

Awake Fibreoptic Intubation in a Patient with a Giant Multinodular Goitre and Retrosternal Extension: A Lesson in Structured Difficult-Airway Planning**Dr Sneha Bindhu Vankdoth¹, Dr Nazima Yusuf Memon¹**¹Junior Resident, ²Associate Professor, Department of Anaesthesia, Dr Shankarrao Chavan Government Medical College (Dr SCGMC), Nanded, Maharashtra, India.**ABSTRACT****Background:**

Giant thyroid masses represent a rare but potentially life-threatening anaesthetic challenge owing to the risks of tracheal deviation, extrinsic compression, and peri-induction airway obstruction. Retrosternal extension amplifies this hazard by concealing the true degree of mediastinal compromise from external examination and by worsening tracheal encroachment when the supine position is assumed. Careful pre-operative assessment and a structured, stepwise airway management plan are indispensable in this clinical context.

Case Report:

A 64-year-old woman with a 15-year history of multinodular goitre presented with a giant thyroid swelling (22×10 cm) and 1 cm of retrosternal extension. She had experienced two years of progressive exertional dyspnoea and was a known case of hyperthyroidism and hypertension, receiving carbimazole 5 mg twice daily and propranolol 10 mg once daily; she was in a euthyroid state at the time of surgery. Standard monitoring and a prepared difficult airway cart were in place before the procedure. Topical airway anaesthesia was achieved with nebulised 4% lignocaine and a hyoid block; intravenous fentanyl was administered for anxiolysis whilst spontaneous ventilation was maintained. Awake fibreoptic intubation was then performed; a size 7 cuffed endotracheal tube was placed under direct fibreoptic visualisation. General anaesthesia was subsequently induced. Volume-controlled ventilation was conducted (FiO₂ 0.60, tidal volume 450 mL, rate 12/min, PEEP 5 cmH₂O, peak pressure 14 cmH₂O, Pplat <25 cmH₂O, ET-CO₂ 35 mmHg); the intraoperative course was uneventful. Extubation was performed after a cuff leak test confirmed adequate airway patency.

Conclusion:

This case confirms that awake fibreoptic intubation is a safe and effective primary airway strategy for giant thyroid masses with retrosternal extension. A structured difficult-airway approach encompassing meticulous topicalisation, preservation of spontaneous ventilation, and cuff-leak-guided extubation is recommended to mitigate perioperative airway risk in this high-risk patient group.

Keywords: *airway management, awake fibreoptic intubation, difficult airway, multinodular goitre, tracheomalacia*

INTRODUCTION

Giant thyroid masses — typically defined as goitres exceeding 200 g in weight or measuring more than 10 cm in greatest diameter — are encountered uncommonly in contemporary surgical practice yet represent one of the most formidable anaesthetic challenges a clinician may face. The spectrum of pathology ranges from long-standing multinodular goitre and toxic goitre to thyroid neoplasms, and affected patients may present with overt compressive symptoms — dyspnoea, stridor, dysphagia, and orthopnoea — that develop insidiously over many years before surgical attention is sought. The anaesthesiologist must contend with a trachea that may be markedly deviated, narrowed, or structurally weakened by prolonged extrinsic compression, and with a patient whose ventilatory function depends critically on the preservation of spontaneous negative intrathoracic pressure. Any pharmacological intervention that abolishes this mechanism — notably induction of general anaesthesia with or without neuromuscular blockade — risks precipitating sudden and catastrophic airway obstruction in the anaesthetic room.¹

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The incidence of difficult laryngoscopy and intubation in patients undergoing thyroid surgery is considerably higher than in the general surgical population when significant tracheal compression is present. Rates of difficult intubation as high as 5–11% have been reported in series encompassing patients with compressive thyroid disease, and emergency surgical airway access has occasionally been required. Sajid and Rekha, in a retrospective analysis of patients with tracheal compression undergoing thyroidectomy, identified the degree of tracheal narrowing on cross-sectional imaging, the presence of audible stridor, and the extent of retrosternal descent as significant independent predictors of anticipated difficult intubation, with awake intubation required in a substantial proportion of their cohort.² Several additional clinical and radiological parameters — including goitre size, cross-sectional tracheal lumen area on computed tomography, neck circumference, and the Mallampati classification — have been validated as markers of perioperative airway risk in patients with benign thyroid disease, underscoring the value of a systematic, multi-factorial pre-operative assessment.³

