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Case Report

Anesthetic Management for Rhinoplasty in a Patient with a History of Bilateral Adrenalectomy Due to Controlled Cushing's Syndrome: A Case Report

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ABSTRACT

Bilateral adrenalectomy, in the event of elective surgery, poses problems for an anesthetic manager due to hemodynamic instability, glucocorticoid replacement dependency, adrenal insufficiency, or a whole series of their associated endocrine disorders, one of which is hypothyroidism. This case report deals primarily with the perioperative considerations and management of the patient with Cushing's syndrome, who was planned for elective rhinoplasty following bilateral adrenalectomy. A 33-year-old woman who underwent bilateral adrenalectomy in childhood due to Cushing's syndrome came for elective rhinoplasty to correct post-traumatic nasal septal deviation. The preoperative workup revealed severe hair loss, dry skin, symptoms of orthostatic hypotension, and a systolic blood pressure reading consistently below 80 mmHg. Laboratory investigations gave evidence of elevated TSH (18.9 mIU/L), suggestive of hypothyroidism. Therefore, she was referred to an endocrinologist, and treatment with levothyroxine and fludrocortisone was initiated. An improvement in thyroid function was established a month later (TSH: 1.9 mIU/L), and hypotension was controlled. Surgery was scheduled after getting approval from the anesthesiology team and a detailed risk discussion with an informed patient consenting to proceed. During surgery, constant monitoring of the patient's vitals was carried out. Everything went on very well, and the patient was discharged, stable. Among challenging patients such as those with adrenal insufficiency, careful preoperative evaluation, hormone imbalance correction, and proper steroid supplementation play a vital role in avoiding adrenal crisis states during or after surgery. Effective teamwork is achieved between anesthesiologists, endocrinologists, and surgeons in endeavoring to make a surgical outcome safe and successful.

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Introduction

It is a rare endocrine disease that results from prolonged glucocorticoid hypersecretion. Ectopic, adrenal-derived, and pituitary adenoma sources are possible. Patients get a classic presentation of symptoms, which are found in features such as moon face, buffalo hump, evidence of hirsutism, osteoporosis, diabetes, hypertension, and proximal muscle weakness [1]. For the patients who still have hypercortisolism after an unsuccessful medical treatment attempt or after pituitary surgery, they can receive definite treatment through bilateral adrenalectomy, but such treatment comes with the price of lifelong adrenal insufficiency and necessary lifelong hormone replacement therapy and close medical attention [2-3]. These patients are at risk of adrenal crisis during a time of physiological stress due to surgery. In order to improve perioperative management, the preoperative preparation must include adjustment of steroid regimens, stabilization of blood pressure, and arrangements for electrolyte replacement [4]. Given their potential for HPA axis suppression, some anesthetic agents should be avoided: for example, etomidate [5]. Furthermore, rhinoplasty presents another consideration, with risks of bleeding, fluctuations in blood pressure, and stress responses, which demand careful intraoperative management, including blood pressure monitoring, avoiding rapid hypotensive events, and cautious use of epinephrine-containing local anesthetics [6]. This case report describes a 33-year-old woman with a history of Cushing's syndrome and prior bilateral adrenalectomy, admitted to Seyyed al-Shohada Hospital in Jahrom for elective rhinoplasty. Given this patient’s complex endocrine profile, there may be unique challenges in anesthesia. Simultaneously, it emphasizes the need for teamwork in application designs and customizations within anesthesia management.

