Case Report

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Perioperative Anaesthetic Challenges in a Patient with a Giant Gastrointestinal Stromal Tumour: A Case Report

Anaesthesia Section

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ABSTRACT

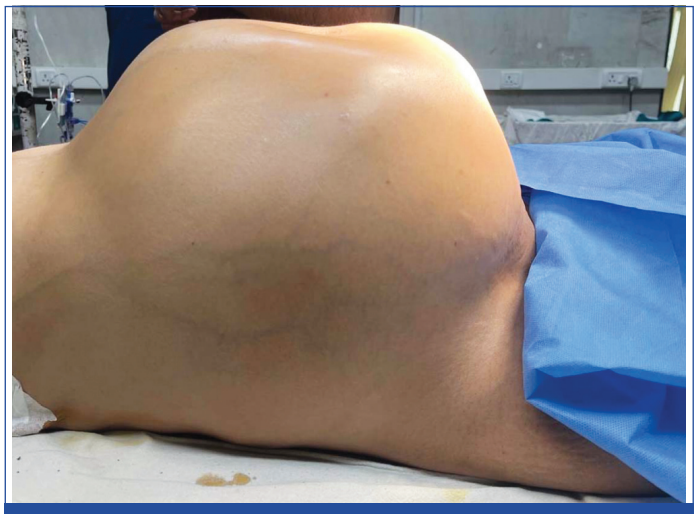
Gastrointestinal Stromal Tumours (GISTs) are the most common mesenchymal tumours of the gastrointestinal tract. Giant GISTs weighing more than 10 kg are exceedingly rare. Such tumours pose formidable anaesthetic challenges owing to marked mass effect, raised intra-abdominal pressure, impaired respiratory mechanics, increased aspiration risk, and the potential for major haemodynamic instability and blood loss. Anaesthesia-focused reports on giant GISTs remain limited. We report the perioperative anaesthetic management of a 67-year-old female with a symptomatic giant intra-abdominal GIST weighing 10.6 kg. The patient presented with progressive abdominal distension and exertional dyspnoea secondary to diaphragmatic splinting. Anticipated challenges included difficult ventilation in the supine position, inferior vena cava compression, aspiration risk, and sudden circulatory changes following tumour decompression. A multidisciplinary plan was formulated. Anaesthesia was conducted using combined general anaesthesia and thoracic epidural analgesia. Modified rapid sequence induction was performed after aspiration prophylaxis. Invasive arterial and central venous monitoring, pressure-controlled ventilation, goal-directed fluid therapy, active temperature management, and preparedness for massive transfusion were employed. Gradual tumour manipulation was ensured to minimise decompression-related complications. Despite significant intraoperative blood loss, haemodynamic stability was maintained. The patient was extubated uneventfully and monitored postoperatively in the Intensive Care Unit (ICU). Recovery was uncomplicated, with marked improvement in respiratory symptoms at follow-up. This case highlights the importance of anticipating physiological derangements, individualising airway and ventilation strategies, and employing meticulous haemodynamic management to achieve favourable outcomes during resection of giant GISTs.

