

Pulmonary edema: A complication of post-complete ingrown toenail excision. A case report

ABSTRACT

A sympathetic crashing pulmonary edema (SCAPE) is an emergency medical situation necessitating early recognition and treatment. We present a case of a 15-years old male who underwent a toenail excision of his left big toe and who developed SCAPE postoperatively. The low incidence of SCAPE intraoperatively makes it challenging for anesthesiologists to diagnose it. It occurs unexpectedly and precipitously, and it may increase the risks of morbidity and mortality if it is not treated promptly. Our aim is to raise awareness of how to abruptly manage such cases.

Key words: Pulmonary edema, SCAPE, toenail

Introduction

Acute pulmonary edema (APE) is a life-threatening situation that may occur perioperatively. An early detection and treatment are a crucial as it is associated with morbidity and mortality in addition to prolonged hospital stay and cost to the patient and hospital.^[1] A complete excision of nail may be a necessary surgical step to treat a recurrent ingrown toenail which is a usual result of partial excision of nail matrix.^[2] An acute, extremely severe, and unexpected pain during the excision could be the cause of acute pulmonary edema to our patient. We report this case to emphasize the importance of early detection and treatment of APE and discuss the underlying mechanisms.


In the literature, most reports in the recognition and management of SCAPE were only in the emergency department setting.^[3] Here, we present a case of SCAPE

that developed intraoperatively as a *complication of ingrown toenails excision*.

The ethical approval for this work was obtained as appropriate to publish this report and waive the requirement to document informed consent. Research No. 2225275 by The Office of Research Affairs, King Faisal Specialist Hospital and Research Centre, Riyadh, KSA at where the observation was obtained.

Case Report

A 15-years old male (body mass index 28.6 kg/m²) known case of mildly controlled bronchial asthma on Symbicort and Ventolin puffs as needed. The last attack was 2 months from the scheduled procedure, and it was treated at home as it was mild one. No history of hospital admission due to an asthma attack. However, there were a few visits to the emergency

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department at early childhood. The patient was discharged from pulmonary services for years. The last pulmonary function test results show normal value without the need of bronchodilator which was done 3 years back. The patient was scheduled for left big toenail removal for the fourth time in day surgery unit. The first three procedures went under general anesthesia uneventfully. The patient was fasting per protocol (8 hours from the procedure time). Standard monitors were applied. Initial vital signs were normal (heart rate 70-80, blood pressure 122/60, Oxygen saturation 100% in room air). Patient was sensitive to pain caused by intravenous (IV) insertion, so we started inducing patient to anesthesia with inhalation induction (Sevoflurane 8%, Oxygen 30%, N2O 70%). After securing IV, Boluses of Glycopyrrolate (200 mcg), Midazolam (2 mg), Propofol (130 mg), Ketamine (15 mg), Dexmedetomidine (30 mcg), and Fentanyl (70 mcg) were given. The Laryngeal mask airway (LMA) was inserted successfully. Anesthesia was maintained with sevoflurane 2% and oxygen 30% with air. The patient was ventilated with pressure support of 5 cm H₂O. Tidal volume was around 325 ml and respiratory rate was about 18 bpm. Ringer Lactate infusion was started at rate of 300 ml/hr. Paracetamol (1000 mg), Dexamethasone (10 mg), and Ondansetron (4 mg) were administered. The surgeon started the procedure by applying local infiltration of bupivacaine 0.25% 4 ml. Toenail was removed in two pieces. Each piece removed was associated with severe sinus bradycardia (heart rate of 30–40) with premature ventricular complex (PVC) between each sinus rhythm for 5 to 10 seconds followed by sinus tachycardia (Heart rate of 120–130) in the last 2 minutes from the procedure. Blood pressure was significantly high (166/110). There was no laryngospasm, nor abnormal breathing nor an increase in airway pressure. Morphine (2 mg) was given. The procedure took only 10 minutes including applying local infiltration and dressing. During deep plane of anesthesia and 100% oxygen and flow of 10 L/min, LMA was removed, and continuous positive airway pressure of 5 cm H₂O was applied. Sevoflurane was turned off. During emergence from anesthesia, a capnograph showed a rounded, shark-fin shape indicating bronchospasm with good tidal volume (480 ml) and respiratory rate (11 bpm). Although the chest was clear during auscultation initially, hydrocortisone (100 mg) and diphenhydramine (75 mg) were given. Patient started to desaturate slowly down to 86% other vital signs remained normal (HR 96, BP 118/89) as well as ventilation parts (TV 479, RR 19). Another anesthesiologist was called for help. While waiting for the help to arrive, the chest was auscultated and revealed mild fine crackles bilaterally. CPAP was increased to 10 cm H₂O. The oxygen saturation was improved slowly and reached to 95% and ventilation support was successfully downgraded to non-rebreathing facemask with flow of

