Case Report

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Anaesthetic Management of a Patient with Acromegaly and Dilated Cardiomyopathy: A Case Report

Anaesthesia Section

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ABSTRACT

Acromegaly is a rare endocrine disorder primarily caused by excessive Growth Hormone (GH) secretion, often due to an anterior pituitary macroadenoma. Patients frequently experience cardiovascular complications, including hypertension and Dilated Cardiomyopathy (DCM). A 32-year-old male presented with features suggestive of acromegaly, including headache and blurred vision. Hormonal tests revealed a growth hormone level of 21 ng/mL and an Insulin-like Growth Factor-1 (IGF-1) level of 778.7 ng/mL. Magnetic Resonance Imaging (MRI) identified a 2.4×2.8×3.1 cm GH-secreting pituitary macroadenoma. Two-dimensional echocardiography indicated severe DCM with a Left Ventricular Ejection Fraction (LVEF) of 15-20% and severe diastolic dysfunction. The patient had no prior history of diabetes or hypertension and underwent successful endonasal trans-sphenoidal excision of the tumour, despite challenges posed by impaired cardiac function. This case emphasises the importance of careful anaesthetic management in acromegaly patients with cardiomyopathy.

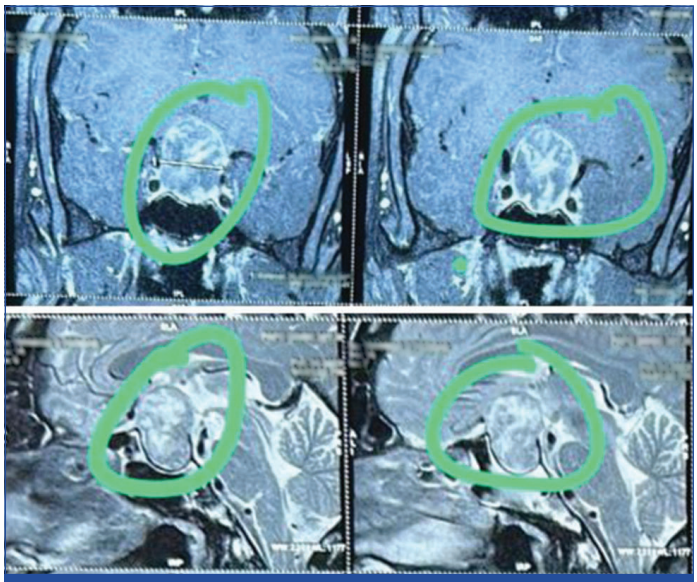
Keywords: Difficult airway, Growth hormone, Pituitary macroadenoma

CASE REPORT

A 32-year-old male presented with chief complaints of headache and progressive blurring of vision over five days. He had no history of hypertension or diabetes mellitus. His vitals were within normal limits. On examination, he was six feet tall and weighed 80 kg. He exhibited typical features of acromegaly, including an enlarged tongue, nose, and lips, mandibular prognathism, prominent supraorbital ridges, and enlarged hands and feet with thickened skin. Airway examination revealed deranged dentition, a right-sided deviated nasal septum [Table/Fig-1a-c], Mallampati grade III [Table/Fig-1c], a 3-finger mouth opening [Table/Fig-1c], a protuberant jaw, and normal neck movements. An Allen's test showed flushing in both hands, indicating adequate collateral circulation. All other clinical and systemic examinations and routine blood parameters were within normal limits, except for borderline-high creatinine (1.6 mg/dL).

[Table/Fig-1]: Clinical images showing: (a) Mandibular prognathism with nasal deviation and supraorbital prominence; (b) Macroglossia; and (c) Mallampati Grade III with lip enlargement.

