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Bleeding after Hysterectomy: Recommendations and What to Expect

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Abstract

Bleeding after gynecological surgery remains an infrequent life-threatening complication, demanding appropriate medical and surgical management. Classified as early/“reactionary” and delayed/secondary, unexpected postoperative hemorrhage may arise regardless of the route or subtype of hysterectomy. Timely recognition and prompt intervention to arrest bleeding are essential strategies for the suitable outcome of the patient. The present chapter presents an overview on different aspects of bleeding after hysterectomy such as incidence rate, risk factors, mechanisms, and management techniques aiming to expand knowledge and skills in recognizing and treating this unpredicted potentially serious problem. Furthermore, we intend to offer a guide toward standardizing treatment practice across bleeding issues following hysterectomy considering clear recommendations and algorithms.

Keywords: post-surgery bleeding, hysterectomy, reactionary hemorrhage, secondary post-hysterectomy hemorrhage, management

1. Introduction

Considered the second most commonly performed operation after cesarean section worldwide, hysterectomy may be classified as abdominal (laparotomy, laparoscopy, or robotic assistance) and vaginal (via an incision through the superior part of the vagina).

The most common indications for hysterectomy are benign conditions such as uterine fibroids, endometriosis, genital prolapse, pelvic pain, heavy menstrual bleeding, but the technique is also used for gynecological malignancy (usually ovarian, uterine, or cervical) and risk-reducing surgery (in cases of BRCA 1 or 2 mutations or Lynch syndrome) [1–4].

Actually, there are three types of hysterectomy—total hysterectomy (the uterus and cervix are removed), subtotal or partial hysterectomy (the uterus is removed, but the cervix is left in place), and total hysterectomy with bilateral salpingo-oophorectomy (uterus, fallopian tubes, ovaries, and cervix are removed) [1–4]. The term radical hysterectomy (removal of the uterus, cervix, parametrium, vaginal cuff, and fallopian tubes) is used to describe a wide range of procedures universally applicable

to cervical cancer. However, the degree of radicality clearly depends on preoperative estimation of tumor location, surgical margins and the risk of occult lymphatic spread. Moreover, the ovaries may or may not be removed according to the patient age [1–4]. In addition, supracervical hysterectomy is sometimes preferred to diminish the intraoperative complications and surgical times, as well as to limit the possibility of lower urinary tract issues and maintain normal sexual function [1–4].

The best route for hysterectomy is multifactorial, depending not only on the surgeon's skills and patient safety (minimally invasive procedures as vaginal, laparoscopic, laparoscopic-assisted, and robotic-assisted hysterectomies) but also on economic reasons [1–4].

Hemorrhage after hysterectomy is recognized as an occasional life-threatening complication in modern gynecological surgery, assuming appropriate medical and surgical management [2–9].

Classified as “reactionary” (postoperative bleeding within the first 24 hours following surgery) and secondary (bleeding occurring in the interval 3–22 days after surgery), unexpected hemorrhage may arise regardless of the route or subtype of hysterectomy [5, 6, 9]. Early recognition and prompt intervention (reoperation or arterial embolization) to arrest bleeding are essential strategies for the suitable outcome of the patient [2–10].

While the role of risk factors for “reactionary” hemorrhage is emerging and critical for a correct assessment of the patient, operative laparoscopy is still ideal to treat hemorrhage after vaginal hysterectomy, laparoscopic hysterectomy, laparoscopic-assisted vaginal hysterectomy, and laparotomy being necessary only in selected cases [2–4, 6, 9].

Secondary hemorrhage presents with varying degrees of severity and tends to be more common after laparoscopic hysterectomy, especially total laparoscopic hysterectomy than after the other hysterectomy approaches [5, 9]. Factors potentially responsible are vaginal vault infection, vault hematoma, a poor surgical technique including excessive thermal injury by electrocoagulation, and early resumption of physical activity, large uterus size, excessive use of an energy source for the uterine artery, and culdotomy [2–5, 7, 9, 10].

Ultimately, the management of secondary hemorrhage is challenging and involves diverse approaches based on the exact cause of bleeding, comprising vaginal packing with or without vault suturing, laparoscopic coagulation of the uterine artery if the source of bleeding could not be identified vaginally or arterial embolization [6, 9, 10].

