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Case Report
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Diffuse Alveolar Hemorrhage: A Rare Complication of Sevoflurane Use in Robot Assisted Pyeloplasty

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Abstract

Introduction: Diffuse Alveolar (DAH) is a rare complication of general anesthesia. It usually presents with hemoptysis and respiratory distress. No case has been ever reported in literature of DAH as a complication of general anesthesia in robotic surgery secondary to inhaled anesthetic sevoflurane use.

Case Report: A 33 years old man, hypertensive on dual antihypertensive case of left pelviureteric junction obstruction was admitted for left robot assisted pyeloplasty. He had no significant respiratory history, was a nonsmoker and denied any illicit drug use and preoperative examination was unremarkable. Anesthesia was induced by propofol and fentanyl and anesthetic effect was maintained with sevoflurane. Intraoperative anesthesia period and post anesthesia recovery was uneventful. On post-operative day 1, patient acutely desaturated and developed mild respiratory distress. Patient then had 5 episodes of mild hemoptysis. Chest examination revealed bilateral coarse inspiratory crepitations. Urgent chest radiograph revealed bilateral perihilar patchy opacities. HRCT chest done subsequently showed multifocal air space opacifications suggestive of DAH. Later post stabilization patient underwent bronchoscopy that corroborated with our initial diagnosis of DAH.

Discussion: Possible differential diagnoses included negative pressure ventilator induced DAH, sevoflurane induced lung injury, arteriovenous malformation or a vasculitic process. Based on history, blood investigations, imaging and evidence from literature we confirmed the diagnosis of DAH due to sevoflurane use.

Conclusion: Use of sevoflurane in general anesthesia might result in DAH and its prudent to avoid halogenated anesthetic agents in such patients if further anesthesia is required in such patients in future.

Keywords: Diffuse alveolar hemorrhage, Robot assisted pyeloplasty; Sevoflurane complication; Complications in robotic surgery

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Introduction

Diffuse Alveolar Hemorrhage (DAH) syndrome is a life-threatening condition caused by a variety of disorders and it's associated with hemoptysis, anemia, and diffuse lung infiltration on chest radiology further complicating to acute respiratory failure [1].

This syndrome has been associated with a number of disorders and medications including systemic vasculitis, connective tissue diseases and systemic lupus erythematosus and medications. However, DAH as a complication of general anesthesia is a rare entity. The basic pathophysiology of DAH includes description of alveolar-capillary basement membrane, resulting in bleeding into the alveolar spaces. Use of inhaled halogen based anesthetic agent like sevoflurane has also been implicated in the causation of DAH [2]. Hereby, we describe an unexpected and possibly fatal case of DAH that occurred during the postoperative period of robot assisted pyeloplasty where DAH was diagnosed quickly and managed successfully with any complications.

Case Presentation

A 33 years old man, a case of left pelviureteric junction obstruction was admitted for left robot assisted pyeloplasty. He was hypertensive and had no significant respiratory history; he denied smoking and denied any illicit drug use. His preoperative parameters and general physical examination was unremarkable.

Figure 1: HRCT Chest.

Figure 2: Trachea showing hemorrhagic patches.

During the procedure the patient was positioned in trendelenburg position, pneumoperitoneum was created and left robot assisted pyeloplasty performed and anesthesia was induced by propofol and fentanyl and anesthetic effect was maintained with halogenated anesthetic agent sevoflurane. Intraoperative and post anesthesia recovery period was uneventful.

On postoperative day 1, the patient developed sudden desaturation with respiratory distress. He was started on oxygen support, chest auscultation bilateral occasional coarse inspiratory crepitations were revealed. Meanwhile, urgent chest X-ray was obtained which revealed bilateral perihilar patchy opacities Figure 1. Following supportive therapy, oxygen saturation improved to 100% on oxygen. However, the patient developed 7-8 episodes of hemoptysis which was subsided with conservative treatment.

