Risk factors for the intraoperative calcar fracture in the cementless total hip arthroplasty: A case-control study

Background
Intra-operative periprosthetic femoral fracture is one of the known complications of the cementless total hip arthroplasty (THA).

Questions/purposes
Purpose of the study was to find out the incidence and risk factors for the intra-operative calcar fractures. The influence of the calcar fracture to revision rate was also evaluated.

Patients and Methods
This was a retrospective analysis of 3208 cementless THAs (2913 patients). Among these hips, a total of 118 (3.7%) calcar fractures were observed. A control group of 118 patients/hips without a calcar fracture were randomly selected. Demographic data of the two groups was collected and radiological analysis of the proximal femur anatomy according Noble and Dorr classifications was performed.

Results
In the control group revision rate was 3.4% and at the fracture group 10.2% (p=0.038). In the fracture group, 55/118 patients (46.6%) had at least one risk factor while only 23/118 patients (19.5%) in the control group had a risk factor (p=0.001). Hardinge approach (p=0.007) was a risk factor for the calcar fracture.

In the radiological analysis, significant differences in the proximal femoral morphology was noted between the groups. In the Noble classification, there were more Stovepipe shape and Champagne-flute shape proximal femurs in the calcar fracture group (p=0.029). In the Dorr classification there were more Type C proximal femurs in the calcar fracture group than in the control group (p=0.011).

Conclusions
Risk of revision for any reason is significantly higher in the calcar fracture group and the most common reason for revision was the calcar fracture which was not noted at the index surgery. The calcar fracture patients do have more patient depend risk factors, like osteoporosis and hip dysplasias than control group patients have. Hardinge approach was noted to be a risk factor for the intraoperative calcar fracture. Small dimensions in the proximal femur dimensions and wide intramedullary canal with thin cortices increase the risk of the intraoperative calcar fracture. The risk patients for calcar fracture have champagne-fluted and stovpeipe shape canals in Noble classification and Type C proximal femurs with wide intra-medullary canals and thin cortices in Dorr classification.