

Pulmonary Function at Minimum 10 Years after Segmental Pedicle Screw Instrumentation for Thoracic Adolescent Idiopathic Scoliosis

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INTRODUCTION:

Adolescent idiopathic scoliosis (AIS) with thoracic curves is associated with reduced pulmonary function preoperatively. It remains unclear how much pulmonary improvement can be obtained using pedicle screw instrumentation at long-term follow up.

METHODS:

Forty-one surgically treated patients with thoracic AIS (Lenke 1-4, 6) using pedicle screw instrumentation (mean age at final FU 26 ± 2 years, 34 females) participated in a prospective 10-year follow-up study. These 41 patients were clinically evaluated and had complete pre- and postoperative lung function data.

RESULTS:

Mean (SD) major curve averaged 57° (8.5°) preoperatively and 15° (6.3°) at 10-year follow up (p<0.001). Preoperatively 32% (13/41) had forced vital capacity (FVC) or forced expiratory volume in one second (FEV₁) below 80% of the predicted normal values representing pulmonary function impairment. FVC improved from preoperative mean 3.29 L (SD 0.78L) to 3.80 L (0.75L) at 10-year follow up (p<0.001). Postoperative thoracic kyphosis showed a significant correlation with percentage predicted FVC (r_s=0.35, p=0.0130). The percentage predicted values for FVC showed a nonsignificant decrease from 88% preoperatively to 86% at 10-year follow up. At 10-year follow up 32% (12/41) of the patients had FVC or FEV₁ below 80% of the predicted values.

DISCUSSION AND CONCLUSION:

The pulmonary function of the surgically treated AIS patients does not significantly improve during 10-year follow up. Despite improvement of absolute values, one-third of the patients fulfilled the criteria for pulmonary function impairment at 10-year follow up.

Table. Pulmonary function test parameters

| | FVC (L) | FVC (%) | FEV ₁ (L) | FEV ₁ (%) | FEV ₁ /FVC(%) | FEV ₁ /FVC (% predicted) | PEF (l/s) | PEF (% predicted) |
|----------|-------------|---------|----------------------|----------------------|--------------------------|-------------------------------------|-------------|-------------------|
| Preop | 3.29 ± 0.78 | 88 ± 12 | 2.86 ± 0.60 | 85 ± 12 | 87 ± 7 | 96 ± 8 | 5.96 ± 1.27 | 89 ± 16 |
| 10-yr FU | 3.87 ± 0.79 | 86 ± 11 | 3.14 ± 0.53 | 83 ± 11 | 83 ± 7 | 99 ± 8 | 6.93 ± 1.21 | 84 ± 12 |
| P Value | < 0.001 | 0.124 | 0.0003 | 0.062 | < 0.001 | 0.411 | < 0.001 | 0.0025 |

FVC, forced vital capacity; FEV₁, forced expiratory volume in one second; PEF, peak expiratory flow