Because of elective gynecologic surgery, we encourage selective patients to donate their own blood before surgery [6, 11]. Several definitions are actually used:

- autologous blood transfusion, when is done with the patient's own blood; blood is stored and can be transfused during surgery;
- homologous transfusion or transfusion from another woman;
- parachute pack or umbrella pack is a useful tool for pelvic bleeding after pelvic exenteration;
- peanut dissector; this tool is indicated for blunt pressure dissection of small places;
- total blood volume; estimated blood volume of total body weight is 8% or 4.5–5.0 liters in the average women. When intraoperative blood loss exceeds 15% of the

blood volume, blood transfusion must be taken into consideration in combating hypovolemic shock. About 15% of an adult blood volume can be calculated by amplification a patient's weight in kg 10 times. The usual method of performing abdominal hysterectomy involved the use of clamps or forceps on vessels.

The present chapter will give an overview on different aspects of bleeding after hysterectomy such as incidence rate, risk factors, mechanisms, and management techniques aiming to expand our knowledge and skills in recognizing and treating this unexpected potentially serious complication. Furthermore, we intend to offer a guide toward standardizing treatment practice across bleeding issues following hysterectomy considering clear recommendations and algorithms.

2. Postoperative bleeding: Current trends/concepts

Postoperative hemorrhage represents a significant potential complication of contemporary gynecological surgery. Despite normal hemostasis, appropriate/suitable surgical technique and close monitoring, postoperative bleeding may occur, leading to the different clinical and operative scenarios and challenging even the most experienced operative team [2–4, 9, 11, 12].

2.1 Subtypes, incidence rate, location, predisposing factors, and complications

2.1.1 Postoperative bleeding subtypes

Based on their timing to surgery, two main subtypes of postoperative hemorrhage are actually recognized [5–9]:

- *subtype 1, early or reactionary postoperative gynecological hemorrhage* where bleeding happens within the first 24 hours following surgery, commonly within the first 4–6 hours postoperative; early bleeding in modern gynecological surgery is reported irrespective of the route of intervention [6, 9];
- *subtype 2, delayed or secondary postoperative bleeding* that develops in the interval 3–22 days after the surgery [5, 9]; secondary hemorrhage is rare and may arise more often after total laparoscopic hysterectomy than after other hysterectomy approaches [5].

2.1.2 Incidence rate of postoperative bleeding

Although the incidence of postoperative hemorrhage basically varies according to surgery, the difference between abdominal, laparoscopic, and vaginal hysterectomy remains statistically insignificant [5–7]. Indeed, some authors postulate that postoperative bleeding occurs more frequently after abdominal and laparoscopic than after vaginal hysterectomy, but overall, the incidence of hemorrhagic events after a hysterectomy varies from 0.2 to 3.1%, irrespective of surgical route [5–8, 10, 13, 14].

On the other hand, the true frequency of delayed bleeding complications is still unknown, although the consequences can be particularly significant in women undergoing outpatient surgery [5–8, 10, 13, 14]. Paul et al. reported an overall cumulative incidence of secondary hemorrhage after a total laparoscopic hysterectomy of 1.3% [5]. Although secondary hemorrhage is rare, it is more often reported after total laparoscopic hysterectomy than after other hysterectomy approaches [5–8, 10, 13, 14].

Table 1 summarizes data on the incidence of postoperative hemorrhage reported by several authors.

2.1.3 Location and source of bleeding

Hemorrhage is responsible for about half of the postoperative complications following gynecological surgery, ranging from persistent venous oozing to massive blood loss from injury to retroperitoneal vessels [5–7, 12, 13].

Main bleeding sites comprise the anterior abdominal wall (both the suprapubic and the umbilical incision), the vaginal cuff (after laparoscopic hysterectomy and laparoscopic-assisted vaginal hysterectomy), and intraabdominal bleeding. Abdominal wall vessel injury occurs with increasing frequency, as the practice of laparoscopic surgery becomes wider and trocars become sharper [2–4, 7, 9].

The source of bleeding in secondary hemorrhage can be the uterine vessels or descending cervical/vaginal vessels; occasionally, uterine artery pseudoaneurysm can cause delayed heavy vaginal bleeding after laparoscopic hysterectomy [2–4, 7, 9]; additionally, the technique of vaginal vault closure may also contribute to the occurrence of secondary hemorrhage [5, 9].

