

Airway Management in a Patient With Acromegaly Undergoing Transsphenoidal Pituitary Macroadenoma Resection: A Case Report

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ABSTRACT:

Background:

Airway management in patients with acromegaly presents a unique challenge due to anatomical changes caused by excess growth hormone. These include macroglossia, prognathism, and soft tissue hypertrophy, which can make both mask ventilation and intubation difficult. Pituitary adenomas, often responsible for acromegaly, require neurosurgical excision under general anesthesia, thereby necessitating a clear airway strategy.

Case report:

We present a 71-year-old male with pituitary macroadenoma, and clinical features of acromegaly scheduled for transsphenoidal resection. Preoperative assessment indicated a high risk of difficult intubation. Induction was performed with fentanyl, propofol, and succinylcholine, and intubation was achieved using a video laryngoscope with bougie assistance.

Conclusion:

This case highlights the importance of detailed airway evaluation and the benefits of advanced tools like video laryngoscopy in the anesthetic care of patients with endocrine disorders affecting airway anatomy. Interdisciplinary coordination and preparedness are essential for patient safety and successful surgical outcomes.

Keywords: Acromegaly, difficult airway, pituitary adenoma, video laryngoscopy, anesthetic management, bougie, macroglossia

INTRODUCTION

Pituitary adenomas are benign, slow-growing tumors originating from the anterior pituitary gland, representing approximately 10–15% of all intracranial neoplasms. While many of these lesions are non-functioning and discovered incidentally, functioning adenomas can cause significant hormonal disturbances, including acromegaly, Cushing's disease, and hyperprolactinemia. Among these, acromegaly results from chronic hypersecretion of growth hormone (GH), typically due to a somatotroph adenoma, leading to elevated levels of insulin-like growth factor 1 (IGF-1). The annual incidence of acromegaly is estimated at 3 to 4 cases per million, with a prevalence of 60 per million population, though many cases remain undiagnosed until advanced stages due to gradual onset of symptoms [1,2].

Acromegaly induces widespread anatomical changes involving the craniofacial skeleton, soft tissues, and airway. Features such as macroglossia, thickening of the pharyngeal and laryngeal soft tissue, mandibular prognathism, and enlarged nasal passages contribute to a structurally challenging upper airway [3,4]. These alterations have profound implications for anesthetic care, particularly airway management, where both difficult mask ventilation and tracheal intubation are frequently encountered.

Studies suggest that the incidence of difficult intubation in patients with acromegaly ranges between 20% and 30%, compared to about 5% in the general surgical population. Furthermore, around 15–20% of acromegalic patients may have obstructive sleep apnea or compromised pulmonary function, further compounding perioperative risk. Predictive tools such as the Mallampati score, thyromental distance, and

inter-incisor gap provide helpful screening but may fail to capture the dynamic airway abnormalities seen in acromegaly [5,6].

Anesthetic management in this population is further complicated by coexisting systemic comorbidities such as hypertension (up to 60–70%), type 2 diabetes mellitus (up to 40–50%), and cardiomyopathy (present in approximately 10%), all of which increase intraoperative and postoperative risk. Neurosurgical intervention, especially via transsphenoidal resection, is the mainstay of treatment for GH-secreting adenomas and is usually performed under general anesthesia with endotracheal intubation [7,8].

Given these challenges, comprehensive preoperative assessment, selection of advanced airway devices, and interdisciplinary coordination are critical for ensuring patient safety. This case report presents the perioperative management of a patient with pituitary macroadenoma and acromegalic features, focusing on the successful use of video laryngoscopy and bougie in navigating a potentially difficult airway. The case underscores the importance of preparedness, decision-making, and technological assistance in managing complex endocrine–neurosurgical patients.

CASE REPORT

A 71-year-old male was referred to the neurosurgery department for evaluation of a sellar mass incidentally found on imaging during a workup for worsening visual field deficits and persistent headaches. Over the preceding two years, the patient had noted progressive changes in facial appearance, enlargement of hands and feet, and increased spacing between teeth, suggesting underlying endocrine pathology. His medical history included long-standing hypertension, type 2 diabetes mellitus, and a remote ischemic stroke without current neurologic deficit.

On physical examination, the patient had coarse facial features, prominent supraorbital ridges, macroglossia, and mandibular prognathism. These findings, together with a markedly enlarged jaw and spade-like fingers, were consistent with acromegaly. Laboratory work-up revealed elevated serum insulin-like growth factor 1 (IGF-1) and failure of growth hormone suppression during an oral glucose tolerance test, confirming the diagnosis. MRI of the brain demonstrated a pituitary macroadenoma measuring $2.8 \times 2.6 \times 2.4$ cm, impinging upon the optic chiasm.

