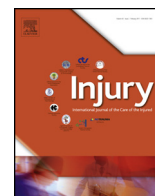




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Reduced survival for uncemented compared to cemented total hip arthroplasty after operatively treated acetabular fractures

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ABSTRACT

Background: Post traumatic arthritis and avascular necrosis of the femoral head are common complications after operatively treated acetabular fractures. This may cause severe disabilities for the patient, necessitating a total hip arthroplasty. Even though an arthroplasty may provide good symptomatic relief, the long-term results are more uncertain and no consensus exists according to preferred prosthetic designs. With this cohort study, we aimed to investigate the medium to long term arthroplasty survival and clinical results of total hip arthroplasty after operatively treated acetabular fractures.

Methods: We included 52 patients treated with a secondary total hip arthroplasty at a median of 2.4 (0.1–14.1) years after an operatively treated acetabular fracture. The median age was 54 (11–82) years. Cemented arthroplasty was used for 33 patients, 10 patients had an uncemented arthroplasty and 9 patients received a hybrid arthroplasty. Average follow up was 8.0 (SD 5.0) years.

Results: Ten-year revision free arthroplasty survival was 79%. Uncemented arthroplasties had a significantly worse 10-year survival of 57%. Arthroplasties performed at a centre without a pelvic fracture service also had a significantly worse 10-years survival of 51%. Cox regression showed similar results with an 8-fold increase in risk of revision for both uncemented arthroplasties and operations performed at a non-pelvic trauma centre.

Conclusion: Total hip arthroplasty secondary to an operatively treated acetabular fracture provides good symptomatic relief. These patients are, however, complex cases and are probably best treated at specialist centres with both pelvic trauma surgeons and arthroplasty surgeons proficient in complex revisions present.

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Introduction

Acetabular fractures are severe injuries and may result in life long disability. Undisplaced and less displaced fractures can generally be treated non-operatively with good to excellent results [1]. For the displaced fractures, operative treatment with open reduction and internal fixation (ORIF) is recommended [2–4], and the clinical results are reported to be successful in 76%–80% of the cases. Good results are, however, closely associated with the fracture reduction, and a residual step-off over 2–3 mm will lead to significantly reduced hip joint survival and clinical results. It is suggested that approximately 11–19% of the acetabular fracture

patients will develop symptomatic arthritis [5–8] and 6%–11% will eventually receive a total hip arthroplasty (THA) [5–8]. The reported results of delayed THA after operatively treated acetabular fractures vary widely as do the type of arthroplasties performed. Romness and colleagues reported up to 18.2% revisions after 10 years for cemented cups in their study [9]. More recent reports have almost exclusively focused on the use of uncemented arthroplasties and have described excellent short to mid-term results, with survival rates approaching 100% [10–12]. Other authors have not confirmed these excellent results, i.e. Morrison showed a 10-year survival rate of 70% for uncemented acetabular components [13]. A review from 2014 could not show statistically significant differences in survival between cemented and uncemented components [14].

The aim of the present study was to investigate the medium to long term implant survival and clinical results of a secondary THA

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after ORIF for acetabular fractures. Furthermore, we aimed to investigate any differences between cemented and uncemented components.

Patients and methods

In 1993 one of the senior authors (O.R.) established a database to prospectively register all acetabular fractures seen in our department. The department is treating all acetabular fractures in the region, with a catchment area of approximately 2.8 million inhabitants [15]. The database contains information on fracture characteristics, treatment, results and data on follow up (FU), with scheduled visits at 3,6 and 12 months, as well as 2,5,10,15 and 20 years. The follow up data include Harris Hip score (HHS) and Merle d'Aubigné score (MMA), and from 2015 also the Eq-5D and Hip disability and Osteoarthritis Outcome Score (HOOS) which also includes the Western Ontario and McMaster universities Osteoarthritis Outcome Score (WOMAC). Patients who received a secondary THA between 1995 and 2014 after failed ORIF for an acetabular fracture were included into the present study. The study was approved by the regional ethics committee.

A total of 55 patients were identified from the registry; 2 patients were lost to follow up and 1 patient had deceased within the first two years after THA, leaving a total of 52 patients to be included in the survival analysis. Failure was defined as revision of the arthroplasty from any cause.

The arthroplasties were performed at six different hospitals by a total of 25 surgeons, all experienced with THA. The cemented arthroplasties (n = 33) were performed by 17 different surgeons, 8 performed the uncemented arthroplasties (n = 10) while 7 surgeons operated the hybrid arthroplasties (n = 9).

