

Physical fitness and exercise in adults with congenital heart disease

Akademisk avhandling

Som för avläggande av medicine doktorsexamen vid Sahlgrenska akademien, Göteborgs universitet kommer att offentligen försvaras i hörsal Arvid Carlsson, Medicinaregatan 3, fredagen den 8 maj 2020, klockan 9.00.

av

Linda Ashman Kröönström

Fakultetsopponent:

Professor Per Morten Fredriksen

Institutt for helsevitenskap

Høyskolen Kristiania, Kristiania, Norge

Avhandlingen baseras på följande delarbeten

- I. Ashman Kröönström L, Johansson L, Zetterström A-K, Dellborg M, Eriksson P, Cider Å. Muscle function in adults with congenital heart disease. *Int J Cardiol.* 2014;170(3):358-63.
- II. Ashman Kröönström L, Cider Å, Zetterström A-K, Johansson L, Eriksson P, Brudin L, Dellborg M. Exercise capacity, physical activity level and health-related quality of life in adults with congenital heart disease. *Accepted.*
- III. Ashman Kröönström L, Eriksson P, Johansson L, Zetterström A-K, Giang KW, Cider Å*, Dellborg M*. Muscle function and range of motion in the arms, hands, and spine in patients with coarctation of the aorta. *Submitted.*
- IV. Ashman Kröönström L, Eriksson P, Zetterström A-K, Johansson L, Dellborg M*, Cider Å*. Exercise training with supplementary oxygen in adults with complex congenital heart disease. *Manuscript.*

*Equal contributions

**SAHLGRENKA AKADEMIN
INSTITUTIONEN FÖR NEUROVETENSKAP
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Physical fitness and exercise in adults with congenital heart disease

Linda Ashman Kröönström

Health and Rehabilitation/Physiotherapy, Institute of Neuroscience and Physiology, Sahlgrenska Academy, University of Gothenburg, Sweden, 2020.

Abstract

Background: The population of patients with adult congenital heart disease (ACHD) is growing, and the estimated life expectancy has increased. Therefore, factors related to lifestyle, such as physical activity (PA), exercise, and the risk of lifestyle-related diseases, to which these patients may be more susceptible, are becoming increasingly important to study.

Aim: The aim of this thesis was to increase understanding of physical fitness (muscle function, cardiorespiratory endurance), PA, and health-related quality of life (HRQoL) in patients with ACHD. Another aim was to study patients who have undergone heart surgery using existing arteries that may impact arterial blood supply to the affected arm, with special attention on the arm and spine, and determine whether exercise may improve physical fitness in patients with complex ACHD.

Methods: Studies I and II were register-based cross-sectional studies including patients with different types of ACHD that aimed to assess muscle function and cardiorespiratory fitness, PA level and HRQoL. Study III was also a cross-sectional study and aimed to assess patients with coarctation of the aorta (CoA), a narrowing of the descending aorta, regarding muscle function, arm length and circumference, and spinal mobility. Study IV aimed to assess exercise training with or without supplemental oxygen in patients with complex ACHD with primary outcome measures VO_{2peak} and muscle function.

Results: Studies I and II found that patients with ACHD, even patients with less complicated ACHD, have lower isoinertial muscle function and impaired cardiorespiratory endurance compared to healthy reference values. Study III found that patients with CoA who had been operated on using the subclavian flap technique have impaired muscle function and reduced arm length and circumference. Exercise training with or without supplemental oxygen was safe for patients with the most complex ACHD, and the intervention was feasible.

Conclusion: The results revealed impaired muscle function and cardiorespiratory endurance in patients with various types of ACHD. Patients may also have impaired muscle function and spinal mobility due to heart surgery. Even patients with less complicated ACHD exhibit impaired physical fitness, which suggests that tests of physical fitness should be offered to all patients with ACHD. Adapting to or maintaining a physically active lifestyle and good physical fitness is important in all patients with ACHD to, reduce the risk of lifestyle-related diseases. Even patients with complex ACHD and decreased physical fitness may be offered individually prescribed exercise to improve physical fitness.

Keywords: Adult congenital heart disease, physical fitness, physical activity, exercise, muscle function, health-related quality of life

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