

Management of Perioperative Pulmonary Edema with Non-Invasive Ventilation in Patient with Pre-eclampsia Undergoing Emergency C-Section

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ABSTRACT

Introduction: Pulmonary edema rarely occurs in normal pregnancy but it is a significant cause of maternal and perinatal morbidity and mortality.

Case report: We report a case of development of acute cardiogenic pulmonary oedema in pre-eclamptic patient, presented at 35 weeks gestation with fetal distress. During the emergency caesarean section, while under spinal anesthesia, after the delivery of baby, suddenly the patient developed cough, tachypnoea and tachycardia with clinical findings suggestive of acute pulmonary oedema. Patient was put on Non invasive ventilation (NIV) with a portable ventilator with CPAP 8cm H₂O and RR of 15/min along with antihypertensives and diuretics. Over the course of 2 days, serial ABG showed improvement in the acid base status, vitals stabilized and patient was gradually weaned off the ventilator and discharged on 5th postoperative day.

Conclusion: The use of CPAP by NIV in pulmonary edema significantly decreases the need for endotracheal intubation and improves survival.

Keywords: Cardiogenic Pulmonary Oedema, Non-invasive Ventilation, Pre-eclampsia.

INTRODUCTION

Pre-eclampsia is a multisystemic and multifactorial disease of pregnancy with hypertension as its main clinical manifestation. Pulmonary edema complicates around 0.05% of low-risk pregnancies and up to 2.9%- 3.4% of pregnancies with preeclampsia and with majority of occurrence in post partum period.^[1] The causes being; left ventricular dysfunction secondary to high systemic vascular resistance, iatrogenic volume overload in the face of contracted intravascular space, decreased plasma colloid oncotic pressure following intravenous fluid replacement with crystalloid and as a result of rapid intravascular mobilization of edema fluid after delivery. We report a case of severe pre-eclampsia complicated into pulmonary edema, while under spinal anesthesia for emergency caesarean section.

CASE REPORT

A 34 year old woman 149.9-cm, 55 kg, gravida 3, para 2, at 35 weeks' gestation presented with fetal distress. On examination her initial vital signs were BP 175/110 mm Hg, HR 98/min, RR 22/min, temperature 36.6°C and an oxygen saturation of 96% on room air. Marked facial pallor and bilateral pitting pedal edema were present. Investigations available were- WBC 7000/mm³; Hb 6.9 g/dL; PCV 20%;

platelets, 270×10⁹L; INR 1.0; urine sugar nil and albumin 3+ on dipstick. Emergency c-section was planned because of fetal distress. Spinal neuraxial blockade was performed using 10mg hyperbaric bupivacaine in left lateral position. After the delivery of baby, suddenly the patient became extremely anxious and tachypnoeic. Auscultation revealed crepts to mid lung fields bilaterally. Saturation decreased to 82%. Provisional diagnosis of pulmonary edema was made. Arterial blood gases showed respiratory acidosis with hypoxaemia. Patient was given Inj. Labetolol 20mg, Inj. frusemide 20mg intravenously. Non invasive ventilation (NIV) on a portable ventilator with CPAP 8cm H₂O and RR of 15/min in slightly propped up position was started. Fluids were restricted. Saturation improved upto 92% within 20 minutes with post-op vitals of BP 149/98 mmHg; PR 94/min; and SpO₂ 94%. Antihypertensives and diuretics were continued postoperatively along with packed red blood cells transfusion to correct anemia. Serial ABG showed improvement in the acid base status. Over the course of 2 days vitals stabilised and patient was gradually weaned off the ventilator and discharged on 5th postoperative day.

DISCUSSION

The parturient with severe pre-eclampsia is at high risk for morbidity and mortality. To complicate matters further, in our setting, the vast majority of these patients present for emergency caesarean section posing an immense challenge to the attending obstetrician and anaesthetist. Acute pulmonary edema is the leading cause of maternal mortality in these patients with treatment largely supportive including, improving oxygenation with reduction of preload (pulmonary venous return) and afterload (systemic vascular resistance).

Regional anaesthesia is the preferred mode of anaesthesia in pre-eclamptic patients as it provides excellent analgesia, avoids airway manipulation, allows early maternal bonding with the newborn and the route of administration lessens

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the risk of neonatal respiratory depression. General anaesthesia is usually reserved for those patients who have a contraindication to a regional anaesthetic technique, because it has its own disadvantages and potential dangers, like rapid drop in haemoglobin oxygen saturation upon initiation of general anaesthesia due to a reduced functional residual capacity and an increased oxygen demand; high risk for aspiration of gastric contents; difficult intubation due to upper airway oedema, and the 'intubation response'. All these could prove detrimental to the patient with severe preeclampsia. As Dyer et al ^[2] compared spinal versus general anaesthesia in patients with pre-eclampsia presenting for emergency caesarean section with a 'nonreassuring' fetal heart trace. Maternal haemodynamics and 5 minute APGAR scores were similar between the groups. Okafor et al ^[3] also compared spinal versus general anaesthesia in patients with pre-eclampsia and eclampsia. The maternal and fetal mortality was found to be high in the general anaesthetic group, attributing factors being lack of equipment and inexperienced management.

Methods of oxygen delivery in pulmonary oedema include the use of a face mask, noninvasive ventilation (which includes bilevel positive airway pressure [BiPAP] and continuous positive airway pressure [CPAP]), and intubation with mechanical ventilation. Which method is used depends on the presence of hypoxemia and acidosis and on the patient's level of consciousness.

In CPAP, a single airway pressure is maintained throughout all phases of the respiratory cycle. CPAP augments the inspiratory and expiratory flow and pressure thereby increasing the tidal volume and unloading the inspiratory muscles. It decreases dead space ventilation and improves alveolar ventilation, re-expands flooded alveoli, and counteracts intrinsic PEEP.

In BiPAP, high pressures can be applied during inspiration and low pressures, during expiration, increasing the patient's comfort. BiPAP decreases inspiratory work of breathing, without changing the pulmonary mechanics, while avoiding unnecessary airway pressure that can cause an excessive reduction in cardiac output and can improve diaphragmatic function better than CPAP alone in patients with hypercapnic acute cardiogenic pulmonary edema.^[4,5]

However, none of these studies demonstrated a reduction in hospital mortality.^[6,7] Furthermore, the results of one of the earlier studies suggested that BiPAP compared with CPAP might increase the risk for new onset acute myocardial infarction in patients with acute cardiogenic pulmonary oedema.^[8] Moreover, patients who received BiPAP initially had more chest pain than did patients who received CPAP.

CONCLUSION

Some of the recent studies have shown conflicting results when compared to previous anaesthetic practices postulating, administration of regional anesthesia not only avoids the maternal complications with general anesthesia, but also improves neonatal outcome.

On the other hand there is strong evidence that patients

presenting with acute cardiogenic pulmonary oedema, were more likely to survive to hospital discharge, if treated with CPAP rather than with BiPAP; significantly decreasing the need for endotracheal intubation. However, there is insufficient evidence to recommend the use of BiPAP due to development of acute MI, probably the exception being patients with hypercapnic pulmonary oedema.

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