Does surgical fixation of flail chest injuries improve pulmonary function? Results from a multi center RCT.

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INTRODUCTION:
Fail chest injuries have high rate of morbidity and mortality. Patients can experience pulmonary dysfunction with 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 non-operative treatment of patients with unstable chest wall injuries. Secondary analysis of this study was conducted. 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, which is based on the patients' age, sex and height.
RESULTS:
A total of 86 patients had data available at 3 months and 91 at 12 months. Mean predicted FEV1 was 74.1 at 3 months and 78.0 at 12 months, while mean predicted FVC was 80.9 at 3 months and 86.6 at 12 months. There was no difference in the predicted FEV1 or FVC scores between the two groups at 3 or 12 months. Both groups improved with time. Between 3 months to 12 months, the operative group had a greater improvement in the percentage of predicted FEV1 compared to the non-operative group (improvement of 5 vs.1, $p = 0.026$). Regarding FVC, there was a trend towards improvement of predicted FVC in the operative group compared to the non-operative group (improvement of 7.3 vs. 3.7, $p=0.07$).
DISCUSSION AND CONCLUSION:
This randomized controlled trial demonstrates that patients with flail chest injury have a mild restrictive lung disease at 3 months, which improves by one year post injury, but does not normalize. At 3- and 12-months post injury, patients with flail chest injuries had similar pulmonary function, with similar FEV1 and FVC, regardless of operative or non-operative management. However, the surgical group had more improvement in FEV1 compared to the non-operative group from 3 months to 12 moths. This study shows that surgical treatment of flail chest injuries does not improve pulmonary function as much as previously reported. Further research is needed to identify factors associated with reduced pulmonary function in this patient population, and how they can be improved.