Pulmonary Edema during perioperative period

Protocol of essay

Submitted in partial fulfillment of the

Master Degree in anesthesiology

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Pulmonary Edema During perioperative period

الوذمة الرئوية اثناء ما حول العملية

رسالة مقدمة من

الطبيبة / مي عبد ربه محمد عبد اللطيف

M.B.B.Ch

توطئة للحصول على درجة الماجستير في التخدير

An Essay Submitted For partial Fulfillment of the Masters Degree in Anesthesiology

تحت اشراف

أ.د / شـــــريف وديـــــع ناشـــــــد

استاذ التخدير والرعاية المركزة

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المحتويات Contents :-

Introduction

- Definition of pulmonary edema: - Fluid accumulation in the lungs leads to impaired gas exchange → Respiratory Failure may occur.

It is due to either failure of heart to remove fluids from the lung "Cardiogenic Pulmonary edema"

OR direct injury to lung parynchema [non cardiogenic type]

(Ware et aL.,2005)

PathoPhysiology: - is explained by disturbance in the normal Starling Equation Due to Changes in hydrostatic or oncotic pressure across alveolar membrane or ↑ permeability of it .

- Pulmonary edema complicates the perioperative period & the etiology may be different from non operative patient .

Traditional teaching , pulmonary edema outside hospital of cardiac etiology. [left heart diastolic dysfunction]; it includes valvular heart disease , arrhythmias , cardiac failure and infarction .

In patient undergoing anesthesia, Causes other than Cardiogenic are encountered Like hypoproteinemia , Fluid overload , anaphylaxis , pulmonary aspiration with alteration of the permeability of alveolocapillary memberane typically seen in ARDS, post obstructive and neurogenic pulmonary edema , Fluid overload occur in general and also in regional anesthesia; its preciepitating factors : old age or patient with cardiac or renal disease & also transurethral resection of prostate syndrome (TURP syndrome) during spinal or epidural anesthesia may occur due to systemic absorption of the irrigating fluids especially if water is used.

Alerting signs & symptoms:-

- Respiratory distress & tachypnea.
- Hypoxia presented by desaturation or cyanosis .
- Increase in airway pressure [inspiratory pressure].
- Pink Frothy sputum up endotracheal tube or LMA. (Laryngeal Mask airway)→ diagnostic.
- Crepitation or bronchospasm.

Diagnosis depend on assessment of the combination between history , symptoms, clinical signs and investigation for both types of pulmonary edema likely for the cause and review preoperative fluid balance and renal function.

If cardiogenic type :ECG, cardiac enzymes, echocardiography, chest X- ray

If non cardiogenic type: Consider

- post obstructive edema.
- Allergy, anaphylaxis.
- Sepsis.
- Renal ⟶ Renal function tests.
- Aspiration by chest X -ray ⟶ patchy irregular densities especially in right lower lobes, Also do ABG ⟶ hypoxemia.
- Multiple organ failure as pancreatitis with increase in serum lipase enz.

N.B

1- ABG : show hypoxemia, chest X- ray confirm diagnosis but not specific ⟶ Generalized opacities with "typical perihilar bat wing appearance" . however opacity may be unilateral asymmetrical especially in the acute period < 4hours.

2- To differentiate between the 2 types also by assessing Cardiac filling pressures by examination of jugular venous pressure or by a central venous (Swan Ganz Catheter), pulmonary artery catheter [pulmonary artery occlusion pressure of 18 mm Hg is regarded by convention as a threshold pressure which differentiates between the two types].

(Runciman et al ., 2005)

Emergency management:-

1) High flow O2 with close monitoring by clinical assessment & ABG.
2) Head up tilt / sit up.
3) If self ventilating apply continuous positive pressure ventilation.
4) Intubate if necessary.
5) Lung protective strategy: Intermittent positive pressure ventilation (IPPV) & positive end expiratory pressure (PEEP) .

- This to maintain arterial O2 saturation above 88% to 90 % to achieve adequate tissue oxygenation and Reduce risk of ventilator induced lung injury by decreasing tidal volumes 4 -6ml/kg (Brower et al .,2002).
- Permissive hypercapnia contraindicated in patient with increased intracranial pressure or acute or chronic myocardial ischemia, pulmonary hypertension, sickle cell anemia , patient takes B- blockers . Also do recruitment maneuvers by sustained increase in alveolar pressure to open collapsed alveoli (Cook et al .,2008).
- PEEP above the lower inspiratory pressure (Holzapfel et al., 1983).

6) Consider drug therapy: intravenous nitrates, Na nitroprusside, morphine, fluid reduction by diuretics to reduce preload. Inotropes as dopamine or dobutamine infusions or phosphodiestrase inhibitors as milrinone may be preferred to dobutamine in patient on B Blocker therapy or with inadequate response to dobutamine. (Bohm et al., 2005), Steroids don't prolong survival and digoxin may be given in fast atrial fibrillation.
7) Restriction of intravenous fluid with a reasonable objective to maintain the intravascular volume which is consistent with adequate Systemic perfusion assessed by acid base balance and renal function (National Heart, Lung and Blood Institute ARDS Clinical Trials Network).

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Aim of the work

1- Early detection, Successful recognition and management of perioperative pulmonary edema.