Preoperative assessment of patient with APECED syndrome

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Abstract:

Autoimmune polyendocrinopathy-candidiasis-ectodermal-dystrophy (APECED) or autoimmune polyglandular syndrome type 1 (APS-1) is a rare autosomal recessive genetic disease due to mutations in the AIRE (AutoImmune REgulator) gene. A 40 year old female patient who suffers from the above mentioned condition was admitted to the hospital due to ureterolithiasis and hydronephrosis of the left kidney. When a patient suffers from an autoimmune disease such as APECED syndrome, preoperative preparation and assessment is of key importance in inducing and maintaining safe anaesthesia. Regarding the major role that the adrenal gland plays in adaptive response to stress, a careful evaluation of corticoid therapy, both chronic and supplemental, was performed. In patients with primary adrenal insufficiency, the major clinical features of adrenal insufficiency are consequences of cortisol deficiency and also volume depletion and hypotension, resulting mainly from mineralocorticoid deficiency as well. Therefore, when patients with impaired hypothalamo-pituitary-adrenal (HPA) axis undergo a surgical procedure, a state of enhanced stress, preoperative preparation must be done in terms of administration of high doses of hydrocortisone to enable the patients organism to cope with very high stress as surgical stimuli as well as maintaining euvolemic and electrolyte balance.
This case has shown that comprehensive preoperative preparation and assessment of patients with primary immune deficiencies can minimize surgical complications and optimize patient outcomes. It is of key importance to predict and address potential metabolic disturbances when people with this or similar conditions that include impairment in HPA axis undergo surgical procedure because lack of preoperative optimization can lead to severe complications during surgery as well as in postoperative period.

Keywords: APECED, autoimmune disease, anaesthesia, preoperative

Sažetak:

Preoperativna priprema bolesnika sa APECED sindromom

Autoimuna poliendokrinopatija-kandidijaza-ektodermalna-distrofija (APECED) ili autoimuni poliglandularni sindrom tip 1 (APS-1) je rijetka autosomno recesivna genetska bolest uzrokovana mutacijama u genu AIRE (AutoImmune REgulator). Bolesnica stara 40 godina koja boluje od navedenog stanja primljena je u bolnicu zbog ureterolitijaze i hidronefroze lijevog bubrega. Kada osoba boluje od autoimune bolesti kao što je APECED sindrom, preoperativna priprema i procjena su od ključne važnosti za indukciju i održavanje sigurne anestezije. S obzirom na glavnu ulogu koju nadbubrežna žlijezda ima u adaptivnom odgovoru na stres, provedena je pažljiva procjena terapije kortikoidima, kako kronične tako i dopunske. U bolesnika s primarnom insuficijencijom nadbubrežne žlijezde, glavna klinička obilježja insuficijencije nadbubrežne žlijezde posljedica su nedostatka kortizola, a

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također i deplecije volumena i hipotenzije, što je također posljedica nedostatka mineralokortikoida. Stoga, kada pacijenti s oštećenom hipotalamo-hipofizno-nadbubrežnom (HPA) osovinom prolaze kroz kirurški zahvat, koji je stanje pojačanog stresa, mora se obaviti preoperativna priprema u smislu primjene visokih doza hidrokortizona kako bi se organizam bolesnika mogao nositi s vrlo visokim stres kao kirurški podražaj kao i održavanje euvolemijske i ravnoteže elektrolita.
Ovaj je slučaj pokazao da sveobuhvatna prijeoperacijska priprema i procjena bolesnika s primarnim imunološkim nedostatkom može minimizirati kirurške komplikacije i optimizirati ishode bolesnika. Od ključne je važnosti predvidjeti i riješiti potencijalne metaboličke poremećaje kada se osobe s ovim ili sličnim stanjima koja uključuju oštećenje HPA osi podvrgnu kirurškom zahvatu jer nedostatak preoperativne optimizacije može dovesti do teških komplikacija tijekom operacije kao iu postoperativnom razdoblju.

Ključne riječi: APECED, autominuna bolest, anestezija, preoperativno

Introduction

Autoimmune polyendocrinopathy-candidiasis-ectodermal-dystrophy (APECED) or autoimmune polyglandular syndrome type 1 (APS-1) is a rare autosomal recessive genetic disease due to mutations in the AIRE (AutoImmune REgulator) gene. The clinical diagnosis is classically based on the presence of at least two of the three main components: chronic mucocutaneous candidiasis, hypoparathyroidism and primary adrenal insufficiency (1). It causes a loss in central immune tolerance, failure to eliminate autoreactive T cells in the thymus, and their escape to the periphery (2).
Hereby is presented preoperative assessment and anaesthetic approach in the case of a female patient with APECED syndrome who was admitted to the Urology department for operative treatment of ureterolithiasis associated with second degree hydronephrosis of left kidney.

