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Spinal mobility, muscle strength and function in patients with idiopathic scoliosis

Different aspects on long term outcome

Akademisk avhandling

som för avläggande av medicine doktorsexamen vid Sahlgrenska akademin, Göteborgs universitet kommer att offentligen försvaras i sal Karl Isaksson, Medicinaregatan 16, Göteborg, onsdagen den 11 december 2019, kl 13.00

av

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Avhandlingen baseras på följande delarbeten

I. Danielsson A. J, Romberg K, Nachemson A. L. Spinal range of motion, muscle endurance, and back pain and function at least 20 years after fusion or brace treatment for adolescent idiopathic scoliosis: a case control study. Spine. 2006;31(3):275-83.

II. Romberg K, Fagevik Olsén M, Kjellby-Wendt G, Lofdahl Hallerman K, Danielsson A. Thoracic mobility and its relation to pulmonary function and ribcage deformity in patients with early onset scoliosis – a long-term follow-up.
Accepted for publication in Spine Deformity

III. Romberg K, Danielsson A, Fagevik Olsén M, Kjellby-Wendt G. Spinal mobility and muscle function in middle-aged patients treated for early onset idiopathic scoliosis – compared with untreated and treated adolescent onset patients. To be submitted.

IV. Romberg K, Johnsson Å. A, Danielsson A, Fagevik Olsén M, Kjellby-Wendt G. Validity of five methods to measure the pulmonary function in patients with early onset scoliosis. To be submitted

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Spinal mobility, muscle strength and function in patients with idiopathic scoliosis

Different aspects on long term outcome

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Abstract

The overall aim of this thesis was to evaluate different aspects of spinal function and pulmonary function, with long-term follow-ups, in patients with idiopathic scoliosis with debut before skeletal maturity. A further aim was to evaluate the criterion validity of different methods for measuring pulmonary function in patients with early onset scoliosis and to establish if any of those methods could be valid, easy to perform and inexpensive to use in clinical practice.

Study I*:* An evaluation of the spinal mobility and trunk muscle endurance and back function in 237 patients with adolescent idiopathic scoliosis 20 years after completed treatment. Both brace treated and surgically treated had reduced lumbar mobility and trunk muscle strength compared to controls. The self-reported physical function was however not severely restricted.

Study II*:* An evaluation of the range of motion in the thoracic spine, thorax expansion and breathing movements and their relation to pulmonary function and ribcage deformity in 106 patients with early onset scoliosis 26 years after treatment. Respiratory muscle strength was evaluated in a subgroup of 33 patients. Both brace treated and surgically treated had reduced thorax expansion and breathing movements compared to reference values. Respiratory muscle strength was reduced only in surgically treated patients. In a multivariate analysis explaining total lung capacity (TLC) % predicted the strongest factors were gender, brace model and smoking habits. Therefore, patients with scoliosis should be strongly recommended not to smoke.

Study III*:* An evaluation of the spinal mobility, trunk muscle endurance and back function in 116 patients with early onset scoliosis 26 years after treatment. Their results were compared to groups with untreated and treated patients with adolescent idiopathic scoliosis. The brace treated patients had similar results to the untreated group and despite having had a longer bracing period better than the brace treated patients with adolescent idiopathic scoliosis. The surgically treated patients had, despite somewhat longer fusions, similar results to the operated patients with adolescent onset.

Study IV: Validity in different methods measuring pulmonary function was evaluated in 33 patients with early onset scoliosis. Compared to ”gold standard” spirometry by plethysmography, handheld spirometry, CT and thorax expansion showed strong correlations. Handheld spirometer and thorax expansion, both inexpensive and less time-consuming, can be useful tools for early detection of reduction of pulmonary function during daily clinical practice.

Keywords: idiopathic scoliosis, long-term outcome, spinal mobility, trunk muscle endurance, back function, thoracic mobility, pulmonary function, validity

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