Implant survival of the most common cemented total hip devices from the Nordic Arthroplasty Register Association database

Junnila M1, Laaksonen I1, Eskelinen A2,3, Pulkkinen P4, Havelin L5,6, Furnes O5,6, Fenstad AM5, Pedersen AB7,9, Overgaard S8,9, Kärrholm J10, Garellick G10, Malchau H10,11,12, Mäkelä KT1,3

1. Turku University Hospital, Department of Orthopaedics and Traumatology
2. Coxa Hospital for Joint Replacement
3. Finnish Arthroplasty Register
4. Helsinki University, Department of Public Health
5. Norwegian Arthroplasty Register, Haukeland University Hospital, Department of Orthopaedic Surgery
6. University of Bergen, Bergen, Department of Clinical Medicine
7. Aarhus University Hospital, Competence Centre for Clinical Epidemiology and Biostatistics, North, Department of Clinical Epidemiology
8. Odense University Hospital, Department of Orthopaedic Surgery and Traumatology and University of Southern Denmark, Institute of Clinical Research
9. Aarhus University Hospital, Danish Hip Arthroplasty Register, Department of Clinical Epidemiology
10. The Swedish Hip Arthroplasty Register, Sahlgrenska University Hospital, Department of Orthopaedics, Institute of Surgical Sciences
11. Massachusetts General Hospital, Harris Orthopaedic Laboratory
12. Harvard Medical School, Department of Orthopaedic Surgery

Background and purpose
Nordic Arthroplasty Register Association (NARA) was established in 2007 by Sweden, Norway and Denmark with the overall aim to improve the quality of joint replacement surgery by register research collaboration. Finland became member of NARA in 2010. Total population of the 4 countries is currently 26 million. It has been stated based on NARA data that the survival of cemented implants for total hip replacement is higher than that of uncemented implants in patients aged 65 years or older (1). In younger patients, uncemented implants do not perform better with regard to overall revision rate, but have a lower long-term risk of revision due to aseptic loosening (2). According to previous Nordic Arthroplasty Register Association (NARA) data 10-year implant survival of cemented total hip arthroplasty (THA) is 94 % and 96 % in patients aged 65 to 74 and 75 or older, respectively. We now report brand-level comparison of cemented THA based on the NARA database which has not been assessed previously.

Patients and methods
There were 360,584 primary all-cemented THAs registered in the NARA database from 1995 to 2013. Implant survival of the 9 most common cemented THA was assessed: Lubinus, Exeter, Charnley, Spectron, MS 30, CPT, Elite, Müller THA, and C-stem THA. The versions of the study implants were not necessarily the same in the 4 countries. Further, the study devices were not necessarily coded similarly in the 4 registers. Only those cup/stem combinations were included with at least 100 implantations in a country. We used Kaplan-Meier analysis with 95 %
confidence interval (CI) to study implant survival at 10 and 15 years, and Cox multiple regression model to assess survival and hazard ratio (HR) with revision for any revision as endpoint, with confidence interval (CI), and with adjustments for age, sex, diagnosis, and femoral head material.

Results

Spectron EF ((89.9 % (CI: 89.3-90.5)) and Elite THA ((89.8 % (CI: 89.0-90.6)) had the lowest 10-year survivorship. Lubinus ((95.7 % (CI: 95.5-95.9)), MS 30 ((96.6 % (CI: 95.8-97.4)), and C-stem THA ((95.8 % (CI: 94.8-96.8) had a 10-year survivorship of 95 % or over. Lubinus ((RR 0.77 (CI: 0.73-0.81)), Müller ((RR 0.83 (CI: 0.70-0.99)), MS-30 ((RR 0.73 (CI: 0.63-0.86)), C-stem ((RR 0.70 (CI: 0.55-0.90)), and Exeter Duration THA ((RR 0.84 (CI: 0.77-0.90)) had a decreased revision risk compared to Charnley THA, the reference implant.

Interpretation

Spectron EF and Elite THA had a decreased implant survival compared to the Charnley THA, the reference implant. Implant survival of Müller, MS 30, CPT, and C-stem THA (94.9 to 96.6 % at 10 years) was far above an acceptable limit for 10 year survival. However, total amount of these devices was small compared to Charnley, Lubinus and Exeter THA, although all had been implanted in over 2000 hips. When an implant becomes more common and is used by an increasing amount of surgeons the results will be more representative since they can be supposed to mirror a wider variation of differences in surgical technique.

A major strength of our study is the unique collaboration of 4 national registries to create a multinational database with large numbers of patients and a long follow-up time. The main weakness of our study is that we were not able to assess every updated version of each device separately. The study devices were implant families consisting of several versions of the device. Another weakness is that we were not able to assess cup and stem survival separately with revision for any reason as the end point.

References