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Case Report

Navigating the uncommon: a case of caesarean section associated with exercise-induced anaphylaxis

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ABSTRACT

Exercise-induced anaphylaxis (EIA) and food-dependent exercise-induced anaphylaxis (FDEIA) are rare but serious conditions where physical activity triggers severe allergic reactions. These are rarely reported in pregnant women undergoing caesarean section. We present the case of a 33-year-old woman with a history of EIA, scheduled for a caesarean section at 37 weeks of gestation. To manage the planned caesarean section, a multidisciplinary team strategy was devised to mitigate anaphylaxis risks. The surgery proceeded without complications under spinal anaesthesia, and the patient did not exhibit any anaphylactic reactions. The patient was monitored in the high dependency unit (HDU) and was discharged two days later. This case highlights the importance of individualized anaesthesia planning, multidisciplinary collaboration, and detailed preparation to ensure the safety of pregnant patients with EIA undergoing caesarean section.

Keywords: EIA, Caesarean section, Pregnancy, FDEIA, Multidisciplinary approach, Idiopathic anaphylaxis, NSAID sensitivity, Stress, Spinal anaesthesia

INTRODUCTION

Exercise-induced anaphylaxis (EIA) and food-dependent, exercise-induced anaphylaxis (FDEIA) represent uncommon yet potentially life-threatening conditions where exercise plays a crucial role in triggering allergic reactions. Anaphylaxis during pregnancy has been documented in a few case reports, but exercise-induced anaphylaxis during the peripartum phase particularly with caesarean section is extremely rare.

The initial case report, dating back to 1985, documented a patient who experienced anaphylactic symptoms during two childbirths and was subsequently diagnosed with EIA triggered by labor.[1] Another case, published in 2007, detailed a patient previously diagnosed with EIA who underwent a successful and uncomplicated natural childbirth with an early epidural.[2] We aim to present a similar case study that describes the treatment, consequences, and clinical presentation of EIA in a pregnant patient undergoing a caesarean section.

Pregnancy and delivery provide a special risk for EIA because of physiological changes that might affect the condition's expression and treatment. The physiological changes that coincide with pregnancy add to the difficulty in treating anaphylactic episodes. The complexity of handling an EIA in a high-risk environment is highlighted by this case report.

CASE REPORT

The case presented involves a 33-year-old woman, 'gravida 2 para 1' (G2P1), who was referred to the anaesthetic clinic during her 36th week of gestation for a planned caesarean section at 37 weeks due to a diagnosis of EIA and a previous caesarean section.

The patient's history reveals the onset of symptoms at 14 years of age, initially manifesting as mild skin symptoms following the ingestion of wheat and nuts. Over time, the intensity of symptoms increased, especially after the combination of food ingestion after physical activities such as running or even brisk walking. The patient sought an allergist consultation, where she was diagnosed with EIA triggered by food or food-dependent mechanisms, termed FDEIA. Subsequent attacks became more frequent, necessitating the use of self-administered intramuscular epinephrine (EpiPen®) injections followed by hospitalization to manage any delayed phase of the reaction.

Interestingly, her symptoms eventually occurred without any identifiable trigger, sometimes in response to mild to moderate stress. Further investigations yielded no specific trigger, leading to the diagnosis of idiopathic anaphylaxis (IA). Notably, the patient exhibited sensitivity to NSAIDs. She used to have EIA attacks once every few weeks to months. The last attack occurred two years ago, a few weeks after her first pregnancy, which required EpiPen®, prompting the prescription of regular fexofenadine and EpiPen® injections as needed.

In her previous pregnancy, spinal anaesthesia was administered with the patient in the lateral position due to her reported inability to sit, low blood pressure, and vertigo. Postoperatively, she was given paracetamol, and codeine was discontinued due to dizziness. During this pregnancy, she did not experience any symptoms related to FDEIA. Her blood tests revealed a haemoglobin level of 95 g/l, with other blood parameters within normal ranges. She weighed 87 kg and had a body mass index (BMI) of 34 kg/m^2.

Spinal anaesthesia was planned for the caesarean section, and a multidisciplinary team approach was taken, encompassing intensive care team collaboration for intensive care unit (ITU) bed arrangements, alerting the theatre team for emergency preparedness, and engaging additional anaesthesia personnel with assigned tasks. A preoperative theatre meeting facilitated communication with theatre staff, where the consultant anaesthetist briefed them about the patient's medical issue. The management of the anaphylaxis algorithm was discussed, and specific team members were assigned tasks in the event of an anaphylactic reaction. We ensured the availability of all necessary drugs for anaphylaxis management was a priority, and the patient was comprehensively informed about the anaesthesia plan and the management strategy in case of potential anaphylaxis. Two units of packed red blood cells were cross-matched and kept ready due to the patient's low haemoglobin levels.

After she entered the operating room with anxiety, blood pressure (BP) of 160/84 mmHg, heart rate of 89 beats per minute, and oxygen saturation by pulse oximetry 97% at room air were measured. An arterial line in the right radial artery and two large bore intravenous lines were inserted, and lactated Ringer's solution was commenced. As the patient was positioned for spinal, she exhibited extreme anxiety leading to tachycardia and a drop in systolic blood pressure up to 65 millimetres of mercury (mmHg). Phenylephrine infusion was administered to manage hypotension, and the decision was made to perform spinal anaesthesia while the patient lying on the bed in the right lateral position. Spinal anaesthesia was successfully administered on the first attempt, and surgery commenced following confirmation of an adequate sensory block level at T5 dermatome. To maintain blood pressure, phenylephrine infusions continued, and boluses were given as needed. Post-delivery, oxytocin was administered, and the patient's anxiety settled gradually. Intravenous paracetamol was given, and surgery proceeded without complications. Postoperatively, routine medications were prescribed, with a cautious approach to avoiding NSAIDs.