Postoperative pelvic hematoma emerging after gynecological surgery may generate serious morbidity and impaired quality of life if large, infected, or incompletely

Authors	Type of study, no of cases	Incidence postoperative hemorrhage
Makinen et al. [15]	<ul style="list-style-type: none">• Large-scale observational study• 10 110 hysterectomies: 5875 AH, 1801 VH, 2434 LH	<ul style="list-style-type: none">• The most severe type of hemorrhagic events• Occurred in 2.1%, 3.1%, and 2.7% in the AH, VH and LH group, respectively
Wilke et al. [13]	<ul style="list-style-type: none">• Secondary hemorrhage following VH, L-AVH• 1391 cases	<ul style="list-style-type: none">• The overall incidence of hemorrhage after VH or LAVH was 1.2% (17 of 1319);• Over the 5-year period, it decreased from 2.4% (five of 209) to 0.6% (two of 315)• The incidence of secondary hemorrhage was 0.23% after VH and LH
Holub and Jabor [7]	<ul style="list-style-type: none">• 1226 patients underwent VH or LH for benign or malignant female pelvic diseases between January 1997 and December 2001• Retrospective analysis	<ul style="list-style-type: none">• The overall incidence of postoperative bleeding after LH or VH was 0.85% over a period of 5 years.• During the same period, the incidence of postoperative bleeding ranged from 2/183 (1.1%) in 1997 to 1/231 (0.43%) in 2001• The frequency of bleeding was 0.93% following LH and 0.71% following VH• 0.17% of secondary hemorrhage after LH and VH
Erian et al. [6]	719 patients between November 1990 and March 2007: 476 VH, 243 LH	<ul style="list-style-type: none">• 0.6% in the VH and 1.2% in the LH group
Paul et al. [5]	<ul style="list-style-type: none">• 1613 total LH between January 2004 and April 2012• 21 patients had secondary hemorrhage after hysterectomy	<ul style="list-style-type: none">• The overall cumulative incidence of secondary hemorrhage after total laparoscopic hysterectomy was 1.3%

^{*}AH, abdominal hysterectomy; LH, laparoscopic hysterectomy; VH, vaginal hysterectomy; L-AVH, laparoscopic-assisted vaginal hysterectomy.

Table 1.
Incidence of postoperative hemorrhage in gynecological surgery.^{*}

resolved hematoma or hematoma with residual fibrosis and persistent pain [2–4, 9]. It usually develops above the vaginal vault, along the pelvic side-wall, retroperitoneal, in the paravesical space, in the abdominal wall as well as in the ischiorectal fossa and vulva [9]. According to its location, postsurgical hematoma may be recognized at routine abdominal and/or pelvic examinations in women with outstanding postoperative discomfort and unexpected anemia, but a definitive diagnosis can only be made by ultrasound or CT scan [5]. A simple or CT/ultrasound-guided or through abdominal incision drainage is commonly required to address the pelvic hematoma issue [2–4, 9].

Postoperative hemorrhage can result from failure to control vascular injury during surgery. Accurate clamp placement, gentle handling of tissues, and the accuracy of dissection are all important and contribute to maximum efficiency with minimum blood loss and minimum tissue damage when abdominal hysterectomy is performed [9].

The electrosurgical instrument can be used for a precise incision of the abdominal wall with minimal tissue injury. By holding the electrode close to the tissue or touching the metal clamp and pressing the coagulation button, superficial coagulation can be achieved [2–4, 9].

2.1.4 Predisposing factors

Intra- and post-operative bleeding generally develops in younger women or those with a more vascular pelvis who underwent a hysterectomy, especially laparoscopic hysterectomy in the presence of fibroids [6, 16].

Possible rationales for secondary hemorrhage comprise a bleeding vessel missed at the end of the procedure, effects of pneumoperitoneum, Trendelenburg position, low intraoperative pressure, wearing off the effect of vasopressin, subacute infection, postoperative analgesia, as well as bleeding disorders [2–5, 7, 9].

Other potential factors accounting for delayed postsurgical bleeding are vaginal vault infection, vault hematoma, poor surgical technique with excessive thermal injury by electrocoagulation, and early resumption of physical activity [5, 7, 9]. A large-sized uterus, high vascularity, large-sized vessels, excessive use of an energy source for the uterine artery, and culdotomy also play a role in this hemorrhagic event [5, 7, 9].

2.1.5 Complications of bleeding

Most of the complications during or after hysterectomy are preventable or treatable. Other complications may exist as medical conditions before hysterectomy but are worsened during surgery, especially if not managed as part of holistic woman's care.

