Statins may reduce femoral osteolysis in patients with total hip arthroplasty

+Lübbeke A, Garavaglia G, Barea C, Bonvin A, Roussos C, Hoffmeyer P
Geneva University Hospitals, Geneva, Switzerland
anne.lubbekewolff@hcuge.ch

ABSTRACT INTRODUCTION:

Periprosthetic osteolysis threatening the survival of the implants is still the main long-term complication after total hip arthroplasty (THA). Statins are frequently taken by elderly patients including those with total hip arthroplasty. In addition to cholesterol-lowering and cardio-protective effects, their use has been associated with reduction of osteoclastic activity and subsequent periprosthetic osteolysis as well as promotion of bone formation in experimental studies. Recently, a large nationwide clinical study reported on a reduced risk of revision for aseptic loosening among statin users with THA. However, the authors cautioned against the use of statins to prevent osteolysis until the findings have been confirmed by other studies and the mechanisms have been clarified. Furthermore, (1) the study endpoint was revision which is not always performed in the presence of implant loosening, and (2) information on lifestyle factors as patient activity and BMI was not available. The study objective was to evaluate the influence of statin use on the development of femoral osteolysis within the first five years after primary THA.

METHODS:

Since March 1996 all patients undergoing THA in our University Hospital are routinely enrolled in a prospective hospital-based cohort and followed longitudinally. The arthroplasty registry was approved by the institutional review board. For this study we included all primary THAs with the same uncemented press-fit cup and a 28mm head operated upon between January 2001 and December 2005. The bearing surface was either standard ceramic-polyethylene or metal-metal. Five years after the operation all patients still alive were contacted by mail and phone for a clinical and radiographic evaluation. Information on statin use was obtained at the time of operation from the anesthesiology report and (2) at the 5-year follow-up visit during the interview. Patients were classified as statin ever-users when they had a recorded statin use at both the time of operation and follow-up, (2) at the time of operation but not at follow-up anymore and (3) at the time of follow-up since at least one year or longer. All other patients were classified as statin never-users. Main outcome was the incidence of focal or linear osteolysis around the cemented femoral stem. Radiographs were analyzed by an experienced orthopaedic surgeon who was blinded to the patient characteristics including statin use. To evaluate the effect of statin use on osteolysis we calculated the absolute risk reduction and relative risk (RR) and their 95% confidence intervals. Due to the relatively small number of events adjustment for baseline differences was performed using the propensity score method (a multivariate confounder score, which combines many covariates into one single variable).

RESULTS SECTION:

Of 1363 primary THAs operated upon during the inclusion period, 180 (13%) had died, 74 (5%) were lost to follow-up, and 406 (30%) reported either poor general health, refused to attend, or had incomplete information on statin use or incomplete radiographs. 705 primary THAs (mean age 68 years, 54% women, 92% cemented stems, 60% with ceramic-polyethylene and 40% with metal-metal bearing surface) were included in the final analysis. Of those, 197 THAs (28%) were in patients who reported statin ever-use. Statin use was recorded both at the time of operation and at the 5 year visit for 81 THAs (41%), at the time of operation for 54 (17%), and at the 5 year visit for 82 THAs (42%). Statin ever-users compared to never-users were more often men (53% vs. 45%, p=0.015), slightly older (69 vs. 67 years, p=0.026), less often engaged in high activity (10% vs. 16%, p=0.047), had a higher BMI (28.1 vs. 26.7, p<0.001) and more often an ASA score of 3 or 4 (34% vs. 12%, p<0.001). The two groups were similar with respect to smoking status, diagnosis, type of stem, type of bearing surface, cementing quality and cup inclination.

Five years after the operation focal or linear osteolysis was found around 38 (5.4%) femoral components. On 5 occasions the osteolysis had developed in statin ever-users (5/197, 2.5%) and in 33 occasions in statin never-users (33/506, 6.5%). The absolute risk reduction associated with statin use was 4%, (95% CI 0.9; 7.1), and the crude RR was 0.39 (95% CI 0.15; 0.98). After adjustment (with use of a propensity score) for age, sex, BMI, activity level, diagnosis, and type of stem the adjusted RR was 0.41 (95% CI 0.15; 1.07, p=0.067).

DISCUSSION:

Statin use was associated with a reduced risk of developing femoral osteolysis in the first five years after primary THA. To the best of our knowledge, this is the first clinical study lending support to the hypothesis that statins may reduce periprosthetic osteolysis as suggested from experimental studies. Our effect estimate (RR around 0.4) was similar to the effect of statin use on revision for aseptic loosening reported by Thillemann et al. The study is limited by the restricted number of events which led to relatively large confidence intervals and an adjusted relative risk estimate that included one. Second, although adjustment was performed for the main known confounders, residual confounding cannot be excluded. Third, although information on statin use was obtained at two occasions and in general patient’s compliance with statins is known to be relatively high, we do not have prescription data for the whole period. Finally, the follow-up time was five years, and the results may change with a longer follow-up period.

SIGNIFICANCE:

Periprosthetic osteolysis and subsequent revision for aseptic loosening are the main threat to implant survival, and considerable efforts have been made to reduce this problem. Statins are increasingly and widely prescribed to reduce cardiovascular morbidity and mortality, and a considerable proportion of THA patients are statin users. In this context, the unintended beneficial effect of statins on implant survival may have important public health implications in terms of revision reduction, if confirmed by other studies. Moreover, further clinical research is necessary to evaluate the usefulness of statins to stimulate bone formation around implants with osteolytic lesions.

REFERENCES:

1 Von Knoch F et al. Effect of simvastatin on polyethylene particle-induced osteolysis. Biomaterials, 2005
4 Thillemann T et al. Risk of revision after primary THA among statin users. JBJS Am, 2010

Poster No. 0965 • ORS 2012 Annual Meeting