Given the tumor's size and associated visual symptoms, the patient was scheduled for endoscopic endonasal transsphenoidal resection under general anesthesia. A comprehensive preoperative assessment was undertaken, with a particular focus on airway parameters due to the patient's craniofacial features and acromegalic changes. Findings are summarized in Table 1.

Anesthetic Management

In the operating theater, standard ASA monitors were applied, and an arterial line was placed under local anesthesia for invasive blood pressure monitoring due to the patient's age and cardiovascular history. Intravenous access was secured with an 18G cannula.

Following three minutes of preoxygenation, anesthesia was induced with:

- Fentanyl 100 mcg IV
- Propofol 120 mg IV
- Succinylcholine 100 mg IV

Initial bag-mask ventilation was effective, allowing for safe administration of a neuromuscular relaxant. Due to predicted intubation difficulty, a GlideScope™ video laryngoscope was selected as the primary device. Despite anatomical challenges, the video laryngoscopy revealed a Cormack–Lehane grade I view. A gum elastic bougie was introduced under direct visualization and a 7.5 mm internal diameter cuffed endotracheal tube was successfully passed over the bougie and positioned within the trachea. Endotracheal placement was confirmed by end-tidal CO₂ tracing and bilateral chest auscultation. Anesthesia was maintained with a combination of sevoflurane in oxygen/air mixture and intermittent rocuronium dosing. Intraoperative monitoring included hourly capillary blood glucose, which remained between 110–140 mg/dL and was managed with a sliding-scale insulin protocol. Hemodynamic parameters remained stable throughout the 3.5-hour procedure. No intraoperative complications occurred and estimated blood loss was minimal (<200 mL).

Postoperative Course

At the end of surgery, neuromuscular blockade was reversed with neostigmine and glycopyrrolate, and the patient was extubated when fully awake with intact airway reflexes. He was monitored in the post-anesthesia care unit (PACU) for 90 minutes before transfer to the neurosurgical intensive care unit.

Postoperative recovery was smooth, with no signs of airway obstruction, desaturation, or delayed emergence. The patient was discharged from the ICU on postoperative day two and from the hospital on day five with neurosurgical and endocrinology follow-up.

DISCUSSION

Airway management in patients with acromegaly presents a unique and complex challenge for anesthesiologists. The underlying pathophysiology of the disease results in progressive enlargement of soft tissues and skeletal structures due to prolonged exposure to elevated growth hormone and insulin-like growth factor-1 levels. These changes, though often externally visible, can also significantly alter the internal airway anatomy, increasing the risk of both difficult mask ventilation and tracheal intubation. Common features such as macroglossia, thickening of the oropharyngeal tissues, enlargement of the epiglottis, and mandibular prognathism narrow the upper airway lumen and alter normal anatomical relationships, making conventional laryngoscopy and tube placement more difficult [9,10].

In the present case, several of these risk factors were identified during preoperative assessment. The patient had a Mallampati class III airway, a reduced inter-incisor gap, and prominent macroglossia, all of which raised concern for potential intubation difficulty. However, normal neck mobility and the absence of sleep-disordered breathing symptoms offered some reassurance. Given the combination of anatomical alterations and advanced age, the use of a video laryngoscope was selected as the primary intubation tool. Video laryngoscopy provides an improved view of the glottis without the need for alignment of the oral, pharyngeal, and laryngeal axes, making it a valuable asset in patients with distorted airway anatomy [11]. In this case, the GlideScope device enabled a clear glottic view, and the successful introduction of a bougie allowed for precise guidance of the endotracheal tube. Although visualization was optimal, the decision to use a bougie highlights an important point: even with enhanced laryngoscopic imaging, the mechanical navigation of the airway can still be challenging due to anatomical distortion or resistance. Difficult airway prediction tools such as Mallampati score and thyromental distance are commonly used but may be less reliable in patients with acromegaly, where tissue hypertrophy is gradual and the airway may appear deceptively normal on gross inspection [12,13]. Therefore, clinicians must maintain a high index of suspicion and prepare for all possibilities. While awake fiberoptic intubation is often recommended in patients with a high risk of airway failure, it requires significant expertise and patient cooperation [14]. In this patient, mask ventilation was easily achieved after induction, and there were no signs of airway collapse or obstruction, justifying the use of muscle relaxants and video-assisted intubation. In addition to airway-related challenges, systemic manifestations of acromegaly must be addressed. The high prevalence of hypertension, insulin resistance, and cardiac complications in this population increases the risk of intraoperative hemodynamic instability and postoperative morbidity [15]. Our patient had well-controlled hypertension and type 2 diabetes mellitus but no evidence of cardiomyopathy or obstructive sleep apnea. These comorbidities were actively managed during the perioperative period with continuous glucose monitoring, arterial line placement for blood pressure monitoring, and postoperative ICU care. The anesthetic plan was further tailored to minimize stress responses and fluctuations in glucose and blood pressure.

