Does Surgical Fixation of Flail Chest Injuries Improve Pulmonary Function? Results From a Multicenter Randomized Controlled Trial

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Purpose: Fail chest injuries have high rate of morbidity and mortality. Patients can experience pulmonary dysfunction, chronic chest tightness, shortness of breath, and restrictive lung disease. There is some evidence that surgery may improve pulmonary function; however no high-quality study has assessed the effect of surgery on pulmonary function in the short or long term post injury.

Methods: A previously published randomized controlled trial was conducted, comparing surgery to nonoperative treatment of patients with unstable chest wall injuries. Secondary analysis of this study was performed. Spirometry testing was conducted to assess forced vital capacity (FVC) and forced expiratory volume exhaled in the first second (FEV1) at 3 and 12 months post injury. The predicted FEV1 and FVC values were then calculated for each patient, based on patient age, sex, and height.

Results: A total of 80 patients had data available at 3 months and 85 at 12 months. Mean predicted FEV1 was 74 at 3 months and 78 at 12 months, while mean predicted FVC was 81 at 3 months and 86 at 12 months. There was no difference in the predicted FEV1 or FVC scores between the 2 groups at 3 or 12 months. Both groups improved with time. Between 3 months vs 12 months, the operative group had a greater improvement in the percentage of predicted FEV1 (median change = 6) compared to the nonoperative group (median change = 0), P = 0.027. Regarding FVC, there was a trend toward increase in percentage of predicted FVC in the operative group (median = 8) compared to nonoperative (median = 3), P = 0.08).

Conclusion: This randomized controlled trial demonstrates that patients with flail chest injury have a mild restrictive lung disease at 3 months, which improves at 1 year. At 3 and 12 months post injury, patients with flail chest injuries have similar pulmonary function, with similar FEV1 and FVC, regardless of operative or nonoperative management. Further research is needed to identify factors associated with reduced pulmonary function in this patient population, and how they can be improved.