

CASE REPORT

Threading the Needle between Clots and Grafts: Anaesthetic Challenges for Urgent Diversion Colostomy in a Post-CABG Patient with Acute Pulmonary Embolism

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ABSTRACT

Anaesthetic management of patients with history of coronary artery bypass grafting (CABG) and acute pulmonary embolism (PE) presents a significant challenge to the Anaesthesiologist.

This report discusses the perioperative challenges in the management of a patient with a complex medical history who required urgent diversion colostomy for subacute intestinal obstruction. The patient was a case of carcinoma rectum with a history of systemic hypertension, diabetes mellitus, dyslipidaemia, chronic deep vein thrombosis (DVT), ischaemic heart disease (IHD) post- CABG and most notably, with added acute PE in the preoperative period. The anaesthetic management was focused on minimizing perioperative risks while managing the patient's critical conditions. A multidisciplinary approach was employed for the optimisation of the cardiorespiratory function, placement of an Inferior vena cava (IVC) filter to prevent further embolic events, anticoagulation therapy, and close monitoring of coagulation parameters. The report reviews the relevant literature and discusses strategies for managing such high-risk patients.

KEYWORDS

• Diversion colostomy • CABG • Pulmonary embolism • IVC filter

INTRODUCTION

Subacute intestinal obstruction secondary to colorectal malignancy is a common clinical condition that may require urgent surgical intervention, often necessitating the creation of a diversion colostomy. For patients with

complex comorbidities, such as those with hypertension, diabetes, dyslipidaemia, chronic DVT, and a history of CABG and chemotherapy, anaesthetic management can be challenging. This becomes even more complicated when the patient develops

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an acute PE in the preoperative period, which significantly impacts the anaesthetic approach and perioperative care. The combination of these conditions necessitates careful preoperative optimisation, vigilant intraoperative monitoring, and post-operative care to prevent complications.

CASE REPORT

A 67-year-old male, known case of carcinoma rectum post-chemotherapy, with a past medical history of systemic hypertension, Type 2 diabetes mellitus, dyslipidaemia, chronic deep vein thrombosis (DVT),

ischaemic heart disease post-CABG, presented with subacute intestinal obstruction turning to acute obstruction. Considering the emergency nature of presentation, he was posted for a palliative diversion colostomy. The preoperative work up revealed normal blood investigations, moderate MR and TR with diastolic dysfunction on echocardiogram. Lower limb venous Doppler revealed evidence of established Deep vein thrombosis on the left side with developing thrombus in right side calf veins. However, just prior to surgery, the patient developed acute PE, evidenced by an elevated D-dimer value, ECG (*Figure 1*) showing S1Q3T3 and T-inversions V1-V6.

