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Dr. Kavya Kalluri
Junior Resident Jawaharlal Nehru Medical College, Belagavi, Karnataka, India

Dr. Rajesh Mane
Professor and Head Department of Anesthesiology JNMC, Belagavi, Karnataka, India

Dr. MG Dhorigol
Professor Department of Anesthesiology, JNMC, Belagavi, Karnataka, India

Corresponding Author:
Dr. Kavya Kalluri
Junior Resident Jawaharlal Nehru Medical College, Belagavi, Karnataka, India

Hyperthermic intraperitoneal chemotherapy and cytoreductive surgery patient perioperative management (CRS-HIPEC): The part temperature, fluid, and acid-base management play

Kavya Kalluri, Rajesh Mane and MG Dhorigol

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Abstract
Case Report: A 32-year-old female patient was diagnosed with bilateral ovarian adenocarcinoma accompanied by peritoneal carcinomatosis. To manage her condition, she underwent cytoreductive surgery (CRS) with successful tumor resection on August 11, 2019. Following this procedure, she was admitted for hyperthermic intraperitoneal chemotherapy (HIPEC), which was performed under general anesthesia along with a noncontinuous epidural block to assist with pain control.
During the HIPEC procedure, careful intraoperative fluid management was implemented to address significant fluid shifts and third-space losses resulting from the extensive surgical intervention. A combination of crystalloids, colloids, and blood products was administered to ensure proper volume replacement and maintain hemodynamic stability. Additionally, strict monitoring and regulation of electrolyte levels and acid-base balance were essential to minimize the risk of complications.
After surgery, the patient was transferred to the intensive care unit (ICU) for close monitoring and ongoing supportive care. Her recovery progressed smoothly without major complications. Over the following days, she maintained stable vital signs, exhibited adequate organ function, and showed steady clinical improvement. By the 10th postoperative day, she had met the criteria for hospital discharge and was released with a follow-up care plan in place to support her continued recovery and long-term health management.

Keywords: CRS HIPEC, peritoneal malignant neoplasms, acid-base shifts

Introduction

Primary peritoneal malignancies, along with malignant tumors originating from the gastrointestinal and gynecological systems that have metastasized to the peritoneum, generally carry a poor prognosis. To manage these cases, oncologists have developed a specialized treatment approach that combines Cytoreductive Surgery (CRS) with Hyperthermic Intraperitoneal Chemotherapy (HIPEC). This approach is particularly suited for patients who exhibit extensive local tumor spread without evidence of distant metastases.
HIPEC is an advanced chemotherapy technique in which highly concentrated, heated chemotherapeutic agents are directly administered into the abdominal cavity following CRS. The CRS-HIPEC procedure involves the surgical removal of visible tumors and metastatic lesions, followed by the infusion of chemotherapy heated to approximately 41°C-43°C using a specialized perfusion pump. However, this elevation in temperature can lead to increased intra-abdominal pressure and significant hemodynamic instability.
The effectiveness of HIPEC is influenced by multiple factors, including patient-specific characteristics, clinical parameters, and treatment variables. Key determinants include the type and concentration of the chemotherapeutic drug, the carrier solution, the perfusate volume, the temperature of the solution, the duration of treatment, and the method of administration. The localized delivery of high-dose chemotherapy enhances disease control within the peritoneal cavity while reducing systemic toxicity. Despite these advantages, CRS-HIPEC is an extensive surgical procedure that presents challenges such as substantial blood loss, fluid shifts, impaired gas exchange, metabolic disturbances, and coagulation abnormalities. These complications necessitate continuous intraoperative monitoring and prompt intervention by anesthesiologists to ensure patient stability and optimize outcomes.

Case report

This is a 32-year-old, female patient who is a known case of carcinoma ovary, had previously undergone cytoreductive surgery in 2019, and was planning to undergo palliative HIPEC surgery. On admission to the operating room, the patient was conscious, and oriented, after adequate fasting, her general condition was stable her pulse rate was 102 beats/min, and her Blood Pressure (BP) was 140/88 mmHg. Clinically, cardiorespiratory and central nervous system examinations were normal. Basic routine laboratory investigations were normal. Electrocardiography showed sinus bradycardia. She was accepted for anesthesia under ASA IV and patient attendees were explained about the anesthetic technique. After providing written informed consent, the patient was monitored with electrocardiogram and pulse oximetry, an arterial line was secured for beat-to-beat monitoring of the blood pressure, a temperature monitoring nasopharyngeal probe was secured in place and a baseline reading of 33.1Celcius was established. A triple lumen central line was secured in the right internal jugular vein of the patient which was used for CVP monitoring, The Patient was also cannulated with an 18 gauge intravenous cannula.

