ISSN: 1607-8322, e-ISSN: 2220-5799 Anaesthesia, Pain & Intensive Care
Vol 27(2); April 2023 DOI: 10.35975/apic.v27i2.2045

CASE REPORT REGIONAL ANESTHESIA

Post cervical spine surgery hyperpyrexia (108°F) in a patient with COVID-19: a case report

Nimisha Cherunghattil, MBBS, Chinmaya K. Panda, MD, PDF, Habib M. R. Karim, MD, DNB, IDCCM, Fellow NIV, Mishal Dhawan, MD, PDCC

Author affiliations:

1. Nimisha Cherunghattil, Department of Anesthesia, Critical Care & Pain Medicine. All India Institute of Medical Sciences, Raipur, India; E-mail: nimishanoufal333@gmail.com; ORCID: {org/0000-0001-8070-1808}
2. Chinmaya K. Panda, Department of Anesthesia, Critical Care & Pain Medicine. All India Institute of Medical Sciences, Raipur, India; E-mail: chinmaya.panda06@gmail.com; ORCID: {0000-0003-0340-314X}
3. Habib M. R. Karim, Department of Anesthesia, Critical Care & Pain Medicine. All India Institute of Medical Sciences, Raipur, India; E-mail: drhabibkarim@gmail.com; ORCID: {0000-0002-6632-0491}
4. Mishal Dhawan, Department of Anesthesia, Critical Care & Pain Medicine. All India Institute of Medical Sciences, Raipur, India; E-mail: mishaldhawan@gmail.com; ORCID: {0000-0003-3247-5441}

Corresponding Author: Dr. Habib Md Reazaul Karim, E-mail: drhabibkarim@gmail.com; Phone: +91-9612372585

ABSTRACT

Perioperative hyperpyrexia raises many questions and can cause permanent brain damage if left untreated. Malignant hyperthermia (MH), although uncommon, but sporadic cases continue to happen and it is potentially life-threatening. It is characterized by sudden rise of body temperatures to above 106° F or even more, and hypercapnia. It is usually associated with anesthetic exposure. However, not every hyperpyrexia is MH; a clinical examination, risk stratification, scoring, and logical approach are required to exclude MH in the postoperative patient. We present a case of rare postoperative hyperpyrexia caused by COVID-19. The patient underwent uneventful spine surgery under general anesthesia and developed hyperpyrexia on the first postoperative day. The case highlights the importance of a logical and systematic approach for excluding the causes of postoperative hyperpyrexia and aggressive management.

Abbreviations: CCU - Critical Care Unit; FiO_2 - Inspired fraction of oxygen; GA - General anesthesia; MH - Malignant hyperthermia; PCR - Polymerase chain reaction

Key words: Hyperpyrexia; Malignant Hyperthermia; COVID-19; Spine Surgery

Citation: Cherunghattil N, Panda CK, Karim HMR, Dhawan M. Post cervical spine surgery hyperpyrexia (108°F) in a patient with COVID-19: a case report. Anaesth. pain intensive care 2023;27(2):276–279; DOI: 10.35975/apic.v27i2.2045

Received: October 31, 2022; **Reviewed:** February 06, 2023; **Accepted:** February 15, 2023

1. INTRODUCTION

Hyperpyrexia (body temperature > 106.7°F (41.5°C) can be observed in patients with severe infections, central nervous system (CNS) hemorrhage, sepsis, malignant hyperthermia (MH), Kawasaki syndrome, etc. Grossly, the etiologies of postoperative pyrexia can be categorized as infectious, non-infectious, iatrogenic, drug-associated, and endocrine-related.[1] Postoperative hyperpyrexia is potentially life-threatening, and if it happens after general anesthesia (GA), especially following volatile anesthetics, the situation might indicate grave etiology like MH. Fortunately, MH is not very common as can be expected in such patients. Definitive diagnosis of MH is not always feasible, especially in countries with limited resources. Still, a logical and systematic approach based on the clinical manifestation, timing of the fever, and a few common laboratory tests can help to rule out the MH. Infection is another common cause and include surgical site infections and septicemia. COVID-19 induced hyperpyrexia has been described in the literature with almost 100% mortality.[2] However, hyperpyrexia caused

