

HITAC for ovarian malignancy---Anesthesiologist's challenge

Dear Editor,

Cytoreductive surgery (CRS) combined with hyperthermic intra peritoneal chemotherapy (HIPEC) can improve outcomes of ovarian cancer with intraperitoneal spread by eliminating residual microscopic peritoneal disease.^[1] Hyperthermic intrathoracic chemotherapy (HITAC) has been used for pleural cancers but has not been widely reported for treatment of ovarian metastases. Anesthetic management in HITAC is especially challenging because of potential complications associated with prolonged duration, one-lung ventilation (OLV), wide hemodynamic instability, cisplatin-induced nephrotoxicity, acid-base imbalance, and rapid rise in temperature.^[2]

We report a case of 46-year-old woman with metastatic ovarian cancer who underwent CRS with HITAC. Her

pre-anesthetic check-up revealed haemoglobin of 9.6 gm% and a right-sided mild pleural effusion. Cardiopulmonary exercise testing revealed anerobic threshold (AT) of 11.5 ml/min/kg, VO₂ max of 12.7 ml/min/kg, she was inducted into our routine pre-habilitation programme.

After thoracic epidural and anesthetic induction, 35 French left-sided double-lumen tube was placed. Intraoperatively, analgesia was maintained with ropivacaine and fentanyl infusion. Radical abdominal hysterectomy with total omentectomy was done along with excision of metastatic deposits.

Semi-open HIPEC with 100mg Cisplatin was used at 42 C for 45min. Maximum body temperature attained was 37.3°C; urine output of 2 ml/kg/h was maintained. Small rents were created in the right hemidiaphragm to achieve diffusion of cisplatin into the right thoracic cavity [Figure 1]. During 100 min. of OLV, there was no hypoxemia [Table 1]. Noradrenaline infusion was used intraoperatively, patient shifted to ICU patient was shifted to ICU and extubated next day.

Table 1: Serial perioperative Arterial Blood Gas Analysis

| Post- induction | During CRS | Pre-HIPEC | During OLV | Post-HIPEC (30 mins) | Post HIPEC (end) |
|------------------------|------------------------|----------------------|------------------------|------------------------|------------------------|
| pH -7.47 | pH - 7.35 | pH -7.36 | pH - 7.19 | pH-7.23 | pH-7.26 |
| pO ₂ -234 | pO ₂ -206 | pO ₂ -227 | pO ₂ -64 | pO ₂ -189 | PO ₂ -163 |
| pCO ₂ -35 | pCO ₂ -42 | pCO ₂ -37 | pCO ₂ -56 | pCO ₂ -34 | pCO ₂ -33 |
| HCO ₃ -25.5 | HCO ₃ -24.5 | HCO ₃ -22 | HCO ₃ -23.1 | HCO ₃ -15.2 | HCO ₃ -15.8 |
| Lactate-0.7 | Lactate- 1.4 | Lactate-1.6 | Lactate - 2.3 | Lactate-3.3 | Lactate-3.6 |
| Na-131 | Na-134 | Na-134 | Na - 136 | Na-138 | Na -140 |
| K- 3.5 | K- 3.7 | K-3,7 | K - 4.3 | K-3.5 | K-3.8 |
| Ca -0.99 | Ca -1.01 | Ca-1.04 | Ca - 0.99 | Ca-1.00 | Ca-0.91 |

pO₂ - partial pressure of oxygen (mmHg), pCO₂ - partial pressure of carbon-dioxide (mmHg), HCO₃ - bicarbonate (mmol/l), Na - sodium (mmol/l), K - potassium (mmol/l), Ca - calcium (mmol/l)



Figure 1: Diaphragmatic rent to allow perfusate into thoracic cavity

There are no extensive studies for the efficacy of HITAC. Small individual studies suggest that 5-year survival rate of only 5% is offered to patients who undergo debulking surgery alone for Pseudo Myxoma Peritonei (PMP).^[3] In comparison, the addition of complete cytoreduction and HIPEC may permit 5- and 10-year survival rates over 75% in low-grade disease. Redo-CRS with HIPEC for disease recurrence has a demonstrated improvement in survival when compared with alternative treatments.^[4]

