

IASR J. Med. Pharm. Sci.
ISSN: 2582-9343
Website: https://ijmps.com/
Open Access Journal
Country: India

IASR Journal of
Medical and Pharmaceutical
Science

ORIGINAL ARTICLE OPEN ACCESS

Perioperative Anaesthetic Management of Hybrid McKeown Oesophagectomy Following Neoadjuvant Therapy: A Case Report

Khadeeja Bind Salam[1], Sajil M S[1]
[1]PG Student, Department of Anaesthesiology, Travancore Medical College, Kollam, Kerala, India
[2]Associate professor, Department of Anaesthesiology, Travancore Medical College, Kollam, Kerala, India

OPEN ACCESS

Corresponding Author
Khadeeja Bind Salam
PG Student, Department of Anaesthesiology, Travancore Medical College, Kollam, Kerala, India

Received: 04 Oct 2026
Accepted: 20 Oct 2026
Published: 18 Nov 2026

©Copyright: IJMPS Journal

ABSTRACT

Background: McKeown oesophagectomy is a complex thoracoabdominal procedure associated with substantial cardiopulmonary and haemodynamic stress. Goal-directed haemodynamic therapy (GDHT) facilitates individualised fluid and vasopressor management, aiming to maintain adequate systemic perfusion while avoiding unnecessary fluid loading. Continuous cardiac output monitoring can support this approach when integrated into an Enhanced Recovery After Surgery (ERAS) pathway.

Case Presentation: Written informed consent was obtained for publication. A 56-year-old man, classified as American Society of Anesthesiologists (ASA) physical status II, with moderately differentiated gastro-oesophageal junction adenocarcinoma (cT3N1M0), underwent hybrid McKeown oesophagectomy following neoadjuvant therapy. Preoperative haemoglobin was 8.8 g/dL. Echocardiography demonstrated concentric left ventricular hypertrophy, preserved systolic function, grade II diastolic dysfunction, mild mitral regurgitation and mild pulmonary arterial hypertension. General anaesthesia was administered using sevoflurane, remifentanil and rocuronium. A double-lumen endotracheal tube facilitated one-lung ventilation. Thoracic epidural analgesia and bispectral index monitoring were employed. Radial arterial, right internal jugular central venous and Acumen IQ continuous cardiac output monitoring were used to guide haemodynamic management. Cardiac index ranged from 2.5–4.1 L/min/m² and stroke volume from 72–129 mL/beat. Following a fluid challenge, stroke volume increased from 77 to 100 mL/beat (29.9%). The patient received two units of packed red blood cells, three 100-mL aliquots of 20% albumin and titrated noradrenaline. No sustained arrhythmia or clinically significant haemodynamic instability was documented. Postoperative tachycardia improved following evaluation and treatment of reversible causes. Hoarseness associated with suspected recurrent laryngeal nerve dysfunction subsequently improved. Jejunostomy feeding commenced on postoperative day 1, followed by a soft oral diet on postoperative day 5.

Conclusion: This case illustrates the integration of continuous cardiac output monitoring with individualised GDHT during major oesophageal cancer surgery. Serial haemodynamic assessment and fluid-challenge response supported an intervention-based approach to fluid and vasopressor management within an ERAS-oriented onco-anaesthesia pathway.

Key Words: *Oesophagectomy; Goal-directed haemodynamic therapy; Fluid therapy; Continuous cardiac output monitoring; Enhanced Recovery After Surgery*.

INTRODUCTION

Oesophagectomy is a major thoracoabdominal surgical procedure associated with considerable perioperative physiological stress. Hybrid McKeown oesophagectomy involves abdominal, thoracic and cervical surgical components, often requiring one-lung ventilation and extensive surgical dissection. Changes in intrathoracic pressure, surgical manipulation, blood loss, fluid shifts and anaesthetic interventions may contribute to significant haemodynamic variation.

Fluid management during oesophagectomy is particularly challenging. Inadequate circulating volume and perfusion pressure may compromise systemic organ perfusion, whereas excessive fluid administration may contribute to interstitial and pulmonary oedema. The objective is therefore to maintain adequate perfusion while avoiding unnecessary fluid loading.

Goal-directed haemodynamic therapy (GDHT) uses haemodynamic variables to guide individualised fluid and vasoactive therapy. Continuous cardiac output monitoring provides serial information regarding cardiac index (CI), stroke volume (SV), stroke volume variation (SVV) and systemic vascular resistance (SVR). When interpreted alongside clinical findings and the surgical phase, these variables can support assessment of haemodynamic changes and responses to therapeutic interventions.

