

Diagnosis and management of intra-operative pulmonary embolism under general anaesthesia in a peripheral tertiary care centre with limited resources

Sir,

It is difficult to detect and diagnose acute pulmonary embolism (APE) in patients under general anaesthesia (GA) as signs and symptoms such as dyspnoea, chest pain, haemoptysis and syncope are not evident.^[1] A 64-year-old male, with left sided carcinoma buccal mucosa and American Society of Anesthesiologists physical status II, was listed for left anterior hemi-mandibulectomy with bilateral multinodal neck dissection and left sided pectoral muscle musculocutaneous flap (PMMC) under GA. Preoperative contrast enhanced computed tomography (CECT) thorax was unremarkable.

After induction, haemodynamics remained stable during excision of the primary lesion. Approximately, 5 hours into the surgery, while raising the PMMC, the patient developed sudden pronounced hypotension with a mean arterial pressure of 45 mmHg and a decrease in end tidal carbon di-oxide (EtCO₂) 38 mmHg to 15 mmHg. This was associated with bradycardia (heart rate 44-48/min) and a gradual fall in oxygen saturation to 86-88%. Peak airway pressures gradually increased from 21 cmH₂O to 32 cmH₂O with an associated increase in plateau pressures from 19 cmH₂O to 29 cmH₂O. Central venous pressures were elevated and bilateral breath sounds were marginally reduced with no adventitious sounds. There was no significant acute blood loss, nor any evidence of sepsis. Immediately, the inhalational agent was switched off and the fraction of inspiratory oxygen increased to 100%. Intravenous mephentermine 6 mg (two boluses), hydrocortisone 100 mg and atropine 0.6 mg were administered intravenously. A single intravenous adrenaline bolus of 10 µg was subsequently administered, followed by an infusion at the rate of 0.02 µg/kg/min. Immediate arterial blood gas (ABG) analysis showed hypercarbia as well as hypoxia [Table 1a]. Transthoracic echocardiography (TTE) through subcostal four chamber view showed dilated and strained right heart chambers (McConnell sign) and distended inferior vena cava [Figure 1a and b]. A probable diagnosis of APE was made.

Our institute is a tertiary cancer care centre in a small town with limited resources. After adequate resuscitation, a joint consensus among operating room team members was made for pharmacological treatment. Unfractionated heparin (UFH) 5000 IU was administered intra-venously. Activated partial thromboplastin time (APTT) was maintained 1.5-2 times of the normal value. We were in the middle of the surgery (with tumour excised and the PMMC flap raised), and the haemodynamics had stabilised. Repeat blood gas analysis came normal [Table 1b]. So, we decided to complete the surgery. Post-surgery, the patient was kept on mechanical ventilation. Vitals in the postoperative period remained stable. A dose of 2500 IU of UFH was repeated as the reported APTT was 38.3 seconds. The patient underwent computed tomographic pulmonary angiography which showed no filling defect [Figure 2] and was shifted onto subcutaneous low molecular weight heparin 60 mg twice a day. On post-operative day (POD) 1, the patient was weaned off the ventilator. He was shifted to the ward on POD 2. He was found haemodynamically stable during follow-up.

APE leads to significant separation of EtCO₂ and PaCO₂ values intra-operatively. It causes a sudden decrease in EtCO₂ and an increase in PaCO₂. This separation in EtCO₂ and PaCO₂ values is also an important tool to measure thrombolysis under GA.^[1] TTE coupled with EtCO₂ changes seems to be useful in intra-operative cardio-circulatory failure to exclude

Table 1: Arterial blood gas analysis

Value	1a	1b
pH	7.23	7.45
PaCO ₂ (mmHg)	69.6	34.6
PaO ₂ (mmHg)	99	153
Lactate (mmol/L)	1.0	2.1
HCO ₃ ⁻ (mmol/L)	26.7	23.4
CtO ₂ (Vol %)	18.4	18.4
SO ₂	96.4%	99.5%

1a: Intra-operative, 1b: Post-embolic phenomenon; PaCO₂: Partial pressure of carbon dioxide; PaO₂: Partial pressure of oxygen; CtO₂: Concentration of total oxygen; SO₂: Oxygen saturation