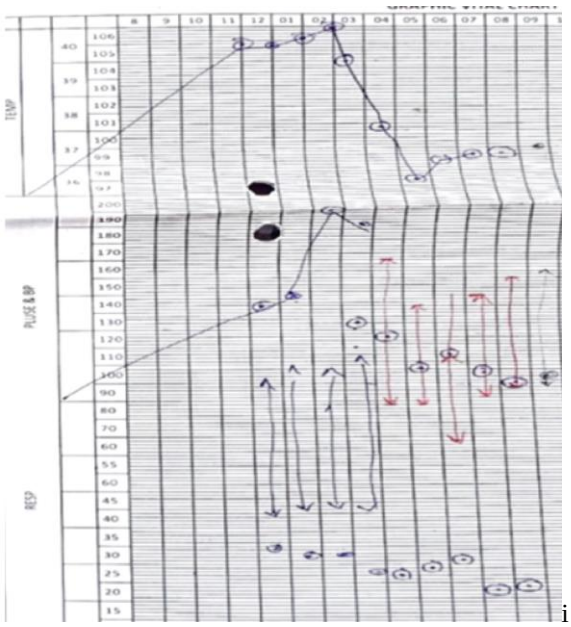

Figure 1: The graph is a section of the nursing monitoring sheet showing the temperature and vitals at that period.

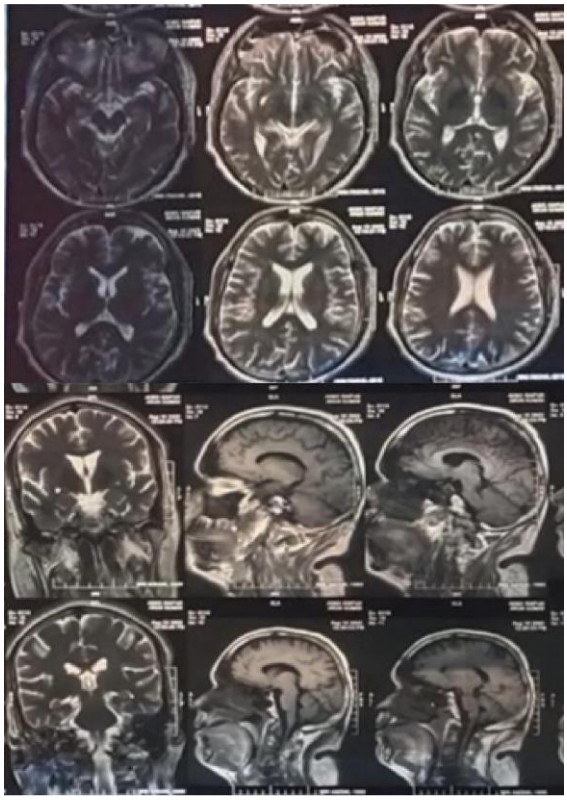

Figure 2: MRI films showing cystic changes in temporal lobes and hyperintensities in corona radiation of bilateral frontal lobes.

by COVID-19 on the first postoperative day and mimicking MH is uncommon.

2. CASE REPORT

A 36-year-old male, diagnosed with prolapse of C4-C5-C6 intervertebral discs with cord compression, was scheduled for anterior cervical discectomy and fusion.

GA was induced with fentanyl and propofol. Inj. vecuronium was used as a muscle relaxant, and isoflurane in air and oxygen was used for maintenance of anesthesia. The procedure was uneventful, muscle relaxation was reversed using neostigmine and glycopyrrolate, the trachea was extubated, and the patient was shifted to the neurosurgery high-dependency unit.

