SUCCESSFUL RESUSCITATION FROM INTRAOPERATIVE CARDIAC ARREST DUE TO MASSIVE HEMORRHAGE DURING ONCOLOGIC ABDOMINAL SURGERY: A CASE REPORT FROM A RESOURCE-LIMITED SETTING

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Abstract: Successful Resuscitation from Intraoperative Cardiac Arrest Due to Massive Hemorrhage During Oncologic Abdominal Surgery: A Case Report from a Resource-Limited Setting. *Intraoperative cardiac arrest is a rare but catastrophic perioperative emergency. Massive hemorrhage is an important reversible cause during major oncologic surgery, where continuous monitoring permits immediate recognition and cause-directed resuscitation. A 46-year-old male weighing 57 kg with a height of 162 cm, classified as ASA physical status III, underwent elective exploratory laparotomy, tumor debulking, and Miles procedure for recurrent pelvic spindle cell sarcoma. Preoperative assessment revealed approximately 15 kg of weight loss over one year, hemoglobin of 9.3 g/dL, and leukocyte count of 22,200/µL, without significant cardiopulmonary abnormalities. Because major blood loss was anticipated, invasive monitoring, central venous access, and packed red cells, platelets, and fresh frozen plasma were prepared preoperatively. During tumor debulking, sudden hemodynamic collapse progressed to cardiac arrest secondary to massive surgical hemorrhage. High-quality cardiopulmonary resuscitation, aggressive volume replacement, and blood-product transfusion were initiated immediately while surgical hemorrhage control was performed. Return of spontaneous circulation was achieved within minutes. The patient was transferred to the intensive care unit, recovered without neurological deficits, and was discharged home in stable condition. Early recognition of hemorrhagic hypovolemia, immediate cardiopulmonary resuscitation, concurrent volume and blood-product replacement, hemorrhage control, and rapid mobilization of available resources contributed to successful resuscitation. Hemorrhage-related intraoperative cardiac arrest may result in favorable neurological recovery when the reversible cause is rapidly identified and treated concurrently with high-quality cardiopulmonary resuscitation and coordinated multidisciplinary management.*
Keywords: *Blood Transfusion, Cardiopulmonary Resuscitation, Heart Arrest, Intraoperative Complications, Hemorrhagic Shock.*

Abstrak: Keberhasilan Resusitasi Henti Jantung Intraoperatif akibat Perdarahan Masif pada Pembedahan Abdomen Onkologi: Laporan Kasus di Fasilitas dengan Sumber Daya Terbatas. Henti jantung intraoperatif merupakan kegawatdaruratan perioperatif yang jarang tetapi berakibat fatal. Perdarahan masif merupakan penyebab reversibel yang penting pada pembedahan onkologi mayor, sementara pemantauan berkelanjutan di kamar operasi memungkinkan pengenalan segera dan resusitasi yang diarahkan pada penyebab. Seorang laki-laki berusia 46 tahun dengan berat badan 57 kg dan tinggi badan 162 cm, status fisik ASA III, menjalani laparotomi eksplorasi elektif, *debulking* tumor, dan prosedur Miles atas indikasi sarkoma sel spindel pelvis rekuren. Evaluasi praoperasi menunjukkan penurunan berat badan sekitar 15 kg dalam satu tahun, hemoglobin 9,3 g/dL, dan leukosit 22.200/µL tanpa kelainan kardiopulmoner yang bermakna. Karena diantisipasi terjadi perdarahan besar, pemantauan invasif, akses vena sentral, serta *packed red cells*, trombosit, dan *fresh frozen plasma* telah disiapkan sebelum operasi.

Saat *debulking* tumor, terjadi kolaps hemodinamik mendadak yang berlanjut menjadi henti jantung akibat perdarahan bedah masif. Resusitasi jantung paru berkualitas tinggi, penggantian volume agresif, dan transfusi produk darah segera dilakukan bersamaan dengan kontrol perdarahan bedah. Sirkulasi spontan kembali dalam beberapa menit. Pasien dipindahkan ke unit perawatan intensif, pulih tanpa defisit neurologis, dan dipulangkan dalam kondisi stabil. Pengenalan dini hipovolemia hemoragik, resusitasi jantung paru segera, penggantian volume dan produk darah secara bersamaan, kontrol perdarahan, serta mobilisasi cepat sumber daya yang tersedia berkontribusi terhadap keberhasilan resusitasi. Henti jantung intraoperatif akibat perdarahan dapat berakhir dengan pemulihan neurologis yang baik apabila penyebab reversibel segera dikenali dan ditangani bersamaan dengan resusitasi jantung paru berkualitas tinggi serta tata laksana multidisiplin yang terkoordinasi.
Kata Kunci: Henti Jantung, Komplikasi Intraoperatif, Resusitasi Jantung Paru, Syok Hemoragik, Transfusi Darah.

