

Case Report

Intra-operative cardiac monitoring by trans-oesophageal doppler is not risk free in surgical patients

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Abstract

The advancement of medical technology and future improvements in public health will lead to surgeons operating on high risk patients. One of these advances is to use intra-operative trans-oesophageal Doppler (TOD) to optimise fluid management. TOD is known to be the most effective technique for intra-operative cardiac monitoring. We report a case of a potentially life threatening complication from intra-operative TOD monitoring.

Introduction

Trans-oesophageal Doppler (TOD) is one way of monitoring the heart intraoperatively. It consists of a probe with an ultrasound transducer at its tip and is passed into the patient's oesophagus to monitor cardiac output. The advantage of TOD is that it gives clearer images compared with trans-thoracic monitoring as a result of reduced attenuation of the ultrasound signal but has comparable results to more invasive monitoring with thermodilution techniques. TOD is being used more frequently for intra-operative cardiac monitoring in all disciplines of surgery. Whilst TOD is relatively safe, performing the procedure may be riskier in an anaesthetised patient and combined with the length of time the probe remains within the oesophagus, thermal and pressure injuries to the wall may result.¹

Major general surgery inflicts a massive insult onto the human body; a perioperative cardiac event thus leads to increased morbidity and mortality particularly in those with other co-morbidities. Intraoperative cardiac monitoring using TOD offers the advantage of being able to detect early signs of myocardial damage, which precede ECG changes such as ventricular wall motion abnormalities.³ Earlier intervention may then lead to improved outcomes. TOD is recommended in patients with a high risk of myocardial infarction undergoing any type of surgery. Other ways of monitoring cardiac function include thermo dilution and the use of multiplane TOD. TOD however allows more intensive monitoring, which may not be achieved by the thermo dilution technique.²

We present a case of oesophageal bleeding secondary to TOD insertion in a patient who had a laparoscopic right hemicolectomy for a caecal carcinoma, to highlight that intraoperative cardiac monitoring is not risk free.

Case Report

A 99 year old female nursing home resident presented with complaints of abdominal discomfort, bloating and vomiting. Her bowels had been opening quite regularly with no recent change in bowel habit or of any blood from the back passage. She had a history of long standing iron deficiency anaemia for which she took iron tablets and had an appendicectomy when she was 52 years old. On abdominal examination there was a hard, irregular and tender 5cm by 5 cm mass in the right iliac fossa. The mass was neither pulsatile, fluctuant nor tethered to overlying skin. A full blood count showed an Hb of 10.7 g/dL and a White Cell Count (WCC) of 18.5 /L. A subsequent ultrasound scan demonstrated a caecal lesion extending into the ascending colon. In view of the clinical findings and results of the investigations she underwent an uneventful laparoscopically assisted right hemicolectomy. TOD was used for intraoperative cardiac monitoring. In the recovery room she developed haemetemesis. Her Hb dropped to 7.1 and she required 3 units of whole blood. An emergency oesophagoduodenogastroscopy revealed an

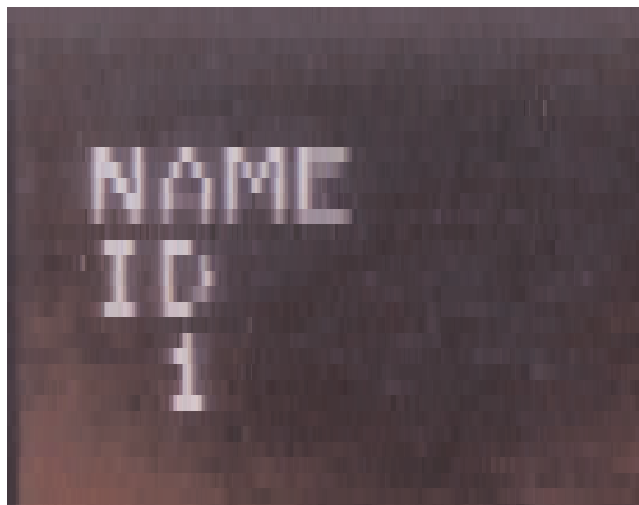


Figure: Gastroscopic findings.

oesophageal mucosal tear with a large haematoma extending from the mid-oesophagus to the stomach cardia and fundus (Figure).

She was treated conservatively with blood transfusions and close postoperative monitoring. She did not have any further haemetemesis and her post operative Hb remained corrected subsequently discharged home in a stable condition.

Discussion

Elderly patients with several different comorbidities often undergo major abdominal surgery. Appropriate perioperative care and fluid balance is therefore essential. During major surgery particularly in an acute setting hypovolaemia is of particular concern. In combination with insensible and occult volume losses it is thought that impaired tissue perfusion and hence reduced oxygen delivery occurs.

Homeostatic processes mean that normally this hypovolaemia is not usually detected by standard heart rate and blood pressure monitoring.⁴ Goal directed fluid therapy is a technique used to maximize stroke volume to enhance postoperative outcomes by increasing oxygen delivery.⁵

Invasive monitoring involving right sided heart catheterization and thermodilution,⁶ to achieve optimal stroke volumes is associated with a higher morbidity than oesophageal Doppler techniques and correlates well with the traditional techniques.⁷ It follows that Doppler probes may be used to implement goal directed fluid therapy to ensure adequate perfusion, oxygen delivery and reduce inflammatory responses as well as minimizing the risk of pulmonary oedema.⁸

With increased medical technological advancements and operations performed on higher risk patients, TOD is an ample method of intraoperative cardiac monitoring to optimise fluid management. With the use of enhanced recovery programmes in colorectal surgery more patients will require this type of monitoring to ensure goal-directed fluid therapy is achieved.

It is important for general surgeons to be aware of the potential complications and requirements for any remedial action in the form of fluids and blood transfusions. Other potential complications highlighted in the literature include oesophagotracheal perforation,⁹ oesophageal tears, hypoxia/laryngospasm, supraventricular tachycardia, hypotension, hypertension, dysphagia. We report this case

to highlight to general surgeons a potential complication of TOD, and the need to ensure that patients who are at high risk are monitored more closely in the perioperative period for complications. One solution to minimize potential complications such as the one mentioned in the case report would be to use a miniaturized Doppler probe, which also has the added advantage of cardiac monitoring during the induction of anaesthesia.

This patient also had a nasogastric tube inserted however in view of the larger size of the Doppler probe, its increased stiffness and known potential for overheating¹⁰ we believe the haemetemesis was related to the TOD.

Although damage to oesophageal mucosa is a recognised complication in intraoperative Doppler monitoring in cardiothoracic surgery, this case has been reported in a patient undergoing colorectal surgery. We believe this is the first reported case of oesophageal trauma following colorectal surgery for cancer.

Conclusion

The use of TOD is important in patients with cardiac disease but it is not a risk free procedure. General surgeons should be aware of this and anaesthetists should consider a miniaturized Doppler probe to help minimize these risks.

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