Complications after surgery include [2–4, 9, 12]:

- *hemorrhage*; occurs more often after laparoscopic hysterectomy as compared to vaginal surgery;
- *infections*; occur more often after vaginal hysterectomy than keyhole surgery;
- *damage to internal organs* such as bowel or urinary tract; the injury may occur to the ureter, bladder, or rectum and complications include incontinence, the urgency of urination, and infections;
- *vaginal cuff dehiscence*; is more commonly reported in laparoscopic hysterectomy as compared to laparoscopic assisted procedures or vaginal hysterectomy;

- *anesthetic complications*; smoking, obesity, and heart/lung infections are the most common causes of anesthetic complications;
- *ovarian failure*; interruption to ovarian blood supply following removal of the uterus may precipitate the symptoms of menopause and lead to osteoporosis and ischemic heart disease;
- *low libido*; the removal of the uterus may lead to less sexual enjoyment due to the loss of uterine contractions;
- *venous thromboembolism*; prophylactic anticoagulants are associated with a lowering of the risk for such events;
- *depression*; most of the women complain of feeling depressed because they have lost an important part of them.

In Romania, the mortality rate following a hysterectomy is very low.

Contemporary management of surgical interventions includes postoperative bleeding and the possibility of blood transfusion with risks of HIV transmission (in 1.9 million cases), the transmission of hepatitis B (one in every 180.000 cases), or a febrile reaction to transfusion (1% cases) [2]. Most experts recommend acute normovolemic hemodilution and cell salvage in women undergoing hysterectomy section who will not accept blood products.

Hypovolemic shock can occur after major bleeding as a direct result of uncontrolled hemorrhage. Depending on the total blood volume lost, hypovolemic shock may be divided into four classes: I (< 75 mL or 15%), II (750–1500 mL, or 15–30%), III (1500–2000 mL or 30–40%) and IV (>2000 mL or > 40%) [6].

The clinical manifestations of class I hypovolemia are not measurable and compensatory mechanisms restore plasma volume within a day. In class II hypovolemia, tachycardia is the most frequent clinical finding as a result of inadequate circulatory volume. The distinction between class I and II hypovolemic shock is made by recording blood pressure and pulse in the standing, sitting, or reclining position. Postural hypotension is observed as result of cardiac failure. Compensatory mechanisms begin to fail with the class III hypovolemic shock. This results in an increase in the arterial and venous oxygen difference with classic signs including worked tachycardia, tachypnea, oliguria, and cold skin. With the class IV hypovolemic shock, a patient's survival depends on rapid transfusion of blood and immediate surgical intervention before cardiovascular collapse and death or organ system failure.

After initial resuscitative measures are instituted, it is highly recommended for patients to be carried out in a critical care unit. Use of sympathomimetic agents after sufficient hydration and vasodilator is normally preferred in the management of patients with hemorrhagic shock who have arterial pressure higher than 70 mm Hg.

Once restoration of the intravascular volume has been completed, it is important to reassess the patient's response to blood transfusion when managing women with severe blood loss, especially in those patients who have pulmonary edema, myocardial infarction, or congestive heart failure [12].

Transfusion for patients with hemoglobin of 8–10 mg/dL is no longer recommended.

When major surgery is anticipated and transfusion is massive, platelets in addition to packed cell transfusion are required. It is recommended that cryoprecipitate be reserved for patients with deficiencies in von Willebrand factor, factor VIII, and fibrinogen factor XIII.

2.2 Management of postoperative hemorrhage

Recognized as an uncommon complication of hysterectomy, postoperative hemorrhage represents a true challenge in routine practice [8]; irrespective of the procedure, a close follow-up of the patient in a high-dependency unit is indicated in order to exclude recurrence of bleeding [6, 7].

The key to successful management is timely intervention meaning prompt diagnosis, urgent resuscitation if necessary and rapid decision for either arterial embolization or reoperation according to the severity of bleeding and the hemodynamic stability of the patient. Both techniques are highly effective to control bleeding; nevertheless, if the patient is hemodynamically unstable or if the interval since surgery is under 24 hours suggesting rapid hemorrhage, the emergency return to the operating theater to arrest the bleeding is preferred [6, 7, 9].

Current options for managing hemorrhage include [6, 7, 9]:

- every patient should be carefully monitored postoperatively for signs of bleeding (hypotension, tachycardia, tachypnea, abdominal distension);
- ultrasound can confirm intraperitoneal bleeding; more ways to determine intraabdominal hemorrhage include abdominal and pelvic CT scan; a routine coagulation profile should be done immediately for the patient with a rapid pulse, low blood pressure, and/or low urine output. The surgeon must take charge of the problem and execute the technical steps necessary to treat hemorrhagic shock in the operating room. Intraperitoneal bleeding can be hidden by incisional pain and analgesic medications. Despite adequate dissection, a small vessel may bleed or the suture may cut through tissue. Skeletonized vessels and small sutures should be used for significantly reducing the incidence of postoperative hemorrhage. Venous bleeding can be more life-threatening than arterial hemorrhage which can be clearly seen and controlled with fast small sutures or clamps.
- the presence of unexpected drop in hematocrit or hemoglobin postoperatively.