INTRODUCTION

Perioperative cardiac arrest is a rare but life-threatening complication, with reported incidences ranging from 0.8 to 4.3 per 10,000 anesthetics depending on patient risk and surgical complexity (Hinkelbein et al., 2017). Unlike out-of-hospital cardiac arrest, perioperative arrest usually occurs in a monitored and witnessed environment, where potentially reversible causes can be identified and treated rapidly (Hinkelbein et al., 2017; Moitra et al., 2018). Regional data suggest that the burden may be higher in some Southeast Asian settings. In a prospective multicenter study involving 163,403 anesthetics across 20 hospitals in Thailand, cardiac arrest occurred at a rate of 30.8 per 10,000 anesthetics, while death within 24 hours occurred at 28.3 per 10,000 anesthetics, although differences in case mix and outcome definitions limit direct comparison with contemporary registries (Charuluxananan et al., 2005).

Major hemorrhage is an important identifiable cause of intraoperative cardiac arrest, particularly during extensive abdominal and oncologic procedures (Armstrong et al., 2024). Survival depends not only on immediate high-quality cardiopulmonary resuscitation but also on rapid recognition and correction of reversible causes, including hemorrhage control and restoration of circulating volume. Current perioperative cardiac arrest guidelines emphasize anticipation, early recognition, a clear treatment plan, availability of appropriate personnel and equipment, and coordinated multidisciplinary management (Hinkelbein et al., 2023).

This report describes successful resuscitation of intraoperative cardiac arrest secondary to massive hemorrhage during complex oncologic abdominal surgery in a resource-limited setting. The case illustrates the importance of anticipating major blood loss, rapidly identifying hemorrhagic hypovolemia, initiating simultaneous resuscitation and surgical hemorrhage control, and mobilizing available resources during a time-critical perioperative emergency.

CASE REPORT

A 46-year-old male (57 kg, 162 cm) with recurrent pelvic spindle cell sarcoma was scheduled for elective exploratory laparotomy, tumor debulking, and Miles procedure. He had previously undergone open prostatectomy and sigmoidostomy. Preoperative evaluation revealed significant weight loss of approximately 15 kg over one year, anemia with a hemoglobin concentration of 9.3 g/dL, and leukocytosis of 22,200/μL. Cardiorespiratory evaluation, chest radiography, and electrocardiography showed no significant abnormalities. The patient was classified as American Society of Anesthesiologists (ASA) physical status III. The available preoperative clinical data are summarized in Table 1.

Table 1. Available Preoperative Clinical Data

Variable	Finding
Age	46 years
Body weight	57 kg
Height	162 cm
Weight loss	Approximately 15 kg over 1 year
ASA physical status	III
Hemoglobin	9.3 g/dL
Leukocyte count	22,200/μL
Chest radiography	No significant abnormality
Electrocardiography	No significant abnormality
Cardiorespiratory evaluation	No significant abnormality

The planned anesthetic technique consisted of general anesthesia with endotracheal intubation combined with epidural analgesia. Central venous catheterization and invasive monitoring were prepared, with planned postoperative admission to the intensive care unit. Because major blood loss was anticipated during tumor debulking, packed red blood cells, platelet concentrates, and fresh frozen plasma were prepared before surgery.

During tumor debulking, the patient developed abrupt hemodynamic deterioration that progressed to cardiac arrest. The event was immediately recognized in the operating room, and cardiopulmonary resuscitation was initiated without delay. Rapid assessment of the operative field identified massive surgical hemorrhage with severe hypovolemia as the presumed reversible cause. Volume resuscitation and blood-product transfusion were initiated concurrently with ongoing cardiopulmonary resuscitation while the surgical team proceeded with hemorrhage control. Return of spontaneous circulation was achieved within minutes.

Following return of spontaneous circulation and hemodynamic stabilization, surgery was concluded after control of the bleeding source. The patient was transferred to the intensive care unit for continued hemodynamic monitoring and organ support. During intensive care management, he demonstrated progressive clinical recovery, including improvement in hemodynamic status and consciousness, followed by successful liberation from mechanical ventilation. He was subsequently transferred to a non-intensive ward and later discharged home in stable condition. No clinically apparent neurological deficit or major organ complication was documented during the reported hospitalization.

DISCUSSION

This case demonstrates successful resuscitation from intraoperative cardiac arrest associated with massive surgical hemorrhage during complex oncologic abdominal surgery. The clinically relevant sequence was acute hemodynamic deterioration during tumor debulking, progression to cardiac arrest, immediate initiation of cardiopulmonary resuscitation, recognition of massive hemorrhage as the presumed reversible cause, concurrent volume and blood-product replacement, and surgical hemorrhage control. Return of spontaneous circulation was achieved within minutes, followed by intensive care management and recovery without clinically apparent neurological or major organ complications. These features illustrate an important distinction between perioperative and out-of-hospital cardiac arrest: the operating room provides continuous monitoring, immediate access to trained personnel, and the opportunity to identify and treat procedure-related reversible causes without delay (Hinkelbein et al., 2023).