Randomised controlled trials have evaluated GDHT in patients undergoing transthoracic and McKeown oesophagectomy, highlighting its relevance to perioperative fluid management in this surgical population.[1,2] Enhanced Recovery After Surgery (ERAS) recommendations also emphasise appropriate perioperative fluid management as part of a comprehensive recovery pathway.[3]

This case describes the perioperative anaesthetic management of a patient undergoing hybrid McKeown oesophagectomy following neoadjuvant therapy, with particular emphasis on the integration of Acumen IQ-guided continuous cardiac output monitoring into an individualised GDHT strategy and ERAS-oriented onco-anaesthesia care.

CASE PRESENTATION

Patient Information

A 56-year-old man, classified as ASA physical status II, diagnosed with moderately differentiated gastro-oesophageal junction adenocarcinoma (cT3N1M0), was scheduled for hybrid McKeown oesophagectomy following neoadjuvant therapy.

His preoperative haemoglobin was 8.8 g/dL. Echocardiographic evaluation revealed concentric left ventricular hypertrophy, preserved left ventricular systolic function, grade II diastolic dysfunction, mild mitral regurgitation and mild pulmonary arterial hypertension.

Preoperative Assessment

The preoperative anaesthetic assessment focused on cardiovascular reserve, pulmonary status, nutritional status and the potential perioperative implications of neoadjuvant treatment.

The echocardiographic findings of grade II diastolic dysfunction and mild pulmonary arterial hypertension. Preoperative anaemia, with a haemoglobin concentration of 8.8 g/dL, was also noted.

Baseline vitals, respiratory examination, airway assessment, electrocardiogram, renal and hepatic function, serum electrolytes, coagulation profile and pulmonary function assessment were normal

Anaesthetic Management

After appropriate preparation and informed consent, the patient was shifted to the operating theatre. Standard ASA monitoring was established. General anaesthesia was administered using sevoflurane, remifentanil and rocuronium. A double-lumen endotracheal tube was inserted to facilitate one-lung ventilation during the thoracic phase of surgery.

Thoracic epidural analgesia was incorporated into the perioperative analgesic strategy. Bispectral index monitoring was used to assess the depth of anaesthesia.

Invasive haemodynamic monitoring included a radial arterial catheter and a right internal jugular central venous catheter. Continuous cardiac output monitoring was established using the Acumen IQ system.

Goal-Directed Haemodynamic Therapy

GDHT constituted the central component of the intraoperative haemodynamic strategy. Serial haemodynamic variables, including cardiac index, stroke volume, stroke volume variation and systemic vascular resistance, were considered alongside mean arterial pressure, heart rate, central venous pressure, operative events and clinical perfusion assessment.

The observed cardiac index ranged from 2.5 to 4.1 L/min/m², while stroke volume ranged from 72 to 129 mL/beat. Stroke volume variation varied between 4% and 15% during the procedure. Mean arterial pressure ranged from 63 to 97 mmHg, and central venous pressure ranged from 8 to 16 mmHg.

A fluid challenge was administered following haemodynamic assessment. Stroke volume increased from 77 to 100 mL/beat, corresponding to a 29.9% increase from baseline. This response was incorporated into the ongoing assessment of fluid responsiveness and haemodynamic management.

Fluid administration and noradrenaline infusion were individualised according to the haemodynamic profile and clinical requirements. The patient received three 100-mL aliquots of 20% albumin and two units of packed red blood cells intraoperatively. Noradrenaline was titrated according to perfusion pressure and haemodynamic assessment.

Table 1. Intraoperative haemodynamic profile and response to fluid challenge

Parameter	Observed value
Cardiac index	2.5–4.1 L/min/m²
Stroke volume	72–129 mL/beat
Mean arterial pressure	63–97 mmHg
Heart rate	55–80 beats/min
Central venous pressure	8–16 mmHg
Stroke volume variation	4–15%
Stroke volume before fluid challenge	77 mL/beat
Stroke volume after fluid challenge	100 mL/beat
Absolute increase in stroke volume	23 mL/beat
Percentage increase in stroke volume	29.9%

CI: cardiac index; SV: stroke volume; SVV: stroke volume variation; MAP: mean arterial pressure; CVP: central venous pressure.