Retrosternal extension warrants particular caution. When thyroid tissue descends posterior to the manubrium, mediastinal structures including the trachea and great vessels may be compressed to a degree not fully apparent on external examination. In the supine position the mass migrates further inferiorly under gravity, and subsequent loss of pharyngeal tone on anaesthetic induction may precipitate sudden obstruction. Tasche et al highlighted the importance of a tiered strategy for substernal goitre surgery, advocating pre-operative flexible endoscopic airway assessment, thoracic surgery consultation for significant mediastinal extension, and cardiopulmonary bypass standby in selected cases.⁴ Awake tracheal intubation (ATI) with a flexible fiberoptic bronchoscope is the preferred technique for this indication because it preserves spontaneous ventilation, maintains pharyngeal tone, and provides real-time visualisation of the tracheal lumen, allowing the operator to confirm patency before tube advancement.⁴

Long-standing tracheal compression additionally predisposes to tracheomalacia — a structural softening of the cartilaginous rings that renders the trachea susceptible to dynamic collapse after the compressing mass is surgically removed and the extrinsic support it inadvertently provided is withdrawn. Soewoto and Ardianti documented a case of post-thyroidectomy tracheomalacia necessitating emergency reintubation in a patient with a large non-toxic goitre, and emphasised that the peri-extubation period is at least as hazardous as the intubation itself.⁵ Failure to anticipate this complication — along with recurrent laryngeal nerve injury, post-operative haematoma, and airway oedema — may transform a technically successful surgery into a post-operative airway emergency.

We report the successful anaesthetic management of a 64-year-old woman with a 15-year history of multinodular goitre presenting with a giant thyroid mass (22×10 cm) and 1 cm retrosternal extension, in whom a structured difficult-airway strategy centred on awake fiberoptic intubation and cuff-leak-guided extubation allowed safe perioperative care.

CASE REPORT

A 64-year-old woman was referred to the surgical unit for elective thyroidectomy. She gave a 15-year history of progressively enlarging anterior neck swelling diagnosed as multinodular goiter, which had been monitored

conservatively for many years. By the time of surgical assessment, the mass had attained a size of 22×10 cm. For the preceding two years she had experienced worsening exertional dyspnoea, which she attributed to gradual tracheal compression by the enlarging gland. There was no history of rapid recent enlargement or intra-goitrous haemorrhage.

Her medical history was notable for hyperthyroidism, for which she had been prescribed carbimazole 5 mg twice daily, and hypertension, for which propranolol 10 mg once daily had been initiated. Prior to surgery she had been medically optimised and was confirmed to be in a euthyroid state at the time of the operation, as verified by thyroid function tests. The beta-blocker was continued throughout the perioperative period to provide rate control and haemodynamic stability, given the recognised risk of tachyarrhythmias, hypertensive crises, and thyroid storm in patients with a background of hyperthyroidism undergoing thyroid surgery.

Pre-operative airway assessment was conducted systematically and was the central focus of anaesthetic planning. The thyroid swelling occupied the entire anterior extent of the neck, was firm to palpation, and moved with swallowing. USG neck revealed a 22×10 cm multinodular goitre with 1 cm of retrosternal extension. A well-defined homogeneous soft-tissue opacity was seen in the lower neck on Xray (Figure 1).



Figure 1:- A well-defined homogeneous soft-tissue opacity was seen in the lower neck on Xray

Clinical examination of the oropharynx and upper airway was performed and the patient was assessed as a predicted difficult airway for whom awake intubation was mandatory. A difficult airway cart — containing a range of direct and video laryngoscopes, supraglottic airway devices, airway exchange catheters, and cricothyroidotomy equipment — was confirmed to be immediately available in the operating theatre. A standby plan for emergency surgical airway access was agreed with the surgical team before the start of the procedure. Informed written consent for the planned

anaesthetic, including explanation of the awake intubation technique, was obtained from the patient.

