in a patient who is actively bleeding. The patient must be stabilized in the intensive care unit to address these issues because these symptoms are linked to additional illnesses that affect pregnancy [1].

In many situations, abdominal packing, which causes mechanical compression of the uterine vascular sinuses, is a quick, efficient, and affordable way to ensure hemostasis. Therefore, uterine packing is an easy and efficient strategy that can save more difficult surgical operations and mothers' lives if medicinal care is unsuccessful. Uterine atony is the most typical reason to employ uterine packing. Other signs include certain coagulopathy cases, placental bleeding in placenta previa or placenta accreta, and bleeding from the placental location. Utero-vaginal packing may be used to stabilize patients who are undergoing surgical preparation in some situations. Some of these patients' uterine packing successfully stops bleeding. Thus additional surgery may not be needed [3].

Pads or roller gauze (sterile pads bound by suture threads or wrapped in a sterile bag or stacked gauze) and balloon
packs are two abdominal packing procedures for controlling bleeding after hysterectomy (Foley catheter or Bakri balloon). Both sorts' physical structures differ from one another. First, the balloon pack is simpler and quicker to put together and use because it is ready to be inflated and used immediately, but the pack of pads needs to be set up and attached. Second, by inflating or deflating the balloon, it is simpler to alter the balloon packs' sizes to match the hemorrhagic areas' sizes. However, it could be difficult to add or remove a pad from the assembled pack [15].

A patient who is hemodynamically unstable and not receiving optimal resuscitation, stabilization of the patient to allow transfer to an appropriate facility, post-hysterectomy hemorrhage with a free interval, diffuse vaginal laceration associated with pelvic bleeding, and the presence of extensive hematoma in the absence of embolization potential are indications for abdominal packing [15].

The key to this maneuver is to pack the actual pelvis (below the pelvic brim) predominantly and not the false pelvis, which results in a physical tamponade within the bony bones of the pelvis itself (above the pelvic brim). The latter has a negligible tamponade effect because the actual pelvis' internal arteries are usually where most bleeding originates. Only X-ray detectable swabs that are larger (at least 30 cm) should be used, and they should be tightly folded either in half or quarters in "sandwich-sized" rolls (Fig. 1). In cases where a hysterectomy has already been done, the "sandwich-sized" folded packs should be applied equally and firmly over the raw, bleeding surfaces of the pelvis and pedicles.

It is crucial to check that surgical pedicles have been secured before treating post-hysterectomy hemorrhage since the abdominal packing's tamponading effect allows coagulopathy correction and blood transfusions to stabilize hemodynamics. If the uterus is still there, packs can be inserted via the side walls of the pelvis and pressed firmly against the sacrum (presacral area) and paravesical region. This will make the packs "airtight" and leave little room for dead space (Fig. 2) [5].

To achieve the thick, "airtight" compression necessary for efficient tamponade, up to eight medium-sized surgical gauzes can be employed in the total number of packs used to stop hemorrhage. The danger of prolonged bleeding increases if the packs are arranged too loosely, and "overpacking" can lead to compartment syndrome (a sustained increase in intra-abdominal pressure >20 mmHg with organ failure) or hypotension because of resistance to venous return to the heart [5].

Karateke packing is an additional technique for abdominal packing. The steps taken by the obstetric bleeding team's packing approach were as follows: In Karateke packing, a Bakri balloon is inserted into the abdomen by tugging via the vagina after a 1 cm incision is made in the posterior vaginal wall, 1-2 cm from the sutured vaginal cuff. The Bakri balloon is wrapped in a circle with six to seven wet, squeezed-near-hot sponges (Fig. 3), then inflated with 500–1000 mL saline and placed in traction via the vaginal channel (Fig. 4). As a result, sponges surround the inflated Bakri balloon in the patient's abdomen. By applying vaginal tension to the underlying sponges, the balloon compresses them, thus transferring pressure to all surgery site surfaces at the same rate. Hemostasis is achieved, and bleeding stops in vascular structures as a result. When there is enough traction, the distal end of the balloon is fastened to the patient's leg. After that, the skin is stitched up without tying the layers of the abdominal fascia [15].
When there is enough traction, the distal end of the balloon is fastened to the patient's leg. After that, the skin is stitched up without tying the layers of the abdominal fascia. Maintenance perfusion is permitted by minimally releasing the tension on the shaft of the Bakri balloon at 2-hour intervals during the surgical period to prevent Compartment syndrome and perfusion failure of the lower extremities. If bleeding persists, the balloon is inflated. Further, additional traction is used, and the compression on the beneath-surface sponges is increased. Up till hemostasis is achieved, this treatment is continued. Following the replenishment of blood and blood products, the depacking treatment was carried out in all patients once the coagulation parameters had returned to the normal range and intra-abdominal hemorrhage had stopped [15].