10 L/min. Patient was sent to post-anesthesia care unit (PACU) with stable vitals (SpO₂ 93%, HR 81, BP 85/49 (62)) and the need for nitroglycerine was not required at this point. Venous Blood Gas was sent and showed normal results while a portable chest anteroposterior radiograph revealed bilateral ground-glass opacities [Figure 1a]. A pulmonary specialist was consulted, and fluid was restricted (total fluid intake was around 300 ml). After 2 hours at PACU, the patient showed significant improvement and ventilation support was downgraded slowly to nasal cannula with 2 L/min flow. Patient was admitted to the ward for further management by pulmonary team where he received furosemide (40 mg), and regular nebulization consisting of albuterol (5 mg) budesoni, de (0.5 mg) and ipratropium (0.5 mg) for one day. A repeated portable chest anteroposterior radiograph in next day and showed a significant improvement in lung fields [Figure 1b]. The patient was discharged home next day.

Discussion

Anesthesiologists are trained to anticipate, identify early, and manage perioperative crises. Therefore, the patient was received varied types of anesthesia medications to ensure deep plane of anesthesia in addition to multimodal analgesia. Although this strategy was able to prevent laryngospasm and bronchospasm triggers to highly suspected patient, autonomic nerve system was not well covered. A sympathetic crashing acute pulmonary edema (SCAPE) is a medical condition characterized by markedly elevated blood pressure, severe dyspnea, and desaturation edema that's mainly due to sympathetic override led to an increase in pulmonary vascular pressure with subsequent increase in the pulmonary permeability and led to the rapid redistribution of intravascular fluid in the lung.^[4-6] Till now, there is no clear protocol for the management of SCAPE. An oxygen supplement and continuous positive airway pressure (CPAP) may consider as the initial steps to treat pulmonary pressure in addition to administration of Lasix and fluid restriction.^[1,3]

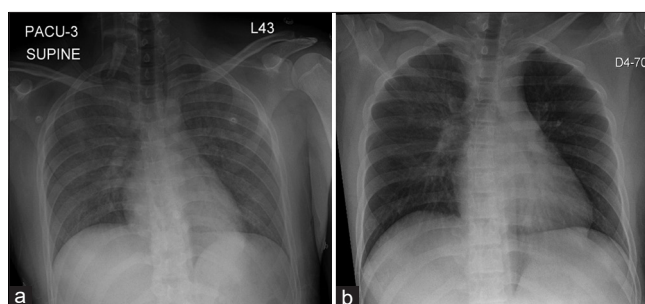


Figure 1: Chest x-ray at PACU shows bilateral ground-glass opacities (a: Left). A follow-up chest x-ray day after APE shows improvement after receiving the treatment (b: Right)

An observational study was done to check the effectiveness of using high doses of nitroglycerin and non-invasive ventilation simultaneously. Despite the limitations of the study, 24 out of 25 patients had complete resolution of symptoms at different time intervals. And no immediate adverse events of NGT have been observed.^[7] Another study found that the need for intubation in such cases was avoided due to the combined treatment.^[8] The fluid status of patients with SCAPE is either euvolemic or hypovolemic. Thus, the role of diuretics is low and not needed mostly. It might worsen the stress response and the sympathetic surge.^[9] This patient had respiratory failure type I as the result of a sympathetic surge with markedly increased systemic and pulmonary vascular resistance. Although our patient was hypovolemic as he was fasting and he received only 300 ml of fluid intraoperatively, it did not prevent the unexpected redistribution of fluid into the lungs.^[4] Luckily, the patient was young with good vital organs and responded well to the treatment. It will be unfortunate to end toenail excision procedure with tracheal intubation and intensive care unit admission.

In conclusion, SCAPE is a respiratory emergency. The low incidence of SCAPE makes it challenging for anesthesiologist and nearly impossible to diagnose it. It occurs unexpectedly and precipitously, and it may increase the risks of morbidity and mortality if it is not treated promptly. Our aim is to raise awareness of how to abruptly manage such cases.

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Conflicts of interest

There are no conflicts of interest.

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