High-Frequency Chest-Wall Compression During the 48 Hours Following Thoracic Surgery

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BACKGROUND: Postoperative pneumonia continues to be a leading cause of mortality and morbidity after thoracic surgery. High-frequency chest-wall compression (HFCWC) is an established therapeutic adjunct for patients with chronic pulmonary disorders that impair bronchopulmonary secretion clearance. We studied the feasibility of applying HFCWC following thoracic surgery. METHODS: Twenty-five consecutive adult patients who underwent a variety of thoracic operations received at least one HFCWC treatment in the first 2 postoperative days, along with routine postoperative care. HFCWC was applied at 12 Hz, for 10 min. Routine hemodynamic and pulse oximetry data were collected before, during, and after HFCWC. We also collected qualitative data on patient tolerance and preference for HFCWC versus percussive chest physiotherapy. RESULTS: No major adverse events were encountered. Hemodynamic and pulse oximetry values remained stable before, during, and after HFCWC. Eighty-four percent of the subjects reported little or no discomfort during therapy, and the subjects who expressed a preference preferred HFCWC to conventional chest physiotherapy by more than two to one. CONCLUSIONS: HFCWC is a safe, well-tolerated adjunct after thoracic surgery. The observation of hemodynamic stability is especially important, considering that the patients were studied in the early postoperative period, during epidural analgesia. *Key words: postoperative pneumonia, thoracic surgery, high frequency chest wall compression, HFCWC.* [Respir Care 2009;54(3):340 –343.

Introduction

Postoperative pneumonia resulting in respiratory failure continues to be a leading cause of mortality, morbidity, and prolonged hospital stay after thoracic surgery.[1] A patient's ability to clear pulmonary secretions following thoracic surgery is a key determinant of the success or failure of the patient's postoperative course. Retained secretions increase intrapulmonary shunt, decrease lung capacity, cause hypoxemia, increase the work of breathing, and are the substrate for nosocomial pneumonia.[2]

Over the past half century, chest physiotherapy, which consists of manual percussion and vibration of the chest, has been used to facilitate the clearance of postoperative pulmonary secretions.[3] Several recent controlled clinical trials (and a large body of anecdotal experience) have demonstrated benefit from manual chest physiotherapy,[4,5] but the potential for discomfort and iatrogenic complications from chest physiotherapy is also well described.[6]

Unfortunately, conventional chest physiotherapy is highly operator-dependent,[7] so its efficacy is quite variable. Moreover, it is labor-intensive, costly, and can be quite painful, especially when applied over a healing thoracotomy, which usually is the area most in need of treatment.

High-frequency chest-wall compression (HFCWC) applies rapid but gentle external compressions to the thorax to generate air flow velocities that facilitate bronchopulmonary secretion clearance.[8] HFCWC is typically delivered in a timed, standardized fashion, with a vest attached to an air-pulse generator. For over 10 years HFCWC has been an established therapy in the management of non-

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surgical patients who have impaired bronchial secretion clearance, including individuals with neuromuscular disorders,[9-12] chronic obstructive pulmonary disease,[13,14] and cystic fibrosis.[15-18] HFCWC has also shown promise in optimizing pulmonary function and enhancing the organprocurement rate in potential lung-transplant donors.[19,20] Finally, HFCWC is well tolerated by and potentially beneficial for critically ill patients.[21] Based on that clinical experience, we hypothesized that HFCWC could provide well-tolerated, effective, standardized, and low-cost pulmonary toilet after thoracic surgery.

Conclusion

HFCWC is a safe, well-tolerated secretion-clearance adjunct in the first 2 days after thoracic surgery.

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