The patient's blood pressure is adjusted to ensure that venous bleeding has been managed. In order to prevent abdominal compartment syndrome (ACS), primary closure of the rectus sheath was typically avoided, and skin was only approximated using sutures or staples. The intra-abdominal packs are removed within 24-48 hours after the patients are moved to the intensive care unit (ICU) for stabilization and correction of any coagulopathy or anemia. It is crucial to understand that while a tamponade pressure greater than arterial pressure will stop smaller arterial and low-pressure capillary bleeding, it will not stop larger arterial points, so other management strategies for arterial hemorrhage must be taken into consideration if they are suspected (such as angioembolization or ligation of internal iliac arteries or their branches) [5].

A potentially fatal condition known as abdominal compartment syndrome (ACS) affects critically ill patients and is brought on by a fast pathological increase in intra-abdominal pressure (>12 mmHg). ACS may induce many organ dysfunctions. Clinically, it is distinguished by a grossly inflated, tense belly and respiratory, cardiovascular, neurological, and renal dysfunction. Left ventricular failure may cause mortality. Since the pack should be removed within 48 hours, the skin can simply be approximated with stitches or staples. Primary closure of the rectus sheath following pelvic packing can worsen ACS [6].

According to research, 90.09 percent of abdominal packing procedures are successful. In his study, after the packing was removed after 24 to 48 hours, 7 out of 99 patients needed a hysterectomy due to uncontrollable bleeding. Regarding post-insertion morbidity, one patient experienced episiotomy wound infection, and three experienced pyrexia. None of the patients had concealed bleeding. However, there was some packing soakage [3].

Research demonstrates that abdominal packing can be effective in treating obstetric bleeding. A combination of abdominal packing and vaginal traction was required in this group of pregnant women when medical and surgical interventions proved ineffective, and the bleeding became life-threatening. This operation is considered damage control surgery used in obstetrics, given the patient characteristics. 24-48 hours of pelvic packing with vaginal traction and primary skin closure was suggested to control the microvascular venous bleeding because the hemorrhage caused clinical deterioration marked by acidosis, hypothermia, coagulopathy, and hypovolemic shock, and occasionally the presence of pre-eclampsia or eclampsia. The wrapping was removed after 24 to 48 hours, in 100% of cases establishing bleeding control [1].

According to another study, a hysterectomy was considered a last resort in some severe cases of PPH that were treated with chitosan-covered gauze. In one instance, uterine bleeding ceased instantly after the gauze was applied intraterine and was compressed for one to two minutes. This gave uterotonics more time to work without endangering the patient by causing excessive blood loss. The gauze prevents the time-critical bleeding brought on by the underlying pathology; it does not treat the uterine atony. We advise a maximum 24-hour stay for the gauze inside the uterus [2].

By raising the traction force and volume of the intra-abdominal balloon in the Karateke packing technique, the compression strength applied to the bleeding location can be increased using the same number of sponges. As a result, it is possible to provide more mechanical pressure to bleeding foci without relaparotomy to add more sponges [15]. According to [16], 62 percent of abdominal packing procedures are successful. Packing failed in 38% of cases, and 13 people died as a result. In another series by [15], hemostasis was achieved in all six patients, including one in whom bleeding could not be controlled by traditional abdominal packing, using Karateke packing.

Fig. 3. Near-hot sponges that have been wet and squeezed are wrapped in a circle around the balloon.

Fig. 4. Through the vaginal route, a Bakri balloon is inflated with 500–1000 mL of saline and placed in traction.
Abdominal packing has shown effective management, and it is advised that packing might be used in tertiary hospitals as it requires no specialized tools or knowledge. It is an easy-to-learn, quick, and affordable treatment that lowers maternal morbidity and mortality and may be taught to trainee doctors and midwives. Packing is rarely used as the only method of hemorrhage control, and the cessation of bleeding is partially due to resuscitative techniques, the reduction of blood loss, and the treatment of coagulopathy. However, due to its ease of application, minimal risk of complications, and usefulness in environments with limited resources, abdominal packing continues to be a crucial technique in the arsenal of the modern obstetrician.

REFERENCES