On the first postoperative day, he developed sudden onset high-grade fever with rigors, diaphoresis, and altered sensorium. He was moved to the critical care unit (CCU) for further management. The patient recorded the highest temperature of 108°F despite antipyretic measures (Figure 1). He was intubated and

sedated to relieve spasms and rigors under propofol deep sedation. Physical cooling measures, including body cooling with cold water sponging, and cold-water wash of the stomach and bladder were initiated immediately. Arterial blood gas (ABG) analysis showed pH 7.35, partial pressure of arterial carbon dioxide ($PaCO_2$) 32.4 mmHg, and partial pressure of arterial oxygen (PaO_2) 70 mmHg on 50% inspired oxygen (FiO_2). One brief episode of ventricular tachycardia was noted and was treated with amiodarone, followed by a prolonged QT interval treated with magnesium sulphate and hypotension treated with ionotropic support. Brain imaging ruled out any cerebrovascular accident (CVA) or CNS infection (Figure 2). The polymerase chain reaction (PCR) test for the COVID-19 came positive.

Subsequently patient had acute kidney injury due to rhabdomyolysis and myoglobinuria, which were treated with hydration and hemodialysis. During the CCU stay, his left complete lung was noted to be collapsed; bronchoscopic plug removal resolved it.

A tracheostomy was done on the 12th day. He was weaned off the ventilator on the 15th day, and discharged to the ward on the 21st day. On discharge, his vitals were stable, but he had limb spasticity, involuntary movements, and tremors. Magnetic resonance imaging (MRI) showed cystic changes in temporal lobes and hyperintensities in Corona radiation of bilateral frontal lobes, suggestive of hypoxic injury

of bilateral frontal lobes, suggestive of hypoxic injury (Figure 2). He was advised continued medical follow-up.

3. DISCUSSION

Perioperative hyperpyrexia is often considered MH, especially after GA. Until recently, MH was deemed non-prevalent in the Indian subcontinent, which has been proved wrong.[3,4,5] Our patient received a volatile agent during anesthesia for surgical correction and fixation of his spine, which might have triggered MH. However, MH is relatively uncommon and frequently presents immediately after or even during surgery, and hyperpyrexia without muscle rigidity and acidosis is mostly not a presenting feature.[3,6] Further, although we did not get the genetic analysis done, creatinine kinase, ABG, and clinical grading scale value of only 13 did not favor MH as a diagnosis in our case on the operative day.[7,8]

Further, our patient recovered from hyperpyrexia without the administration of dantrolene. Nevertheless, MH has been successfully managed without dantrolene.[5] It, however, upholds the need for dantrolene and its importance of all-time availability.[9]

Central temperature dysregulation can cause a shift in the thermostatic point, thereby leading to pyrexia. Our patient underwent spine surgery, unlikely to disrupt central temperature regulation, as seen in some CVA and CNS infections. On the other hand, exuberant immune response, microthrombus formation, and brain injury have been postulated to cause hyperpyrexia in COVID-19 patients. Nevertheless, infection and sepsis are the commonest cause of such fever, especially within the first three postoperative days.[10,11] Our patient did not show signs and evidence of common postoperative infections at the presentation; total leucocyte and differential leucocyte counts were normal, and the cultures were also negative. COVID-19-related hyperpyrexia was described in six cases in a report.[2] Unfortunately, entire hyperpyrexia patients expired. Although our patient required multiple organ support and had a prolonged CCU stay, he survived the stormy course. At discharge, his blood urea and serum creatinine were 92 mg% and 1.7 mg%, respectively. Urine output was normal; no acid-base imbalance and electrolyte imbalance were present.

Although our patient had exposure to isoflurane, which is linked with delayed MH, and showed myoglobinuria,[11,12] the lack of disproportionate rise of expired carbon-dioxide, acidosis, lack of muscle rigidity or spasms led us to exclude the diagnosis logically. Further, the timing of hyperpyrexia, positive evidence of COVID-19, and the Larach clinical grade scale aided us (Box 1). Genetic analysis could have given a better insight. Still, the facts that need consideration are that only some patients showing

genetic susceptibility develop MH even after exposure to triggering agents, and only few MH cases are explained by the genetic basis.[11,13]

4. CONCLUSION

Our case reiterates the need for aggressive management and organ support for perioperative hyperpyrexia. In the COVID-19 era, active infection in the surgical patient might pre-dispose to malignant hyperpyrexia. Further studies are needed to explore the relationship of COVID-19, increased immunogenicity and malignant hyperpyrexia. We stress the need of the availability of dantrolene sodium in every medical institution in which surgical department exists.