An epidural was secured using an 18 gauge Tuhoys needle in the L1-L2 interspace using loss of resistance technique and fixed at 12cm from the skin, 3 ml of 2%LOX was given as a test dose. Epidural was activated with 5 ml of 0.25%bupivacaine, Intra-operatively, there was no fall in blood pressure.

The patient was premedicated with 0.2mg of injection Glycopyrrolate, 1mg of injection Midazolam, and 80 mcg of Fentanyl. The patient was induced using 100mg of injection Propofol and 6mg of Vecuronium and was intubated using a 7.5mm internal diameter endotracheal tube. Isoflurane was started at 0.4% when the surgical procedure began which lasted for 10 hrs. A 14 French Ryles tube was secured. Antibiotic prophylaxis was administered before the surgical incision and was repeated every sixth hour.

Repeated blood gas analyses were required during the intraoperative period to manage metabolic imbalances and electrolyte disturbances. Continuous infusion of low-dose atracurium was maintained to support hemodynamic stability throughout the administration of the chemotherapeutic agents, cisplatin and doxorubicin.

Fluid replacement involved the administration of 8,500 mL of crystalloids along with four packed red blood cell (PRBC) units. By the end of the procedure, total urine output reached 2,000 mL, with an average diuresis rate of 200 mL per hour.

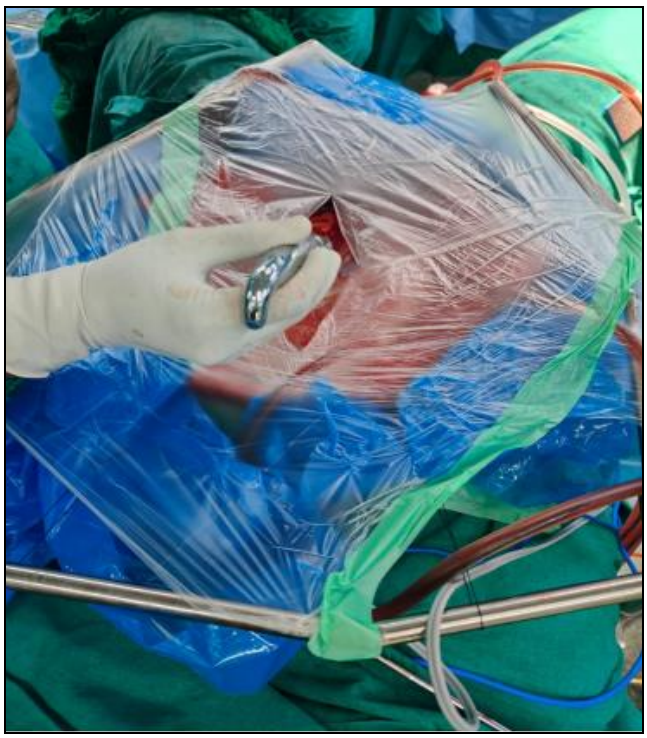
Calcium replenishment was administered using a 10% calcium gluconate solution. During the intraoperative period, the patient's body temperature fluctuated between 33.1°C and 37.4°C, and she experienced moderate metabolic acidosis, with a pH variation between 7.3 and 7.4.

At the conclusion of the procedure, the patient was transferred to the intensive care unit (ICU) while still intubated, without requiring vasoactive medications. She was successfully extubated after 24 hours. Postoperative pain management was achieved through an epidural infusion of 0.125% bupivacaine, initiated at a rate of 4 mL per hour. Her recovery remained uneventful, and she was discharged on the 10th postoperative day with instructions for regular follow-up appointments.

Conclusion

We successfully managed a case of HIPEC uneventfully with constant temperature, central venous pressure monitoring, and ABG monitoring intraoperatively.

HIPEC machine



Open HIPEC

Rise in temperature noted

Conflict of Interest
Not available

Financial Support
Not available

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