Chest radiograph and Electrocardiogram (ECG) were unremarkable. Hormonal evaluation revealed: GH - 21 ng/mL, IGF-1 - 778.7 ng/mL, cortisol - 0.52 µg/dL, Thyroid-Stimulating Hormone (TSH) - 0.04 µIU/mL, prolactin - 13.6 ng/mL, and HbA1c - 6.3%. MRI of the brain revealed a pituitary macroadenoma (2.4×2.8×3.1 cm) with suprasellar extension compressing the optic chiasma [Table/Fig-2]. Visual field testing confirmed bitemporal hemianopia. Non Contrast Computed Tomography (NCCT) of the peripheral nasal sinuses revealed polypoidal mucosal thickening in the bilateral maxillary sinuses and a right-sided deviated nasal septum. Echocardiography



[Table/Fig-2]: MRI showing pituitary macroadenoma.

demonstrated severe DCM with global hypokinesia, an LVEF of 15-20%, and Grade III diastolic dysfunction.

Differential diagnoses considered based on the initial presentation included gigantism, pituitary adenomas, familial acromegaly, pseudo-acromegaly, severe insulin resistance, and genetic overgrowth syndromes. Detailed investigations (hormonal assessment, MRI brain, and echocardiography) confirmed the diagnosis of a growth hormone-secreting pituitary macroadenoma with DCM.

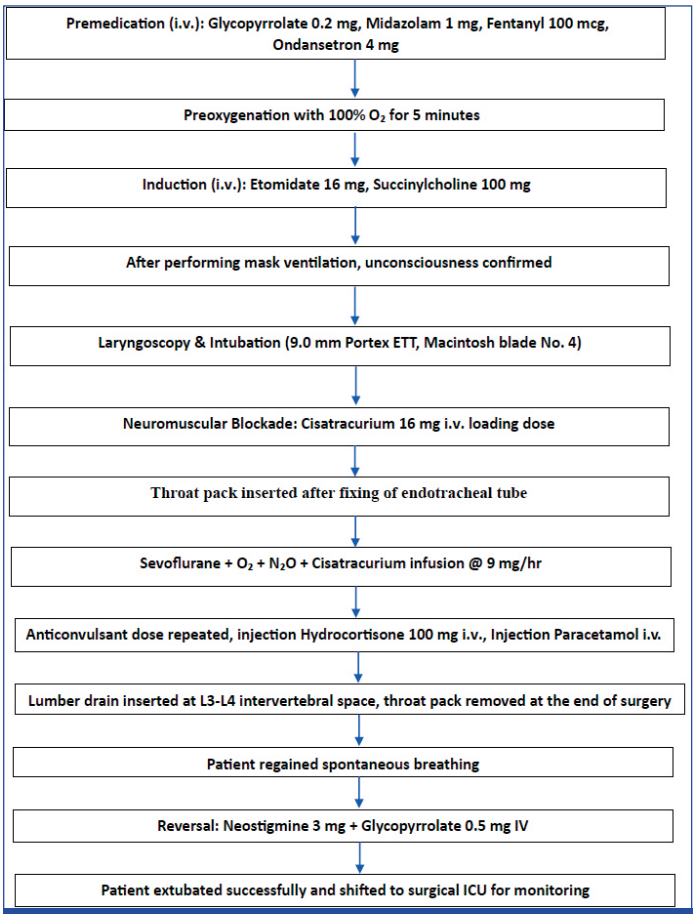
A multidisciplinary team (anaesthesiology, endocrinology, cardiology, neurosurgery, ophthalmology, and pulmonology) optimised the patient preoperatively. He was classified as American Society of Anaesthesiologists (ASA) Physical Status IV and scheduled for elective endonasal trans-sphenoidal tumour excision.

Anaesthetic Management

Informed consent was obtained. The patient was kept nil per os for eight hours. Anticonvulsant prophylaxis was initiated. A single intravenous dose of cefoperazone-sulbactam (1.5 g) was

administered 30 minutes before surgery to provide broad-spectrum prophylactic antibiotic coverage.

In the preoperative room, an 18-G intravenous cannula was secured in the dorsum of his right hand. In the operating room, routine vital monitoring (pulse rate, oxygen saturation, non invasive blood pressure, and ECG) was performed. The anaesthetic protocol for premedication, induction, maintenance, and extubation is depicted in the flow diagram [Table/Fig-3].



