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Case Report

Anesthesia for Laparoscopic Cholecystectomy in a Patient with Hypereosinophilic Syndrome: A Case Report and Literature Review

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ABSTRACT

Background: Hypereosinophilic syndrome (HES) is a rare and heterogeneous disorder characterized by persistent eosinophilia and multi-organ involvement. Anesthetic management of patients with HES requires careful assessment of organ dysfunction to optimize perioperative care.

Case Presentation: We report the case of a 49-year-old male with HES resistant to imatinib, maintained on corticosteroid therapy (80 mg/day), who presented for laparoscopic cholecystectomy due to cholecystitis. Preoperative evaluation revealed cardiac involvement with moderate left ventricular systolic dysfunction (EF 45%), a left bundle branch block, and elevated troponin levels. Pulmonary manifestations included a history of angioedema and asthmatic coughs. General anesthesia was performed with stable hemodynamics and respiratory function. Postoperative management included multimodal analgesia, thromboprophylaxis, and continued corticosteroid therapy.

Conclusion: This case highlights the importance of a multidisciplinary approach in anesthetic management of HES patients, emphasizing cardiovascular and respiratory optimization to prevent perioperative complications.

Keywords

Hypereosinophilic syndrome, Anesthesia, Laparoscopic cholecystectomy, Perioperative management, Case report.

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Introduction

Hypereosinophilic syndrome (HES) is a rare disorder characterized by persistent eosinophilia (>1.5 × 10^9/L) and multi-organ involvement. It can be classified as primary (clonal myeloid disorders), secondary (reactive eosinophilia due to interleukin-5 overproduction), or idiopathic [1]. Advances in molecular diagnostics have identified subtypes such as myeloproliferative HES (M-HES) and lymphocytic HES, leading to targeted therapies. Patients with HES may require surgical interventions, necessitating careful anesthetic planning due to potential cardiac, pulmonary, and hematologic complications. This case report describes the anesthetic management of a patient with HES undergoing laparoscopic cholecystectomy, emphasizing perioperative considerations.

Case Report

Patient History and Preoperative Assessment

A 49-year-old male with HES diagnosed in 2015 was scheduled for laparoscopic cholecystectomy due to cholecystitis. His condition

was resistant to imatinib, and he was maintained on corticosteroid therapy (80 mg/day).

Preoperative Findings

- **Neurological:** History of headaches during HES flares, no deficits (GCS 15/15).
- **Cardiovascular:** NYHA class II dyspnea, left bundle branch block, elevated troponin (8 ng/mL), EF 45%.
- **Pulmonary:** History of angioedema and asthmatic coughs, normal breath sounds.
- **Hematologic:** Eosinophil count 64,000, Hb 16 g/dL, platelets 327,000, PT 71%, no corticosteroid-induced diabetes.

Anesthetic Management

General anesthesia was performed with stable hemodynamics and respiratory function. Key considerations included:

- Laparoscopic insufflation pressure maintained at 10 mmHg to minimize cardiovascular stress.
- Multimodal analgesia: Paracetamol 1g and transversus abdominis plane (TAP) block.
- Thromboprophylaxis: Enoxaparin 0.6 mL subcutaneously.
- Corticosteroid continuation: Hydrocortisone 80 mg/day to prevent adrenal insufficiency.

The procedure lasted 40 minutes, with an estimated blood loss of 50 mL. The patient was extubated in the operating room and transferred to the ICU for monitoring.

Postoperative Care

- **Analgesia:** Paracetamol 1g every 6 hours, morphine as needed.
- Early mobilization and oral feeding at H6.
- **Monitoring:** ECG, troponin, CBC at H12, H24, and H48.
- Cardiology follow-up initiated for heart failure management.

