

# Comparison between invasive and noninvasive ventilation in managing flail chest r...

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## **Comparison between invasive & non-invasive ventilation in managing flail chest**

Abstract

Background

Invasive ventilation has been beneficial with the provision of the airway defense for patients with respiratory complications and blunt injury such as the flail chest. It increases the airway defense and consequently minimizes the risk of reparatory related infections. Furthermore, invasive ventilation has the ability to allot the flow of lower tidal volumes. On the other hand, non-invasive ventilations involve the use of a ventilator support without the invasive artificial airway. This type of ventilation has been in a wide use and it has become popular within the previous two decades. The flexibility nature of the method has enabled it to be valuable in respiratory patient management.

### **Objective**

The goal of this paper is to compare the use of invasive and non-invasive ventilation methods of treatment in managing flail chest.

### **Data sources**

Information and data from five articles in different journals were used to achieve the objective. The five journals included: the Chest Journal, European Respiratory Journal, Respiratory Care, Anesthesiology and Lancet.

## **Study Selection**

The study included the following study designs: Randomized, multicenter, salmeterol, placebo controlled, double blind, crossover trials that studied the effectiveness of invasive ventilation and non-invasive ventilation and fluticasone salmeterol.

## **Data extraction**

A total of five different case studies were analyzed for patients with flail chest. Different patients with the chest problem were treated using invasive ventilation while similar patients were treated using non-invasive ventilation. The safety as well as the efficacy of the two types of ventilation for chest flail was ensured. The outcome of the studies was collected and recorded and conclusions made on the obtained data. The measurements for the studies included; stabilization, associated injuries as well as earlier versus late treatment of the frail chest.

## **Results**

In the studies conducted, both invasive ventilation and the non-invasive ventilation posted positive results. Pneumatic stabilization was achieved in both the two methods, but with differing results between the two. The stabilization of the thoracic cage was found to be a favorable condition to heal fractures in it. Two of the patients receiving treatment passed away due to the associated injuries; as a result of profuse bleeding of the patients. Twenty-two patients examined were to show surprising little impairment of the complete pulmonary functioning.

## **In this study chest flail treatment with the invasive ventilation method was considered to better option.**

### Conclusions

The outcome of the study was measured on the basis of; Stabilization of the thoracic wall, associated injuries for the invasive ventilation, easier earlier treatment as well as difficult and long due treatment. The invasive ventilation method proved to be more effective than non-invasive method. However, associated injuries were recorded for the invasive method. Earlier treatment was easier than a difficult and long due treatment at the acute stage.

### **Introduction**

Flail chest is a threatening and deadly injury if not well managed. A flail chest takes place when a section of the thoracic wall gets detached from the remaining part of the chest wall. This scenario happens during the fracturing of the ribs leading to a segment of the thoracic cage to appear floating without the support of the rest of the chest wall. Flail chest may also happen when ribs get a fracture proximally together with the disarticulation of the costochondral cartilages distally<sup>1</sup>. The costal cartilages can be very bendable for young children. Therefore, a flail chest can happen when many ribs get fractured without the support of the rest and the segment separates independent of the remaining part of the chest wall.

In a normal breathe in the process, the diaphragm contracts as the inter-costal muscles thrust the rib cage out. The pressure in the thorax cavity becomes lesser below atmospheric pressure, and air finds its way into the thoracic cavity through the trachea. To determine the symptoms of flail

chest, a flail segment cannot offer resistance to the decreased pressure and hence seems to force its way in as the rest of the rib cage increases in volume<sup>2</sup>.

For a normal breath out, the symptoms of flail chest happen when a flail segment is forced outwards as the volume in the rib cage decreases. Under normal health conditions, during inspiration and expiration; the diaphragm and inter costal muscles relax, letting the abdominal parts to force air upwards and out of the thorax.

The treatment of the injury includes the ventilation, which allows blood to get oxygenated from the supplement of the air from the ventilation machine. It also offers a better tidal volume for the of flail chest patient. The invasive method of ventilation delivers greater than before patency of endotracheal tubes via decreased secretion build up<sup>3</sup>. It also has the ability to provide reduced tidal volumes. On the other hand, non-invasive ventilation provides the patient with non-related patient injuries.

## **Methods**

The studies were selected after a close review of several literatures before the five article journals were picked up on. Randomized and placebo controls were applied for all the studies. The studies were randomized on the basis of the type of ventilation used. The patients were then tested for the stabilization of the thoracic cage, the associated injuries, as well as the stabilization as well as earlier treatment versus late treatment.

The PubMed was utilized to look out for the medical journals, which included;

the Chest Journal, European Respiratory Journal, Respiratory Care, Anesthesiology and Intensive Care Medicine.

## **Result**

The patients that participated in the study were randomly selected from all the patient demographics. The patients selected were of 35 years and above. They were also selected on the basis of earlier treatment for comparison with late treatment. A total of 721 patients were involved in the five studies.

## **Stabilization**

The results from all the five studies indicated that there was thoracic cage stabilization after both the invasive ventilation as well as the non-invasive ventilation was used<sup>1, 2, 3, 5</sup>. Stabilization occurred much easier in earlier treatment of the chest flail. The late treatment for the flail chest took time before the thorax cage stabilization was attained.

## **Associated Injuries**

The patients that used the invasive ventilation method reported pulmonary injuries while those that used the non-invasive method recorded no injuries.

## **Discussion**

Two methods were used for the stabilization of the flail chest. Good results for this study were recorded for the invasive ventilation method. However, this method recorded some associated injuries, which were higher as compared to the non-invasive ventilation method. Stabilization of the chest flail was recorded for both methods of ventilation. It was also noted that

those patients that reported for earlier treatment, stabilized much earlier and with a lot of ease. Those that reported the problem late had difficulties recovering and hence slow stabilization.

Those patients that recorded to suffer associated injuries were noted to be highly sensitive especially reacting to the tubes used for the invasive ventilation method<sup>3</sup>. The invasive method treatment instantly gave out satisfactory ventilation as well as oxygenation. This at the same time helped to stabilize the thoracic wall in a favorable location. This occurrence was followed by the healing of the fractures. The death rate was lower for those patients that sought treatment earlier<sup>1, 5</sup>. The studies therefore suggest that one should not wait until the complication manifests itself in the late stages before seeking medication. When discovered in the acute stage, it takes fairly more days to stabilize for both the invasive ventilation as well as the non-invasive ventilation. Deaths were recorded for those patients with associated injuries<sup>4</sup>.

## **Conclusion**

Both the invasive ventilation and the non-invasive ventilation provided the thoracic wall stabilization after administration. However the invasive method of ventilation has more cases of stabilization. This is due to the ability of invasive method of ventilation delivers greater than before patency of endotracheal tubes via decreased secretion build up. It also has the ability to provide reduced tidal volumes. On the other hand, non-invasive ventilation provides the patient with non-related patient injuries. The method is therefore advisable for patients who are more sensitive and react to the

passage of the tubes that are inserted into the body in case of invasive ventilation method of managing flail chest. Patients of flail chest are also advised to seek earlier treatment. This is because the death rate was lower for those patients that sought treatment earlier. The studies therefore suggest that one should not wait until the complication manifests itself in the late stages before seeking medication. When discovered in the acute stage, it takes fairly more days to stabilize for both the invasive ventilation as well as the non-invasive ventilation. Patients with associated injuries should be treated with special care as their cases can be fatal. In general according to these studies the invasive method is recommended for flail chest patients.

## References

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