Keywords: Intra-abdominal pressure, Perioperative care, Respiratory mechanics

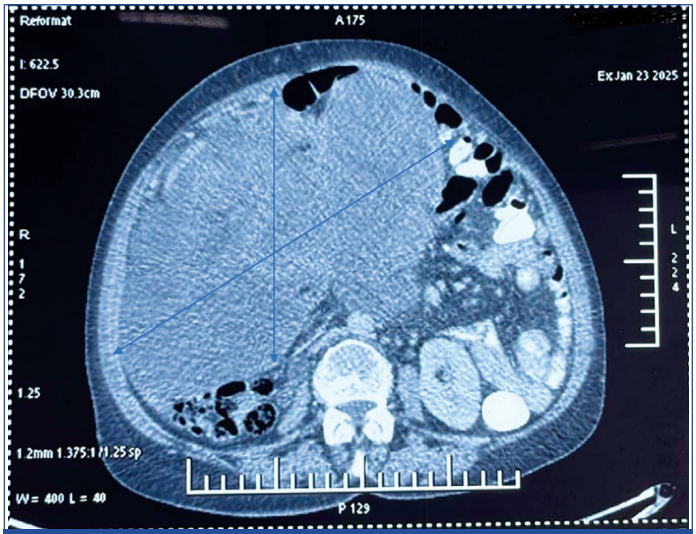
CASE REPORT

A 67-year-old female, weighing 40 kg, presented with progressive abdominal distension for eight months, early satiety, and dyspnoea on exertion (modified Medical Research Council grade II) [Table/Fig-1]. There was no history of hypertension, diabetes mellitus, coronary artery disease, chronic lung disease, or prior surgery. She was not receiving long-term medication. The patient was classified as American Society of Anaesthesiologists (ASA) physical status III.

Computed tomography revealed a large intra-abdominal mass measuring approximately 25×18×15 cm, compressing bowel loops and causing mild left hydronephrosis due to ureteric compression [Table/Fig-2]. Laboratory investigations showed mild anaemia (haemoglobin 10.5 g/dL) with otherwise normal biochemical parameters [Table/Fig-3]. The patient was unable to perform pulmonary function testing due to a poor understanding of commands.



[Table/Fig-1]: Clinical photograph showed marked abdominal distension due to a giant intra-abdominal tumour.



[Table/Fig-2]: Contrast-enhanced computed tomography of the abdomen demonstrated a large intra-abdominal mass with compression of adjacent bowel loops and the left ureter.

After obtaining informed written consent, the patient was scheduled for exploratory laparotomy and tumour excision under combined general anaesthesia and thoracic epidural analgesia. Standard ASA monitoring was instituted, and two wide-bore intravenous cannulae were secured. A thoracic epidural catheter was placed at the T10-T11 interspace using an 18-G Tuohy needle.

The patient was positioned semi-recumbent to optimise pre-oxygenation, as diaphragmatic splinting from the large mass

Test name	Result	Normal range
Haemoglobin (g/dL)	10.5	11.5-17.0
HCT*(%)	31.1	37.0-54.0
TLC**(cells/mm3)	7700	4000-10,000
Platelet count (109/L)	239	150-500
Urea (mg/dL)	24	17-43
Creatinine (mg/dL)	0.67	0.60-1.10
Sodium (mmol/L)	138	136-145
Potassium (mmol/L)	4.74	3.5-5.10
Calcium (mg/dL)	8.7	8.6-10.2
Magnesium (mg/dL)	2.20	1.60-2.60
Phosphorous (mg/dL)	3.9	2.5-4.5
Total Protein (g/dL)	6.8	6.4-8.3
Albumin (g/dL)	3.7	3.5-5.2
A/G*** Ratio	1.2	1.1-2.5
Total Bilirubin (mg/dL)	0.5	0.30-1.20
AST# (U/L)	14	0-31
ALT## (U/L)	6	0-34
ALP### (U/L)	88	42-98
Amylase (U/L)	39	28-100
CEA^ (ng/mL)	0.9	0-2.5
CA 19-9^^ (U/mL)	4.0	0-37
Alpha FP^^^ (ng/mL)	3.08	0-10
CA$ 125 (U/mL)	51	0-35

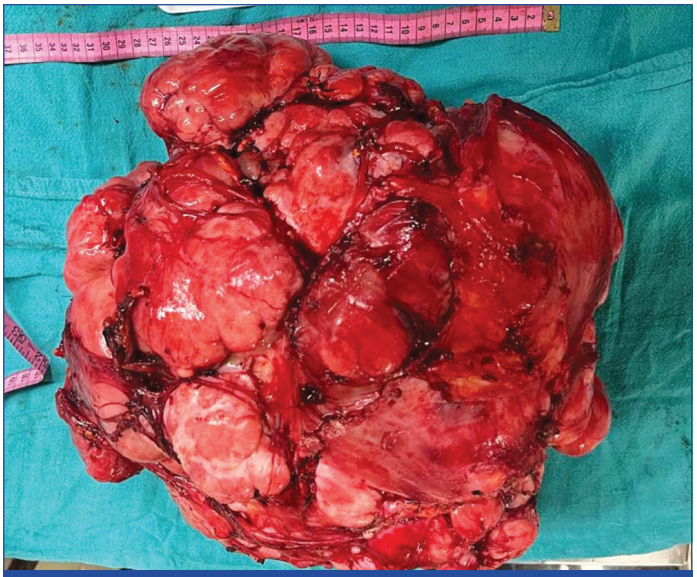
[Table/Fig-3]: Preoperative laboratory investigations showed mild anaemia with otherwise normal biochemical parameters.
*Haematocrit; **Total leucocyte counts; ***Albumin/Globulin; #Aspartate aminotransferase; ##Alanine aminotransferase; ###Alkaline phosphatase; ^Carcinoembryonic antigen; ^^Carbohydrate antigen 19-9; ^^^Alpha fetoprotein; $Cancer antigen 125