Case Report

A 33-year-old woman desired rhinoplasty because she had a deviated septum and external deformity. She also recalled nasal trauma and complained of snoring with some feeling of oxygen blockage during sleep. The patient was diagnosed with Cushing's syndrome in early childhood, characterized by a typical moon facies, buffalo hump, and severe hirsutism. Bilateral adrenalectomy was performed when she was six years old, and she had not undergone consistent follow-up thereafter for endocrine assessment. During the rhinoplasty assessment, the patient reported some history of heavy hair loss, dry skin from time to time, and a few intermittent episodes of orthostatic hypotension, with blood pressure recorded between 70/50 mmHg and 80/60 mmHg. This clinically led to a referral to the anesthesiology department for preoperative evaluation. During the preliminary anesthetic evaluation, the patient was documented to have a blood pressure reading of 78/54 mmHg. Laboratory results later revealed elevated TSH levels, at 18.9 µIU/mL, confirming hypothyroidism and thereby establishing the endocrine association. At the time of referral, she was on a 5 mg/day oral prednisolone regimen. Owing to continued hypotension secondary to elevated TSH, levothyroxine (50 µg/day) and fludrocortisone (100 µg/day) were started. Following 30 days of hormone replacement therapy, the patient achieved a normalized thyroid hormonal state (TSH: 1.9 µIU/mL) with ACTH measured at 14 pg/mL and blood pressure stabilization, after which the anesthetic team allowed her to be fit for surgery, and the risks inherent to the procedure were duly articulated to her. The endocrinology recommendation regarding perioperative management was to give intravenous hydrocortisone (100 mg) prior to induction of anesthesia and then to administer 100 mg every 8 hours for 24 hours with gradual tapering down to her maintenance dose; to avoid etomidate owing to its inhibitory effect on adrenal steroid production; to induce anesthesia slowly and gently to prevent any possibility of hypotension; and to perform laryngoscopy with care and gentleness with the head in a neutral position so as to avoid a sudden hypertensive response. Pre-induction monitoring incorporated ECG, pulse oximetry, ETCO2, and an invasive arterial line. Induction with midazolam 2 mg, fentanyl 100 µg, propofol 80 mg titrated to effect, and atracurium 30 mg was done slowly and gently, still with avoidance of hypotension (SBP maintained at >100mmHg). It was necessary to monitor hemodynamics closely because of the fact that the patient was unable to respond to stresses with an increase in cortisol production because of bilateral adrenalectomy. During the procedure, the patient maintained a stable blood pressure state. Throughout the surgery, mean arterial pressure (MAP) readings were maintained between 70 and 85 mmHg, and heart rate (HR) between 60 and 75 bpm. Mid-surgery, the patient developed a short-lived period of hypertension following the administration of an epinephrine injection, which was promptly treated by administering two IV nitroglycerin boluses of 50 µg each. The blood pressure was recorded every five minutes during the procedure; the rest of the vital signs were continuously monitored. Toward the end of the surgery, the patient was extubated uneventfully after full reversal of neuromuscular blockade with neostigmine (2.5 mg) and glycopyrrolate (0.4 mg), with a TOF ratio greater than 0.9, and transferred to the recovery room in stable condition with an SpO_2 of 98% on room air, an RR of 12 breaths per minute, and stable hemodynamics.

Discussion

The perioperative care of patients who have undergone a previous bilateral adrenalectomy poses unique challenges for surgical and anesthetic teams, especially in elective settings such as rhinoplasty. Ensuring patient safety in these cases demands rigorous hemodynamic monitoring and carefully managed hormone therapy throughout the entire operative period.

Because these patients lack adrenal glands, they cannot produce essential endogenous glucocorticoids, including cortisol. Consequently, it is absolutely critical to administer glucocorticoid and mineralocorticoid replacement therapy prior to surgery to avert potentially life-threatening adrenal insufficiency or an adrenal crisis [7]. It is important to note that while bilateral adrenalectomy is a definitive solution for managing hypercortisolism in Cushing's syndrome, it is not without significant long-term implications. Patients face a lifelong dependency on steroid supplements and remain at a perpetually elevated risk of adrenal crisis when confronted with physiological stressors, including surgery.

O'Riordain et al. (1994) confirmed that while this procedure successfully normalizes cortisol levels, it mandates exceptionally precise postoperative care to prevent complications, notably acute adrenal insufficiency. This concern becomes especially relevant in elective and

cosmetic surgeries, like rhinoplasty, where hemodynamic stability and the stress response must be tightly controlled [8].

