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# Early Detection of Hemorrhagic Shock in the Recovery Room Following Laparoscopic Ovarian Torsion Surgery and Management with a Massive Transfusion Protocol: A Case Report

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**Editorial**

**Background:** Hemorrhagic shock is one of the most critical postoperative complications, and when it occurs after laparoscopic procedures, early recognition is essential for survival. In minimally invasive surgeries such as laparoscopic detorsion of the ovary, occult intra-abdominal bleeding may progress rapidly while initial clinical signs remain subtle, leading to delayed diagnosis. Prompt activation of the Massive Transfusion Protocol (MT), along with coordinated teamwork between anesthesia, surgical staff, and the blood bank, plays a decisive role in preventing multi-organ failure and mortality.

**Case Presentation:** A 32-year-old woman with no significant past medical history underwent emergency laparoscopic surgery for ovarian torsion. Approximately 30 minutes after the procedure, while preparing for discharge from the recovery room, she developed sudden hypotension and tachycardia. Clinical evaluation suggested hemorrhagic shock, and urgent blood transfusion was initiated. Bedside ultrasonography revealed a large hemoperitoneum. The patient was quickly placed under invasive monitoring, and the Massive Transfusion Protocol was activated. She received a total of 13 units of PRBC, 10 units of platelets, 10 units of FFP, along with fibrinogen, calcium, and albumin. Despite two emergency laparotomies and temporary abdominal packing, the source of bleeding remained unclear. Following hemodynamic stabilization in the ICU, angiography identified a small arterial branch at the laparoscopic port site as the bleeding source, which was subsequently controlled in the final surgical intervention.

**Conclusion:** This case highlights the importance of vigilant postoperative monitoring in the recovery room after minimally invasive surgery. Sudden onset of hemorrhagic shock, even in initially stable patients, requires rapid and systematic evaluation. Early activation of the Massive Transfusion Protocol, adherence to evidence-based resuscitation guidelines, advanced hemodynamic monitoring, and close interprofessional collaboration were crucial in achieving a favorable outcome. This case may serve as a practical model for managing acute postoperative hemorrhagic shock following laparoscopic procedures.

**Keywords:** Hemorrhagic Shock, Laparoscopy, Ovarian Torsion, Recovery Room, Massive Transfusion Protocol, Hemodynamic Monitoring, Intra-abdominal Bleeding.

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## Introduction

Hemorrhagic shock is one of the leading causes of preventable mortality in surgical and trauma patients, and its timely recognition and intervention play a decisive role in patient outcomes [1]. Acute intravascular volume loss due to active bleeding leads to impaired tissue perfusion, reduced cellular oxygen delivery, metabolic acidosis, organ dysfunction, and ultimately multiple organ failure [2,3]. In the perioperative setting, particularly during the immediate postoperative period in the post-anesthesia care unit (PACU), hemorrhagic shock may initially present with nonspecific signs such as tachycardia and mild hypotension. If not promptly recognized, these early manifestations can rapidly progress to severe hemodynamic instability [4].

Ovarian torsion is a common gynecologic emergency in women of reproductive age and typically requires urgent surgical intervention, most often via laparoscopy [5]. Although laparoscopy is considered a minimally invasive technique with advantages such as reduced postoperative pain, shorter hospital stay, and fewer complications, it is not without risks. Serious complications, including vascular injury and intra-abdominal bleeding, may still occur. Hemorrhage resulting from injury to abdominal wall vessels at laparoscopic port entry sites, although rare, can lead to significant hemoperitoneum and hemorrhagic shock. Delayed diagnosis in such cases is associated with a substantial increase in mortality [6].

A cornerstone in the management of severe hemorrhage is the timely implementation of the Massive Transfusion (MT) protocol [7,8]. MT is commonly defined as the transfusion of more than 10 units of packed red blood cells (PRBCs) within 24 hours, or more than 4 units within 1 hour in the presence of ongoing bleeding. Structured implementation of this protocol, with emphasis on balanced resuscitation using appropriate ratios of blood products (PRBCs, fresh frozen plasma [FFP], and platelets), correction of hypocalcemia, prevention of hypothermia, and management of coagulopathy, plays a critical role in preventing the lethal triad of acidosis, hypothermia, and coagulopathy [9]. Numerous studies have demonstrated that early and systematic activation of the Massive Transfusion Protocol (MTP) is associated with reduced mortality and improved clinical outcomes [10].

