

The short term results of hip resurfacing arthroplasty using personalized instrumentation

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Introduction: Since Smith-Peterson's glass mold arthroplasty in 1939, hip resurfacing arthroplasty was developed and introduced to orthopaedic surgery field but it had many problem like early loosening. Recently it is being popular for some indication as development of new implant design and manufacturing. There are still many suggested advantages of hip resurfacing arthroplasty. These include bone conservation, improved function as a consequence of retention of the femoral head and neck and more precise biomechanical restoration, decreased morbidity at the time of revision arthroplasty, reduced dislocation rates, normal femoral loading and reduced stress-shielding, simpler management of a degenerated hip with a deformity in the proximal femoral metaphysis, an improved outcome in the event of infection, and a reduced prevalence of thromboembolic phenomena as a consequence of not using instruments in the femur. But, there are limited or inconsistent data to support some of these claims regarding the benefits of hip resurfacing including the potential for a more natural feel because of the minimal disturbance of the proximal part of the femur resulting in a better and faster functional outcome. We evaluate the short term results of hip resurfacing arthroplasty using custom patient-specific tooling for prosthesis placement for better standardization.

Materials & Methods: 40 cases, 36 patients (male: 20, female: 16) those of who were candidates of a Hip Resurfacing procedure, participated in the study. Mean follow up period was 2.5 years (8 months ~3 years). A CT scan was performed on each patient and a 3D model was generated using the computer tomography dataset. From this model a bone-surface skin was extracted and this data set was used to create a personalized jig. Detailed analysis of the native bone structure was then used to preoperatively plan the appropriate size and position of the implant. A mean 7 degree corrective valgus angle was prescribed on all cases. Postoperative radiological datasets were superimposed onto preoperative plan position and offsets were measured. Operative times were recorded per step during the procedure. Surgeon comfort and ease of use was also noted.

Results: Mean preop and postop implant position tolerance within 3 degrees. Mean postop implant stem-shaft angle was 136° (122°~142°) and mean acetabular inclination angle was 41°(37°~50°). Mean Harris hip scores was improved from 48.4 points preoperatively to 93.8 at final follow up. There was one case of loosening of femoral metal head with angulation and migration in avascular necrosis (postoperative 6 months) and one case of femoral neck fracture (postoperative 1.5 year) so we revised to primary total hip surgery. Mean surgical time was recorded to 55 minutes (35~75). Personalized jig utility was positive with no intra-operative complications.

Conclusion: "Femoral neck referencing personalized jigs" provides a surgeon an easy to use, accurate alignment tool to simplify a demanding hip resurfacing procedure with very predictable outcome but long term follow up and much cases are needed.