HITAC is associated with complications and a high-index of suspicion should be kept in perioperative period. Ensuring an adequate preload must be balanced against the risks of lung injury. Chances of acute kidney injury can be reduced by the maintenance of normovolaemia, forced-diuresis, and goal-directed fluid administration. Hyperthermia-related complications, including coagulation defects, direct tissue injury, acid-base disturbance, and electrolyte abnormalities can arise after the institution of heated-chemotherapeutic agents. The thoracic cavity fills with the perfusate, resulting in compression of venacavae, reduced cardiac output, mediastinal shift, and increased airway pressures further complicating the cardiovascular stability. OLV itself adds to the complications- hypoxemia, hypercarbia, labile hemodynamic parameters, acidosis, etc. Most of these

patients require intensive monitoring post-operatively and are associated with protein loss, coagulation, renal, electrolyte, and glycemic dysfunction. Measures include supplementation of albumin, serial electrolytes, ABG and DVT prophylaxis.

HITAC is a complex procedure wherein the physiologic challenges of major abdominal surgery, and one-lung ventilation is compounded by the thermal stress induced by peritoneal surface instillation of heated chemotherapeutic solution. A well-coordinated team of anaesthesiologists, surgeons, and intensivists with timely intervention enables excellent outcomes in such surgeries.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

**Shreya Das Adhikari[#], Vinod Kumar¹,
Praneeth Suvvari^{2,#}, Nishkarsh Gupta¹**

Department of Anaesthesiology, Kasturba Medical College, Manipal, Udupi, Karnataka, ¹Department of Oncoanaesthesia and Palliative Medicine, Dr BRA IRCH, All India Institute of Medical Sciences, New Delhi, ²Department of Anaesthesia and Palliative Medicine, Basavatarakam Indo American Cancer Hospital and Research Institute, Hyderabad, Telangana, India

[#]Previously Senior Resident, Dr BRA IRCH, AIIMS, New Delhi.

Address for correspondence: Dr. Vinod Kumar,
Room No. 139, First Floor,

Department of Oncoanaesthesia and Palliative Medicine, Dr Bhimrao Ambedkar Institute Rotary Cancer Hospital, All India Institute of Medical Sciences, New Delhi - 110 029, India.

E-mail: vkchanpadia@gmail.com

References

1. Sugarbaker PH, Chang D, Stuart OA. Hyperthermic intraoperative thoracoabdominal chemotherapy. *Gastroenterol Res Pract* 2012;2012:623417.
2. Ramegowda JK, Salam MA, Nayak V, Zaveri S. Anaesthetic management

of extra-pleural pneumonectomy and hyperthermic intrathoracic chemotherapy procedure. *Indian J Anaesth* 2015;59:807-10.

3. Pestieau SR, Esquivel J, Sugarbaker PH. Pleural extension of mucinous tumor in patients with pseudomyxoma peritonei syndrome. *Ann Surg Oncol* 2000;7:199-203.
4. Votanopoulos KI, Ihemelandu C, Shen P, Stewart JH, Russell GB, Levine EA. Outcomes of repeat cytoreductive surgery with hyperthermic intraperitoneal chemotherapy for the treatment of peritoneal surface malignancy. *J Am Coll Surg* 2012;215:412-7.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

| Access this article online | |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Quick Response Code: | Website: https://journals.lww.com/joacp |
|  | DOI: 10.4103/joacp.JOACP_110_20 |

How to cite this article: Adhikari SD, Kumar V, Suvvari P, Gupta N. HITAC for ovarian malignancy – Anesthesiologist's challenge. *J Anaesthesiol Clin Pharmacol* 2022;38:328-30.

Submitted: 16-Apr-2020 **Accepted:** 09-Apr-2021

Published: 21-Feb-2022

© 2022 Journal of Anaesthesiology Clinical Pharmacology | Published by Wolters Kluwer - Medknow