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CLINICAL INFORMATION

Anesthetic management of a large mediastinal mass for tracheal stent placement

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Abstract The anesthetic management of patients with large mediastinal masses can be complicated due to the pressure effects of the mass on the airway or major vessels. We present the successful anesthetic management of a 64-year-old female with a large mediastinal mass that encroached on the great vessels and compressed the trachea. A tracheal stent was placed to relieve the tracheal compression under general anesthesia. Spontaneous ventilation was maintained during the perioperative period with the use of a classic laryngeal mask airway. We discuss the utility of laryngeal mask airway for anesthetic management of tracheal stenting in patients with mediastinal masses.

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PALAVRAS-CHAVE

Anestesia;
Doenças do Mediastino;
Máscaras laringeas;
Stents

Manejo anestésico de grande massa mediastinal para a colocação de *stent* traqueal

Resumo O manejo anestésico de pacientes com grandes massas situadas no mediastino pode ser complicado por causa dos efeitos da pressão da massa sobre as vias aéreas ou grandes vasos. Relatamos o manejo anestésico bem-sucedido de uma paciente de 64 anos com uma grande massa mediastinal que invadiu os grandes vasos e comprimiu a traqueia. Um *stent* traqueal foi colocado para aliviar a compressão da traqueia, sob anestesia geral. A ventilação espontânea foi mantida durante o período perioperatório com o uso de uma máscara laríngea clássica. Discutimos a utilidade da máscara laríngea para o manejo da colocação de *stent* traqueal em pacientes com massas situadas no mediastino.

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Introduction

Mediastinal tumors that are large enough to cause compression of airway or major vessels pose a significant risk for

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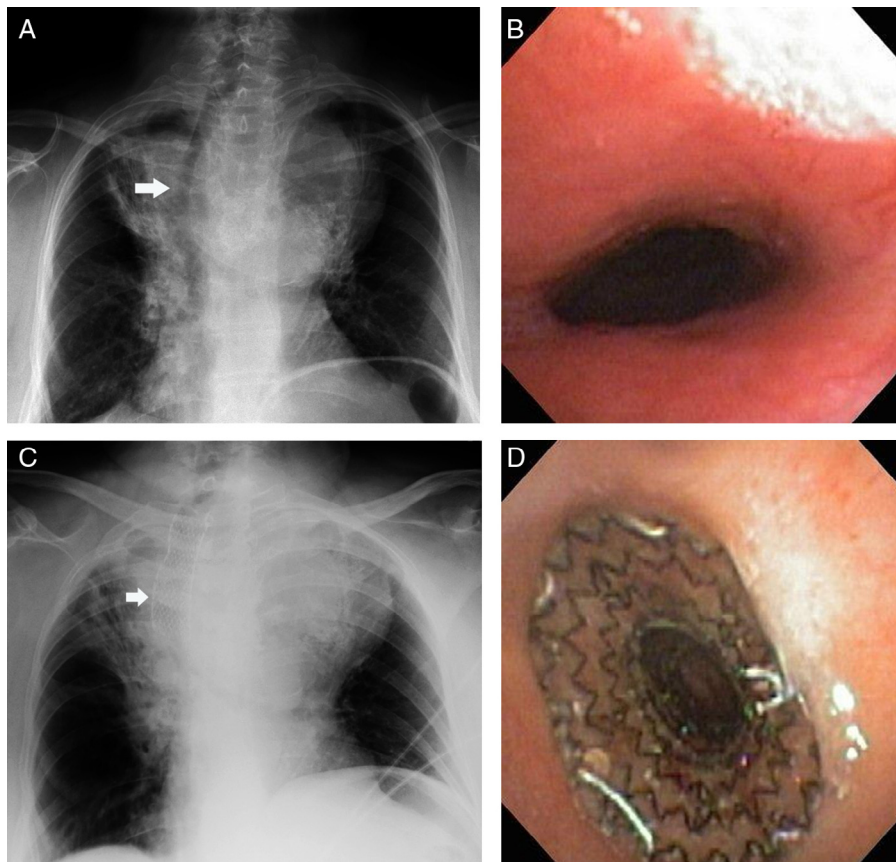


Figure 1 (A) Chest X-ray showing a large mediastinal mass with marked deviation of the trachea to the right with tracheal compression, (B) bronchoscopic view of the trachea showing the narrowing, (C) chest X-ray after the stent placement showing the stent in the trachea, and (D) bronchoscopic view of the tracheal stent.

cardiopulmonary complications. Catastrophic hypoxia, vascular complications and cardiac arrest can occur during the perioperative period and have been reported in both the adult¹ and pediatric populations.^{2,3} Further, the use of muscle relaxants and positive pressure ventilation during general anesthesia has been associated with an increased risk of airway collapse.⁴ We report the general anesthetic management of a patient who underwent tracheal stenting for a large mediastinal tumor while maintaining spontaneous ventilation with a laryngeal mask airway (LMA).