A simplified algorithm to describe steps after gynecological surgery and potential post-surgery bleeding is provided in **Figure 1**.

A closer look at the holistic management of postoperative blood should also underpin the following [9]:

- to assess blood value and coagulation mechanisms;
- to identify changes in the coagulation components, and to initiate replacement therapy in order to achieve adequate hemostasis. In assessing the patient's coagulation status, it is very important to avoid such a situation known as the trauma triad of death consisting of—hypothermia, metabolic acidosis, and coagulopathy. In some patients with benign disease, blood transfusion is rarely indicated. Experience has shown that blood transfusion may be significant in women with malignant disease;
- to establish the therapeutic strategy by measuring the level of prothrombin time < 14 sec, activated partial thromboplastin time (aptt) < 40 sec, fibrinogen >100 mg/dL, platelets >80 × 10³ mL.

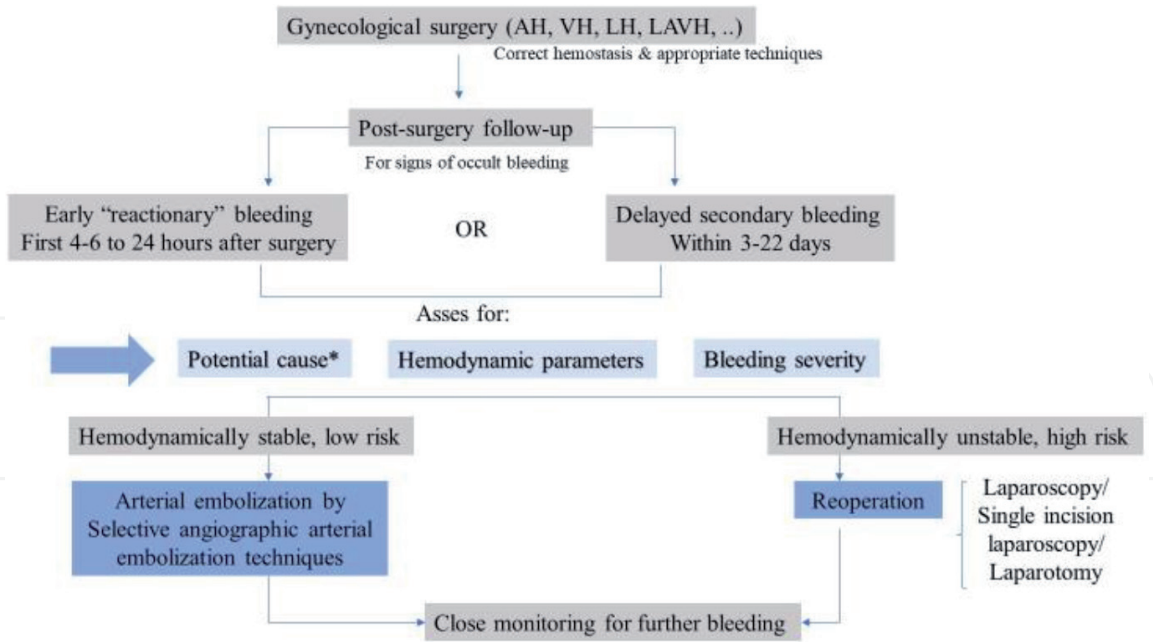


Figure 1.
A simplified algorithm of post-surgery bleeding approach.

2.2.1 Reoperation

In hemodynamically unstable women (rapid pulse, falling blood pressure, with or without renal impairment) or if the bleeding occurs shortly in post-surgery (the so-called reactionary hemorrhage), it is desirable to return to the operating room [5–9].

A preoperative abdominal and pelvic ultrasound or CT scan is routinely required to visualize the source of bleeding as being intra- or retro-peritoneal, as well as adequate local examination without or under anesthesia. Moreover, the operative procedure should be mentally revised to identify any potential bleeding issue [9].

Surgical revision for postoperative bleeding may be performed transvaginally, laparoscopically, or both [5–9, 13, 14].

