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A DELICATE AIRWAY BALANCE: STEPWISE MANAGEMENT OF CRITICAL TRACHEAL COMPRESSION SECONDARY TO OESOPHAGEAL TERATOMA

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Critical tracheal compression secondary to mediastinal or oesophageal masses represents a major anaesthetic challenge because induction of general anaesthesia, neuromuscular blockade, and positive-pressure ventilation may precipitate complete airway collapse [1]. We report the successful management of a patient with near-complete tracheal compression using a carefully planned stepwise airway strategy prioritising maintenance of spontaneous ventilation and backup rescue measures, and we address here the specific technical details raised during peer review.

A 42-year-old woman presented with progressive dyspnoea, noisy breathing, and chest discomfort of 1.5 years' duration, with marked worsening since the preceding month. Computed tomography of the thorax demonstrated a 4 × 4 × 4 cm extraluminal oesophageal mass at the D1–D2 level causing severe tracheal compression, with the narrowest tracheal diameter measuring 3.59 mm (Fig. 1). Surgical excision was planned.

Fig 1: Computed tomography of the neck showing the narrowest diameter of the trachea, 3.59 mm at D1-D2 level.

A multidisciplinary discussion was conducted preoperatively, involving anaesthesiologists, surgeons, perfusionists, and pulmonologists, with the airway strategy prioritising maintenance of spontaneous ventilation [2]. Partial femoral vascular access was secured preoperatively to facilitate rapid institution of cardiopulmonary bypass (CPB) if complete airway obstruction or cardiovascular collapse occurred [3].

A structured, three-tier airway plan was formulated in advance and communicated to the entire team. Plan A was regional anaesthesia — cervical epidural catheterisation combined with an ultrasound-guided superficial cervical plexus block — with conscious sedation and gradual surgical decompression of the mass under spontaneous ventilation. Plan B was awake rigid bronchoscopy if airway compromise worsened before adequate decompression; the airway was pre-prepared for this contingency with bilateral superior laryngeal nerve blocks and intratracheal topicalisation, and a rigid bronchoscopy set together with a cardiothoracic surgeon capable of emergency rigid bronchoscopy or tracheostomy were kept immediately available in the operating room. Plan C was institution of femorofemoral CPB, via the pre-secured femoral access, in the event of complete airway collapse or failed ventilation/intubation [4].

On the day of surgery, cervical epidural catheterisation was performed at the C6–C7 interspace, with an initial bolus of 6 ml of 0.5% ropivacaine followed by a maintenance infusion of 0.25% ropivacaine at 3 ml/hr. The ultrasound-guided right superficial cervical plexus block was administered together with the bilateral superior laryngeal nerve blocks, using a total of 15 ml of 0.5% bupivacaine and lignocaine with adrenaline; together, these provided adequate surgical anaesthesia while avoiding airway instrumentation.

We recognise that cervical epidural placement and titration in a patient with a critically compromised airway demands technical expertise and a low threshold for abandoning the block if surgical conditions were inadequate; the block was performed by a consultant experienced in regional techniques, with the surgical and rescue teams scrubbed and ready throughout.

Sedation was administered as a dexmedetomidine loading dose of 1 mcg/kg over 10 minutes followed by a maintenance infusion of 0.5 mcg/kg/hr, titrated to maintain spontaneous ventilation and a cooperative, arousable patient. Depth of sedation was monitored continuously with bispectral index (BIS), and an arterial line was sited for continuous blood pressure monitoring and serial arterial blood gas sampling; capnography via nasal cannula was used throughout to track ventilatory adequacy. Preservation of spontaneous ventilation was considered crucial because negative intrathoracic pressure helps maintain patency of critically narrowed airways. Awake flexible video-bronchoscopy was considered but deferred, as negotiating the narrowed tracheal lumen risked bleeding or oedema that could further compromise the airway; surgical decompression under spontaneous ventilation was therefore prioritised before any definitive airway instrumentation.

Approximately one hour into surgery, the patient developed

mild carbon dioxide retention on serial arterial blood gas while maintaining spontaneous breathing. By this stage, substantial — though not complete — tumour debulking had been achieved, and the surgeon had adequate external control over the residual mass; because tracheal narrowing had improved but not fully resolved, a test laryngoscopy was performed with a video laryngoscope while the surgeon retracted the mass externally, and the trachea was intubated with a 4 mm cuffed endotracheal tube sized to pass the still-narrowed segment, advanced beyond the compression without loss of spontaneous ventilation. Once resection was completed and the airway oedema had settled, the 4 mm tube was exchanged for a 6 mm cuffed endotracheal tube, retained to secure airway patency while the patient breathed spontaneously, and she was shifted to the intensive care unit. Extubation on postoperative day two followed a composite assessment — a satisfactory chest x-ray, a positive cuff-leak test, and direct confirmation of airway patency on fibreoptic examination — rather than radiography alone. Histopathology confirmed oesophageal teratoma.

This case highlights key airway principles in critical tracheal compression: preservation of spontaneous ventilation, avoidance of premature airway instrumentation, stepwise rescue planning with pre-prepared contingencies for awake rigid bronchoscopy, multidisciplinary coordination, and preparedness for extracorporeal rescue. Regional anaesthesia combined with cautious, closely monitored sedation represents a useful alternative in carefully selected patients where conventional induction carries a high risk of catastrophic airway collapse, provided the technique is performed by clinicians experienced in advanced regional anaesthesia and backed by immediately available rescue airway and bypass options.

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