Postoperative care in patients with acromegaly requires vigilance for delayed airway obstruction due to edema, as well as prolonged emergence from anesthesia, particularly in those with coexisting metabolic disorders. In our case, extubation was performed cautiously once the patient was fully awake and had regained protective airway reflexes. The absence of desaturation or respiratory distress in the immediate recovery period supported the decision to extubate in the operating room. Nonetheless, continued observation in the intensive care unit allowed early detection of any delayed complications.

Over the past two decades, airway management in acromegalic patients has notably evolved from primarily direct laryngoscopy with higher difficult intubation rates to proactive use of video laryngoscopy combined with bougie, significantly improving first-attempt success [16]. Difficult intubation rates varied from 9.1% to 62.5%, influenced by anatomical factors like macroglossia, Mallampati class III-IV, and elevated IGF-1 levels [17]. Traditional predictors such as Mallampati scores alone are insufficient, highlighting the need for comprehensive airway assessment. The adoption of advanced tools has enhanced safety, reduced complications, and minimized the need for multiple intubation attempts [18]. Awake fiberoptic intubation remains a valuable technique for select high-risk patients, though it demands expertise and patient cooperation. Overall, the trend favors planned, technology-assisted airway strategies employing multidisciplinary coordination, optimizing outcomes in this challenging population. These

conclusions are drawn from the data summarized in Table 2: Comparative Analysis of Acromegaly Airway Management Studies .

Conclusion

Airway management in patients with acromegaly remains a significant anesthetic challenge due to the anatomical and physiological changes associated with prolonged growth hormone excess. Careful preoperative assessment to identify risk factors such as macroglossia, limited mouth opening, and altered airway anatomy is essential. In this case, the use of video laryngoscopy combined with a gum elastic bougie enabled successful intubation on the first attempt, minimizing airway trauma and ensuring patient safety. Additionally, addressing systemic comorbidities such as hypertension and glucose intolerance is critical for perioperative stability. The coordinated multidisciplinary approach, along with the use of advanced airway devices, contributes to favorable surgical and anesthetic outcomes in this complex patient population. This case highlights the importance of preparedness and tailored airway management strategies to effectively navigate the challenges posed by acromegalic anatomy.

REFERENCE:

