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Anesthesia Management of a Patient with Massive Goiter: A Case Report

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Abstract

Introduction: Massive goiter may compress the trachea, causing tracheal deviation and structural abnormalities, resulting in dyspnea. Most patients present with multiple cardiopulmonary complications. Therefore, airway management in such patients carries considerable risks during anesthesia and surgery, and perioperative anesthetic management is relatively complex.

Case Presentation: A 78-year-old woman was admitted to the Department of Thyroid Surgery with complaints of a cervical mass with dyspnea. Preoperative multidisciplinary evaluation, detailed airway assessment, and a personalized anesthetic plan were formulated. General anesthesia with awake fiberoptic bronchoscope intubation was adopted. Perioperative vital signs, airway patency, and thyroid-related hormone levels were closely monitored. The operation was completed smoothly, and the patient recovered well without perioperative airway complications, recurrent laryngeal nerve injury, or thyroid crisis.

Conclusion: This case summarizes the key points of anesthetic management for massive goiter resection, providing a clinical reference for similar cases.

Keywords

Massive Goiter, Thyroidectomy, Airway Management, Awake Fiberoptic Intubation, Anesthetic Management

Introduction

Massive goiter is a common benign thyroid tumor, and giant thyroid adenoma is defined as a thyroid tumor with a diameter exceeding 5 cm or a weight over 100 g [1]. Due to its large volume, massive goiter often compresses surrounding tissues and organs, especially the trachea, leading to tracheal stenosis, deviation, dyspnea, and even sleep apnea syndrome, which significantly increases the difficulty of perioperative airway management and anesthetic risk. Herein, we report a case of successful anesthetic management for resection of a massive goiter with tracheal compression and summarize the clinical experience of anesthetic treatment for such cases.

Case Presentation

A 78-year-old female patient, 162 cm tall and weighing 68 kg, was admitted to the hospital with an "anterior cervical mass for 8 years, aggravated with dyspnea for 6 months." The patient reported progressive enlargement of the anterior cervical mass, accompanied by progressive dyspnea, especially in the supine position, without symptoms of hoarseness, dysphagia, or hypermetabolism.

Physical examination revealed a huge mass in the

anterior cervical region, measuring approximately 11.6 cm × 5.8 cm × 6 cm, with a tough texture, well-defined margin with intact capsule, poor mobility, no tenderness, and no obvious jugular vein distension.

Preoperative auxiliary examinations: Thyroid function tests showed that free triiodothyronine (FT3), free thyroxine (FT4), and thyroid-stimulating hormone (TSH) were within normal ranges, excluding hyperthyroidism. Cervical computed tomography (CT) revealed a huge space-occupying lesion in the bilateral thyroid lobes (**Fig-1**), with tracheal compression and lateral displacement, a tracheal narrowest diameter of 0.24 cm (**Fig-2**), and no invasion of surrounding large blood vessels. Pulmonary function testing indicated mild restrictive ventilatory dysfunction. Electrocardiogram (ECG) and routine blood tests were normal.

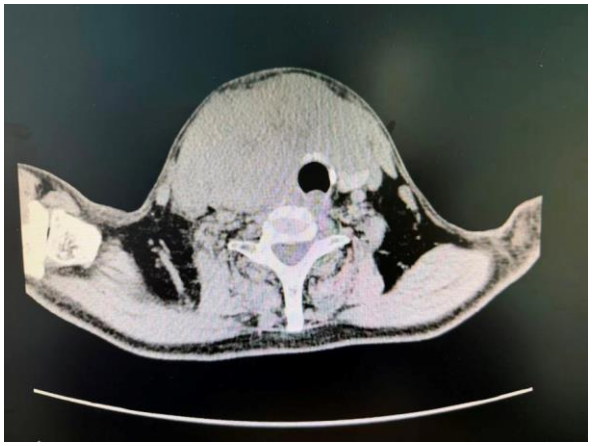

Fig-1:

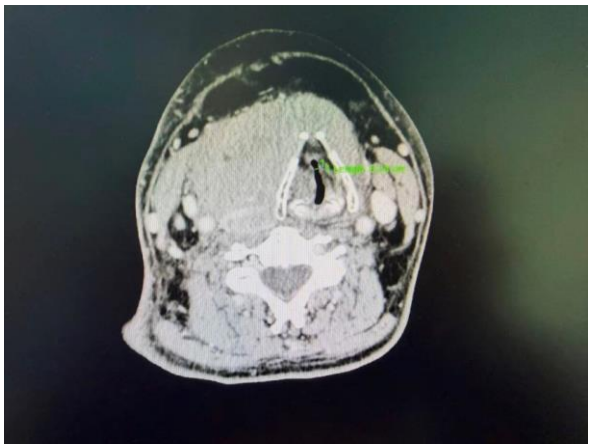

Fig-2:

The preoperative diagnosis was massive goiter with tracheal compression. The Department of General Surgery planned to perform total thyroidectomy under general anesthesia. Given the severe tracheal compression and potential difficult airway, anesthesiologists conducted a detailed preoperative airway assessment one day before surgery and formulated a personalized anesthetic plan prioritizing awake tracheal intubation to ensure airway safety.

Preoperative Preparation

Routine preoperative fasting and water deprivation were performed for 8 hours. The patient was fully informed of the anesthetic plan and awake intubation process to relieve anxiety and improve cooperation.