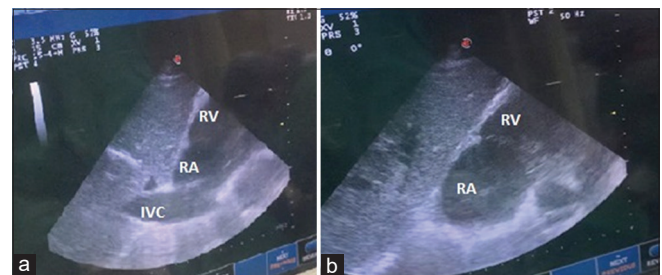


Figure 1: (a) Echo showing dilated IVC and RA (b) Dilated RA and RV. IVC: Inferior vena cava; RA: Right atrium; RV: Right ventricle



Figure 2: CT Pulmonary Angiography (Post Surgery)

other differential diagnoses.^[2] The 2019 consensus European Society of Cardiology (ESC) guidelines strongly recommend intravenous UFH as a treatment of choice in haemodynamically unstable APE.^[3] Catheter-directed therapy (CDT) had been done for APE.^[4] CDT is recommended by the American College of Chest Physicians as second-line therapy for massive pulmonary embolism.^[5]

Our case is a classic example of APE in head and neck malignancy. The involvement of a multidisciplinary team can also help in preparedness for emergent and unanticipated situations.^[6] We emphasise that vigilant monitoring of EtCO₂, timely use of TTE and systemic anticoagulation with adequate intraoperative haemodynamic resuscitation can lead to safe completion of surgery with minimal morbidity and mortality. Though UFH is not a recommended modality in the intra-operative period, due to the limitations of our set-up, CDT was beyond our purview.

Acknowledgement

Special thanks and gratitude to Dr. Lalita Gouri Mitra, for her able guidance and support in completing this project.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

**Jagdeep Sharma, Harsimran Singh Walia,
Sofia Jaswal, Atin Goyal**

Department of Anaesthesia, Critical Care and Pain, HBCH Sangrur (A
Unit of Tata Memorial Hospital, Mumbai), Punjab, India

Address for correspondence:

Dr. Jagdeep Sharma,
House No. 689/FF, Sector 40-A, Chandigarh - 160 036, India.
E-mail: snehlatas222@gmail.com

Submitted: 01-Jun-2021

Revised: 10-Jan-2022

Accepted: 02-Mar-2022

Published: 25-Mar-2022

REFERENCES

1. Mao Y, Wen S, Chen G, Zhang W, Ai Y, Yuan J. Management of intra-operative acute pulmonary embolism during general anesthesia: A case report. *BMC Anesthesiol* 2017; 17:67.
2. Elouardi Y, Zarrouki Y, Darouich H, Khallouki M. Fatal venous air embolism during lumbar spondylolisthesis surgery. *Indian J Anaesth* 2021;65:171-3.
3. Konstantinides SV, Meyer G, Becattini C, Bueno H, Geersing GJ, Harjola VP, *et al.* 2019 guidelines for diagnosis and management of acute pulmonary embolism developed in collaboration with the European Respiratory Society (ERS). *Eur Heart J* 2020;41:543-603.
4. Hemlata K, Shreyash K. Protection from pulmonary thromboembolism during general anaesthesia in a patient with Protein S deficiency. *Indian J Anaesth* 2021;65:267-8.
5. Kearon C, Akl E, Ornias J, Blaivas A, Jimenez D, Bounameaux H, *et al.* Anti thrombotic therapy for VTE disease. *Chest* 2016;149:315-52.
6. Bajwa SS, Mehdiratta L. Preparedness for emergencies and complications. *Indian J Anaesth* 2020;64:366-8.

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: www.ijaweb.org
	DOI: 10.4103/ija.ija_484_21

How to cite this article: Sharma J, Walia HS, Jaswal S, Goyal A. Diagnosis and management of intra-operative pulmonary embolism under general anaesthesia in a peripheral tertiary care centre with limited resources. *Indian J Anaesth* 2022;66:S131-2.

© 2022 Indian Journal of Anaesthesia | Published by Wolters Kluwer - Medknow