Discussion

Hypereosinophilic syndrome (HES) is a rare disorder with variable organ involvement, requiring individualized anesthetic management. The prevalence of HES remains uncertain, but it is frequently diagnosed in middle-aged patients [1]. The clinical manifestations vary widely, affecting multiple organ systems. Dermatological symptoms such as urticaria, eczema, angioedema, pruritic papules, nodules, and erythroderma are observed in more than half of cases [2]. Pulmonary involvement, including cough, dyspnea, and wheezing, is present in approximately 40% of patients, often accompanied by gastrointestinal symptoms such as nausea, vomiting, abdominal pain, diarrhea, and ascites [3]. Cardiac complications, although less frequent, are particularly concerning due to their potential severity, including acute myocarditis, intraventricular thrombi, endomyocardial fibrosis, and valvular damage [4]. Other possible complications include neurological involvement, hepatosplenomegaly, and coagulation disorders [5].

Recent advances in molecular diagnostics have improved the understanding of HES pathogenesis. Some cases previously classified as idiopathic are now recognized as primary myeloid disorders, such as chronic eosinophilic leukemia, caused by a chromosomal deletion at 4q12 leading to the FIP1L1-PDGFRA fusion gene [6]. In other cases, the condition results from increased interleukin-5 (IL-5) production by clonally expanding T cells, often associated with a $CD3^{-}CD4^{+}$ phenotype, as seen in the lymphocytic variant of HES [7]. Secondary causes of eosinophilia include reactive conditions such as helminth infections [8]. Despite these advances, approximately 75% of cases remain idiopathic. Persistent, asymptomatic eosinophilia of unknown origin is termed hypereosinophilia of undetermined significance [9]. A small subgroup of patients presents with familial eosinophilia, likely related to an unidentified hereditary gene [10].

The diagnosis of HES is based on sustained eosinophilia exceeding 1.5×10^9/L and/or eosinophilic tissue infiltration leading to target organ damage [1]. Once these criteria are met, further investigations are performed to identify the specific pathogenic mechanism, utilizing cytogenetic, phenotypic, and functional analyses [6]. If no underlying cause is found, the condition is labeled as idiopathic HES [9].

Treatment strategies depend on disease severity and the identification of pathogenic variants. Patients positive for the FIP1L1-PDGFRA fusion gene respond well to imatinib, which is the first-line treatment [11]. For others, corticosteroids are typically the initial therapy [12]. In cases resistant to corticosteroids, additional agents such as hydroxyurea, interferon-alpha, and imatinib may be considered, particularly for corticosteroid-sparing purposes [13]. Recent studies suggest that mepolizumab, an anti-IL-5 antibody, may be effective as a corticosteroid-sparing agent in FIP1L1-PDGFRA-negative patients, though it is currently available only through clinical trials or compassionate use programs [14]. Prognosis largely depends on the risk of malignant transformation or cardiac complications [4].

During the anesthetic consultation, it is crucial to assess organ damage, particularly cardiovascular complications such as irreversible endomyocardial fibrosis and myocardial lesions [15]. These conditions require careful management of oxygenation and perfusion to prevent deterioration of myocardial reserves. Neurological evaluation with perfusion monitoring, such as near-infrared spectroscopy (NIRS), should also be performed [16]. For patients on long-term corticosteroid therapy, perioperative management must address potential complications, adjusting for surgical stress to prevent hemodynamic collapse from adrenal insufficiency [17]. Strict attention to asepsis and appropriate antibiotic prophylaxis is necessary for these patients [18].

In the present case, the patient had both cardiac and respiratory involvement, necessitating a tailored anesthetic approach. The primary goal was to maintain hemodynamic stability and prevent further deterioration of myocardial reserves. Additionally, high-quality anesthesia was required to avoid sympathetic stimulation and ensure careful airway management to prevent hypoxemia.

Conclusion

This case highlights the importance of a multidisciplinary approach, particularly in anesthetic and surgical management, for patients with HES. It also emphasizes the need for continued research into novel therapeutic agents to enhance treatment outcomes.

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