Anesthetic challenges of Allgrove's triple A syndrome

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Abstract:

Allgrove's Triple A syndrome is an autosomal recessive disorder characterized by the triad of primary adrenal insufficiency, achalasia cardia and alacrima. The perioperative period poses significant anesthetic challenges due to the risk of adrenal crisis and aspiration related to achalasia. The possible presence of autonomic dysfunction (4A syndrome) further complicates the anesthetic management. Here we describe the successful perioperative management of an adult with Allgrove syndrome, highlighting the importance of stress-dose corticosteroids and meticulous perioperative care.

Key words: Achalasia, Adrenal crisis, Allgrove syndrome, Anaesthesia

Case description:

A 32-year-old male weighing 55 kg, diagnosed with Allgrove syndrome, presented for laparoscopic pyelolithotomy for a right pelvi-ureteric junction calculus. He had been diagnosed at the age of 15 following evaluation for a febrile illness from our institute itself, during which hyperpigmentation of the knuckles and tongue, dysphagia, and alacrima were noted.[1] Endocrine evaluation demonstrated a low serum cortisol of 1.3 mcg/dL and markedly elevated adrenocorticotropic hormone -ACTH (1250 pg/mL), consistent with ACTH-resistant adrenal insufficiency. Barium swallow and ophthalmological assessment confirmed achalasia and alacrima, respectively. He had been maintained on oral prednisolone (10 mg/day) since diagnosis. He still has swallowing difficulties, absent tear production, and occasional regurgitation

Three years prior, he experienced a hypotensive episode suggestive of adrenal crisis (AC) following a ureteroscopic procedure, which resolved with supportive management. He had also undergone uneventful pneumatic dilatation for achalasia. There was no history of muscle weakness, speech abnormalities, abnormal sweating, seizure or corneal ulcerations. Preoperative systemic evaluation, including bedside autonomic function tests, was unremarkable.

Standard fasting and aspiration prophylaxis were followed. Premedication include intravenous midazolam 1mg, fentanyl 2µg/kg and dexmedetomidine 1µg/kg as slow bolus. Apart from standard monitors invasive blood pressure and central venous pressure were monitored. Ringer lactate was used for fluid maintenance. A nasogastric tube was inserted for gastric decompression.

General anesthesia was induced with titrated propofol, and tracheal intubation was performed under atracurium and cricoid pressure with a cuffed endotracheal tube. Anesthesia was maintained with isoflurane in an air–oxygen mixture and dexmedetomidine infusion (0.5 µg/kg/hr). Mechanical ventilation was delivered in pressure-controlled mode with continuous capnography. Eye protection was ensured using lubricating ointment and soft padding. The patient was positioned slowly for pyelolithotomy with appropriate padding of pressure points.

At induction, hydrocortisone 100 mg IV was administered, followed by a continuous infusion at 10 mg/hour. Hourly blood glucose, electrolyte and blood gas analyses were performed and remained within normal limits. A single episode of hypotension responded promptly to ephedrine (6 mg IV). The intraoperative period was otherwise uneventful.

Postoperatively, the patient was extubated smoothly and monitored in the ICU. To safeguard against high chance of AC, hydrocortisone infusion continued for 24 hrs, after which oral prednisolone 10 mg daily was resumed. Blood glucose and electrolyte levels remained stable, and the postoperative course was uneventful.

Discussion:

Allgrove syndrome, first described by Allgrove et al in 1978 [2], is a multisystem disorder involving ACTH–resistant adrenal insufficiency, achalasia and alacrima. The causative mutation in the *AAAS* gene, located on chromosome 12q13, encodes the ALADIN protein, which plays a critical role in autonomic nervous system regulation.[3] Neurological manifestations such as ataxia, hyperreflexia, and developmental delay may coexist. When autonomic dysfunction is present, the syndrome is referred to as 4A syndrome. Anaesthesiologist usually encounter these cases for oesophageal dilatation. [4,5,6]

All components of Allgrove syndrome require vigilant perioperative assessment and management. Inadequately treated adrenal insufficiency or any stress like surgery or infection can precipitate AC with hypotension, shock, electrolyte imbalance (hyponatremia, hyperkalemia) and hypogylcemia perioperatively.[2] Preoperative optimization with corticosteroid replacement is

essential. In our case, stress-dose steroids were administered intraoperatively and continued in the postoperative period to ensure adequate serum cortisol levels. Blood glucose monitoring is critical due to the risk of both steroid-induced hyperglycemia and adrenal crisis–induced hypoglycemia. [3]

Signs of autonomic dysfunction should be assessed preoperatively, as this may necessitate a slower anaesthetic induction and cautious patient positioning.[4] As achalasia cardia can cause regurgitation and aspiration, any history of aspiration pneumonitis should be asked for. Preoperative aspiration prophylaxis, nasogastric decompression, head-end elevation, and rapid sequence induction are recommended. Alacrima and suppressed corneal reflexes under general anesthesia increase the risk of corneal injury, warranting eye protection with lubricants and soft padding essential. Maintaining hemodynamic stability, avoiding abrupt changes in intravascular volume, and close postoperative surveillance are vital in these patients.

Conclusion:

Although rare, Allgrove syndrome present distinct anesthetic challenges. A focused perioperative strategy encompassing Stress-dose corticosteroids, Slow induction and positioning, and Stable hemodynamics—the "Triple S" approach—can help ensure safe and successful anesthetic management in these complex cases.[5]

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