In the recovery room setting, meticulous monitoring of vital signs, close attention to subtle hemodynamic changes, and rapid decision-making by the anesthesia and surgical teams are of paramount importance. Early diagnosis of hemorrhagic shock in the PACU is particularly challenging, as initial signs may be mistakenly attributed to residual anesthetic effects, postoperative pain, or surgical stress responses [11]. Therefore, persistent hypotension, sustained tachycardia, declining hemoglobin levels, and the presence of free intra-abdominal fluid on imaging should be considered warning signs of active bleeding.

The present report describes a case of severe hemorrhagic shock following laparoscopic surgery for ovarian torsion, which was identified in the recovery phase through timely clinical recognition by the anesthesiologist and managed successfully through rapid implementation of the Massive Transfusion Protocol and repeated surgical interventions. During hospitalization, the patient required transfusion of more than 10 units of PRBCs, thereby meeting the criteria for MT.

The significance of this report can be highlighted in several key aspects: first, it underscores the critical role of vigilant monitoring and early recognition of shock in the recovery room; second, it emphasizes the necessity for prompt readiness of the clinical team to activate the MT protocol in non-traumatic patients; and third, it highlights the potential for severe hemorrhage due to abdominal wall vascular injury even in seemingly minimally invasive procedures such as laparoscopy. Given the limited number of similar case reports describing MT following laparoscopic ovarian torsion surgery, this case may contribute to improved clinical awareness, refinement of diagnostic algorithms in the PACU, and strengthening of multidisciplinary approaches in the management of acute hemorrhage.

## Case Report

A 32-year-old female patient with no known underlying medical condition was diagnosed with ovarian torsion and was a candidate for emergency laparoscopic surgery at Sarem Superspecialty Hospital. The surgery under general anesthesia began at 14:00 and ended at 16:30. The patient was transferred to the recovery room in stable condition. At 17:00, during the discharge assessment from the recovery room, the patient developed tachycardia and hypotension. Given the clinical signs of shock, the anesthesiologist immediately diagnosed hemodynamic shock and ordered two units of PRBC. An emergency CBC and abdominal ultrasound were requested at the same time. At 17:30, the first unit of PRBC was infused. Emergency ultrasound reported significant free fluid in the peritoneal cavity (hemoperitoneum). The second unit of PRBC was subsequently infused. At 18:00, the patient was transferred to the operating room. Despite the presence of three suitable venous routes, a central venous catheter was inserted through the right internal jugular vein under ultrasound guidance for accurate hemodynamic monitoring, and an arterial line was also placed for continuous blood pressure monitoring. The patient was intubated under Rapid Sequence Induction and an emergency laparotomy was performed by the gynecological surgical team.

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Intra-abdominal examination revealed a significant volume of blood (more than 3 liters) in the peritoneal cavity, which was drained. According to the surgical team, the primary source of bleeding was controlled. During this stage, the patient received a total of four units of PRBC, four units of Fresh Frozen Plasma (FFP), and four units of platelets. At 20:30, the abdomen was closed and the patient was prepared for transfer to the ICU. However, due to recurrent hemodynamic instability and recurrent hypotension, the patient remained in the operating room under close monitoring for 45 minutes. Repeated ultrasound still showed intra-abdominal blood. As a result, with suspicion of continued bleeding, the general surgery team was also involved and a repeat laparotomy was performed at 02:30. Approximately 2 liters of blood was found in the abdominal cavity, but despite careful examination, no specific source of active bleeding was identified. Finally, at 01:00 AM, the patient's abdomen was packed and the decision was made to continue monitoring in the ICU. By the end of this stage, the patient had received a total of 10 units of PRBC, 10 units of platelets, and 10 units of FFP, along with 2 grams of fibrinogen, three vials of calcium, and two vials of albumin. The patient was transferred to the ICU with an endotracheal tube and relatively stable hemodynamic status. The next morning, after correction of the acid-base status and laboratory parameters, the patient was extubated at 09:00 with a good general condition. Subsequently, angiography was performed to accurately determine the source of bleeding. Subsequently, the patient was transferred back to the operating room and during surgery by another surgical team, a small arterial branch at the entrance of the laparoscopic port was identified and controlled as the source of bleeding. This patient met MT criteria during hospitalization and received a total of 13 PRBC units. Timely diagnosis of hemorrhagic shock in recovery and rapid implementation of the MT protocol played a key role in patient survival and favorable final outcome.

**Discussion**

Hemorrhagic shock is one of the most important causes of preventable mortality in surgical patients, and as observed in this report, early diagnosis and prompt intervention can significantly improve patient outcomes. The findings of this case are in line with the evidence from previous studies in many respects, but there are also significant differences in some aspects that can help to understand this phenomenon more deeply.

