Is the Application of External Thoracic Support Following Median Sternotomy a Placebo or a Prudent Intervention Strategy?

In this issue of Respiratory Care, Fiore et al report on the effects of a directed cough maneuver on cough peak expiratory flow, cough expiratory volume, and thoracic pain in 21 patients in the early recovery period following open heart surgery via median sternotomy. The thoracic support they used (patient holds his or her hands over the sternotomy incision) alone did not significantly affect peak cough expiratory flow, cough expiratory volume, or incision pain during cough. When, in addition to thoracic support, the patients were instructed to take a maximal inspiration before coughing, peak cough expiratory flow and cough expiratory volume were significantly higher.

While contemplating the outcomes in this clinical research paper, I am most surprised by the lack of clinical or statistical influence on thoracic pain with the use of thoracic support during cough efforts in the early postoperative recovery period. Further reflection on the responses of a majority of my patients over 30 years of clinical practice in acute/critical care environments would favor the application of external thoracic support to minimize incisional discomfort, as attempts are made to generate functionally effective cough (expiratory) forces.

In the field of rehabilitative medicine, the application of external support (ie, bracing, splinting, orthotic appliances) can serve several purposes, including: protect an injured or vulnerable structure or tissue (eg, ankle sprain), immobilize when rest for recovery and healing is warranted (eg, spinal fusion), restrict an undesired movement (eg, tendon repair at the wrist/hand), provide psychological reassurance, and facilitate early mobilization for function (eg, coughing after thoracic and/or abdominal surgery).

Considering the kinesiology of the rib cage (thorax) when the lungs are inflated versus deflated, numerous articulations (manubriosternal, sternocostal with costochondral and chondrosternal junctions, and interchondral) of the ribs to the spinal column and sternum are naturally stabilized by corresponding ligaments and multiple layers of skeletal muscle. When this anatomical structural support is compromised by accidental trauma (eg, rib fracture), disease (eg, osteoporosis), abnormal postural alignment (eg, scoliosis), and/or planned surgical intervention (eg, median sternotomy; thoracotomy), the judicious use of supplemental external support is warranted.

Cardiovascular and pulmonary diseases, cancer (including lung), and influenza/pneumonia are among the top 10 causes of death. Many patients with coronary artery disease who undergo median sternotomy for heart surgery also have COPD and/or develop postoperative nosocomial pneumonia, and multiple coughing episodes are the norm. These coughing episodes may be planned or targeted on an hourly basis in conjunction with incentive spirometry, or may be a spontaneous, habitual response for bronchial hygiene when chronic bronchitis or cystic fibrosis complicates the postoperative recovery period. With due regard for the inter-patient differences in mucus hypersecretion and rheology, the coughing efforts may be more injurious in some patient (eg, 7 of the 21 subjects had a documented history of current/recent/remote smoking).

Unlike the directed-coughing protocol followed in the 2-day period of the controlled experiment by Fiore and associates, some patients cough several times a minute. The expiratory forces generated could be considered cumulative trauma and contributory to sternal/incisional dehiscence on a vulnerable rib cage/thorax. In such an instance I would advocate the use of supplemental external support (eg, clinician’s or patient’s hands, pillow or stuffed animal/toy, rolled/folded towel or blanket) to be prudent and efficacious for functional coughing.

“A cough is only as effective as the deep breath preceding it,” is a statement I often emphasize with my doctoral students in physical therapy. The article by Fiore and colleagues adds further supportive evidence to this axiom, which has been previously affirmed in the literature. In addition, background knowledge of anatomy and kinesiology, combined with patient reports in my clinical practice experience, have made me an advocate of external thoracic support directed cough maneuvers as well.

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REFERENCES


The author reports no conflict of interest in the content of this editorial.

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