

Health-related quality of life after surgery for severe scoliosis

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A severe scoliosis remains a significant clinical challenge. We evaluated health-related quality of life (HRQoL) using SRS-24 outcome questionnaire in two groups: Group A consisted of 25 consecutive patients operated for severe scoliosis of 90 degrees or more (15 males, mean age at surgery 15.4 years, one adolescent idiopathic scoliosis, four secondary scoliosis, and 20 neuromuscular scoliosis). Group B had 14 patients undergoing full vertebral column resection (VCR) for paediatric spinal deformity (mean age at surgery 12.3 yrs, one adolescent idiopathic scoliosis, three neuromuscular scoliosis, seven congenital scoliosis or kyphosis, two global kyphosis, and one secondary scoliosis). Mean follow-up time was 2.6 years (range 2.0 – 5.5). The mean preoperative major curve in the severe scoliosis group was 104 (90 to 127) degrees and was corrected to 36 (18–69) degrees at final follow-up with a mean final correction of 66% (43–82%). In the VCR group the major curve averaged preoperatively 86 (67 – 120) degrees and 37 (17-80) degrees at 2-year follow-up with a mean final correction of 57% (18-86%).

The SRS-24 total score averaged 98 (range, 72-108) for the severe scoliosis group and 101 (92-108) for the VCR group at final follow-up. After excluding patients who had undergone vertebral column resection from the severe scoliosis group, the VCR group had a significantly better SRS-24 total score when compared with the severe scoliosis group ($p=0.048$). No permanent neurologic deficits occurred in either group.

Surgical treatment of severe scoliosis is technically demanding and complications are to be expected. However, if severe complications can be avoided, these patients are highly functional and their mean health-related quality of life outcomes are good for the severe scoliosis group and excellent for the vertebral column resection group.

Health-related quality of life (HRQoL) is defined as a subjective multidimensional construct that captures the impact of health status, including disease and treatment, on three core domains: physical, psychological, and social functioning (1). Various questionnaires have been used when evaluating subjective outcome and the quality of life in patients with spinal

disorders. These questionnaires can be divided into two categories: disease specific [e.g. the Scoliosis Research Society questionnaire (2)] and general health [e.g. the Short Form 36 (3)].

The Scoliosis Research Society has developed a patient-oriented outcome questionnaire (SRS-24 outcome questionnaire) to assess the impact surgical treatment for adolescent idiopathic scoliosis (AIS) (2). This questionnaire provides information on back pain, cosmetic aspects, patient satisfaction, and level of activity. It contains 24 questions, which give a maximum score of 120 (a highly satisfied and asymptomatic patient). Roughly, a total score of 100 or more indicates excellent outcome, between 80 and 100 satisfactory outcome, and below 80 fair outcome. Previously, our study group has reported the long-term health-related quality of life in patients undergoing surgery for adolescent idiopathic scoliosis and spondylolisthesis using SRS 24 – questionnaire (4). These patients reported excellent HRQoL after a mean of 15 years for AIS surgery and good HRQoL after surgery for spondylolisthesis. However, none of the scoliosis patients had

a moderate scoliosis of 70 degrees or more at the time of surgery.

A severe scoliosis of 90 or more remains a significant clinical challenge. It is associated with increased mortality (4), and most patients with a scoliosis of 60 degrees or more have a restrictive lung disease, i.e. smaller than normal lung volumes (5). Surgical options include anteroposterior surgery, pre- and peri-operative halofemoral traction, and vertebral column resection (VCR) with total pedicle screw technique. Here, I present the results of the SRS-24 outcome questionnaire in patients undergoing surgery for severe scoliosis of 90 or more and in children needing vertebral column resection for spinal deformity.

Materials and methods

Turku Children's Hospital has hosted a paediatric spine register since 2009 and Helsinki Children's Hospital a similar register between 2006 and 2009. Twenty-five consecutive patients (15 males, mean age at surgery 15.4 [range, 9.6–20.0] yrs) operated for scoliosis of 90 degrees or more with a minimum two year follow-up (range 2-5 years) were followed using these two registers. Twenty patients had neuromuscular scoliosis (NMS), 4 secondary scoliosis, and 1 AIS. There were fifteen patients (12 anteroposterior approaches,

three VCR) operated with hybrid instrumentation (H group) (lumbar pedicle screws, sublaminar wires at apex, and upper thoracic hooks) and ten patients (three antero-posterior approaches, two vertebral column resections) operated using total pedicle screw instrumentation (TPS Group).