Importantly, although steroid replacement therapy is generally deemed necessary following bilateral adrenalectomy, Shen et al. (2006), in a study involving 331 patients, found that individualized evaluation is crucial. Their findings indicated that many patients

reached stable conditions without signs of adrenal insufficiency by following a standardized tapering protocol of hydrocortisone. These results highlight the need for personalized hormonal replacement and close monitoring of the hypothalamic-pituitary-adrenal (HPA) axis, especially during surgical stress [9].

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Induction agents must be carefully selected in such patients. Due to the deficiency of adrenal hormones (e.g., cortisol and aldosterone), anesthetic drugs may have exaggerated hemodynamic effects. The use of propofol requires caution due to its potential for significant hypotension, whereas benzodiazepines like midazolam are generally well-tolerated [10]. Opioids like fentanyl can also cause hypotension and respiratory depression. In patients with bilateral adrenalectomy, stress response depends entirely on exogenous steroid replacement.

Raff et al. (1987) demonstrated that the combination of fentanyl and dexamethasone effectively blunts the ACTH response to surgical stress by reducing CRH release from the hypothalamus. Using supplementation may represent a safe option for anesthesia induction in such patients [11].

Managing hemodynamic instability remains one of the main challenges during anesthesia in patients with adrenal disorders, including pheochromocytoma, or those with a history of adrenalectomy. In a recent study, Kim et al. (2023) reported that administering dexmedetomidine at a rate of 0.5 mcg/kg/h after induction led to a marked reduction in systolic, diastolic, and mean arterial pressures, as well as heart rate, throughout surgery. Their findings indicate that dexmedetomidine can help maintain intraoperative hemodynamic stability without significantly affecting plasma catecholamine concentrations, making it a valuable option for this high-risk patient group [12].

For patients with adrenal disorders such as Cushing's syndrome or pheochromocytoma, neuromuscular blockers need to be given carefully. Because of underlying metabolic abnormalities or long-term steroid therapy, their response to muscle relaxants can be unpredictable or sometimes prolonged. As reported by Domi et al., ongoing neuromuscular monitoring is key in these situations, as it helps ensure safe extubation and prevents residual paralysis. In patients with chronic steroid-induced myopathy, dose adjustments may be necessary [13].

Following surgery, gradual tapering of steroids (e.g., prednisolone) to a maintenance dose is essential to avoid adrenal insufficiency.

In addition, blood pressure and electrolyte levels (especially sodium and potassium) must be closely monitored [9,13].

Remarkably, this patient showed the onset of severe hypothyroidism (TSH: 18.9). Takasu et al. (1993) reported that autoimmune thyroid dysfunction can develop after bilateral adrenalectomy or following the suppression of hypercortisolism, even in patients without pre-existing thyroid disease or detectable antibodies. In their study, 2 out of 20 patients experienced transient thyroid dysfunction in the postoperative period [14].

In the same way, Russo et al. (2010) described a case of severe hypothyroidism following bilateral adrenalectomy in a 33-year-old woman with

Cushing's syndrome and bilateral adrenal hyperplasia. Despite achieving good control of hypercortisolism, the patient's thyroid function continued to deteriorate, eventually leading to clinical signs of hypothyroidism [15]. These findings highlight the importance of monitoring thyroid function after adrenalectomy and suggest that early intervention may be required if thyroid dysfunction emerges [14–15].

Conclusion

Careful preanesthesia preparation, correction of hormonal derangements, and steroid coverage against a possible risk of adrenal crisis during or after the surgery are required for a patient with adrenal insufficiency. This group of specialists, working with various collaborators in this multidisciplinary venture, includes the anesthetists, endocrinologists, and surgeons, who will work together for the safety and surgical success of all their patients.

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Data availability

Data is available on request due to privacy/ethical restrictions.

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