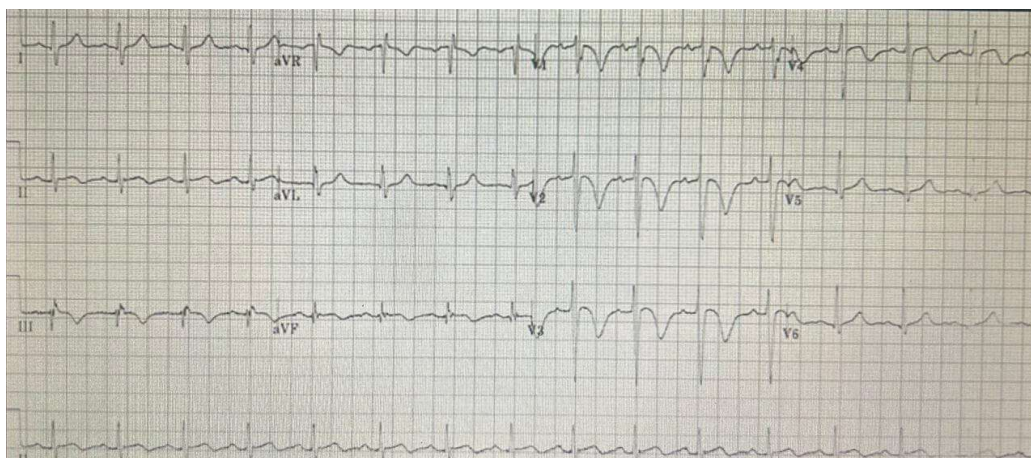


Figure 1: ECG showing S1Q3T3 and T-inversions V1-V6

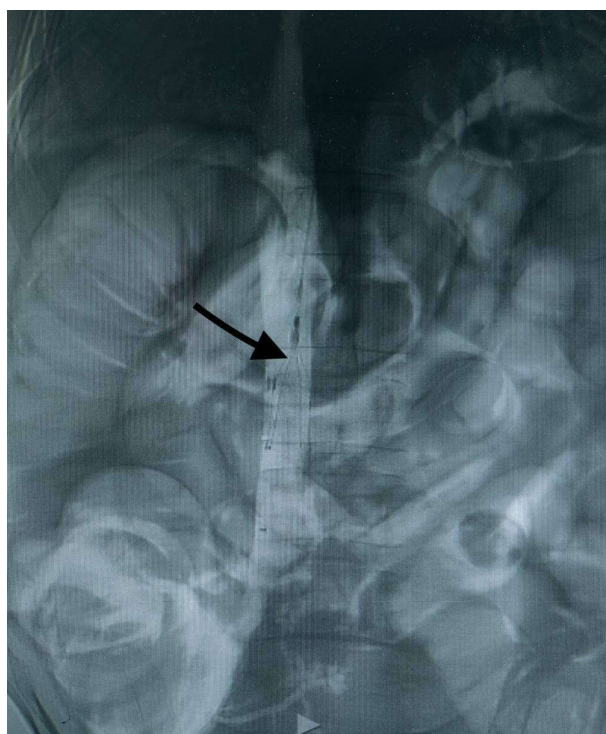


Figure 2:

The diagnosis was confirmed with a CT pulmonary angiogram showing thrombus in the right main pulmonary artery extending into the right upper lobe and lower lobe segmental arteries. Anticoagulation could not be possible in the setting of an emergency surgical intervention. So the entire team decided to place a retrievable IVC filter (*Figure 2*) to prevent further embolic events and proceed with surgery.

Anaesthesia Technique

The patient was taken to the Interventional Radiology suite prior to surgery. All the standard ASA monitors attached, and an arterial cannula was secured under local anaesthesia. A suprarenal IVC filter was placed under monitored anaesthesia care with local anaesthetic infiltration at puncture site. Right IJV was cannulated with 7Fr triple lumen CVC under USG guidance. After an uneventful procedure, the patient was shifted to operation theatre and connected to monitors. General anaesthesia with controlled ventilation was

chosen. Anaesthesia was induced using modified Rapid Sequence Induction and Intubation with Inj.Etomidate 0.2mg/kg, Inj. Fentanyl 2mcg/kg and Inj.Succinyl choline 1mg/kg. After induction of anaesthesia, USG-guided bilateral transversus abdominis plane (TAP) block was given. Anaesthesia was maintained with Air/Oxygen/Isoflurane, Cisatracurium boluses and PCV mode of ventilation, taking care to avoid factors which may increase the pulmonary vascular resistance. Given the patient's acute pulmonary embolism, a low tidal volume strategy was used to avoid volutrauma. Positive end-expiratory pressure (PEEP) was maintained at 5cm H₂O. Normothermia was maintained throughout the procedure. The patient required careful titration of fluids, with the use of vasopressors (phenylephrine boluses) to maintain mean arterial pressure within acceptable limits. Serial ABG monitoring was done intraoperatively and ventilatory parameters adjusted accordingly. Hourly monitoring of blood sugar values was done and kept within 180mg/dL. At the end of the procedure, anaesthesia was discontinued, neuromuscular blockade was reversed and the patient was extubated, shifted to ICU for postoperative monitoring due to the high risk of further embolic events and respiratory compromise. Therapeutic anticoagulation was started 6 hours after surgery with continuous monitoring of coagulation profile. Postoperative analgesia was managed with patient-controlled analgesia (PCA) with opioids, alongside adjuncts like paracetamol and regional blocks if applicable. The patient had an uneventful postoperative recovery with no further embolic events occurred during the hospital stay. He was discharged home on 6th postop day with close follow-up.

DISCUSSION

Patients with inoperable colorectal malignancy can often present with acute intestinal obstruction necessitating emergency colostomy, posing significant anaesthetic challenges. Several key factors influenced anaesthetic decision-making in this case, including the presence complex medical history of systemic hypertension, diabetes mellitus, dyslipidaemia, chronic DVT, ischaemic heart disease post-CABG status and, most notably added acute PE in the preoperative period.