[Table/Fig-3]: A flow diagram showing sequential anaesthesia management.

An invasive 20-G intra-arterial catheter was inserted into the left radial artery for continuous blood pressure monitoring, and a urinary catheter was placed to monitor urine output during surgery. His haemodynamic parameters remained within normal limits throughout the six-hour procedure. Vital parameters, blood sugar, and serum sodium monitoring are shown in [Table/Fig-4].

Given the decreased ejection fraction, invasive arterial pressure monitoring, ECG, pulse oximetry, and urine output were closely monitored. Cardiovascular management included careful fluid titration, avoidance of tachycardia, maintenance of stable preload and afterload, and judicious use of anaesthetic agents to minimise myocardial depression. The patient remained haemodynamically stable throughout the procedure.

Serial measurements of random blood sugar levels and serum sodium were performed to guide perioperative fluid and electrolyte management. Values remained within acceptable limits, with no significant derangements observed. The Valsalva manoeuvre was performed intraoperatively to assess for Cerebrospinal Fluid (CSF) leakage on the neurosurgeon's request. Although this manoeuvre carries a risk of displacing sub-sellar fat grafts, meticulous packing and secure sealing were undertaken, and no graft migration or related complications were observed postoperatively or on follow-up.

The patient remained stable after surgery and was transferred to the Intensive Care Unit (ICU) for postoperative monitoring. Postoperative analgesia included paracetamol infusion (1 g) and tramadol (100 mg) administered every 8-12 hours for three days. The postoperative course was uncomplicated, and the patient was discharged on postoperative day 10 in stable condition. Desmopressin therapy was initiated, and the patient was advised to follow-up regularly. On subsequent visits, he remained clinically stable without recurrence of symptoms or new complications.

DISCUSSION

Acromegaly results from excess growth hormone secretion due to a pituitary macroadenoma, leading to progressive tissue overgrowth and metabolic disturbances [1]. It typically affects middle-aged individuals, with a prevalence of 50-60 per million and an incidence of 3-4 per million annually [2]. The condition impacts multiple systems, including respiratory, cardiovascular, neurological, and musculoskeletal systems [3]. Characteristic features include thickened facial and subcutaneous tissues, enlarged tongue, lips, hands, feet, frontal sinuses, and elongation of the mandible, epiglottis, and vocal cords [2]. Pharyngeal tissue hypertrophy and macroglossia predispose patients to Obstructive Sleep Apnoea (OSA), necessitating thorough preoperative evaluation to prevent airway compromise [3]. In present case, patient showed no OSA symptoms but was closely monitored postoperatively in the ICU.

Carpal ligament hypertrophy may compress the ulnar artery, impairing collateral hand circulation in approximately 50% of cases [2]. Allen's test is essential before radial artery cannulation to avoid ischaemia. In present case, adequate collateral flow allowed safe arterial monitoring.

Airway management is challenging due to macroglossia, retrognathia, and possible thyroid goitre, which may cause tracheal compression or laryngeal stenosis [3-5]. Index patient had a 3-finger mouth opening, Mallampati grade III, normal neck mobility, and Grade II airway involvement. Intubation was performed using a Macintosh blade-4, with a difficult airway cart ready.

Kirti R et al., reported a similar case with Mallampati grade IV, where bougie-assisted intubation under general anaesthesia with invasive monitoring was successful, without OSA signs [6]. Intubation techniques include Macintosh blade-5, laryngeal masks, light wands, video laryngoscopes, and awake fibre-optic intubation. Mehrotra M and Basu AR, achieved awake intubation without

Haemodynamic parameter	Preoperative baseline	At induction	After induction	At extubation	After extubation	After shifting to SICU	POD1	POD2
HR	80	88	92	86	82	78	76	78
SBP	128	132	134	120	118	110	112	112
DBP	74	80	88	84	84	70	80	84
SpO_2	99	100	99	98	99	99	100	100
Input/output	800/1000					820/1850	2170/3550	1800/3400
Other investigation parameter								
RBSL	109	135	-	113	-	118	127	132
Serum Sodium	135	-	-	-	-	142	143	138