1. Nemergut EC, Zuo Z. Airway management in patients with pituitary disease: a review of 746 patients. *J NeurosurgAnesthesiol*. 2006;18(1):73-7. DOI: 10.1097/01.ana.0000183044.54608.50
2. Schmitt H, Buchfelder M, Radespiel-Tröger M, Fahlbusch R. Difficult intubation in acromegalic patients: incidence and predictability. *Anesthesiology*. 2000 Jul;93(1):110-4. DOI: 10.1097/0000542-200007000-00020
3. Friedel ME, Johnston DR, Singhal S, Al Khalili K, Farrell CJ, Evans JJ, Nyquist GG, Rosen MR. Airway management and perioperative concerns in acromegaly patients undergoing endoscopic transsphenoidal surgery for pituitary tumors. *Otolaryngol Head Neck Surg*. 2013 Dec;149(6):840-4. DOI: 10.1177/0194599813507236
4. Zhang Y, Guo X, Pei L, et al. High levels of IGF-1 predict difficult intubation of patients with acromegaly. *Endocrine*. 2017;57(2):326-34. DOI: 10.1007/s12020-017-1338-x
5. de Carvalho CÍC, da Silva DM, Leite MS, de Orange FVA. Is Mallampati classification a good screening test? A prospective cohort evaluating the predictive values of Mallampati test at different thresholds. *Braz J Anesthesiol*. 2022 Nov-Dec;72(6):736-741. DOI: 10.1016/j.bjane.2021.09.008
6. Langeron O, Masso E, Huraux C, Guggiari M, Bianchi A, Coriat P, et al. Prediction of difficult mask ventilation. *Anesthesiology*. 2000;92(5):1229-36. DOI: 10.1097/0000542-200005000-00009
7. Seidman PA, Kofke WA, Policare R, Young M. Anaesthetic complications of acromegaly. *Br J Anaesth*. 2000;84(2):179-82. DOI: 10.1093/oxfordjournals.bja.a013400
8. Patel S, Divatia JV, Myatra SN. An unusual airway challenge in a patient with acromegaly. *J Anaesthesiol Clin Pharmacol*. 2017 Jul-Sep;33(3):410-411. DOI:10.4103/joacp.JOACP_221_16
9. Jamil J, Wan Hassan WMN, Ghani AR, Yeap TB. Anaesthetic challenges in a patient with acromegaly and multinodular goitre undergoing endoscopic pituitary surgery. *BMJ Case Rep*. 2023 16;16(2):e250640. DOI: 10.1136/bcr-2022-250640
10. Apfelbaum JL, Hagberg CA, Caplan RA, et al American Society of Anesthesiologists Task Force on Management of the Difficult Airway. Practice guidelines for management of the difficult airway: an updated report by the American Society of Anesthesiologists Task Force on Management of the Difficult Airway. *Anesthesiology*. 2013;118(2):251-70. DOI: 10.1097/ALN.0b013e31827773b2
11. Hansel J, Rogers AM, Lewis SR, Cook TM, Smith AF. Videolaryngoscopy versus direct laryngoscopy for adults undergoing tracheal intubation. *Cochrane Database Syst Rev*. 2022 Apr 4;4(4):CD011136. DOI: 10.1002/14651858.CD011136.pub3
12. Sharma D, Prabhakar H, Bithal PK, Ali Z, Singh GP, Rath GP, Dash HH. Predicting difficult laryngoscopy in acromegaly: a comparison of upper lip bite test with modified Mallampati classification. *J NeurosurgAnesthesiol*. 2010 Apr;22(2):138-43. DOI: 10.1097/ANA.0b013e3181ce6a60
13. Kapoor I, Mahajan C, Prabhakar H. Assessment of airway in patients with acromegaly undergoing surgery: predicting successful tracheal intubation. *J Neuroanaesthesiol Crit Care*. 2021; 8:40-4. DOI: 10.1055/s-0039-1692550
14. Wong J, Lee JSE, Wong TGL, Iqbal R, Wong P. Fiberoptic intubation in airway management: a review article. *Singapore Med J*. 2019 Mar;60(3):110-118. Sun X, Chen C, Zhou R, Chen G, Jiang C, Zhu T. DOI: 10.11622/smedj.2018081
15. Mizera Ł, Elbaum M, Daroszewski J, Bolanowski M. CARDIOVASCULAR COMPLICATIONS OF ACROMEGALY. *Acta Endocrinol (Buchar)*. 2018 Jul-Sep;14(3):365-374. DOI: 10.4183/aeb.2018.365
16. Chemsian R, Bhananker S, Ramaiah R. Videolaryngoscopy. *Int J Crit IllnInj Sci*. 2014 Jan;4(1):35-41. doi: 10.4103/2229-5151.128011
17. Hang Y, Guo X, Pei L, Zhang Z, Tan G, Xing B. High levels of IGF-1 predict difficult intubation of patients with acromegaly. *Endocrine*. 2017 Aug;57(2):326-334. DOI: 10.1007/s12020-017-1338-x
18. Law JA, Broemling N, Cooper RM, Drolet P, et al Canadian Airway Focus Group. The difficult airway with recommendations for management-part 1-difficult tracheal intubation encountered in an unconscious/induced patient. *Can J Anaesth*. 2013 Nov;60(11):1089-118. doi: 10.1007/s12630-013-0019-3

Declaration of Patient Consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given their consent for their clinical information and images to be reported in the journal. The patient understands that names and initials will not be published, and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed

CONFLICT OF INTEREST: nil

Statement on Human and Animal Rights: This case report aligned with the ethical principles outlined in the Declaration of Helsinki and its subsequent amendments.

Informed consent was obtained, and privacy and confidentiality of patient was maintained.

All the findings reported in case report was original.

AUTHOR'S CONTRIBUTIONS

“Conceptualization, G M and RKKV.; methodology, RKKV.; software, RKKV.; validation, GM., RKKV, TSK.; formal analysis, RKKV.; investigation, GM, TSK,RKKV.; resources, GM, RKKV,TSK.; data curation, GM,RKKV,TSK writing—original draft preparation, GM,TSKV,RKKV writing—review and editing, RKKV,TSKV visualization GM,RKKV,TSK supervision, GM,RKKV,TSK.; project administration, RKKV. All authors have read and agreed to the published version of the manuscript”.