Postoperative hemorrhage from the vaginal vault recurrently originates from the vaginal artery in the lateral vaginal fornix or from one of its branches, since the lateral vaginal angle which includes the vaginal artery may not be accurately protected or turn into disligated [9, 13, 14]. Excessive vaginal bleeding needs to be objectively measured; since the vagina is a distensible organ, clots obstructing the vaginal introitus may lead to a large amount of blood accumulating and distending the vagina, subsequently covering the true significance of hemorrhage [9, 13, 14]. Vaginal bleeding can be controlled by clamping and ligating the bleeding point as well as by delayed-absorbable transfixion suturing of the vaginal mucosa and paravaginal tissue [9, 13, 14]. If such techniques are not enough or bleeding vessels have retracted, other tactics should be intended [8].

When no noticeable vaginal source, bleeding after abdominal or vaginal hysterectomy is traditionally treated by laparotomy or laparoscopy [7, 9]. While laparotomy is recommended in cases of intraperitoneal bleeding or unsuccessful conservative transvaginal treatment, operative laparoscopy is clearly indicated if the source of bleeding cannot be identified by the means of vaginal examination and/or if an intraabdominal bleeding source is suspected [7, 9, 13].

2.2.2 Laparotomy

Post-surgery bleeding requires laparotomy in two situations.

Firstly, if the surgical hemostasis cannot be achieved transvaginally, laparotomy may be necessary [9].

Secondly, if the patient underwent an abdominal hysterectomy, the incision should be reopened, succeeding the following steps (i) clots and blood evacuation from the abdomen and pelvic area; (ii) searching of the potential bleeding sites, commencing with the most expected places; (iii) ligating, suturing, or clipping of the identified bleeding sites; (iv) verifying the ureteral integrity as high risk of ureteral damage during reoperation; and (v) closing second time after a completely dry abdomen and pelvis [9].

2.2.3 Laparoscopy

The laparoscopic approach to postoperative bleeding following laparoscopic hysterectomy, vaginal hysterectomy, or laparoscopic-assisted vaginal hysterectomy is an attractive alternative to the abdominal surgical approach in the majority of patients [6, 7, 9, 13]. The procedure can be used to adequately evaluate the pelvis and the abdominal wall, which is occasionally the source of hemorrhage after laparoscopic hysterectomy. Moreover, whether the bleeding is from the abdominal wall, the surgical pedicles, or the vaginal cuff, it can be managed laparoscopically [8, 9]. Evidently, hemostasis can be more easily obtained in laparoscopic surgery because of magnification, close inspection, routine use of suction irrigation, and bipolar coagulation [7, 9]. Besides, bipolar coagulation, a Foley catheter introduced in the port-site bleeding, or a collagen-fibrin agent can be used to achieve local hemostasis during laparoscopy [7, 9].

Following laparoscopic irrigation/suction using Ringer's solution to clear the operative field, a combination of laparoscopic suturing using absorbable suture material and laparoscopic bipolar coagulation is commonly recommended [6, 8, 9]. Also, electrosurgery is effective in controlling bleeding during laparoscopic surgery. Furthermore, different forms of fibrin adhesive are tested in gynecologic open surgery in order to stop oozing hemorrhages after primary hemostatic treatment with a high efficacy rate (98%) [6]. Holub and Kliment reported successful treatment of hemorrhage from damaged tissue near important pelvic structures using the laparoscope to apply collagen fleece combined with fibrin glue [7, 17].

To avoid further risk of injury to the abdominal wall and to improve the recovery time from surgery, *single incision laparoscopic surgery* is a viable option for the management of hemorrhage, particularly for those patients whose original surgery was accomplished via single incision laparoscopic surgery. Curlin et al. reported a case where single incision laparoscopy was used to manage postoperative hemorrhage after total laparoscopic hysterectomy with right salpingectomy and left salpingo-oophorectomy [8].

2.3 Arterial embolization

Conversely, if the patient is reasonably stable and there is not abrupt early bleeding (based on the volume of blood in the abdomen or retroperitoneal space as estimated by ultrasound and the time from surgery), it seems realistic to try to identify the bleeding artery and embolize it by transcatheter interventional radiological techniques [2–4, 9, 10].

Arterial embolization remains an important minimally invasive option for the management of delayed postoperative hemorrhage [2–4, 8, 9, 18]. Transcatheter arterial embolization has been shown to be an effective tool for the management of postoperative hemorrhage after gynecologic laparoscopy, but also after abdominal and vaginal hysterectomy [8, 9]. Selective angiographic arterial

embolization is a quite simple and safe procedure with a clinical success rate up to 90% in routine practice and usually a low complication rate less than 10%, including a mild postembolization syndrome with pain, fever, high leucocyte count related to vascular thrombosis and tissue necrosis [8, 9]. Bladder necrosis, vesicovaginal fistula, neuropathies as well as renal toxicity are uncommon, isolated side effects [9].

