Domi,et al., Int J Anesthetic Anesthesiol 2014, 1:002
DOI: 10.23937/2377-4630/1002
Volume 1 | Issue 1

International Journal of
Anesthetics and Anesthesiology

ISSN: 2377-4630

Review Article

Postoperative Respiratory Complications

Rudin Domi*, Myzafer Kaci, Herion Dredha, Artan Bodeci, Hektor Sula, Ilir Ohri, Sokol Paparisto, Gjergj Andrea and Enton Bollano

"Mother Teresa" University Hospital Center, Albania

***Corresponding author:** *Rudin Domi, Associate Professor of Anesthesiology, Department of Anesthesiology and Intensive Care, "Mother Teresa" University, Hospital Center, Tirana, Albania, Tel: 00355682067003, E-mail: rdomi73@yahoo.it*

Epidemiology

The incidence of postoperative pulmonary complications (PRC) it is recently considered to be up to 5% [1]. In the high-risk group, the incidence may reach or even exceed 20% [2]. The mortality associated with PRC can be ranged 10-25% [3]. Fleischman et al found that the incidence of PRC was higher than perioperative cardiac events, considered to be a common postoperative problem [4]. Other authors reported that PRC is associated with a high morbidity profile [5].

Pathophysiology

The pathophysiological changes depend on the interactions between anesthesia, surgical site, and preexisting diseases. Anesthesia impairs the breathing pattern through central nervous system depression. Decreased functional residual capacity, until being less than closing capacity, may predispose for atelectasis formation. After the atelectasis formation, impaired pulmonary gas exchange may develop, progressing till respiratory failure occurs [6].

During anesthesia the muscles' tonus is reduced and the intraabdominal pressure due to viscera can reduce lung capacities as well. By the other side in a supine anesthetized patient, the posterior areas alveoli become less ventilated but the blood flow remains unchanged [7]. This process can explain possible ventilation-perfusion mismatch producing hypoxemia, atelectasis, and pneumonia.

The respiratory muscles are also inactive due to muscle relaxants and positive end- expiratory pressure during mechanical ventilation. Postoperative pain and surgical incision are responsible for respiratory muscle inactivity as well.

Smoking damages ciliated epithelium increases bronchial hyperactivity, increases mucus secretion, and small airways obstruction. All the preexisting disease can exacerbate PRC, especially pulmonary diseases, prolonged mechanical ventilation, and prolonged hospitalization. So optimizing the patient preoperatively is a crucial step to prevent PRC.

Risk Factors

Several risk factors for PRC are recently identified [8]. Generally risk factors are patient related or surgical related. The patient related risk factors for PRC include congestive heart failure, ASA class 2 and more, advanced age, chronick obstructive pulmonary disease, weight loss, smoking, gastroesophageal reflux, alcohol use, diabetes mellitus, obesity, obstructive sleep apnea, hypertension, cancer, liver disease, and pulmonary hypertension. The surgical related risk factors include thoracic and upper abdominal surgery, prolonged procedures (more than 3 hours), emergency surgery, massive transfusion, and prolonged hospitaliation.

Protective Techniques

Preoperative optimization of preexisting pulmonary diseases is the first serious step. It is recently reported that chest physiotherapy seems to improve the patient's respiratory function and decreases PRC [9]. Optimizing asthmatic patient includes chronic use of medications (aminophylline, corticosteroids, inhalator beta-adrenergic agonists and muscarinic antagonists). The patients suffering from obstructive pulmonary disease should have a detailed bronchodilation therapy before surgery, often achieving maximal doses [10]. Smoking cessation is another important step but needs to be taken at least 4 weeks before elective surgery.

Anesthetic techniques are responsibility of the anesthesiologist. Avoiding bronchospasm and bronchial hyperactivity can be realized by adequate anesthesia depth. If possible the muscle relaxants must be avoided because of histamine release and deteriorating effects on respiratory muscles. Mechanical ventilation using low Tidal volume and moderate levels of PEEP can reduce PRC, pulmonary infections, and atelectasis (1).

An interesting debate is going on fluid therapy. Regarding minor surgery there is no significant difference between liberal and restrictive fluid management [11] but liberal fluid management seems to increase the PRC incidence in major surgery and in high-risk patients [12,13]. The use of colloids seems to be safer than crystalloids. Crystalloids solutions are administered in large quantities, distribute rapidly in extravascular space, and often are associated with tissue edema and hyperchloremic acidosis. Several studies have reported a possible colloids' effect on modulating the inflammatory response to prevent the development of lung injury after shock [14,15].

Postoperative continuous positive airway pressure (CPAP) seems to be an effective method to reduce PRC. CPAP is especially useful for the patient that cannot breathe deeply after being extubated. Several authors had shown a significant reduction of PRC when CPAP was applied [16].

ClinMed International Library

Citation: Domi R*, Kaci M, Dredha H, Bodeci A, Sula H, et al., (2014) Postoperative Respiratory Complications. Int J Anesthetic Anesthesiol 1:002. doi.org/10.23937/2377-4630/1002

Received: July 23, 2014: **Accepted:** August 04, 2014: **Published:** August 04, 2014

Gastric decompression is another effective method. Nasogastric tube may increase the likelihood of gastric aspiration and ventilator associated pneumonia, but decompressing the stomach can help for maintaining saturation, oxygenation, and ventilatory capacities. As a conclusion nasogastric tube must be used very carefully and with the right indication.

It is recently [17] reported that laparoscopy seems to be more effective that open surgery. Thoracic epidural analgesia is another issue. Aggressively treating postoperative pain can reduce PRC by encouraging deep breathes early mobilization of the patient. PRC are reduced by 30% as Li et al stated [18].

