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Multimodal Anesthesia-Analgesia for Patients with Huntington's Disease: A Case Series

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Abstract

Objective. The aim of this article is to demonstrate that the anesthetic challenges faced by patients with Huntington's disease (HD) undergoing major surgery, can be successfully managed using modern, opioid-sparing, multimodal strategies. **Case Report.** We present two case studies involving HD patients who received general anesthesia. The first patient also suffered from alcohol use disorder (AUD) and underwent thoracoscopic pleural biopsy. The second patient was scheduled for laparoscopic hemicolectomy. Due to the unavailability of ultrasound and excessive choreic movements, locoregional anesthetic techniques were not feasible. Both patients were successfully managed using similar opioid-sparing, multimodal anesthetic-analgesic strategies, and had uncomplicated postoperative courses. In both patients, a dexmedetomidine infusion was used, and both reported a brief amelioration of their chorea postoperatively. **Conclusion.** This is the first reported case of a patient with Huntington's disease with concurrent AUD undergoing general anesthesia using modern, opioid-sparing, multimodal, anesthetic-analgesic strategies. Even when the advantages of locoregional anesthesia are not available, HD patients can be safely and effectively treated using modern anesthetic methods that minimize opioid use and its associated side effects.

Key Words: Alcohol Use Disorder ▪ Chorea ▪ Dexmedetomidine ▪ Huntington Disease ▪ Non-opioid Analgesic.

Introduction

Huntington's Disease (HD) is a rare condition affecting 5-7 per 100,000 people, characterized by the typical adult onset of irreversible motor, psychiatric and cognitive symptoms, and progressive neurodegeneration (1). The literature on the anesthetic management of patients with HD is scarce, mostly in the form of individual case reports (2-4), with most focusing on the safe use of various pharmacological agents, summed up in the review by Kivela et al. (1). Some papers illustrate the use of remifentanil (3) and dexmedetomidine (4), for improved patient outcome.

The objective of this article is to illustrate that HD patients undergoing major surgery can be effectively managed by implementing modern, opioid-sparing, multimodal strategies.

Case Reports

We report the successful anesthetic management of two HD patients using different multimodal anesthesia-analgesia strategies. A 69-year-old male patient, weighing 78 kg, (BMI 25.45 kg/m^2), underwent thoracoscopic pleural biopsy and talc pleurodesis due to a large cyst on the left hemithorax. A 82-year-old female patient, weighing 61 kg, (BMI 26.4 kg/m^2) was scheduled for laparoscopic right hemicolectomy due to colon cancer. Both reported no family history of HD and it was confirmed by genetic testing. Their chorea mainly affected their upper body, causing moderate gait problems, and the female patient also reported depression treated with escitalopram, and dysphagia with frequent episodes of choking. Both patients displayed mood swings, treated with quetiapine

and benzodiazepines, respectively. Neither patient reported autonomic dysfunction upon evaluation using orthostatic Heart Rate (HR) and Blood Pressure (BP) tests. Patients reported excessive chorea in the upper body, rendering an epidural catheter placement perilous, due to probable accidental removal. Due to the unavailability of ultrasound, loco-regional anesthetic techniques were not feasible.

The male patient reported alcohol use disorder, which further complicated his anesthetic management. He also reported chronic obstructive pulmonary disease (COPD), stage 2B, noting poor compliance with his treatment. During preoperative evaluation, he exhibited wheezing. He was prescribed methylprednisolone 12.5 mg IV b.i.d, nebulized ipratropium and budesonide b.i.d., in order to reduce the incidence of postoperative pulmonary complications. His premedication included bromazepam 1.5 mg b.i.d., esomeprazole 40 mg b.i.d., domperidone 10 mg b.i.d., and he was instructed to take his quetiapine. He reported a history of abdominal aortic aneurysm repair surgery, after which he was on clopidogrel. The clopidogrel had not been discontinued, but the patient initially withheld that information. He admitted taking clopidogrel 3 days before, during the insertion of the intraarterial cannula. After careful consideration of the patient's bleeding risk, together with the patient's surgeon, it was decided to continue with the surgery due to the patient's advanced condition, as he had rapidly lost 7 kg in the month prior.

