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**Title:** Retrospective Study About Cementless Total Hip Arthroplasty With Ceramic-on-ceramic Bearing Surfaces for Post-traumatic Hip Osteoarthritis After Acetabular Fracture: Long-term Results (ATP)

**Study start: July 15, 2019**

**Primary completion: July 19, 2019**

**Study completion: August 20, 2019**

### **Brief summary**

A retrospective consecutive population of patients treated with cementless total hip arthroplasty with ceramic-on-ceramic bearing surfaces due to post-traumatic osteoarthritis due to acetabular fractures will be selected. The aim of this retrospective study is to evaluate the long-term clinical and radiographic results of this implant in such a specific cohort. The secondary aim of the study is to provide the complication rate and the failure rate of the cohort. A descriptive analysis of the failures will be provided as well.

### **Study description**

Total hip arthroplasty (THA) is the recommended treatment to restore functionality and control pain in post-traumatic hip osteoarthritis due to acetabular fractures. However, THA in post-traumatic osteoarthritis following acetabular fractures is a complex procedure and it is burdened with occasional failures. Modest long-term outcomes have been reported, generally lower than conventional THAs performed due to osteonecrosis or primary osteoarthritis: 10-year clinical results are usually good but not excellent (average Harris Hip score: 88), 10-year revision rate is between 15% and 26%. In review study about the complications of post-traumatic THAs, 30% of ossifications, 4.4% of dislocations, 5.6% of infections, and 2.1% of neurovascular lesions were reported: all the percentages were higher than in primary conventional THAs.

The most critical issues are related to the young age of the patients, to the anatomical changes affecting the periarticular tissues, to the presence of hardware and to the greater exposure to septic complications. All these factors may prevent the surgeon to achieve a good cup positioning and a satisfying outcome. However a correct surgical technique, associated with meticulous pre-operative planning and the use of low-wear implants can improve the clinical result and the long term survival rates.

However, the literature about mid-to-long-term studies about post-traumatic THAs is scarce (currently 5 with an average follow-up of at least 5 years). Furthermore, these studies often include outdated implants, positioned with invasive surgical techniques and with removal of all previous hardware. Therefore, a long-term study (minimum 10-year follow-up) involving more recent implants, with modern articular couplings demonstrating low wear (such as ceramic-on-ceramic), and performed with minimally invasive technique and pre-operative CT-guided planning, would be desirable.

The aim of this study is to describe the survival rates and the long-term clinical and radiological outcome (minimum 10-year follow-up) of cementless THAs, with ceramic-on-ceramic couplings, performed with minimally-invasive technique and CT guided pre-operative planning, in post-traumatic osteoarthritis due to acetabular fractures

### **Population**

retrospective, consecutive population treated with a cementless total hip arthroplasty with ceramic-on-ceramic bearing surfaces for post-traumatic hip osteoarthritis due to acetabular fracture. A minimum follow-up of 10 years was mandatory

#### Inclusion criteria

- symptomatic, post-traumatic hip osteoarthritis due to acetabular fracture
- consecutive population with a minimum follow-up of 10 years
- cementless total hip arthroplasty with ceramic-on-ceramic bearing surfaces
- pre-operative planning using CT
- complete clinical and radiographic assessment

#### Exclusion Criteria:

- other type of hip osteoarthritis
- other type of implants
- inadequate pre-operative planning (eg: no CT)
- incomplete assessment

#### Methods

Clinical patient evaluation was assessed by using the HHS and WOMAC score at the minimum follow-up of 10 years.

Radiological evaluation was assessed using Moore's criteria regarding osseointegration (radial trabeculae, superior and inferior buttresses, stress shielding, absence of radiolucent lines). Adequate osseointegration of the cup: at least 3 parameters out of 5.

A prosthetic implants survival rate evaluation has been made using Kaplan-Meier method.

#### Statistical analysis plan

Statistical analysis has been done by using Windows SPSS 14.0, 14.0.1 version (SPSS Inc, Chicago, IL) and JMP, 12.0.1 version (SAS Institute Inc, Cary, NC, 1989-2007).

The quantitative data were expressed as average values and standard deviations, adding the range of minimum and maximum values. Statistical analysis was realized using Chi-squared test or Fisher exact test for qualitative data. Comparison of averages was performed using Student T test (significant correlation  $P < .05$ ).

The survival curves have been calculated and plotted according to Kaplan-Meier method. On x-axis time is expressed in years, while on y-axis the percentage of prosthesis survival is reported. The curve starts by definition at 100% survival when the period of follow-up begins. The implant is considered to be "surviving" up to when it was necessary to replace even single component. End point is the prosthesis failure. Prosthesis failure is defined as the revision of even one prosthetic component.

Each curve is flanked by a pair of curves symmetrical to it that are the 95% Confidence Interval. The range of the interval is closely dependent on the number of operations considered in the analysis. When the number of operations is low, uncertainty of analysis is high and showed by a wide confidence interval.