The pathophysiology in this patient was consistent with hypovolemic cardiac arrest secondary to acute surgical blood loss. Progressive loss of circulating volume reduces venous return, ventricular preload, stroke volume, and ultimately coronary and cerebral perfusion. When blood loss becomes critical, compensatory mechanisms fail and circulatory collapse may progress to cardiac arrest. Perioperative cardiac arrest caused by hemorrhage therefore differs

fundamentally from primary cardiac arrest because restoration of circulating volume and definitive hemorrhage control are central components of resuscitation (Hinkelbein et al., 2023; Bonanno, 2023). Although pulseless electrical activity is commonly associated with profound hypovolemia, the initial cardiac rhythm in this patient was not documented sufficiently to assign a specific arrest rhythm.

The management performed in this case was broadly consistent with the 2023 ESAIC/ESTES recommendations for hemorrhage-related perioperative cardiac arrest. These guidelines recommend simultaneous hemorrhage control, volume or blood-product replacement, and closed-chest compressions rather than treating cardiac arrest independently from its underlying cause (Hinkelbein et al., 2023). In this patient, cardiopulmonary resuscitation was initiated concurrently with blood-product transfusion, volume resuscitation, and surgical control of the bleeding source. Preoperative recognition of substantial bleeding risk, preparation of packed red blood cells, platelets, and fresh frozen plasma, invasive monitoring, and planned postoperative intensive care also provided a degree of preparedness before the crisis occurred. These measures were consistent with the broader principle of identifying and correcting reversible causes during advanced life support (Soar et al., 2021).

The operating-room crisis in this case may also be interpreted as a "micro-disaster" because a sudden life-threatening event generated an immediate demand for coordinated personnel, blood products, monitoring, resuscitation, and surgical intervention within a limited time frame. Rather than using the term only as a metaphor, the response can be mapped to established emergency-response principles, as summarized in Table 2. Immediate recognition of cardiovascular collapse represented situational awareness; assessment of the operative field identified the principal threat; concurrent surgical hemorrhage control and anesthetic resuscitation represented coordinated command and treatment; and mobilization of previously prepared blood products represented rapid resource deployment. Communication and situational awareness are also recognized as core non-technical competencies for anesthesia crisis management in the Indonesian setting (Heriwardito et al., 2026).

Table 2. Mapping of Disaster-Response Principles to the Intraoperative Management of the Present Case

Disaster-response principle	Application in the present case	Interpretation
Preparedness	Major blood loss anticipated; blood products, invasive monitoring, central venous access, and postoperative ICU care planned	Resources were prepared before deterioration occurred
Situational awareness	Sudden hemodynamic collapse and cardiac arrest immediately recognized	Facilitated rapid transition from routine anesthesia to resuscitation
Threat identification/ prioritization	Operative field rapidly assessed and massive hemorrhage identified as the presumed reversible cause	Management was directed toward the immediate life-threatening cause
Command and coordination	CPR and anesthetic resuscitation proceeded concurrently with surgical hemorrhage control	Parallel rather than sequential management reduced delay in source control
Resource mobilization	Volume replacement and available blood products were rapidly administered	Available resources were redirected toward immediate circulatory restoration

Disaster-response principle	Application in the present case	Interpretation
Surge response	ICU-level postoperative monitoring and organ support were required after ROSC	Care requirements rapidly escalated beyond routine perioperative management
Communication	Concurrent actions between anesthesia and surgical teams indicate multidisciplinary coordination	The specific communication method, including closed-loop communication, was not documented

CPR: cardiopulmonary resuscitation; ICU: intensive care unit; ROSC: return of spontaneous circulation.

The case should, however, be interpreted within the limitations of the available documentation. Point-of-care ultrasound, viscoelastic coagulation testing, rapid-infusion systems, specific balanced-transfusion ratios, and advanced mechanical or endovascular hemorrhage-control techniques were not sufficiently documented and therefore cannot be presented as components of the resuscitation performed. Similarly, the available records do not quantify blood-bank turnaround time, blood-product availability at the time of arrest, staffing ratios, blood or fluid warming systems, or ICU bed availability. These operational characteristics should be reported when they can be verified, because they would more precisely define the "resource-limited" setting and improve the transferability of the case to other hospitals with comparable constraints.

The principal lesson from this case is therefore not the use of advanced resuscitation technology, but the value of anticipation and rapid cause-directed action using immediately available resources. Preparation for expected hemorrhage, early recognition of deterioration, simultaneous resuscitation and surgical source control, and coordinated escalation to intensive care were the documented components most closely associated with the successful clinical course. For similar institutions, structured perioperative crisis preparation and team training may further strengthen these capabilities, particularly in communication, situational awareness, task allocation, and rapid mobilization of blood products (Pai et al., 2024; Heriwardito et al., 2026).

CONCLUSION

This case illustrates that intraoperative cardiac arrest secondary to massive surgical hemorrhage may be successfully managed through early recognition, immediate high-quality cardiopulmonary resuscitation, rapid correction of hypovolemia, and coordinated surgical and anesthetic intervention. The patient achieved return of spontaneous circulation and recovered without clinically apparent neurological sequelae during the reported hospitalization. Applying disaster-response principles such as preparedness, situational awareness, communication, and rapid resource mobilization may contribute to effective management of similar perioperative crises in resource-limited settings. As a single case report, these findings cannot be generalized and should be interpreted as a practical clinical experience rather than evidence of treatment effectiveness.

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