The patient reported a preoperative BP of 130/80 mmHg, HR of 89 bpm and SpO_2 of 96% in room air. Standard ASA monitors were used and an arterial 20G cannula was inserted in the right radial artery. Anesthesia was induced with fentanyl 2μg/kg, lidocaine 1mg/kg, propofol infusion using the Target Controlled Infusion (TCI) Schneider protocol set at 7μg/ml, and rocuronium 1 mg/kg for a modified rapid sequence induction. The patient was intubated with a left-sided Robertshaw double-lumen tube and placed in the right lateral decubitus position. One Lung Ventilation was then initiated, with Volume Control Auto-flow, Tidal Volume at 4 ml/kg ideal body weight, and respiratory rate at 16 bpm titrated by arterial CO_2. After a lung recruitment maneuver, the patient's PEEP was set at 6 mmHg, and FiO_2 at 40%, titrated by arterial PO_2. Anesthesia was maintained by TCI propofol infusion set at 4μg/ml, supplemented with a dexmedetomidine 0.5 μg/kg loading bolus over 10 minutes, followed by an infusion set at 1μg/kg/h. Pain management included parecoxib 40 mg, paracetamol 1g, dexamethasone 8mg, magnesium sulphate 2.5 g, morphine 2 mg and two additional boluses of fentanyl, for a total dose of 300 μg. An infusion of vitamin B complex was administered to prevent Wernicke's encephalopathy. After a 5-minute episode of hypertension that resolved with the administration of Clonidine 60 μg, the patient became hemodynamically stable, with BP and HR not deviating more than 20% from baseline. The operation lasted 50 minutes. Postoperative pain was managed with tramadol IV 100 mg t.i.d. and paracetamol IV 1 g t.i.d. Lorazepam 1 mg q.i.d. was prescribed in order to prevent acute alcohol withdrawal.

The female patient was premedicated with esomeprazole 40 mg b.i.d., and domperidone 10 mg b.i.d., and was instructed to take her escitalopram. She reported a preoperative BP of 136/73 mmHg, HR of 54 bpm, and SpO_2 of 99% in room air. Standard ASA monitoring was established and an arterial 20G cannula was inserted in her right radial artery. Anesthesia was induced with fentanyl 2μg/kg, lidocaine 1mg/kg, propofol 2mg/kg and rocuronium 1mg/kg, for a modified rapid sequence induction. Anesthesia was maintained by a dexmedetomidine 0.5μg/kg loading bolus over 10 minutes, followed by an infusion set at 0.7μg/kg/h, a lidocaine 0.5 mg/kg loading bolus followed by an infusion set at 0.7 mg/kg/h and desflurane set at approximately 1 MAC. Post-induction, mild bradycardia (47 bpm) with mild hypotension were treated with 2 boluses of ephedrine 10 mg. During the initiation of abdominal insufflation with CO_2 the patient suffered a brief episode of severe bradycardia (minimum Heart Rate: 32 bpm) that quickly resolved after pneumoperitoneum deflation and administration of atropine 0.5 mg. Insufflation was then gradually restarted without issues, with

no further instability. She was placed supine, in a 10° Trendelenburg position. Pain management included dexketoprofen 50 mg, paracetamol 1g, dexamethasone 4mg, ketamine 30 mg, magnesium sulphate 2.5 g, morphine 3mg and additional fentanyl, for a total dose of 200 μg. The operation lasted 110 minutes. Postoperative pain was managed with a PCA pump with morphine, ketamine and midazolam for 3 days, alongside paracetamol IV 1 g t.i.d.