On the day of surgery, the patient arrived in the operating theatre and was positioned semi-recumbent to optimise airway mechanics and patient comfort before any instrumentation. Standard monitoring was applied immediately, comprising continuous five-lead electrocardiography, peripheral oxygen saturation by pulse oximetry, end-tidal carbon dioxide measurement, and non-invasive blood pressure measurement. A large-bore intravenous cannula was sited in a forearm vein. Baseline vital signs were documented and continuous perioperative monitoring for tachyarrhythmias and haemodynamic instability was maintained throughout, as clinically appropriate given the background of hyperthyroidism.

Topical anaesthesia of the upper airway was achieved in a stepwise fashion. The patient inhaled nebulised 4% lignocaine for approximately 15 minutes to anaesthetise the nasal, oropharyngeal, and supraglottic mucosa. A hyoid block was subsequently performed by infiltrating lignocaine bilaterally at the level of the hyoid bone to anaesthetise the internal branches of the superior laryngeal nerve. Intravenous fentanyl was then administered for anxiolysis and attenuation of the cough reflex, with meticulous care taken to preserve spontaneous ventilation and avoid respiratory depression. The patient was positioned semi-recumbent throughout the topicalisation process.

Awake fiberoptic intubation was subsequently performed with the patient cooperative and breathing spontaneously without assistance. A flexible fiberoptic bronchoscope was introduced trans-nasally and advanced under continuous direct visualisation through the pharynx, past the epiglottis, and through the glottis into the trachea. The tracheal rings and carina were identified under vision, confirming a patent lumen. A cuffed endotracheal tube of size 7 mm internal diameter was then railroaded over the bronchoscope into the trachea, and its correct intratracheal position was confirmed by direct fiberoptic visualisation and by the appearance of a continuous capnographic waveform. General anaesthesia was then induced with intravenous agents. Bilateral equal air entry and breath sounds were confirmed on auscultation, and the endotracheal tube was connected to the anaesthetic machine.

The patient was placed on mechanical ventilation in volume-controlled mode with the following parameters: inspired oxygen fraction 0.60, tidal volume 450 mL, respiratory rate 12 breaths per minute, positive end-expiratory pressure 5 cmH₂O, peak airway pressure 14 cmH₂O, plateau pressure less than 25 cmH₂O, and end-tidal CO₂ 35 mmHg. All ventilatory parameters remained stable throughout the operative period and required no adjustment. The intraoperative course was uneventful; no episodes of haemodynamic instability, tachyarrhythmia, or ventilatory difficulty were encountered at any stage of the procedure.

At the conclusion of the surgical procedure, the patient was

assessed for extubation readiness. Given the concern for tracheomalacia arising from 15 years of extrinsic tracheal compression, a cuff leak test was performed: the endotracheal tube cuff was deflated and an audible air leak around the tube was confirmed at the established tidal volume, suggesting that adequate tracheal circumference had been maintained and that critical mucosal oedema or cartilaginous collapse was not present. Extubation was performed in a controlled manner with the patient fully awake and responsive to commands, with all airway rescue equipment immediately available at the bedside.

DISCUSSION

This case highlights several instructive anaesthetic considerations pertinent to the management of giant multinodular goitre with retrosternal extension in an elderly patient with coexisting hyperthyroidism and hypertension. The central clinical lesson is the risk of underestimating airway compromise in patients who have adapted insidiously to years of progressive tracheal narrowing. Such patients may appear haemodynamically stable and capable of adequate gas exchange at rest, yet be moments away from complete obstruction once anaesthetic induction abolishes the compensatory mechanisms — preserved consciousness, upright posture, and active upper airway muscular tone — on which their ventilatory adequacy depends.