In addition, all university children's hospitals performing paediatric spine surgery (Turku, Helsinki, Tampere, and Oulu) were contacted to identify spinal column resections (n=45 patients identified) performed in our country between 2005 and 2009 with a minimum two-year follow-up. After excluding single hemivertebra resections (n=25) and vertebral column resections performed for patients with MMC (n=6), 14 patients with full VCR (mean age at surgery 12.3 yrs [range 6.5-17.9] AIS 1, NMS 3, Congenital scoliosis 1, Congenital scoliosis revision 4, Congenital kyphosis 2, global kyphosis 2, and secondary scoliosis associated with NF 1 pt) were identified. Seven procedures were performed using anteroposterior approach and seven using the posterolateral approach. Mean follow-up time was 2.6 years (range 2.0 – 5.5).

SRS-24 questionnaires were filled out preoperatively, at 6 months, and at 24 month follow-up visits.

Results

The mean preoperative major curve in the severe scoliosis group was 104 (90 to 127) degrees and was corrected to 36 (18–69) degrees at final follow-up with a mean final correction of 66% (43–82%). Patients operated using total pedicle screw instrumentation had a significantly better radiographic correction of the scoliosis than the hybrid instrumentation group at 6 months, 1-year, and 2-year follow-up visits (mean 78%, [69 to 87%] vs. 62% [43 to 82%] at final follow-up; $p < 0.01$ for all comparisons). The SRS-24 total score averaged 98 (range, 72-108) for the whole group at FFU without any significant differences between the two instrumentation groups.

In the VCR group, the major curve averaged preoperatively 86 (67 – 120) degrees, 31 (15-53) degrees at 6 months, and 37 (17-80) degrees at 2-year follow-up, with a mean final correction of 57% (18-86%) (Figure 1). The mean SRS-24 total scores were 101 (92-108) for the whole group without any significant differences between the anteroposterior and posterolateral approaches, respectively.

After excluding patients who had undergone vertebral column resection from the severe scoliosis group,

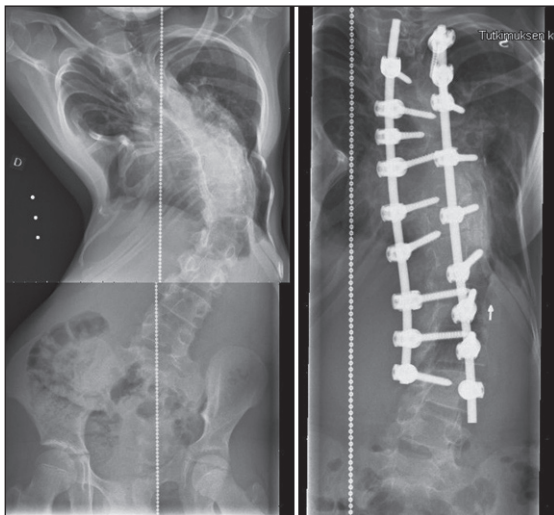


Figure 1. Combined congenital scoliosis and thoracic cage anomaly on a 12-year-old boy. Severe kyphoscoliosis produced spinal cord function deficit. Vertebral column resection (Th 7 and 8) and total pedicle screw instrumentation was performed. SRS-24 outcome questionnaire gave a total of 102 points at final follow-up visit.

the VCR group had a significantly better SRS-24 total score when compared with the severe scoliosis group ($p=0.048$). No deaths or permanent neurologic deficits occurred in either group.

Discussion

Surgical treatment of severe scoliosis is technically demanding and complications are to be expected. However, if death and spinal cord complications, i.e. paraplegia, can be avoided, these patients are highly functional and their mean HRQoL outcomes were good for the severe scoliosis group and excellent for the vertebral column resection group, respectively. For the severe scoliosis group all patient data was collected prospectively, while VCR outcomes were evaluated using a retrospective data collection.

Lenke's study group has previously evaluated treatment of patients with a scoliosis of 100 degrees or more (6). Patients having total pedicle screw constructs had a significantly better radiographic correction than patients operated using hook or hybrid constructs. Their radiographic correction rate of 67% for the total pedicle screw group was somewhat lower than our 78%. The same group evaluated efficacy of pre- and perioperative halo-gravity traction in the treatment of scoliosis over 100 degrees (7). Preoperative traction provided a mean 28% radiographic correction of the coronal deformity and a final correction of 51% after surgery with a perioperative halo- or halo-femoral traction. HRQoL outcomes were not reported in any of these studies.

In conclusion, total pedicle screw constructs can provide excellent correction of severe scoliosis with or without vertebral column resection. Patients needing vertebral column resection are usually extremely satisfied during postoperative follow-up if severe neurologic complications can be avoided. Paediatric vertebral column resection should be reserved for extreme cases only and in a country of 5 million people, these procedures should be performed by only few experienced teams in two or at maximum three University Children's Hospitals.

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Kirjallisuus

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