Case Report

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Perioperative Management of Patients with Asthma-COPD Overlap Syndrome - Where Do We Stand? A Case Report-Based Discussion

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ABSTRACT

Postoperative pulmonary complications (PPCs) are associated with a significant morbidity and mortality; prevention and management strategies depend greatly on the patients' comorbid conditions. Chronic Obstructive Pulmonary Disease (COPD) is a well-known risk factor for PPCs, but controlled Asthma does not appear to be so. On the other hand, the role of Asthma-COPD Overlap Syndrome (ACOS) as a risk for PPCs is yet to be studied. While there is a guidance for the perioperative risk reduction and management of COPD and Asthma, specific guidance for ACOS is also lacking. As a consequence, physicians tailor their management by considering both the components.

We present a case of a 74-year-old man with ACOS, diagnosed with invasive bladder carcinoma. He was taken for laparoscopic radical cystectomy and ileal conduit. Although he had an uneventful surgery, we lost him on the seventh postoperative day due to multiple complications, including PPCs.

The case highlights the need for considering the ACOS separately as a risk and calls for a specific roadmap for perioperative management.

1. Asthma-COPD Overlap Syndrome patients appear to be at high risk of PPCs
2. There is a lack of evidence-based guidance and literature to tailor the management of such patients to reduce the perioperative risks for PPCs
3. It is high time to delineate the ACOS patients from Asthma and COPD, study them in context to PPCs and perioperative outcome so that specific guidance can be developed.

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Introduction

Chronic obstructive pulmonary disease (COPD) and bronchial Asthma are potentially overlapping in about one-third of either of the cases [1]. Dutch hypothesis recognized it as a spectrum of the single disease progressing from Asthma in early-stage to persistent airflow limitation as noticed in COPD. Although a precise definition is lacking, in 2014 Global Initiative for Asthma (GINA) and Global Initiative for Obstructive Lung Disease (GOLD) described it as asthma-COPD overlap syndrome (ACOS) characterized by persistent airflow limitation with several features of Asthma and COPD [2]. Despite disagreement in definition, there is broad consensus that patients with ACOS experience frequent exacerbations, have a poor quality of life, more rapid deterioration of lung function, and increased mortality [3,4]. The risk of postoperative pulmonary complications (PPCs) is also high, which requires specific perioperative measures to control such catastrophes [5,6]. While perioperative management of Asthma and COPD are well described, there is a dearth of literature on ACOS.

Case presentation

A 74-year-old man, 170 cm, 54 Kg, body mass index of 18.69 Kg/m^2, with 40-pack years of smoking history, was diagnosed with invasive bladder carcinoma. He was also diagnosed with bronchial Asthma for difficulty in breathing, wheezing, and frequent flu-like syndrome four years back and was being treated with Formoterol and Fluticasone metered-dose-inhaler. However, he still had a minimal expiratory wheeze. On the testing day, he could walk 274 m in 6 min, with a 5% fall (from 91 to 86%) in peripheral oxyhemoglobin saturation (SpO2). No signs and symptoms of respiratory infection were present. Preoperative investigation revealed serum creatinine of 0.87 mg% (estimated glomerular filtration rate 57 mL/min; 69 mL/min using ideal body weight), normal blood urea and electrolytes, 12-lead electrocardiogram, and hemoglobin of 12.4gm%, serum albumin 1.8 mg/dl. Pulmonary function tests showed post-bronchodilator FEV1 increment by 20% but persistent FEV_1/FVC <0.7. Further, diffusing capacity of Carbon-monoxide (DLCO) was 50%. Chest X-ray showed chronic obstructive lung disease-like features (Figure 1).

Salbutamol and Ipratropium nebulization three times a day was started. Inj. Hydrocortisone 100mg and other medications were also administered on the morning of surgery. Preoperatively, his room air SpO2 was 94%, respiratory rate 18/minute, heart rate 78/min, and normal blood pressure. The ARISCAT score was 34, denoting an intermediate risk for postoperative pulmonary complications (13.3%) [7].