Ventilatory and Analgesic Strategy

One-lung ventilation was facilitated using a double-lumen endotracheal tube during the thoracic phase. Lung-protective ventilation was employed. Thoracic epidural analgesia formed part of the multimodal analgesic strategy.

Postoperative Management and Outcome

Following completion of surgery, the patient was successfully extubated in the operating theatre and transferred for postoperative monitoring. He remained under observation in the post-anaesthesia care unit for 48 hours.

Postoperative tachycardia was evaluated for reversible causes and improved following treatment. Hoarseness was noted, with suspected recurrent laryngeal nerve dysfunction; the symptom subsequently improved.

Jejunostomy feeding was initiated on postoperative day 1, and a soft oral diet was commenced on postoperative day 5.

DISCUSSION

Haemodynamic Challenges in Oesophagectomy

Oesophagectomy presents considerable challenges for perioperative haemodynamic management because of extensive surgical dissection and the transition between abdominal and thoracic phases. One-lung ventilation and changes in intrathoracic pressure can influence venous return and right ventricular loading. Surgical manipulation, blood loss and anaesthetic drugs may further alter preload, afterload and cardiac output.

This patient had pre-existing grade II diastolic dysfunction and mild pulmonary arterial hypertension. These findings were relevant to haemodynamic management because significant changes in preload, afterload and pulmonary vascular resistance may be poorly tolerated in susceptible patients. Accordingly, haemodynamic assessment required consideration of both forward flow and perfusion pressure rather than reliance on a single pressure measurement.

Preoperative anaemia, with a haemoglobin concentration of 8.8 g/dL, was another important consideration during major thoracoabdominal surgery. The intraoperative administration of two units of packed red blood cells should be interpreted in relation to the documented blood loss, haemoglobin trend and clinical indication.

Role of Goal-Directed Haemodynamic Therapy
GDHT provides a structured approach to fluid and vasopressor management by relating haemodynamic measurements to therapeutic interventions. In this case, continuous monitoring enabled serial assessment of cardiac index, stroke volume and stroke volume variation during surgery, while arterial pressure and other clinical parameters were used to guide vasoactive support.

An important observation was the increase in stroke volume from 77 to 100 mL/beat following a fluid challenge, representing a 29.9% increase from baseline. This documented haemodynamic response provides a practical illustration of an intervention-response approach to GDHT.

However, fluid responsiveness should not be equated with an obligatory requirement for fluid administration. A fluid bolus should be considered in the context of the patient's perfusion, clinical condition and anticipated risks of additional volume. Similarly, hypotension associated predominantly with reduced vascular tone may require vasopressor therapy rather than repeated fluid administration.

Role of Continuous Cardiac Output Monitoring
Continuous cardiac output monitoring using the Acumen IQ system provided serial haemodynamic information that was incorporated into clinical decision-making. Cardiac index and stroke volume were used to follow changes in forward flow, while stroke volume variation was considered as a dynamic indicator of preload responsiveness under appropriate measurement conditions.

The observed SVV range of 4–15% should be interpreted in relation to ventilation conditions and the surgical phase. Its reliability may be influenced by arrhythmias, spontaneous respiratory effort, tidal volume, chest compliance, respiratory mechanics and changes in intrathoracic pressure during one-lung ventilation.

Central venous pressure was monitored as an additional haemodynamic variable but should not be interpreted in isolation as a measure of circulating blood volume or fluid responsiveness. Similarly, SVR, when available, can assist in interpreting changes in vascular tone and the potential contribution of vasodilatation to hypotension.

The clinical relevance of continuous monitoring lies in its integration with clinical assessment and the response to treatment. The monitoring system does not replace clinical judgement; rather, it provides additional information to support individualised therapeutic decisions.

Evidence Supporting GDHT in Oesophagectomy
Mukai et al. conducted a multicentre randomised controlled trial evaluating intraoperative GDHT in patients undergoing transthoracic oesophagectomy. Their study investigated the effect of GDHT on major postoperative morbidity and mortality.[1]

Yang et al. evaluated staged GDHT in patients undergoing McKeown oesophagectomy. Their randomised controlled trial examined the impact of staged haemodynamic management on postoperative pulmonary complications.[2]

These studies provide a clinical rationale for incorporating GDHT into perioperative management during oesophagectomy. The present case describes its practical application using Acumen IQ-guided continuous cardiac output monitoring, with particular emphasis on serial haemodynamic assessment and the documented response to a fluid challenge.