[Table/Fig-4]: Vital parameters, blood sugar and sodium monitoring.
HR: Heart rate; SBP: Systolic blood pressure; DBP: Diastolic blood pressure; SpO_2: Peripheral oxygen saturation; RBSL: Random blood sugar level; SICU: Surgical intensive care unit; POD: Postoperative day

fibre-optic tools or invasive monitoring in low-resource settings [2]. Anatomical variations may necessitate smaller tubes or devices like Bullard laryngoscopes [7]. ArunKumar R and Anandakrishnan S, used awake fibre-optic intubation with invasive monitoring in an acromegaly patient with limited mouth opening and neck mobility [4]. Although safest, fibre-optic intubation is costly and requires careful handling of equipment. Cardiovascular complications in acromegaly include hypertension, arrhythmias, and heart failure due to prolonged GH and IGF-1 elevation, which may lead to cardiomyopathy. Early stages are characterised by hyperdynamic circulation, progressing to ventricular hypertrophy, valvular dysfunction, and DCM if untreated [1,8,9]. Early intervention yields better outcomes than delayed treatment in older patients [1].

Anaesthetic management must avoid myocardial depression, hypotension, and tachycardia to prevent heart failure. Fluid therapy should be tightly regulated to avoid overload and pulmonary oedema in DCM. Adequate anaesthesia depth is crucial. Agents like lignocaine, beta-blockers, or dexmedetomidine help suppress tachycardia during induction and extubation. Drugs that increase afterload should be avoided, and sinus rhythm should be maintained. Electrolyte balance is essential. Inotropic support (e.g., noradrenaline, dobutamine, dopamine, phosphodiesterase inhibitors, levosimendan) may be required in cases of myocardial depression [1].

Nair AS et al., used thiopentone, fentanyl, vecuronium, and sevoflurane with arterial monitoring but no central venous access [1]. Li M and Huang H, recommended etomidate, fentanyl (30 µg/kg), midazolam, and sevoflurane for minimal myocardial impact [10]. Jain SN et al., found cisatracurium safer than atracurium in cardiac patients [11]. In present case, etomidate, fentanyl, midazolam, and cisatracurium were chosen for cardiac stability, with sevoflurane maintenance and invasive blood pressure monitoring. Central venous access was not used. Etomidate offers minimal cardiovascular depression compared to propofol or ketamine. Sevoflurane's low blood-gas partition coefficient allows lower dosing without sensitising the myocardium to epinephrine. Cisatracurium was preferred over vecuronium due to borderline serum creatinine. Fluid management was cautiously monitored, though Central Venous Pressure (CVP) was not used [10].

Trans-sphenoidal surgery complications include CSF rhinorrhoea, meningitis, panhypopituitarism, transient diabetes insipidus, vascular and cranial nerve injury, and stroke. Prophylactic anticonvulsants are advised pre- and intraoperatively [4]. CSF leak is tested via the Valsalva manoeuvre, and the sella is packed with fat [4]. Nasal packing and related complications should be explained [4]. In the present case, a lumbar drain was placed postoperatively to manage intracranial pressure. Pain was well controlled, and recovery was uneventful. Literature supports these approaches in DCM patients to prevent decompensation [Table/Fig-5] [1,7,12-14].