impeded ventilation. Following aspiration prophylaxis and adequate pre-oxygenation, modified rapid sequence induction was performed using fentanyl 2 µg/kg, propofol 2 mg/kg, and rocuronium 1 mg/kg. The trachea was intubated with a 7.0-mm cuffed endotracheal tube. Anaesthesia was maintained with sevoflurane (minimum alveolar concentration 0.6-0.7) in an oxygen-air mixture. Pressure-controlled ventilation with lung-protective settings and left lateral tilt was employed to minimise inferior vena cava compression. Multimodal analgesia was used for perioperative pain management.

Invasive arterial and right internal jugular venous cannulation was performed. Intraoperative findings revealed a highly vascular tumour weighing approximately 10.6 kg [Table/Fig-4]. The estimated blood loss was approximately 1.5 L, exceeding the calculated maximum allowable blood loss of 890 mL. Intraoperative fluid management included 3.5 L of crystalloids, transfusion of one unit of packed red blood cells, and administration of tranexamic acid 1 g intravenously. Total urine output was 800 mL. Urine output was maintained at >1 mL/kg/h, and normothermia was ensured using active warming measures, including a forced-air warming system (Bair Hugger™, 3M, USA) and an in-line fluid warming device (Hotline® Fluid Warmer, Smiths Medical, USA). The duration of surgery was around five hours. The patient remained haemodynamically stable throughout the procedure. She was extubated uneventfully and transferred to the ICU for observation. Postoperative recovery was smooth, and she was discharged from the ICU after 48 hours. At the one-month follow-up, she was asymptomatic and showed significant improvement in respiratory effort.

DISCUSSION

The GISTs are the most common mesenchymal tumours of the gastrointestinal tract, accounting for approximately 80% of all gastrointestinal mesenchymal neoplasms and 0.1-3% of



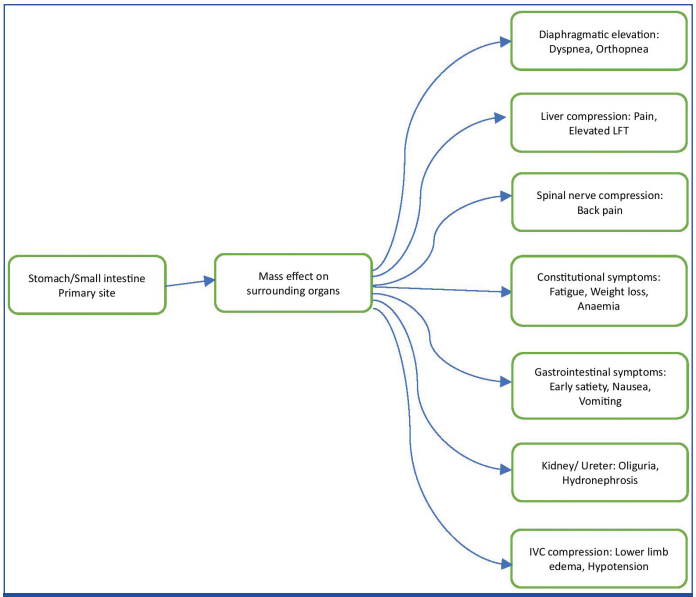
[Table/Fig-4]: Specimen of the resected tumour demonstrated a large size and prominent vascularity.

gastrointestinal malignancies [1]. They arise from neoplastic proliferation of the interstitial cells of Cajal and may exhibit benign or malignant behaviour. While approximately 70% of GISTs are considered low risk, malignant tumours metastasise predominantly via the haematogenous route, most commonly to the liver and peritoneum [2]. The GISTs may occur anywhere along the gastrointestinal tract, with the stomach (≈60%) and small intestine (20-30%) being the most frequent sites [1,2]. Extra-gastrointestinal GISTs are rare and may arise from the omentum, mesentery, or retroperitoneum [2].