Further High-Resolution Computed Tomography (HRCT) scans of the chest revealed patchy areas of consolidation and ground glass opacification in bilateral lungs predominantly in basal segments (Figure 2). Blood tests showed a significant drop in Hemoglobin from 15.6 g/dL preoperative to 12.7 g/dL, with a low hematocrit 29%, and an unremarkable coagulation profile with normal echocardiography. Patient underwent bronchoscopy which revealed patchy area of hemorrhage in trachea (Figure 2) and right main bronchus. Sequential BAL showed progressively darkened reddish tinge (Figure 3) s/o alveolar hemorrhage and BAL fluid for cytology showed hemosiderin laden macrophages confirming the diagnosis of DAH. Other special tests for autoimmune and vasculitis testing were negative. Patient was managed symptomatically and he showed significant clinical and radiological improvement within one week of DAH and was discharged home in hemodynamically stable condition.

Discussion

As robotic surgery is gaining interest of everyone, complications related to the procedure are also new and under observation. Pneumoperitoneum during the procedure is essential for adequate working space. Carbon Dioxide (CO_2) gas is used to create pneumoperitoneum causing higher abdominal or retroperitoneal pressures affecting respiratory and circulatory systems. These procedures also use trendelenburg position which further increases effects on these systems and may lead to hypoxia, hypercarbia, arrhythmias, hypertension, pulmonary edema and rarely DAH [3]. Sevoflurane is an inhalational anesthetic agent used for induction and maintenance of general anesthesia. Common side effects include nausea, vomiting, hypotension, and bradyarrhythmia. Respiratory side effects include cough, laryngeal spasm and respiratory depression [4]. Few cases are there which describes sevoflurane induced DAH [4]. But there is no case where DAH is present in robotic assisted surgery which has its own complication of atelectasis, hypoxia and pulmonary edema. It is essential to differentiate the complication whether due to procedure related or due to some other cause so that in future essential precautions can be made accordingly. The

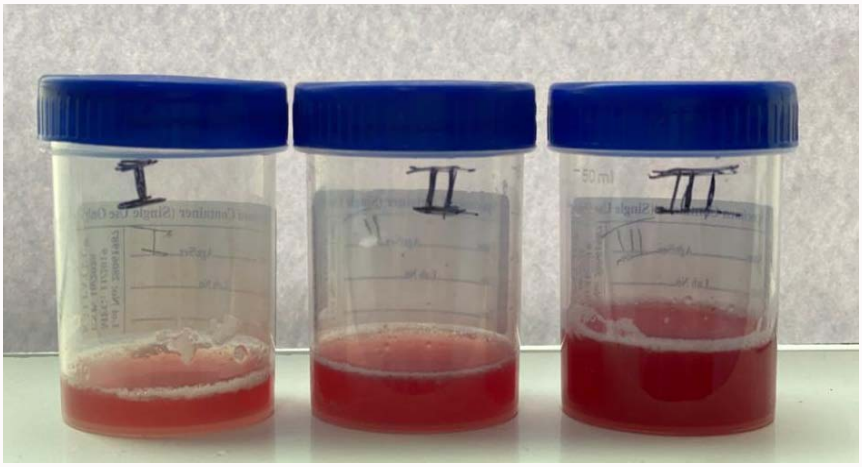

Figure 3: Sequential BAL showing progressively increased red tinge.

mechanism by which inhalational anesthetic agent may lead to DAH is not yet clear. Some suggests physical pressure causing injury to alveoli, pulmonary endothelial damage, increased oxidative stress and exothermic reaction between sevoflurane and the carbon dioxide absorbents in the anesthetic circuit leading to thermal airway injury [5].

For our case possible differentials considered were postoperative pulmonary atelectasis, sevoflurane induced lung injury. Based on history, blood investigations, imaging, BAL and we confirmed the diagnosis of DAH due to sevoflurane use.

Conclusion

Use of sevoflurane in general anesthesia might result in DAH and its prudent to avoid halogenated anesthetic agents in such patients if further anesthesia is required in such patients in future.

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