With informed written consent, the patient was taken for surgery. Injection of Fentanyl 2 mcg/Kg and Propofol titrated to effect was used for General anesthesia (GA) induction; vecuronium was used to facilitate tracheal intubation. GA was maintained with Air in Oxygen 50% with MACage 1.1+0.1 Sevoflurane. Epidural 0.2% Bupivacaine 8mL was administered after the test dose. Paracetamol 750 mg was also administered. He was ventilated using volume control using 400mL tidal volume with pressure limited to 25 cmH2O and the EtCO2 maintained within a target of 35-40 mmHg with an increase of approximately 25% MV during the CO2-based insufflation for laparoscopy. Intraoperatively, he was hemodynamically stable except for one episode of bradycardia which was treated with an injection of Glycopyrrolate 0.2 mg. He also developed surgical emphysema extending to the nipple line. Neostigmine and Glycopyrrolate were administered as reversal at the train-of-four count three. Although he could generate 10-12 regular breaths/min with a tidal volume of 300-320 mL and pressure support of 6 cmH2O, he remained sedated and retained CO2 (EtCO2 raised to 56 mmHg) when allowed to breathe without support within 20 minutes of the trial. Therefore, he was shifted to the critical care unit (CCU), where he recovered fully and fulfilled the extubation criteria within one hour. He was, however, extubated the following day but required O2 supplementation through nasal prong 2L/min to maintain SpO2 of 92-94%. The epidural catheter position was doubtful in the postoperative period and was removed following administration of 3mg Morphine. The pain was managed further with paracetamol, which was under control. With physiotherapy, deep breathing exercises, and continued therapy, he was weaned off from O2 on the third post-op day and discharged to the ward. After two days of ward stay, the patient deteriorated because of respiratory insufficiency and got readmitted into CCU again. The patient was started with NIV support and respiratory rehabilitation. Increased work of breathing along with deterioration in mental status was noted, so was intubated, and invasive mechanical ventilation was started. He fulfilled the criteria for septic shock, and management was started in the same line; vasopressors were added and titrated to maintain a mean arterial pressure of 60-65 mm Hg. However, he succumbed to his illness on the second day.

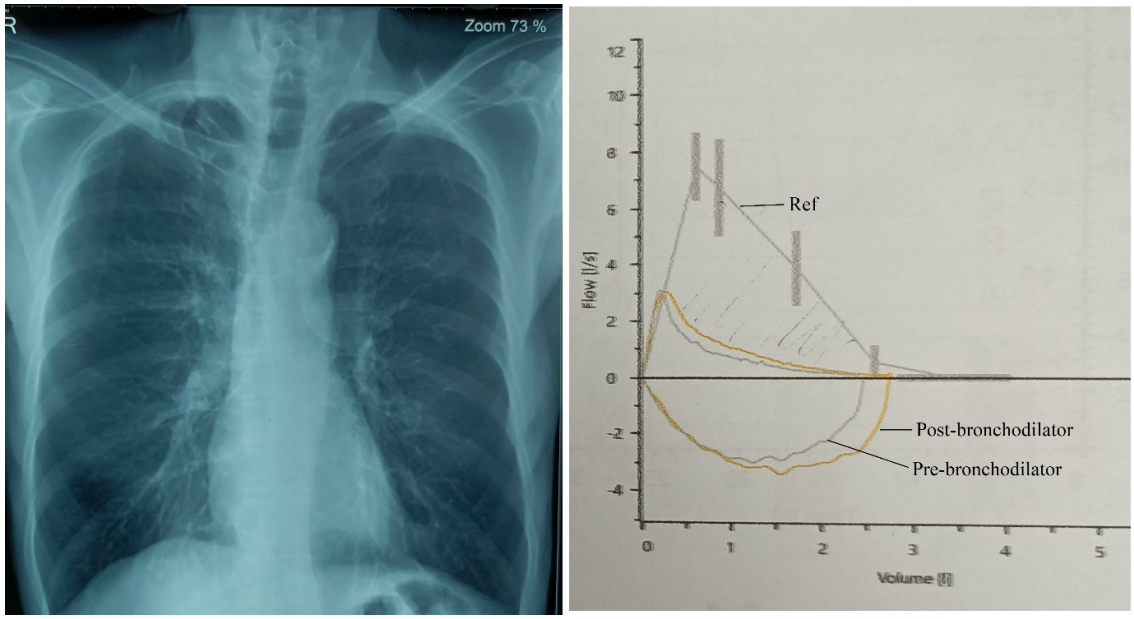

Fig. 1. Chest X-ray showing the COPD like changes and Spirometry flow-volume loop showing the patients pre and post-bronchodilator graph in relation to the reference one.