The findings of a single case cannot establish that the monitoring system or GDHT independently reduced postoperative complications. However, the case illustrates how continuous haemodynamic information can be incorporated into a structured perioperative decision-making process.

Integration with ERAS
The perioperative management of patients undergoing major cancer surgery extends beyond intraoperative haemodynamic optimisation. It requires coordination of analgesia, ventilation, fluid management, early extubation, nutritional support and postoperative rehabilitation.

ERAS recommendations for oesophagectomy emphasise multimodal perioperative care, including appropriate fluid management and early postoperative recovery strategies.[3]

In this patient, thoracic epidural analgesia, lung-protective ventilation, individualised fluid and vasopressor therapy, early extubation and early nutritional support formed components of an ERAS-oriented approach.

The initiation of jejunostomy feeding on postoperative day 1 and progression to a soft oral diet on postoperative day 5 represent relevant postoperative recovery milestones. However, the contribution of any individual component of the perioperative strategy to these outcomes cannot be determined from a single case.

Onco-Anaesthesia Considerations

The perioperative management of patients undergoing major cancer surgery requires consideration of the physiological effects of malignancy, nutritional depletion, previous systemic therapy and the magnitude of the planned procedure.

Neoadjuvant treatment warrants assessment for potential treatment-related adverse effects and organ dysfunction. In this patient, preoperative anaemia and cardiovascular findings were important considerations during anaesthetic planning.

The onco-anaesthesia approach therefore involved integrating cardiovascular assessment, haemodynamic optimisation, analgesia, lung-protective ventilation, early extubation and postoperative nutritional support into a coordinated perioperative strategy.

LIMITATIONS

This report describes the perioperative management of a single patient and cannot establish the superiority of Acumen IQ monitoring or GDHT over conventional haemodynamic management. The observed postoperative course cannot be attributed solely to the monitoring system or fluid-management strategy.

The interpretation of dynamic haemodynamic variables, particularly SVV, is dependent on ventilation conditions, cardiac rhythm and surgical phase. A more detailed intervention-response record, including serial SVR, cardiac index and noradrenaline requirements, would strengthen the interpretation of the GDHT strategy.

CONCLUSION

This case illustrates the integration of continuous cardiac output monitoring with individualised goal-directed haemodynamic therapy during hybrid McKeown oesophagectomy following neoadjuvant therapy. Serial haemodynamic assessment and a documented stroke volume response to fluid challenge supported an intervention-based approach to fluid and vasopressor management within an ERAS-oriented onco-anaesthesia pathway.

The emphasis is on the clinical interpretation of haemodynamic trends and their relationship to therapeutic interventions rather than on the monitoring technology as an isolated innovation.

PATIENT CONSENT

Written informed consent was obtained from the patient for publication of the clinical details.

CONFLICT OF INTEREST

The authors declare no conflict of interest

FUNDING

No external funding was received for the preparation of this manuscript.

AUTHOR CONTRIBUTIONS

Khadeeja Bind Salam: Conceptualisation, clinical data collection, literature review and manuscript preparation.
Sajil M S: Clinical supervision, critical revision of the manuscript and final approval.

REFERENCES

1. Mukai A, Suehiro K, Watanabe R, Juri T, Hayashi Y, Tanaka K, et al. Impact of intraoperative goal-directed fluid therapy on major morbidity and mortality after transthoracic oesophagectomy: a multicentre, randomised controlled trial. Br J Anaesth. 2020;125(6):953-61. doi:10.1016/j.bja.2020.08.060.
2. Yang C, Shi Y, Zhang M, Yang Y, Xie Y. Impact of staged goal-directed fluid therapy on postoperative pulmonary complications in patients undergoing McKeown esophagectomy: a randomized controlled trial. BMC Anesthesiol. 2024;24:330. doi:10.1186/s12871-024-02719-y.
3. Low DE, Allum W, De Manzoni G, Ferri L, Immanuel A, Kuppusamy MK, et al. Guidelines for perioperative care in oesophagectomy: Enhanced Recovery After Surgery (ERAS®) Society recommendations. World J Surg. 2019;43(2):299-330. doi:10.1007/s00268-018-4786-4.
4. Gagnier JJ, Kienle G, Altman DG, Moher D, Sox H, Riley D; CARE Group. The CARE guidelines: consensus-based clinical case reporting guideline development. J Clin Epidemiol. 2014;67(1):46-51. doi:10.1016/j.jclinepi.2013.08.003.