In pulmonary veins, thrombotic plaques are caused by a triad of Virchow's: endothelial damage, venous stasis, and blood coagulation. The risk factors involved are malignancy, obesity, extended immobilization, surgery, trauma, pregnancy, oral contraceptives, genetic factors, medical conditions, stroke, congestive heart failure, and hypercoagulable states.^[1] Patients with malignancies are seven times more likely to experience thrombosis overall than non-cancer individuals. Anticancer medication itself may cause thrombosis directly.² When the pulmonary artery lumen is blocked, the pulmonary vascular resistance (PVR) increases, alveolar dead space increases, and pulmonary blood flow is redistributed, which impairs gas exchange.³ The ventricular wall experiences increased stress as right ventricular pressure rises, which causes dilatation, dysfunction, and impaired perfusion.⁴ As per arterial blood gas analysis, these patients will have hypoxia and acidosis. These patients are particularly susceptible to any decrease in SVR and myocardial depression, which may be brought on by anaesthetic drugs, because of their extremely high PVR and right ventricular dysfunction, which results in a fixed cardiac output state.⁵ The treatment modalities for acute pulmonary thromboembolism include anticoagulant therapy, early initiation of thrombolysis, IVC filters and surgical embolectomy. Vasodilator administration improves myocardial function and coronary perfusion while lowering afterload, which effectively manages pulmonary thromboembolism.⁶ Patients who encounter complications with anticoagulant therapy or who are contraindicated for it are candidates for an IVC filter. However, 1-2 years following IVC filter implantation, there is a higher risk of recurrent DVT.⁷ This issue can be mitigated by using a retrievable IVC filter. It is important to resume long-term treatment as soon as feasible with anticoagulants, direct thrombin, or anti-Xa inhibitors. According to current treatment guidelines, the individuals who have acute proximal deep vein thrombosis and are contraindicated for anticoagulation, should have IVC filters installed.⁸

In our case scenario, even though the patient developed acute pulmonary embolism in the preoperative period, anticoagulation therapy could not be initiated in the setting of an urgent surgical intervention. Hence, we decided to proceed with the insertion of a retrievable

suprarenal IVC filter to prevent further dislodgement of thrombi and thereafter take up for the emergency surgical procedure.

Additionally, more and more patients with IHD - with or without interventions are seeking non-cardiac surgical procedures. During the peri-operative phase, these patients are more susceptible to cardiac ischemia, myocardial infarction, conduction abnormalities, morbidity, and death. It is important to address factors that influence the myocardial oxygen supply-demand ratio in such scenario.⁹ Multiple factors affect peri-operative cardiac morbidity which includes smoking, age, lifestyle, obesity, renal impairment, recent myocardial infarction, congestive heart failure, dysrhythmias, diabetes mellitus, peripheral vascular disease, angina pectoris, hypertension and hypercholesterolemia.¹⁰ Our patient was a known case of IHD for which he had undergone CABG 4 years back. Hence, maintaining perioperative hemodynamic stability with adequate coronary perfusion pressure was critical in this case. The need for inotropic support can arise at any point in the perioperative period due to the presence of RV dysfunction in these kind of patients. We used phenylephrine boluses to tackle the haemodynamic changes during intraoperative period.

The goals of anaesthetic management in such a case like ours should be: (i) cautious titration of anaesthetic agents to preserve myocardial function,¹¹ (ii) maintaining normovolaemia; (iii) preventing an overdose of drugs during induction due to the slow circulation time; (iv) avoidance of an increase in ventricular afterload and (v) preventing sudden hypotension (vi) preventing tachycardia; (vii) judicious fluid therapy; and (viii) preventing an increase in pulmonary vascular resistance by avoiding hypoxia, hypercarbia, hypothermia, acidosis, and nitrous oxide.¹²

CONCLUSION

Anaesthetic management for a patient with a complex medical history and added acute pulmonary embolism undergoing an emergency diversion colostomy for acute intestinal obstruction is a great challenge to the anaesthesiologist. We employed a tailored, multidisciplinary approach that included careful preoperative assessment, placement

of an IVC filter, meticulous intraoperative monitoring, and postoperative care is to achieving a successful outcome. This case underscores the importance of individualising anaesthetic strategies based on the patient's underlying conditions and current health status.

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