After the operation, she was transferred to the high dependency unit (HDU) for postoperative observation. The arterial line was removed once the effects of the spinal anaesthesia wore off, and her pain management was deemed satisfactory. She remained in the HDU for one day before being transferred to the post-natal ward. She was discharged home on the second post-operative day without experiencing any complications.

DISCUSSION

EIA is a rare clinical syndrome characterized by symptoms consistent with anaphylaxis provoked primarily by exercise.[3] The pathophysiology of EIA and FDEIA is not clearly understood. EIA can occur in individuals of all ages and fitness levels and can be triggered by various types of exercise even in the same patient. Diagnosing EIA primarily relies on clinical assessment, which can be challenging due to the varied and sometimes unpredictable nature of the condition. To confirm the diagnosis, validated protocols may be necessary, such as conducting skin prick testing in combination with food-exercise challenges. Additionally, laboratory investigations may be utilized to detect specific immunoglobulin E (IgE) levels or employ allergy molecular diagnostics to identify allergenic triggers accurately. Moreover, advanced techniques like allergy molecular diagnostics contribute to the precision of diagnosis by identifying molecular components of allergens. These approaches collectively aid in confirming EIA and determining trigger factors, facilitating effective management and preventive measures. If a connection between anaphylactic symptoms and exercise is confirmed, it is essential to specify whether it is FDEIA or food-independent EIA. Clearly stating this distinction is crucial for preventing future EIA attacks.[3]

EIA presents a diverse array of clinical symptoms, spanning from itching to difficulty breathing and even vascular collapse. When symptoms manifest in unusual or unexpected ways, it becomes essential to explore alternative diagnoses. This thorough examination is

crucial for ensuring accurate identification and appropriate management of the condition. EIA occurrences have been reported to be linked with warm environments, high humidity, and cold environments.[4] Despite numerous proposed theories regarding the origin of EIA, the rarity of the condition has hindered scientists' efforts to fully understand its underlying pathophysiological and immunological mechanisms. Histamine release is believed to be playing a key role in EIA.[5] Cutaneous mast cells show morphologic changes after exercise in EIA but the factor that causes this is not clear.[6] Exercise may cause increased permeability of the gut to absorb more partially digested pre-allergens from the gut.[7] NSAIDs have demonstrated the induction of symptoms associated with FDEIA upon concurrent ingestion of the causative food. It is postulated that aspirin enhances gastrointestinal permeability and antigen uptake as well aspirin itself enhances immune cell degranulation.[7,8] Our patient showed a similar correlation with NSAIDS and EIA. During mild exercise, blood flows from inactive to active tissues. The theory suggests that immune cells sensitized to food are usually harmless in local circulation but can cause symptoms when exercise-induced blood flow shifts them to the skin and muscles. This is pertinent to FDEIA, where food allergens absorbed by intestinal mast cells at rest may provoke symptoms when transported to target tissues during exercise.[9] Other proposed mechanisms are increased intestinal mast cell degranulation due to changes in surrounding osmolality due to increased blood flow and exercise-induced lower plasma pH causing mast cell degranulation.[10,11]

Psychological stress has been linked to increased disease activity in allergic patients, as indicated by studies demonstrating the modulation of allergic responses by mood and stressors. Specific correlations were found between personality distress scales and skin reactivity to allergen challenges. Other studies associated life events, negative support, mood disorders, behaviour problems, and family conflicts with increased asthma hospital admissions and morbidity. Additionally, a study on college students with asthma revealed heightened allergic inflammatory responses during final examinations, indicating an impact of natural stress exposure on eosinophil levels in sputum and blood.[12,13] Our patient showed stress-related fluctuation in haemodynamic like tachycardia and severe hypotension however there were no other manifestations of allergic reactions like skin changes.

Prophylaxis for EIA involves crucial avoidance measures, including refraining from outdoor exercises in extreme weather or pollen seasons and avoiding aspirin and NSAIDs during exercise. Classical recommendations for FDEIA include abstaining from exercise post-food intake. Evidence suggests reversed sequences, warranting avoidance of postprandial exertion and food ingestion after exercise in FDEIA. Pharmacologic protection includes co-administering cetirizine and montelukast, while agents inhibiting cell degranulation like sodium cromoglycate and ketotifen show preventive effects. Acute EIA treatment aligns with general anaphylaxis protocols, emphasizing immediate cessation of physical activity and standard pharmacotherapy involving epinephrine, antihistamines, and systemic corticosteroids. The use of medications like antihistamines and H2 blockers remains a topic of debate due to insufficient evidence supporting their use as prophylactic treatment.[3,14] Our patient was managed with antihistamines and EpiPen® injections when needed.

CONCLUSION

This case report describes the caesarean section of a patient with a history of EIA and IA. The patient was successfully managed with spinal anaesthesia. To tailor the anaesthesia plan appropriately, the anaesthetist must assess the patient's medical history, including any EIA triggers and previous reactions. To counteract allergic reactions, close monitoring is also necessary to address any signs of anaphylaxis promptly. To ensure a safe and successful caesarean section for a patient with Exercise-Induced Anaphylaxis, the anaesthesia team, obstetricians, and other healthcare professionals must communicate, collaborate effectively and prepare for any possible complications.

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