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Physical Therapy Impact on Respiratory Function in Scoliosis Patients, and Neurosurgical Relevance: Systematic Review

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Key Points

Question:
Does physical therapy improve respiratory function in AIS patients postoperatively?
How does respiratory impairment in scoliosis affect neurosurgical planning?
What are the long-term benefits of post-surgical respiratory therapy?

Findings:
Physical therapy improves respiratory function more effectively than thoracoplasty. Studies confirm increases in FVC, FEV, and inspiratory capacity after physical therapy.

Meaning:
Physical therapy is a valuable non-surgical approach to improving postoperative respiratory function. Optimized exercise regimens may enhance recovery in AIS patients. Further RCTs with long-term follow-up are needed to confirm sustained benefits.

Abstract

Importance:
Adolescent Idiopathic Scoliosis (AIS) is a spinal malalignment which occurs after ten years of age, causing a lateral curvature of the spine usually of more than 10º using Cobb's angle. Such curvatures not only impacts the spine, but also causes abnormalities with the rib-cage, affecting the respiratory function negatively, even if patients are asymptomatic. A characteristic decrease is seen in the vital capacity and minute ventilation in patients. The decrease in respiratory function does not only impact the patient, and their physical health. It also impacts neurosurgical planning for spine-correction-surgery, both intra-operatively and post-operatively. The surgeon must take into account how severely impacted is the respiratory function, plan the intra-operative ventilation management, and post-operative respiratory therapy to potentially allow the patient to return back to their normal life. One such post-operative respiratory therapy that has been used is physical therapy using exercises.

Objective:
These abstract aims to examine whether physical therapy is effective in improving the patient's respiratory function post-operatively in adolescent idiopathic scoliosis (AIS) cases.

Evidence Review
This study used MeSH terms as its primary search criteria in PubMed, including: scoliosis, lung physiology, exercise tolerance, and exercise therapy. Afterwards, studies were filtered to only include those from 2005 onwards, and Randomized Controlled Trails (RCTs) only. Two studies were excluded as they didn't fit within the scope of the abstract, leaving a total of seven studies included.

Findings
(Laurentowska et al., 2009) determined that patients who had undergone physical therapy instead of thoracoplasty had better respiratory function, proving that physical therapy as a non-surgical approach is better than a surgical one. Furthermore, (Moramarco et al., 2016), (Fabian, 2010), (Alves et al., 2006), and (Bas et al., 2011) have all concluded that physical therapy is effective in improving the respiratory function, with increases in FVC, FEV, and inspiratory capacity. (Xavier et al., 2020), and (Ghafar et al., 2022) have shown that certain exercises are better than others, and questioned the long-term benefits for patients.

Conclusions and Relevance:
Physical therapy is effective in improving respiratory function for patients with AIS post-operatively, however, further RCTs with patient follow-up are needed to determine long-term impacts.

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