Tumours exceeding 10 cm in diameter are classified as giant GISTs [3]. Cases weighing more than 10 kg are exceedingly rare, with only two reported in the literature to date [4,5]. Giant GISTs pose formidable anaesthetic challenges due to extreme mass effect, extensive resection, raised intra-abdominal pressure, impaired respiratory mechanics, increased aspiration risk, and the potential for major haemodynamic instability and massive blood loss [Table/Fig-5] [1,2,4-11]. Anaesthesia-focused reports describing the perioperative management of such tumours remain limited. This case highlights key perioperative anaesthetic considerations in a patient with a symptomatic giant GIST and compares them with those reported in previously published cases [Table/Fig-6,7] [4-10].

In the present case, the patient had a symptomatic giant GIST occupying most of the abdominal cavity, resulting in dyspnoea and hydronephrosis due to marked mass effect. The increased intra-abdominal pressure caused diaphragmatic splinting, reduced lung compliance, and decreased functional residual capacity, leading to restrictive respiratory physiology. Similar respiratory compromise has been reported in previously published cases of giant GISTs and other large intra-abdominal tumours, where reduced pulmonary compliance and impaired oxygenation posed major perioperative challenges [4-8]. These findings highlight the importance of preoperative respiratory optimisation and careful intraoperative ventilatory management in such patients.

Positioning-related haemodynamic and respiratory challenges were central to anaesthetic management in this case. Anaesthesia was induced in a left lateral position with a semi-recumbent tilt to improve ventilation and minimise compression of the inferior vena cava. This strategy helped maintain haemodynamic stability and adequate oxygenation throughout induction. Similar positioning techniques have been described in other cases of giant intra-abdominal tumours to prevent supine hypotensive syndrome and hypoxaemia caused by major vessel compression [4,6-8]. In contrast, several reports have documented significant hypotension during induction and tumour manipulation due to inferior vena cava



[Table/Fig-5]: Pathophysiological effects of a giant Gastrointestinal Stromal Tumour (GIST) arising from the stomach or small intestine, illustrating mass effect on surrounding organs and resultant systemic manifestations [1,2,4-11].

Key Management in Perioperative Care of Giant GIST		
Phase	**Key concerns**	**Management focus**
Preoperative	Full stomach, Anaemia, Inferior Vena Cava (IVC) compression	Optimisation, Aspiration prophylaxis
Induction	Difficult airway, aspiration risk, haemodynamic instability	Rapid Sequence Intubation (RSI) or awake intubation
Maintenance	Massive bleeding, reduced venous return	Invasive monitoring, controlled ventilation
Emergence	Sudden decompression, Re-expansion pulmonary oedema	Gradual lung inflation, cautious extubation
Postoperative	Respiratory distress, pain, delayed recovery	Multimodal analgesia, ICU care

[Table/Fig-6]: Summary of perioperative key managements in case of giant intra-abdominal tumour.

Parameter	Giant GIST (present case)	Other giant intra-abdominal tumours
Tumour characteristics	Solid, highly vascular giant GIST with marked mass effect	Often cystic or mixed; vascularity variable [4-10]
Respiratory mechanics	Diaphragmatic splinting and reduced lung compliance causing exertional dyspnoea	Severe restrictive physiology and hypoxaemia commonly reported [4-10]
Positioning issues	Limited supine tolerance; managed with semi-recumbent position and left lateral tilt	Supine intolerance frequently necessitating modified positioning [4-10]
Aspiration risk	Managed as full-stomach due to raised intra-abdominal pressure	Similar aspiration risk widely described [7-9]
Airway management	Modified rapid sequence induction with controlled ventilation	Awake or modified induction depending on severity [4,8,9]
Haemodynamic concerns	Risk of IVC compression and major blood loss due to tumour vascularity	Marked haemodynamic instability and venous compression reported [4-10]
Post-resection physiology	Gradual tumour handling prevented hypotension and Re-Expansion Pulmonary Edema (REPE)	Sudden decompression associated with hypotension and REPE [7-9]
Postoperative care	Planned ICU monitoring with early extubation	ICU/HDU admission frequently required [4-10]