Discussion

Our patient was diagnosed with bronchial Asthma four years back with an eosinophilic peripheral smear. He received formoterol and fluticasone, which improved his FEV1. However, his FEV_1/FVC remained <0.7 with the persistence of wheeze. The background of 40 pack-years smoking with no family history of allergy and atopy and DLCO of 50% and COPD changes in X-ray suggested the diagnosis of ACOS as per GINA-2014 guidelines [2]. Perioperative management of Asthma or COPD alone is well defined in the literature, but there is a lack of evidence-based perioperative practice for ACOS posted for surgery. It warrants a more detailed discussion on ACOS based on available literature as the nature of this disease course is worse than that of Asthma and COPD alone.

As far as we know, a guideline for the perioperative management of ACOS is still lacking. The present case was managed with the available literature and the author's past experiences with the preoperative preparations and interventions that are useful for Asthma and COPD. Smoking cessation, allergen avoidance, proper inhaler technique, and pulmonary rehabilitation were started well in advance to decrease PPCs. Our patient was on inhaled corticosteroid, long-acting beta-agonist (ICS/LABA) combination therapy. Based on the expert opinion, the initial approach to ACOS is similar to that for Asthma, i.e., to start with inhaled steroids in low to moderate doses and immediate access to inhaled short-acting bronchodilator (e.g., short-acting beta-agonist, short-acting muscarinic antagonist, or combination) for as-needed symptom relief. The addition of a long-acting beta-agonist and muscarinic agents (LABA/LAMA) may be done for symptom relief, but LABA/LAMA monotherapy should be avoided [2, 8].

In contrast, in COPD-dominant ACOS, LABA and LAMA are prescribed, and it is advised to avoid ICS monotherapy. All these therapies should be continued till the morning of surgery. In poorly controlled asthmatics and COPD patients requiring a high dose of inhaled steroid requiring endotracheal intubation for high-risk surgeries, a stress dose of intravenous hydrocortisone 100 mg should be given before induction of anesthesia and 50 mg every eight hours for 24 hours [9, 10]. Nebulisation with a short-acting beta-2 agonist (SABA) 20-30 minutes prior to airway manipulation and midazolam in small titrated doses (e.g., 0.25-0.5 mg) may be used to address airway hyper-responsiveness and anxiety [9]. Ketamine and propofol have broncho-dilating properties; patient selection should be carefully considered during induction [11].

Although our patient had much expected postoperative respiratory failure, it was managed effectively and survived perioperative 48h without any anesthesia-related complications. Unfortunately, we lost him for eternity on the seventh day of hospitalization. The nature of the surgery, age, compromised organ functions, comorbidities, and unfortunate hospital-acquired infection leading to septic shock explains the death. However, whether the

perioperative management strategy can be further refined remains open to be solved. Anaesthesiologists need to focus on ACOS as a separate entity, report cases and conduct prospective studies to find the answer to the query in the future.

Conclusion

Postoperative Pulmonary Complications in patients with ACOS might lead to mortality after major surgeries. The lack of clear and specific guidance for ACOS patients raises a dilemma. The present case highlights the need for considering the ACOS separately as a risk for PPCs and calls for a specific roadmap for perioperative prevention and management.

List of abbreviations

ACOS: Asthma-COPD Overlap Syndrome, COPD: Chronic Obstructive Pulmonary Disease, DLCO: diffusing capacity of Carbon-monoxide, GINA: Global Initiative for Asthma, GOLD: Global Initiative for Obstructive Lung Disease, FEV1: Forced Expiratory Volume in one second, FVC: Forced Vital Capacity, ICS: Inhaled corticosteroid, LABA: long-acting beta-agonist, LAMA: long-acting muscarinic agents, PPCs: Postoperative Pulmonary Complications, SABA: Short-acting Beta-2 Agonist.

Ethical Considerations

Informed consent was obtained to present the data as a case report from the patient/party. In our institute, ethical approvals are not required for case reports.

Consent for Publication

Obtained from the patient

Availability of data and material

Not applicable.

Authors Contribution

The entire authors contributed in case management and case related data collection, literature search, manuscript draft preparation. HMRK did the final editing. All the authors approved the final manuscript. HMRK will act as guarantor.

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Conflict of interest

The authors declared no conflict of interest.

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