Clinical report

A 64-year-old female with a medical history remarkable for hypertension and asthma was diagnosed with a sarcomatoid carcinoma of the lung. This tumor measuring 9.3 cm × 9.0 cm × 11.7 cm encroached on the anterior mediastinum. Due to the advanced stage of the cancer, she was considered a poor surgical candidate. She received chemotherapy with adriamycin, ifosfamide and mesna in conjunction with radiotherapy. She remained relatively asymptomatic after therapy for a period of 5 years after which she presented to us with worsening dyspnea, cough and hoarseness of voice of one month duration. The dyspnea was worst on lying flat than in the semi-recumbent position. The chest X-ray revealed a large mediastinal mass

with marked deviation of the trachea to the right with tracheal compression (Fig. 1A). The CT scan confirmed that the mediastinal mass had increased in size and, now measured 10.3 cm × 10.4 cm × 12.7 cm. It encroached on the great vessels and trachea, causing significant tracheal compression and deviation (Fig. 2). As the predominant symptom was



Figure 2 CT scan showing the large mediastinal mass measuring 10.3 cm × 10.4 cm × 12.7 cm encroaching on the great vessels and trachea causing tracheal compression and deviation.

dyspnea due to the obstruction of the trachea, she was scheduled for the placement of a tracheal stent as a palliative measure to relieve the airway obstruction.

On the day of the procedure, a large bore peripheral intravenous line and a right radial arterial access were established. General anesthesia while maintaining spontaneous ventilation with a LMA was planned. Rigid fiberoptic bronchoscopes were made available as a back-up intervention in the event of tracheal collapse during induction of anesthesia. The cardiopulmonary bypass team was placed on stand-by in the event that significant cardiorespiratory decompensation was to occur and we were unable to rescue with the rigid bronchoscopes. In the semi-recumbent position, general anesthesia was induced with 70% nitrous oxide in oxygen and sevoflurane. On induction of anesthesia, nitrous oxide was discontinued and anesthesia was maintained with sevoflurane in 100% oxygen. With the patient breathing spontaneously, bronchoscopy was performed to assess the feasibility of placing a self-expanding metallic tracheal stent. A size 5 classic LMA was placed to maintain spontaneous respiration. Neuromuscular blocking agents and positive pressure ventilation were avoided. There was large air leak with the passage of bronchoscopes through the LMA and we were unable to maintain good sevoflurane concentrations necessary for the procedure. Hence, we decided to supplement it with propofol infusion at sedative dose of 25–50 mcg/kg/min. With this small dose of propofol, we could maintain spontaneous respiration and achieve adequate depth of anesthesia required for stent placement. An 18 mm × 60 mm self-expanding metallic tracheal stent was deployed through the LMA (Fig. 1D) with immediate improvement in the tidal volumes. The LMA was successfully removed at the end of the procedure and the patient recovered in the post anesthesia care unit uneventfully.

Discussion

Mediastinal masses are known to be associated with significant morbidity and mortality due to the anatomical relation of the mass with important structures within the thorax. The cardiorespiratory compromise resulting from the mass collapsing on the trachea, cardiac chambers, pulmonary veins or the superior vena cava could have devastating outcomes. Patients presenting with symptoms of dyspnea, cough, hoarseness, stridor, postural symptoms, superior vena cava syndrome or evidence of tracheal compression of more than 50% as assessed by CT scans, are at a higher risk for cardiopulmonary collapse.⁴ The presence of pericardial effusion was found to be an independent risk factor for complications.² An individualized anesthetic plan should be formulated for each patient presenting with a mediastinal mass based on the clinical and radiological features. General anesthesia is best avoided in such high-risk patients when possible. If general anesthesia is absolutely necessary, maintaining spontaneous respiration would preserve the normal transpulmonary pressure gradient that aids in keeping the airway distended and patent, thus preventing airway collapse.⁵

Patients with intrathoracic tumors are frequently seen in the perioperative period for a variety of procedures requiring anesthesia. The use of metallic self-expandable stents

as a palliative measure for relieving airway obstruction due to compression by tumors has increased significantly in the recent past. Anesthesia for tracheal stent placement has been well described by Brodsky.⁶ Tracheal stents are preferably placed under general anesthesia as it provides an immobile patient with good visualization of the airway for stent placement. Airway management can be achieved with an endotracheal tube, rigid bronchoscopy with jet ventilation or a LMA.^{7,8} Sarkiss et al. describe the successful use of the LMA in patients presenting for interventional pulmonology.⁹ Even patients with massive mediastinal masses have undergone successful procedures with LMA placement.¹⁰

In our case, the patient was not only symptomatic, but also demonstrated tracheal narrowing starting just below the larynx on the CT scan. During the anesthetic planning of our patient, the possibility of cardiorespiratory decompensation could not be underestimated. Our patient had subglottic compression of the trachea and the stent placement through an endotracheal tube or a rigid bronchoscope would have been difficult.⁷ Hence, a LMA was preferred for the placement of tracheal stent from the surgical stand point. The large internal diameter of the LMA allows easy passage of the stent loader with the stent without interruption of ventilation. A classic LMA was chosen as it has aperture bars instead of the epiglottic elevator bars that allow easy passage of bronchoscope and stents. Our major concern with the use of LMA in this patient was that the airway was not secure and there was still the possibility of tracheal compression by the tumor which could result in significant difficulty with ventilation. In the event of airway collapse, the plan was to stent the airway open with a rigid bronchoscope. The cardiopulmonary bypass team was on standby as a last resort in case of emergent situation although it would have been difficult to gain femoral access and go on pump in a timely manner.¹¹

Conclusion

In conclusion, LMA could be used to provide sufficient anesthetic depth for tracheal stent placement in patients with massive mediastinal mass while maintaining spontaneous ventilation. However in these patients, a backup plan to rescue the airway should be made available in the event of airway compromise.

Conflicts of interest

The authors declare no conflicts of interest.

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