5. Acknowledgement

None

6. Institute Research Board statement

Case reports do not need institutional review and ethical approvals in our institute. We have obtained written informed consent from the patient to publish the report and images taken.

7. Conflict of interests

The authors declare no conflicts of interest.

8. Authors Contribution

CK: literature search, data collection, manuscript draft, and revision.

HMRK: literature search, data interpretation, manuscript editing, and revision

CKP: literature search, data interpretation, manuscript editing

MD: literature search, data collection, manuscript draft,

9. REFERENCES

1. Hages AM, Heitz J W. Fever, hyperpyrexia, and hyperthermia. In: Heitz J W (editor). Post-Anesthesia Care; Symptioms, Diagnosis, and Management 1st edition. Cambridge: Cambridge University Press; 2016, p.97-108.
2. Suwanwongse K, Shabarek N. Hyperpyrexia in patients with COVID-19. J Med Virol. 2020;92:2857-62. [PubMed] DOI:10.1002/jmv.26154
3. Khan TH. Malignant Hyperthermia. Anaesth Pain & Intensive Care 2016;20(2):254. [Full Text Link]
4. Ramanujam M, Gulati S, Tyagi A. Malignant hyperthermia: An Indian perspective. J Anaesthesiol Clin Pharmacol. 2019;35:557-8. [PubMed] DOI: 10.4103/joacp.JOACP_243_18

5. Jadoon H, Khan TH, Ahmed F, Tasneem S. Malignant hyperthermia: survival without dantrolene - a case report. Anaesth Pain & Intensive Care 2016;20:236-9. [Full Text Link]

6. Gupta PK, Hopkins PM. Diagnosis and management of malignant hyperthermia, *BJA Educ 2017;17:249-54.* DOI:10.1093/bjaed/mkw079

7. Gupta D, Ramakant, Singh PK. Postoperative hyperpyrexia: Retracing malignant hyperthermia. J Anaesthesiol Clin Pharmacol. 2012;28:405-6. [PubMed] DOI:10.4103/0970-9185.98370

8. Larach MG, Localio AR, Allen GC, Denborough MA, Ellis FR, Gronert GA, et al. A clinical grading scale to predict malignant hyperthermia susceptibility. *Anesthesiology.* 1994;80:771–9. [PubMed] DOI:10.1097/00000542-199404000-00008

9. Khan TH. Malignant hyperthermia, dantrolene and apathy. Anaesth Pain & Intensive Care 2016;20:129-30. [Full Text Link]

10. Yousef MAA, Rosenfeld S. Evaluation of postoperative fever after surgical correction of neuromuscular scoliosis: implication on management. Eur Spine J. 2018;27:1690-97. [PubMed] DOI: 10.1007/s00586-017-5456-1.

11. Rosenberg H, Pollock N, Schiemann A, Bulger T, Stowell K. Malignant hyperthermia: a review. Orphanet J Rare Dis. 2015;10:93. [PubMed] DOI: 10.1186/s13023-015-0310-1.

12. Wedel DJ, Gammel SA, Milde JH, Iaizzo PA. Delayed onset of malignant hyperthermia induced by isoflurane and desflurane compared with halothane in susceptible swine. Anesthesiology. 1993;78:1138-44. [PubMed] DOI: 10.1097/00000542-199306000-00018.

13. Litman RS, Griggs SM, Dowling JJ, Riazi S. Malignant Hyperthermia Susceptibility and Related Diseases. Anesthesiology. 2018;128:159-67. [PubMed] DOI: 10.1097/ALN.0000000000001877.