In terms of the time of onset and manifestation of shock, the results of this report are consistent with studies conducted in the field of post-laparoscopic bleeding. Various studies have reported that bleeding due to vascular injury in laparoscopy, especially at the trocar entry site, can manifest itself with delay and insidiously, and its initial symptoms may be limited to mild tachycardia or hypotension. This is due to the pressure of the pneumoperitoneum during surgery and the vasodilatory effects of anesthetics, which may temporarily mask bleeding. In the present case, the patient was stable until the end of the procedure and signs of shock appeared approximately 30 minutes after transfer to the recovery room, which is consistent with similar reports [12,13]. However, in terms of the severity of bleeding and the need for repeated interventions, this case appears to be more severe than many reported studies. In most case reports, bleeding from the laparoscopic port has been controlled with a single surgical intervention or even conservatively, whereas in this patient, two laparotomies and finally angiography were required to identify the source of bleeding [14]. This difference may be due to several factors: involvement of a small but active arterial branch that may not be readily identifiable on initial surgical examination, intermittent bleeding that may temporarily stop and restart during surgery, and limited visibility at laparotomy in the presence of diffuse bleeding that makes it difficult to identify the exact source.

In terms of management, the results of this report are fully consistent with the strong evidence base for the efficacy of MTP. Several studies have shown that early initiation of MTP with balanced ratios (approximately 1:1:1 for PRBC, FFP, and platelets) reduces mortality, improves coagulation status, and reduces the need for secondary interventions. In this patient, rapid and structured MTP, combined with fibrinogen and calcium, resulted in hemodynamic stabilization and prevention of the lethal triad [15,16]. This finding is consistent with the results of large studies in trauma and surgery that emphasize the importance of balanced resuscitation.

However, a notable difference in this report is the use of MTP in a nontraumatic patient. Most of the evidence on MTP is based on trauma patients, whereas in this case, the bleeding occurred after an elective-emergency surgery. However, more recent studies have shown that the principles of MTP can be generalized to nontraumatic bleeding (including gynecological or general surgery) and have similar results in improving survival. Therefore, this report is consistent with the growing trend of new evidence regarding the use of MTP in a nontraumatic setting.

From the perspective of identifying the source of bleeding, the use of angiography in this patient is in line with recent recommendations. In studies that have investigated bleeding of unknown origin, angiography has been introduced as an effective diagnostic and even therapeutic tool [17,18]. However, in many reported cases, the source of bleeding is identified at the time of the initial surgical intervention, and the need for angiography is less frequently reported. This difference is likely related to the small and deep nature of the vessels involved in this patient, as well as the slow but persistent bleeding. Another important point is the key role of close monitoring in the PACU, which

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is well highlighted in this report and is fully consistent with previous studies. Evidence suggests that many cases of severe postoperative bleeding are first identified in the recovery period by subtle changes in vital signs. In this patient, too, rapid recognition by the anesthesiologist and prompt intervention were crucial in preventing progression to multiorgan failure. Overall, this case report is consistent with the existing evidence in most key aspects (time of onset, importance of monitoring, effectiveness of MTP, and role of the multidisciplinary team), but shows some discrepancies in terms of bleeding severity, need for repeated interventions, and use of angiography for definitive diagnosis, which are likely due to the specific pathophysiological features of this patient and the nature of the vascular injury. These differences not only highlight the importance of clinical vigilance, but also indicate that management algorithms should be flexible and tailored to the individual patient.

## Conclusion

This case report demonstrates that the occurrence of hemorrhagic shock after seemingly minimally invasive procedures such as laparoscopic ovarian torsion, although rare, can rapidly become life-threatening and requires high clinical vigilance during the recovery period. The sudden onset of hemodynamic symptoms, in initially stable patients, should always be considered as a sign of active bleeding until proven otherwise. In this patient, early diagnosis in the PACU, careful hemodynamic monitoring, and immediate activation of the Massive Transfusion protocol according to evidence-based resuscitation principles played a decisive role in preventing progression to multiorgan failure and death. This case also highlights the importance of a stepwise and multidisciplinary approach in the management of complex hemorrhages; in that if the source of bleeding is not identified during initial interventions, the use of complementary methods such as angiography can be crucial for diagnosis and ultimate control.

## Ethical Issue

In conducting this research, all ethical principles in medical and biological research were observed in accordance with the Declaration of Helsinki, and the rights, dignity, and confidentiality of the participants were protected.

## Conflict of Interests

There was no conflict of interest in this study.

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