Additionally, ondansetron 4mg was administered to both patients for nausea prevention. Their wounds were infiltrated with ropivacaine 0.75%, 1 mg/kg. Dexmedetomidine and lidocaine infusions were discontinued ten minutes before the end of surgery. Their surgeries were uncomplicated, and both were extubated following a bolus of sugammadex 2 mg/kg. They were observed in the post-anesthesia care unit, reporting minimal pain (Visual Analogue Scale = 1-2). Initially their chorea improved, but returned to baseline after approximately 1h. Both had uneventful postoperative courses and were soon discharged from hospital.

Discussion

HD is an autosomal dominant disease, caused by a trinucleotide (CAG) repeat expansion in the huntingtin gene on chromosome 4, producing a mutant protein, with an extended polyglutamine repeat (5). Microglial activation triggers an inflammatory response in these patients, causing neurodegeneration and cellular apoptosis, leading to HD's clinical manifestations (5). One of its most characteristic motor symptoms is chorea, which consists of involuntary, excessive movements that progress from facial twitches to whole-body movements. With disease progression, chorea gives way to bradykinesia, rigidity and akinesia. Due to pharyngeal muscle involvement, patients have an increased risk of choking and aspiration (3-5). The use of prokinetics that act on central dopamine receptors, such as metoclopramide, should be avoided, as they can exacerbate chorea (1). Conversely, domperidone, characterized by lower brain exposure (6), has not been reported to cause adverse effects in HD patients.

Autonomic Dysfunction is reported in some sources (7) as a frequent complication of HD; however, it has not yet been reported for patients with HD undergoing anesthesia (1). HD patients' response to succinylcholine is contradictory in population studies, with some describing atypical cholinesterase genotypes in HD patients, and others showing similar genotype distribution to normal controls (1). Increased sensitivity to barbiturates and benzodiazepines among patients with HD is noted in older reports, however, the dosages described were likely excessive (1).

The literature on the anesthetic management of patients with HD is quite scarce and mostly in the form of individual case reports (3, 4, 8) and retrospective reviews (1). Total Intravenous Anesthesia (TIVA) techniques with propofol and remifentanil have been demonstrated in HD patients, with the rapid recovery of airway reflexes reported.

In our study, both patients received dexmedetomidine, resulting in brief postoperative chorea alleviation, in accordance with other case reports (4, 8). Both patients were managed using modern opioid-sparing, anesthetic-analgesic strategies, and had uneventful postoperative courses. Such approaches may help reduce post-thoracotomy pain syndrome incidence (9). By using dexmedetomidine, intravenous lidocaine, magnesium, ketamine, dexamethasone, paracetamol and Non-Steroidal Anti-Inflammatory Drugs, it is possible to effectively stabilize the sympathetic nervous system and reduce inflammation and postoperative pain, whilst minimizing the use of opioids and their associated side-effects (10). Opioid-sparing approaches offer additional advantages in the context of Alcohol Use Disorder (AUD), due to the expected higher effective dosage of opioids and associated side-effects (11). We suggest that these modern anesthetic approaches can be used safely in HD patients presenting for major surgery, with added benefits such as chorea amelioration.

Conclusion

To our knowledge this is the first case report of HD patients under general anesthesia using multimodal, opioid-sparing anesthetic strategies. Such tailored approaches may enhance patient outcomes, while reducing opioid-related side effects.

What Is Already Known on This Topic:

HD is a rare disorder and thus anesthetic management of HD patients is primarily documented in individual case reports. Most of these focus on the safe use of various pharmacological agents, with insufficient data to propose an ideal anesthetic strategy. Since 1966, fewer than 40 HD patients have been documented as having received general anesthesia. Moreover, these incidences of general anesthetics relied on older, opioid-based, anesthetic techniques.

What This Study Adds:

In contrast to previous reports, both patients in this study were managed using a modern clinical approach, with opioid-sparing, anesthetic-analgesic strategies, and had an uneventful postoperative course. Even when locoregional anesthesia is not feasible, tailored approaches, with newer anesthetic techniques, can optimize patient outcomes while minimizing opioid use and the related side-effects.

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Informed Consent: Informed consent was obtained from the patients for the publication of this case report.

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