

# Cam morphology of femoroacetabular impingement syndrome

## – Clinical, radiological and follow-up studies

### Akademisk avhandling

Som för avläggande av medicine doktorexamen vid Sahlgrenska akademien, Göteborgs universitet kommer att offentligens försvaras i R-husets Aula, Sahlgrenska Universitetssjukhuset Mölndal, Göteborgsvägen 31

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Fakultetsopponent:

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### Avhandlingen baseras på följande delarbeten

- I. Swärd Aminoff A, Abrahamson J, Todd C, Thoreson O, Agnvall C, Laxdal G, Pruna R, Jónasson P, Swärd L, Karlsson J, Baranto A. (2020). Differences in cam morphology and hip range of motion between young skiers and soccer players. [Submitted]
- II. Abrahamson J, Swärd Aminoff A, Todd C, Agnvall C, Thoreson O, Jónasson P, Karlsson J, Baranto A. (2018). Adolescent elite skiers with and without cam morphology did change their hip joint range of motion with 2 years follow-up. *Knee Surg Sports Traumatol Arthrosc*: 27(10): 3149-3157
- III. Abrahamson J, Jónasson P, Swärd Aminoff A, Sansone M, Todd C, Karlsson J, Baranto A. (2020). Hip pain and its correlation with cam morphology in young skiers - a minimum of 5 years follow-up. *J Orthop Surg Res*: 15, 444. doi: <https://doi.org/10.1186/s13018-020-01952-8>
- IV. Abrahamson J, Lindman I, Sansone M, Öhlin A, Jónasson P, Karlsson J, Baranto A. (2020). Female athletes have more and longer duration of symptoms prior to arthroscopy for femoroacetabular impingement syndrome. [Submitted]
- V. Abrahamson J, Lindman I, Sansone M, Öhlin A, Jónasson P, Karlsson J, Baranto A. (2020). Low rate of high-level athletes maintained a return to pre-injury sports two years after arthroscopic treatment for femoroacetabular impingement syndrome. *J Exp Orthop*: 7(1): 1-8. doi: <https://doi.org/10.1186/s40634-020-00263-5>

# Cam morphology of femoroacetabular impingement syndrome

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### **Abstract**

Femoroacetabular impingement syndrome (FAIS) leads to hip pain and reduced hip function in young athletes. Recent studies have reported high-impact sporting activities during adolescent growth as an important cause of cam morphology. However, not all athletes with cam morphology develop symptoms and dysfunction related to FAIS, nor do they require surgical treatment. The question of why some athletes with cam morphology function well at a high level of sports for years, while others do not, and possible differences between genders and different sports, remains to be answered.

The aim of this thesis is to investigate the correlation between cam morphology, hip joint range of motion (ROM) and hip pain in young elite athletes and patient-reported outcome measures (PROMs) and the rate of athletes still active at elite level after arthroscopic treatment for FAIS, and to make comparisons between genders, sports types and evaluations over time.

Study I is a cross-sectional study comprising young athletes (60 male football players, 40 male and 35 female skiers). The prevalence of cam morphology, hip ROM, hip pain and FAIS is studied. Football players had reduced hip rotation compared with skiers, independent of cam morphology and hip pain. Male and female skiers had a higher proportion fulfilling the diagnostic criteria for FAIS compared with football players. Study II is a cohort study comparing hip ROM over 2 years in young skiers (n=30) with and without cam morphology. All the skiers reduced their hip rotation, independent of cam morphology. A statistical, not clinically relevant, larger reduction was shown in internal rotation in skiers with cam morphology. Study III is a cohort study investigating the correlation between cam morphology, activity level and hip pain over 5 years in young skiers (n=60). Activity level and cam morphology had no, or only a low, correlation with hip pain. Study IV is a cross-sectional study comprising 919 athletes undergoing arthroscopic treatment for FAIS. Preoperative PROMs and types of sport participation between genders is studied. Females had a longer duration and a higher degree of symptoms. Horseback riding and football were equally common in females, while football was dominant in males. Study V is a cohort study comprising 551 athletes undergoing arthroscopic treatment for FAIS. The rate of continued sporting activity is evaluated and compared between sports, genders and PROMs. Only 25% were still active at pre-injury level after 2 years, with no gender difference, but with a greater improvement in PROMs.

**Keywords:** femoroacetabular impingement syndrome, cam morphology, athletes, sports medicine, adolescent, return to sport, hip arthroscopy, patient reported outcome measures

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