For the clinical FU, all patients with complete data on HHS, EQ-5D, HOOS and WOMAC score, at a minimum of 2 years after THA, were included. These 45 patients with complete data were followed for a median of 7.7 (2–21) years. The HHS was considered excellent (100–90 points), good (89–80 points), fair (79–70 points) or poor (<70 points). The EQ-5D index and the individual HOOS scores (pains, symptoms, activities of daily living, sports & recreation and quality of life) were calculated.

Radiographs of the non-revised hips were assessed by two of the authors for signs of radiographic loosening according to Gruen [16] for cemented stems and Engh [17] for uncemented stems, while Charnley zones [18] were used to assess the cups.

Statistics

The survival analysis was performed on STATA software (Version 14.2; StataCorp), using the Kaplan-Meier method with censoring. Differences in survivorship between groups were analysed with the log-rank test. Cox-regression was applied to identify negative predictors for survival and estimate hazard ratios. Clinical data was analysed with SPSS software (Version 22; IBM). The clinical data were normally distributed and ANOVA was used when three groups or more were compared, and students T-test for continuous parameters such as clinical scores. Level of significance was set at p = 0.05.

Results

THA survival

For the survival analysis, all patients with a minimum of 1 year FU were included; this left a total of 52 patients. Two were lost to FU and one patient had deceased within 1 year. There were 17 (33%) females and 35 (67%) males, with a median age of 54 (range 11–82) years. The median FU was 7.3 (1–21) years.

Table 1
Distribution of fracture types according to the Letournel classification.

Fracture type (Letournel's classification)	Number
Posterior wall	12
Posterior column	2
Anterior wall	1
Anterior column	2
Transverse	1
Posterior column + wall	2
Transverse and posterior wall	16
T-fracture	1
Anterior column + posterior hemitransverse	9
Both column	6
Total	52

The mean time to THA from the index operation was 4 (SD 3.8) years and median 2.4 (range 0.1–14.1) years. In total, 16 patients needed impaction bone grafting in the acetabulum. There was an overweight of fracture patterns affecting the posterior part of the joint, with one third of the fractures being transverse with posterior wall (Table 1). Forty patients received their THA in a centre with a pelvic fracture service, 11 were operated elsewhere and 1 patient had missing data. Cemented THA was the most commonly used technique with 33 patients, 10 patients received an uncemented arthroplasty and 9 had a hybrid THA done (Table 2). Patients with uncemented arthroplasty were younger with a mean age of 42 (SD 16) years, compared with the group with hybrid articulations, mean age of 51 (SD 12) years and the cemented arthroplasty group with a mean age of 56 (SD 16) years (p = 0.057), although not statistically significant. There were no differences in gender distribution across the groups.

The overall 10-year revision free survival for any cause was 79% (95% CI 62%–89%) (Fig. 1). When dividing into cemented, uncemented and hybrid THA groups, we found that uncemented THAs (10 patients) had a statistically significant worse survival of 57% (95% CI 21%–81%) estimated at 10-years (p = 0.005) (Fig. 2). Cemented THA (33 patients) had an estimated 10-year survival of 80% (95% CI 56%–91%), and hybrid prosthesis (9 patients) had 100% 10-year survival. When dividing the data into separate arthroplasty

Table 2
The different types of prosthetic components used in our series.

Stems	Number	Cups	Number	Head	Number
Cemented					
Charnley	20	Ogee	19	Co-Cr 32 mm	14
Exeter	10	Marathon	9	Co-Cr 28 mm	9
Lubinius	1	Exeter	3	Monoblock 22 mm	8
Elite Plus	1	Lubinius	1	Co-Cr 22 mm	2
CPT	1	Elite	1		
Total	33		33		33
Uncemented					
Corail	5	Trilogy	5	Ceramic 28 mm	3
SCP	2	Duraloc	2	Ceramic 32 mm	3
HActiv	2	TM	1	Zirconium 28 mm	2
Landos	1	Pinnacle	1	Co-Cr 32 mm	1
		Igloo	1	Co-Cr 36 mm	1
Total	10		10		10
Hybrid					
Corail	6	Ogee	2	Co-Cr 32 mm	4
Exeter	2	Marathon	2	Co-Cr 28 mm	2
CPT	1	TM	2	Ceramic 32 mm	2
		Exeter	1	Monoblock 22 mm	1
		Trilogy	1		
		Elite	1		
Total	9		9		9

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