

International Outcomes of Total Hip Arthroplasty

Influence of Patient, Implant, and Surgical factors on Total Hip Arthroplasty Survivorship in Australia, Sweden, and the US

Akademisk avhandling

Som för avläggande av medicine doktorsexamen vid Sahlgrenska akademien, Göteborgs universitet kommer att offentligens försvaras i R-aulan, Sahlgrenska universitetssjukhuset, Mölndal, torsdagen den 13 juni 2019, kl. 09.00

av Elizabeth Walton-Paxton

Fakultetsopponent:

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Avhandlingen baseras på följande delarbeten:

- I. Meta-analysis of individual registry results enhances international registry collaboration. Paxton EW, Mohaddes M, Laaksonen I, Lorimer M, Graves SE, Malchau H, Namba RS, Kärrholm J, Rolfson O, Cafri G. *Acta Orthop*. 2018 Aug;89(4):369-373.
- II. An international comparison of THA patients, implants, techniques, and survivorship in Sweden, Australia, and the United States. Paxton EW, Cafri G, Nemes S, Lorimer M, Kärrholm J, Malchau H, Graves SE, Namba RS, Rolfson O. *Acta Orthop*. 2019 Apr;90(2):148-152.
- III. Do implants matter? An international comparison of Exeter and Summit THA survivorship in Sweden, Australia, and the US. Paxton EW, Cafri G, Lorimer M, Kärrholm J, Malchau H, Graves SE, Namba RS, Rolfson O. In Manuscript
- IV. Predictors of total hip arthroplasty revision in the US, Australia, and Sweden. Paxton EW, Cafri G, Bülow E, Lorimer M, Kärrholm J, Graves SE, Malchau H, Namba RS, Rolfson O. In Manuscript
- V. Patient risk factors of total hip arthroplasty revision in patients with osteoarthritis. Paxton EW, Cafri G, Kärrholm J, Malchau H, Namba RS, Rolfson O. In Manuscript

**SAHLGRENKA AKADEMIN
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Abstract

Although total hip arthroplasty (THA) is a successful treatment for osteoarthritis (OA), numerous factors influence the success of THA including patient, surgical, hospital and implant factors. Understanding the influence of these factors on THA risk of revision is critical for prevention of revision surgery. Collaborations of regional and national arthroplasty registries provide an opportunity to evaluate differences in THA patients, clinical practices, risk factors, and outcomes between countries to improve THA outcomes internationally. The purpose of this thesis was to examine variation in patient, surgical, implant characteristics, and THA outcomes in Sweden, US and Australia to identify THA risk factors and clinical best practices. The five studies in this thesis investigated: 1) Meta-analysis as an alternative to individual patient data analysis in comparing survival of porous tantalum cups versus other uncemented cups, 2) Variation in patient surgical, hospital, implant factors, and THA revision rates between countries, 3) Implant-specific sources of variation in THA implant survival across the countries, 4) Patient, implant, clinical practices and hospital predictors of THA revision in Sweden, Australia, and the US, and 5) The influence of patient-related factors and comorbidities on THA risk of revision in a US healthcare setting.

Primary THAs with an OA diagnosis were identified using the Swedish, Australian, and Kaiser Permanente registries. Kaplan–Meier statistics were used to assess time to revision with censoring for death and loss to follow-up. Multivariable cox regression models were used to identify patient, implant, surgical, and hospital factors associated with revision surgery. Patient-level data analysis and meta-analytic approaches yielded the same results with the porous tantalum cups having a higher risk of revision than other uncemented cups. Patients, implants and surgical practices differed between the countries. Sweden's 5- and 7-year THA survival was higher than Australia and the US. However, when patient characteristics, fixation and implants were controlled for THA survival was similar between countries. Predictors of THA revision also differed by country. In the US cohort, increased number of comorbidities and certain comorbidities had higher risk of all cause, revision due to dislocation, and septic revision.

Meta-analysis is a viable method for enhancing international registry collaboration. In comparing THA survival across countries, implant selection plays a critical role. Predictors of THA revision differ between countries most likely due to variation in clinical practices and implant selection. The number of patient co-morbidities and higher risk comorbidities should be considered by surgeons and patients prior to THA surgery.

Keywords: Total Hip Arthroplasty Survival, Revision Risk Factors, Meta-analysis, Arthroplasty Registries, Variation in International Practices

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