Preoperative medication included midazolam 0.02 mg/kg intravenous injection 30 minutes before surgery for sedation and atropine 0.3 mg to reduce oral secretions. Monitoring equipment was prepared in advance, including ECG, non-invasive blood pressure (NIBP), pulse oxygen saturation (SpO_2), end-tidal carbon dioxide partial pressure ($EtCO_2$), and bispectral index (BIS). Emergency airway equipment (laryngeal mask, tracheal tubes of different models, and a percutaneous tracheotomy kit) was prepared for immediate use.

Induction of Anesthesia:

The patient entered the operating room in a semi-recumbent position to reduce airway compression. Routine vital sign monitoring was initiated, with baseline NIBP 135/85 mmHg, heart rate (HR) 78 beats/min, and SpO_2 96% (room air).

A 1% lidocaine solution was used for sufficient surface anesthesia of the oropharynx and laryngopharynx, and dexmedetomidine was continuously infused at 1 μg/kg over 15 minutes. Under an awake state, a fiberoptic bronchoscope was used to guide smooth tracheal intubation. The tracheal tube was placed across the narrow segment of the trachea, and correct positioning was confirmed by the $EtCO_2$ waveform.

After successful intubation, general anesthesia was induced with propofol 2 mg/kg, sufentanil 0.5 μg/kg, and cisatracurium 0.2 mg/kg, and mechanical ventilation was initiated with a tidal volume of 8–10 mL/kg and respiratory rate of

12–14 times/min, maintaining $EtCO_2$ at 35–40 mmHg.

Maintenance of Anesthesia:

Anesthesia was maintained with continuous infusion of propofol 4–6 mg/(kg•h) and remifentanil 0.1–0.2 μg/(kg•min), while maintaining hemodynamic stability. Intraoperative BIS was maintained at 40–60 to ensure an adequate depth of anesthesia.

Vital signs, airway pressure, and blood gas analysis were closely monitored throughout the operation. Thyroid hormone levels and electrolytes were dynamically monitored to prevent thyroid crisis and electrolyte disorders. Special attention was paid to tracheal and recurrent laryngeal nerve stimulation during surgery, and anesthetic depth was adjusted in a timely manner.

Postoperative Management:

At the end of the operation, residual muscle relaxation was reversed with neostigmine 0.04 mg/kg and atropine 0.02 mg/kg. The patient was transferred to the post-anesthesia care unit (PACU) for close observation.

The tracheal tube was removed after the patient fully regained consciousness, spontaneous breathing was stable, muscle strength had completely recovered, and airway patency was confirmed. Postoperative monitoring included HR, BP, SpO_2, neck swelling, hoarseness, and dyspnea. The patient was discharged from the PACU 2 hours after extubation without complications.

The operation lasted 150 minutes, with intraoperative blood loss of approximately 80 mL, and hemodynamics remained stable throughout the procedure. Postoperative pathological diagnosis confirmed benign thyroid adenoma (giant follicular thyroid adenoma). The patient had no dyspnea, hoarseness, hypocalcemic tetany, or thyroid crisis after surgery. The wound healed well, and she was discharged from the hospital 7 days postoperatively without perioperative anesthetic complications.

Discussion

Giant thyroid adenoma is characterized by a large tumor volume and easy compression and displacement of the trachea, forming a difficult airway, which is the core difficulty in anesthetic management for such cases [2].

Detailed preoperative evaluation is the premise for ensuring anesthetic safety. Cervical CT is the gold standard for evaluating the degree of tracheal compression, displacement direction, and length of the narrow segment, which can guide the selection of tracheal tube model and intubation strategy. For patients with severe tracheal stenosis and dyspnea in the supine position, awake fiberoptic bronchoscope intubation is the preferred airway management method because it can avoid complete airway obstruction caused by loss of muscle tone after induction of general anesthesia and ensure intraoperative airway patency [3].

Intraoperative anesthetic maintenance should focus on hemodynamic stability and prevention of thyroid crisis. Although this patient had normal preoperative thyroid function, excessive intraoperative surgical stimulation may lead to massive release of thyroid hormones, triggering acute thyroid crisis. Therefore, close monitoring of vital signs and thyroid hormone levels is required. Combined superficial cervical plexus block can effectively reduce the dosage of intravenous anesthetics and opioids, decrease cardiovascular stimulation during surgery, and facilitate rapid postoperative recovery [4].

Postoperative airway management is equally important. Tracheal soft tissue edema, tracheal collapse, and hematoma compression after thyroid resection are the main causes of postoperative acute airway obstruction. Therefore, patients should be closely observed in the PACU, and extubation should only be performed after strict extubation criteria are met. Meanwhile, attention should be paid to monitoring recurrent laryngeal nerve function and serum calcium levels to detect and manage related complications promptly [5].

Conclusion

The key points of anesthetic management for

giant thyroid adenoma resection are:

1. Comprehensive preoperative airway evaluation and sufficient preparation;
2. Selection of awake fiberoptic bronchoscope intubation for difficult airway management to ensure airway safety;
3. Stable intraoperative anesthetic maintenance with close monitoring of hemodynamics and thyroid function;
4. Meticulous postoperative airway management and complication prevention.

Personalized and refined anesthetic management is the key to ensuring perioperative anesthetic safety in such patients.

Conflict of Interest

The authors have read and approved the final version of the manuscript. The authors have no conflicts of interest to declare.

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