[Table/Fig-7]: Comparison of perioperative anaesthetic challenges in the present giant Gastrointestinal Stromal Tumour (GIST) case and other reported giant intra-abdominal tumours [4-10].

and aortic compression [7-9]. This complication was not observed in the present case, likely owing to optimal positioning and gradual tumour handling.

Airway management and aspiration risk represent major anaesthetic challenges in patients with giant GISTs. In the present case, delayed gastric emptying and increased intra-abdominal pressure necessitated treating the patient as having a full stomach. Aspiration prophylaxis followed by rapid sequence induction was successfully employed. Similar approaches have been reported in most published cases, underscoring the high aspiration risk associated with giant intra-abdominal tumours [4,6-9]. Ventilatory management was further complicated by reduced lung compliance and elevated airway pressures, necessitating lung-protective ventilation strategies. Unlike several reported cases that required postoperative mechanical ventilation due to respiratory compromise, immediate extubation was feasible in this patient, reflecting adequate intraoperative optimisation and preserved postoperative respiratory function [4-8].

Intraoperative haemodynamic instability and massive blood loss remain significant concerns during resection of giant GISTs due to their high vascularity. In the present case, anticipation of blood loss, invasive haemodynamic monitoring, and timely availability of blood products enabled maintenance of haemodynamic stability without prolonged vasopressor support. Similar cases have reported blood losses exceeding 1-2 litres, often requiring massive transfusion and continuous vasopressor infusion [6-9]. Patients may occasionally present in haemorrhagic shock due to spontaneous intra-abdominal tumour bleeding. Such patients require prompt resuscitation and may need to undergo emergency laparotomy, as reported by Duguma YM et al., and Attar HM et al., [5,6]. Additionally, sudden decompression following tumour removal may theoretically result in acute vasodilation and hypotension; therefore, gradual tumour manipulation and controlled decompression are recommended, although such complications have not been specifically reported in GISTs to date [8].

Thromboprophylaxis should be considered in view of the increased risk of venous stasis resulting from venous compression and prolonged immobility. In the present case, intermittent pneumatic compression was used as mechanical thromboprophylaxis during the perioperative period. In contrast, Galeano-Valle F et al., reported a patient who developed chest pain due to pulmonary embolism and was subsequently managed with enoxaparin [10].

Alternative anaesthetic strategies described in the literature include awake fibre-optic intubation, elective postoperative mechanical ventilation, and neoadjuvant imatinib therapy to reduce tumour size before surgery [8,11,12]. Airway management should be individualised based on symptom severity and airway assessment. Awake fibre-optic intubation has been advocated in patients with large abdominal masses associated with severe orthopnoea, as reported by Grăjdieru O et al., [8]. Awake fibre-optic intubation was not chosen in the present case due to the absence of severe orthopnoea and a favourable airway assessment. Elective postoperative ventilation was also not required, as the patient demonstrated adequate respiratory mechanics and gas exchange at the end of surgery. Although preoperative imatinib therapy may improve tumour resectability, its potential adverse effects, including hepatotoxicity, fluid retention, and cardiotoxicity, necessitate careful patient selection and were not contributory in this case [11,12]. Hence, an individualised, physiology-guided anaesthetic approach was adopted.

CONCLUSION(S)

Giant GISTs represent a rare but high-risk scenario for anaesthesiologists due to severe respiratory and haemodynamic consequences of mass effect. Thorough preoperative assessment, anticipation of physiological disturbances, individualised airway and ventilation strategies, invasive monitoring, and controlled tumour decompression are pivotal to safe perioperative management. Favourable outcomes in complex cases depend on a multidisciplinary approach, vigilant postoperative care, meticulous preoperative assessment, anticipation of physiological derangements, and close interdisciplinary coordination to minimise morbidity and mortality.

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