Transfusion of blood and blood components is a daily practice in intensive care units and in anesthesia. Several complications are reported but two of these are respiratory-related: transfusion-related acute lung injury (TRALI) and transfusion-associated circulatory overload (TACO). TRALI has an estimated incidence of 1.12% per unit transfused blood [17], increasing morbidity and mortality [19]. TRALI is characterized as onset of respiratory distress/failure within 6 hours after the plasma containing blood components. It is more frequently faced in septic, cardiac surgery, and intensive care units [19,20]. TACO often happens after high volume of blood transfusion. It is characterized by hypertension, increased left atrial pressure, pulmonary infiltrates, and increased brain natriuretic peptide. Taking present the risks-benefits ratio, minimizing blood and blood components transfusion, and having a detailed transfusion protocol may guarantee less complications [21].

Conclusions

PRC are as common as cardiac complications. Several factors are evidencend as risk factors: age, preegsisting disease, smoking, diabetes, surgical site, sleep apnea, and pulmonary hypertension. The strategies for risk reduction include preoperative medical optimization, CPAP, selectively gastrc decompression, laparoscopic approach, thoracic epidural analgesia, smoking cessation 4 weeks before surgery, and using low Tidal Volume combined with moderate PEEP during mechanical ventilation.

References

1. Hemmes S, Neto A, Schultz M (2013) Intraoperative ventilator strategies to prevent postoperative pulmonary complications: a meta-analysis. Curr Opin Anesthesiol 26: 126-133.
2. Canet J, Gallart L, Gomar C, Paluzie G, Vallès J, et al. (2010) Prediction of postoperative pulmonary complications in a population-based surgical cohort. Anesthesiology 113: 1338-1350.
3. Canet J, Galliart L (2013) Prediction of postoperative pulmonary complications in the general population. Curr Opin Anesthesiol 26: 107-115.
4. Fleischman K, Goldman L, Young B (2003) Association between cardiac and non cardiac complications in patients undergoing non cardiac surgery; outcomes and effects on length of stay. Am J Med 115: 515-520.
5. Johnson RG, Arozullah AM, Neumayer L, Henderson WG, Hosokawa P, et al. (2007) Multivariable predictors of postoperative respiratory failure after general and vascular surgery: results from the patient safety in surgery study. J Am Coll Surg 204: 1188-1198.
6. Tokics L, Hedenstierna G, Strandberg A, Brismar B, Lundquist H (1987) Lung collapse and gas exchange during general anesthesia: Effects of spontaneous breathing, muscle paralysis, and positive end-expiratory pressure. Anesthesiology 66: 157-167.
7. Dresse C, Joris J, Hans G (2012) Mechanical ventilation during anesthesia; Pathophysiology and clinical implications. Trends in Anesthesia and Critical Care 2: 71-75.
8. Smetana G, Lawrence V, Cornell J (2006) Preoperative pulmonary risk stratification for noncardiothoracic surgery: systematic review for the American College of Physicians. Ann Intern Med 144: 581-596.
9. Warner DO (2000) Preventing postoperative pulmonary complications. Anesthesiology 92: 1467-1472.
10. Slinger P (2008) Perioperative lung injury. Best Practice & Research Clinical Anesthesiology 22: 177-191.
11. Guldner A, Pelosi P, Gama de Breu M (2013) Nonventilatory strategies to prevent postoperative pulmonary complications. Curr Opin Anesthesiol 26: 141-151.
12. Evans RG, Naidu B (2012) Does a conservative fluid management strategy in the perioperative management of fluid resection patients reduce the risk of acute lung injury?. Interact Cardiovasc Thorac Surg 15: 498-504.
13. Lobo SM, Ronchi LS, Oliveira NE, Brandão PG, Froes A, et al. (2011) Restricitive strategy of intraoperative fluid management during optimization of oxygen delivery decreases major complications after high-risk surgery. Crit Care 15: R 226.
14. Powers KA, Kapus A, Khadaroo RG, He R, Marshall JC, et al. (2003) Twenty-five percent albumin prevents lung injury following shock/resuscitation. Crit Care Med 31: 2355-2363.
15. Quinlan GJ, Mumby S, Martin GS, Bernard GR, Gutteridge JM, et al. (2004) Albumin influences total plasma antioxidant capacity favorably in patients with acute lung injury. Crit Care Med 32: 755-759.
16. Ferreyra GP, Baussano I, Squadrone V, Richiardi L, Marchiaro G, et al. (2008) Continuous positive airway pressure for treatment of respiratory complications after abdominal surgery. Ann Surg 247: 617-626.
17. Weller W, Rosati C (2008) Comparing outcomes of laparoscopic version open bariatric surgery. Ann Surg 248: 10-15.
18. Liu S, Wu C (2007) Effect of postoperative analgesia on major postoperative complication: a systematic update of the evidence. Anesth Analg 104: 689-702.
19. Vlaar AP, Hofstra JJ, Determann RM, Veelo DP, Paulus F, et al. (2011) The incidence, risk factors, and outcome of transfusion-related acute lung injury in a cohort of cardiac surgery patients: a prospective nested case-control study. Blood 117: 4218-4225.
20. Vlaar AP, Schultz MJ, Juffermans NP (2013) Transfusion-related acute lung injury: a clinical review. Lancet 382: 984-994.
21. El Kenz H, Van der Linden P (2014) Transfusion-related acute lung injury. Eur J Anaesthesiol 31: 345-350.