Case report

A 40 year old female patient was admitted to the hospital due to ureterolithiasis and hydronephrosis of left kidney. The patient had many clinical conditions associated with APECED syndrome such as Mb Addison, hypoparathyroidism, liver lesions, keratoconjunctivitis, diabetes mellitus type 1, onychomycosis, hyperlipidemia (3) and also underwent multiple surgeries regarding to colon perforation. The patient was assessed by anaesthesiologist and was assigned ASA III (American Society of Anesthesiologists score is a subjective assessment of a patient's overall health that is based on five classes) due to severe autoimmune syndrome combined with many comorbidities that are associated with the primary diagnosis. Apart from that, her physical condition was satisfying. She was cardiopulmonary compensated with preoperative blood pressure of 140/80 mmHg and heart rate of 50 beats per minute. Past anaesthetic procedures have passed without complications. Nevertheless, when a patient suffers from an autoimmune disease such as APECED syndrome, preoperative preparation and assessment is of key importance in inducing and maintaining safe anaesthesia as well as postoperative care. Regarding the major role that the adrenal gland plays in adaptive response to stress, which was hindered due to Mb Addison, a careful evaluation of corticoid therapy, both chronic and supplemental, was performed. In patients with primary adrenal insufficiency, the major clinical features of adrenal insufficiency are consequences of cortisol deficiency and also volume depletion and hypotension, resulting mainly from mineralocorticoid deficiency as well (4). Her chronic steroid therapy was continued preoperatively, consisting of 15 mg of hydrocortisone and 50 mcg of fludrocortisone. Additionally, another 100 mg of hydrocortisone was given intravenously on the day of surgery and the first postoperative day.
Regarding diabetes mellitus, the patient was on chronic insulin regimen that included long acting insulin (Degludec) before bedtime and fast acting insulin (Aspart) right after meals during the day. The dose of long acting insulin was halved the day before and fast acting insulin was omitted on the day of surgery. Blood glucose levels were often measured starting on admission to avoid hypo- or hyperglycemia, and safe target range was achieved with fast acting insulin. After careful preoperative preparation, the patient arrived at the operating room. Standard noninvasive monitoring was set up and the patient was preoxygenated with 100% oxygen by mask. After an anaesthetic induction with midazolam, sufentanil, propofol and rocuronium, the patient was intubated on the first attempt. As mentioned before, after induction, 100 mg was administered of SoluCortef (hydrocortisone). The monitoring was then extended in the way that SedLine was connected as well as invasive blood pressure (a. radialis lat. dex.). Intravascular euvolemic was maintained with crystalloids. Otherwise, the intraoperative course was uneventful. After the procedure, the neuromuscular blockade was reversed, the patient was awakened, extubated and sent to the Urology de-

partment. In the aftermath, the patient has successfully recovered and returned to her original chronic therapy regimen.

Discussion

APECED syndrome is an autoimmune disease, caused by mutations in the AIRE gene that codes for a protein called the autoimmune regulator. Those mutations reduce or eliminate the function of the autoimmune regulator protein that helps the body distinguish its own proteins and cells from those of foreign invaders (such as bacteria, fungi, and viruses). This reaction, which is known as autoimmunity, results in inflammation and can damage otherwise healthy cells and tissues (5). This causes damage to, among others, adrenal glands and patients with APECED syndrome usually suffer from Addison disease. Therefore, those patients are usually given hydrocortisone as part of their chronic therapy.

Primary adrenal insufficiency (Addison's disease) is due to adrenocortical disease, while secondary and tertiary adrenal insufficiency are due to disorders of the pituitary gland (ACTH secretion) or the hypothalamus (CRH secretion). Primary adrenal insufficiency is associated with both cortisol and mineralocorticoid deficiency. In contrast, secondary and tertiary adrenal insufficiency are associated with cortisol, but not mineralocorticoid deficiency, because aldosterone is regulated primarily by the renin-angiotensin system, which is independent of the hypothalamus and pituitary.

In this case cortisol and aldosterone cannot be secreted normally. Cortisol has a number of effects on the body that are thought to be carried out in order to help the body deal with a stressor that lasts longer than a few minutes. It acts to increase circulating levels of glucose in your blood as well. As glucose is a crucial energy source for our cells, this also provides our body extra energy to deal with the stressor. Also, cortisol acts during the experience of a serious stressor to inhibit processes that are deemed to be of lesser importance at the time (6). Clinical manifestations of mineralocorticoid deficiency include hyponatremia, hypovolemia, hypotension, hyperkalemia, and metabolic acidosis (7).

When patients with impaired HPA axis need to undergo a surgical procedure, which is a state of enhanced stress, preoperative preparation must be done in terms of administration of high doses of hydrocortisone to enable the patients organism to cope with very high stress as surgical stimuli as well as maintaining euvolemic and electrolyte balance.

Conclusion

This case has shown that comprehensive preoperative preparation and assessment of patients with primary immune deficiencies can minimize surgical complications and optimize patient outcomes. It is of key importance to predict and address potential metabolic disturbances when people with this or similar conditions that include impairment in hypothalamo-pituitary-adrenal (HPA) axis undergo surgical procedure because lack of preoperative cortisol optimization and poor glycemia regulation can lead to severe complications during surgery as well as in postoperative period. The use of stress doses of glucocorticoids has become a common perioperative practice for patients on glucocorticoid therapy.The current approach is to determine glucocorticoid coverage based upon the patient's history of glucocorticoid intake, as well as the type and duration of surgery.

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Conflict of interess

No conflict of interess to declare

Ethical approval

For every elective and urgent procedure in our Hospital, it is required to obtain an informed consent form. The patient had signed the informed consent form and therefore gave the Hospital permission to perform procedures as well as use the data for scientific purposes with strong protection of personal information.

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