Arterial embolization technique comprises the following main steps—(i) identification of the site of bleeding by angiofluoroscopy if more than 2–3 mL/min bleeding rate; (ii) percutaneous catheterization of the femoral artery or, uncommonly, brachial artery under local anesthesia with retrograde direct access to the hypogastric artery; (iii) canulation of the hypogastric artery or specific collateral vessel if appropriate; (iv) injection of the embolization material under angiographic observation (metal coins, autologous clot, small pieces of gelfoam, small silastic spheres, subcutaneous tissue, or other hemostatic materials; (v) repeat angiography to demonstrate the occlusion of the bleeding vessel; (vi) remove of the catheter followed by careful monitoring for further bleeding [8–10].

Although second surgery is often the initial choice for postoperative hemorrhage, for a patient who is hemodynamically stable but is experiencing postoperative hemorrhage, transcatheter arterial embolization is a welcome alternative to a second surgery [8, 9]. However, if rapid access to interventional radiology is not available or if transcatheter arterial embolization is unsuccessful, laparoscopy can still be considered [8, 9]. Besides, a potential advantage of surgical management of postoperative hemorrhage over transcatheter arterial embolization is the ability to evacuate the hemoperitoneum, which may decrease postoperative pain, the risk of infection, and the risk of ileus [8, 9].

3. Recommendations for managing postoperative bleeding in gynecological surgery

It is typical to expect some bleeding after hysterectomy in the 6–8 weeks following the procedure; the discharge may be red, brown, or pink. Bleeding should steadily decrease in the days and weeks following the surgery and should never be excessive at any point of recovery [18]. The exception is menstruation in women who have undergone a subtotal hysterectomy [18, 19]. In case of bleeding after hysterectomy, it is more likely to be of some pathologic cause instead of menstruation which needs to be ruled out [19].

However, a sudden and significant increase in bleeding during recovery should be considered abnormal. Points of concern comprise but are not limited to—bright red vaginal bleeding (indicating active bleed), temperature over 100.4°F, severe nausea or vomiting, increasing pelvic pain, a local complication such as redness, swelling, or drainage at the incision site as well as difficulty in urinating or pain with urination suggesting either an infection or a neurogenic bladder [18].

Delayed vaginal hemorrhage after laparoscopic supracervical hysterectomy usually requires emergent reoperation. Several studies have described continued cyclical bleeding from the cervical stump after supracervical hysterectomy in 0–25% of cases [20].

Effective interventions addressing hemorrhage after hysterectomy are needed to reduce women's mortality worldwide.

3.1 Recommendations

a. Counseling

Prior to hysterectomy, these women should be offered specific counseling and have a prospective plan for the management of their disease, developed by gynecologists of how their condition and hysterectomy interact. Prehysterectomy counseling services starting for all women planning this surgical intervention are a key part of hospital services and should be an integral part of the local health services network. They could be provided by general practitioners or specialist clinicians or surgeons, all of whom should be suitably trained or may require different management or specialized services before hysterectomy. There are special circumstances as congenital or acquired coagulation disorders that should be considered to evaluate by a thorough history and lab tests.

b. Professional interpretation services for women who do not speak English.

It is not clear how much the specific medical terminology is conveyed to the patient. Healthcare providers have to invest in technology, security, specialists, and translators to ensure healthcare becomes world-class. Medical tourism is growing each year. Romania provides the highest quality healthcare at the lowest price. Also, the cost of hysterectomy in Romania is lower than the same treatment in UK or UE. In developed countries as the USA, UE countries or Canada patients have to wait a long time for major surgeries. The cost involved in treating a patient depends upon factors like—type of hysterectomy needed, hospital and physician selected for it, and duration of staying.

c. Communication and referrals among professionals.