The decision to proceed with awake fiberoptic intubation in the present case was directly consistent with the Difficult Airway Society (DAS) guidelines for awake tracheal intubation in adults, formulated by Ahmad et al and published in *Anaesthesia* in 2020.⁶ These guidelines enumerate predicted difficult laryngoscopy, anticipated difficult mask ventilation, and aspiration risk as the principal indications for ATI, and recommend a structured procedural framework encompassing formal patient consent, optimised airway topicalisation, targeted sedation with preservation of spontaneous ventilation, and a pre-agreed escalation plan in the event of failure. In the present case, each of these elements was enacted: nebulised and injected topical lignocaine achieved reliable mucosal anaesthesia across the nasal and laryngeal mucosa; intravenous fentanyl provided anxiolysis without respiratory compromise; and an emergency tracheostomy standby was confirmed before the first agent was administered.

The case documented by Nadaraj et al in 2026 illustrates a complication that may be encountered during awake fiberoptic intubation in patients with chronic thyroid compression.⁷ In their patient, prolonged extrinsic pressure had rendered the tracheal lumen featureless and devoid of normal cartilaginous landmarks, causing the operator to mistake the trachea for the oesophagus during scope advancement. This report underscores the importance of thorough pre-operative endoscopic familiarisation and real-time visualisation to detect orientation errors before tube placement.⁷

The spectrum of difficulty in giant compressive goitre is illustrated by two further reports. Sharma et al described successful management of a massive retrosternal thyroid swelling using a supraglottic airway device as a conduit for fiberoptic intubation — a valuable contingency when primary fiberoptic attempts encounter difficulty.⁹ Cankar Dal, by contrast, reported a patient with a giant goitre presenting in acute respiratory arrest in whom conventional laryngoscopy failed and emergency tracheostomy was required as a rescue intervention.⁸ These cases together emphasise that the capacity to escalate rapidly to a surgical airway must always be pre-arranged.

Extubation after thyroid surgery for giant goitre carries its own category of risk, distinct from but as consequential as the intubation challenge. Long-standing tracheal compression may produce tracheomalacia — structural weakening of the cartilaginous rings — such that removal of the endotracheal tube unmasks a collapsible, unsupported tracheal segment that the tumour had paradoxically been stabilising from outside.⁹

The cuff leak test applied in the present case serves as a practical bedside indicator of tracheal patency: a positive leak at established tidal volumes implies an adequate functional tracheal circumference and argues against critical narrowing or collapse. Mahajan et al, in their account of context-sensitive airway management in a patient with retrosternal goitre, emphasised that extubation should be treated as a discrete planned procedure rather than as a reflexive step at the conclusion of surgery.¹⁰

The coexisting hyperthyroidism in the present patient underscores an additional dimension of perioperative risk. Operating on a biochemically thyrotoxic patient carries a substantial risk of thyroid storm, tachyarrhythmias, and haemodynamic instability; confirmation of euthyroid status before surgery and continuation of beta-blockade through the perioperative period are standard practice to mitigate these hazards, as was achieved in this case.

CONCLUSION

This case demonstrates that awake fiberoptic intubation, supported by thorough pre-operative airway assessment and meticulous stepwise pharmacological topicalisation of the airway mucosa, constitutes a safe, effective, and controllable technique for securing the trachea in patients presenting with giant multinodular goitre and retrosternal extension. A structured difficult-airway strategy — encompassing awake intubation with maintenance of spontaneous ventilation, preparation of a difficult airway cart, pre-agreed emergency surgical airway access, and cuff-leak-based extubation criteria — reduces perioperative morbidity and should be adopted as standard practice whenever significant tracheal compression or retrosternal extension is identified during pre-operative evaluation.

Conflict of Interest: None declared

Source of Funding: None declared

Consent Obtained from Patient: Yes

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Author Contribution: SB - contributed to patient management, data collection, and manuscript drafting; NYM - Patient Management, participated in data interpretation, literature review, and manuscript editing

Received: 01-05-2026

Accepted: 05-06-2026

Published :01-07-2026