	Issues	Considerations
Airway management	1. Hypertrophy of tissues of face, pharynx, lips, vocal cord, epiglottis, macroglossia, mandibular prognathism: - Leads to difficult airway like limited mouth opening, Mallampati Grade 3 or 4, Deviated nasal septum, Limited extension and flexion of neck 2. Prevalence of Obstructive Sleep Apnoea (OSA) due to hypertrophy of pharynx. 3. Thyroid goitre- May contribute to difficult airway.	1. Thorough preoperative airway assessment Keep difficult airway cart ready: nasal and oral airway, bougie, Macoy blade 5, macintosh blade 5, Video laryngoscope, Fibreoptic, tracheostomy kit Prepare airway for awake intubation (nebulisation, gurgle, nasal packing) and give airway block for awake intubation 2. Proper history taking about symptoms of OSA. Provide CPAP preoperatively, if needed, and take special precautions during extubation. Precaution is to be taken during emergence from anaesthesia leading to smooth extubation without coughing and bucking. 3. Evaluate and manage thyroid goitre preoperatively; ensure euthyroid status before surgery; perform thyroidectomy if needed prior to endonasal surgery.
Cardiovascular management	Cardiovascular manifestations like hypertension, hyperdynamic status, systolic and diastolic dysfunction, arrhythmia, Dilated Cardiomyopathy (DCM) and heart failure	1. Proper history of cardiac related symptoms. 2. ECG and 2D echo investigations 3. History of hypertension- Continue medication of antihypertensive agents 4. Precautions in DCM- Intraoperative: • Avoid myocardial depression (avoid propofol and ketamine) • Give cardio stable medication throughout perioperative period (Midazolam, fentanyl, Etomidate, Sevoflurane, Vecuronium, tramadol, Paracetamol etc.,) • Avoid hypotension and tachycardia • Maintain normovolemia • Maintain good depth of anaesthesia and analgesia: avoid tachycardia during induction and extubation-Give β blocker, lignocaine, dexmedetomidine • Maintain sinus rhythm • Avoid increasing after-load and peripheral vascular resistance; maintain adequate cardiac output • If myocardial depression is suspected- keep ready inotropic support like noradrenaline, dobutamine, dopamine, levosimendan, phosphodiesterase inhibitor
Neuromuscular involvement	• Most individuals with acromegaly present with neurological and musculoskeletal manifestations, including headache, nerve entrapment syndromes, and paraesthesia (commonly carpal tunnel syndrome), as well as muscle weakness and arthralgia. • Cartilage hypertrophy and osseous overgrowth predispose to degenerative arthritis and, in severe cases, spinal stenosis due to kyphosis, lordosis and scoliosis deformities.	- Assess neuromuscular and skeletal symptoms preoperatively - Anticipate difficult regional block placement due to skeletal deformities - In patients with severe cardiac dysfunction, regional anaesthesia should be administered cautiously to avoid hypotension
Fluid management	Fluid overload leads to arrythmias and heart failure	Careful monitoring of fluid overload with central venous pressure monitoring and transoesophageal echocardiography
Monitoring: Peripheral venous access, Central venous pressure, Intra-arterial blood pressure	Hypertrophy of tissues in hands (carpal ligament), which compresses the ulnar artery affecting the collateral circulation in one or both hands.	1. Leads to difficulty of taking peripheral venous access. 2. Perform Allen's test preoperatively to check presence of collateral circulation in both hands if radial artery cannulation is required.
Pain management	Pain effects on the cardiovascular system.	Required to decrease stress response on cardiovascular system. Use cardio stable pain medication which has minimal effect on cardiovascular system like fentanyl, tramadol, paracetamol etc.,

Postoperative care	1. Cardiovascular complication like arrythmia, heart failure etc., 2. Other complication like cerebral ischaemia, rhinorrhoea, meningitis, cranial nerve injury, vascular injury, transient diabetes insipidus etc., 3. Nasal obstruction after surgery. 4. Sitting position leads to embolism	1. Careful monitoring of patient with intra-arterial blood pressure and central venous pressure. Maintain euvolemia. 2. Give prophylactic anticonvulsant dose and antibiotic during perioperative period. 3. Careful postoperative monitoring of the neuro-cardiovascular symptoms. 4. Valsalva test done for CSF leak during extubation 5. Insertion of lumber drain to decrease intracranial pressure during postoperative period 6. Monitoring of saturation of oxygen.

[Table/Fig-5]: Summarising key implications of anaesthetic considerations in acromegaly with cardiac complication.

CONCLUSION(S)

Management of acromegaly with DCM requires a multidisciplinary team for perioperative care addressing impaired airway and cardiac function. Thorough airway assessment and adherence to stepwise difficult airway protocols are imperative for successful airway management. Cardiac complications can be minimised by following DCM-specific anaesthetic principles.

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