Good communication among professionals is essential. Referral between specialties involved should be rapid. They can use a variety of communication methods including—mobile phone, email, fax, Whatsapp, Instagram, Tik Tok, Facebook, etc. In many cases, junior trainees in the front line did not have proper support and need to have clear guidelines about when to seek senior help.

d. Women with serious medical conditions

They require immediate and appropriate multidisciplinary specialist care; women will require referral to tertiary or specialist medical centers for their preexisting medical or mental conditions before hysterectomy. Conditions that require prehysterectomy counseling and advice include—epilepsy, diabetes, asthma, congenital or known acquired cardiac disease, autoimmune disorders, renal and liver disease, obesity (BMI > 30), severe mental illness, or psychiatric conditions that require a change of medication, HIV infection. Women with potential serious underlying preexisting medical or mental health conditions should be immediately referred to appropriate specialist centers of expertise as soon as their symptoms develop.

e. Clinical training

All clinical staff must undertake regular training for the identification and management of serious disease conditions or potential emergencies or signs and

symptoms of potentially life-threatening conditions, circulatory failure, severe hypertension or major hemorrhage, pyrexia $>38^{\circ}\text{C}$, tachycardia >100 bpm, breathlessness. The local clinicians may be excellent at the management of severely ill women but must also accept written, documented, and audited courses. There should be a well-trained team of doctors for recording and charting investigations performed, obtaining quick results, ensuring that abnormal results are followed up promptly and have resulted in a better outcome.

f. Identifying and managing very sick women with critical illness before, during or after hysterectomy

In very acute situations, a team approach can be very healthful. The management of patients with an acute severe illness with circulatory failure, arterial hypertension, and major hemorrhage requires a team approach and help from the anesthetic and critical care services. There are some healthcare professionals who failed to manage crisis situations outside their immediate area of expertise; therefore, it is crucial to recognize their limitations and to know when and whom to call for another opinion once the patient was admitted to the hospital.

Coagulation factors, hematocrit, serum calcium, glucose, and electrolytes could be assessed every 120 minutes or after 10 U of transfusion; these lab tests are very helpful for the diagnosis of postoperative bleeding.

RCOG guidelines of the responsibilities of the consultant on call should be followed.

Bilateral hypogastric artery ligation can reduce blood loss to a minimum during hysterectomy [9].

Hypotensive anesthesia is also a safe and effective technique in reducing the circulation to the operative field [9].

g. Serious incident and women death reporting

Health professionals, senior or junior, must recognize an act on the signs and symptoms of potentially life-threatening conditions.

The evaluation of such a report must include clinicians from relevant disciplines (including anesthetics) who were not involved with the deaths. This report is recommended to be a requirement in the future.

The identification and act on women's death should be reviewed as a serious incident and disseminated to all health professionals, junior or senior. Women's deaths are generally underreported because of incorrect classification of cause.

Fatal hemorrhage can result from laceration of the external iliac vein or the hypogastric vein where they join together which are at risk of injury when the surgeon dissects between the distal common iliac artery, the psoas muscle, and the area of lumbosacral nerve trunks [9]. These vessels cannot be clamped and ligated with clips or sutures [9].

Dissection around the aorta and vena cava done with inadequate exposure performed in order to remove lymph nodes around them can result in serious hemorrhage. Bleeding usually can be avoided by placing a finger over the laceration and a vascular needle is used to close the laceration from side to side. The same technique may be used for common and external iliac veins [9].

Also, bleeding can occur by dissecting pararectal space and presacral space as well as obturator fossa [9].

h. Pathology

Patient death autopsy must be improved and require more expertise.

In Romania, the number of women death after hysterectomy (death rate) is very small and many of the autopsies reviewed were considered adequate. When an autopsy is needed, the body can be taken to another area for more expert examination. Despite evaluation by many examiners in the different specialties, the final diagnosis could not be resolved because of inadequate clinical data, poor autopsy quality, or the unmanageable nature of some death.

4. Conclusion

The lack of routine observation in the postoperative period or a failure to appreciate blood loss or recognition of abnormal vital signs such as oxygen saturation and respiratory rate can lead to death after hysterectomy. The patient should be evaluated before hysterectomy for risk factors and the medical conditions of the women should be diagnosed by a careful history and lab tests in order to decrease the possibility of hemorrhage.

The risks of blood transfusion, the transmission of HIV or hepatitis B should be discussed before surgical procedure.

The peace of surgical intervention should be governed by good exposure of the tissue, accuracy of dissection, and clamping or suturing the vessels in a precise manner. The skills and experiences of the surgeon without wasting time with unnecessary hesitation or indecision will reduce the risk of uncontrolled hemorrhage after a hysterectomy.

The surgeon should control the life-threatening hemorrhage by judgment, knowledge, and technical skills. The patient's medical history for vital signs, blood loss volume, and levels of coagulation factors will determine how quickly blood transfusion is initiated. Careful postoperative clinical evaluation of the patient by the surgeon and surgical team with abdominal or pelvic ultrasound or CT scanning will help to prevent or minimize significant blood loss after hysterectomy and localize the site of bleeding.

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