

Cemented versus Press-Fit Acetabular Fixation in Oncologic Reconstruction

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INTRODUCTION:

There is no consensus on the optimal fixation of the acetabular implant in total hip arthroplasty (THA) performed in oncologic reconstructions or in radiated bone. This study was designed to compare the outcomes of cemented and press-fit acetabular reconstructions in THA performed for these indications. Press-fit THA is the widely accepted method of fixation for primary osteoarthritis, is procedurally efficient, and historically thought to have less risk for postoperative thromboembolic events. Cemented implants are generally reserved for individuals with poor bone quality for reasons including osteoporosis, irradiation, and malignancy, though they have potential downsides including increased operative time, increased blood loss, and increased technical difficulty.

METHODS:

This study was designed as a single institution retrospective cohort for all patients with neoplastic disease involving the proximal femur or acetabulum, or radiation osteonecrosis of the hip, from 2011 to 2021. Patients treated with standard THA as well as THA with proximal femoral replacement were included. We assessed outcomes including surgical time, blood loss, perioperative complications, reoperation for any reason, and revision arthroplasty.

RESULTS:

Forty-four cases met the inclusion criteria for this study. The cemented cohort comprised 23 cases, while the press-fit cohort had 21 cases. The average age in the cemented cohort was 65 years, while the average age of the press-fit cohort was 64 years. The cemented cohort included 8 males and 15 females, while the press-fit cohort contained 12 males and 9 females. The average BMI was higher in the cemented cohort (30.8) compared to the press-fit cohort (28.1). Tumor histology in the cemented cohort included breast (N = 6), renal (N = 6), lung (N = 4), myeloma (N = 4), colorectal (N = 1), bladder (N = 1), and prostate (N = 1). Tumor histology in the press-fit cohort included lung (N = 5), breast (N = 4), prostate (N = 3), myeloma (N = 3), renal (N = 2), uterine (N = 1), colorectal (N = 1), esophagus (N = 1), and giant cell tumor (N = 1). In the cemented acetabulum cohort, all patients had tumor in the acetabulum (acetabulum only: N = 19, both acetabulum and femur: N = 4). In the press-fit acetabulum cohort, only 7 patients had tumor in the acetabulum, while most had disease only in the proximal femur (acetabulum only: N = 3, both acetabulum and femur: N = 4, femur only: N = 14). In the cemented cohort, a greater percentage of patients received neoadjuvant radiotherapy (N = 11 (47.8%)) compared to the press-fit cohort (N = 8 (38.0%)). In the cemented cohort, 17/23 (73.9%) of patients had an acetabular cage construct. In the cemented acetabulum cohort, 18 (78.2%) patients had a cemented femoral component as well, while 5 (21.7%) patients had a press-fit femoral component (reverse-hybrid fixation). In the press-fit acetabulum cohort, 17 (81.0%) patients had a cemented femur (hybrid fixation), while 4 (19.0%) patients had a press-fit femoral component. The average operation time was longer in the cemented cohort (238 min) compared to the press-fit cohort (178 min). The average estimated blood loss was higher in the cemented cohort (986 cc) versus the press-fit cohort (574 cc). The total survival at the time of data collection in April 2023 was 6/23 (26.1%) for the cemented cohort, and 7/21 (33.3%) for the press-fit cohort. The 1-year survival was higher in the cemented cohort (17/23 = 73.9%) versus the press-fit cohort (11/21 = 52.3%). There was 1 postoperative complication in the cemented cohort (a deep vein thrombosis), while there was zero in the press-fit cohort. There were more revision surgeries needed in the cemented cohort (4/23 = 17.3%) compared to the press-fit cohort (1/21 = 4.8%). The average time to revision surgery was 578 days in the cemented cohort.

DISCUSSION AND CONCLUSION:

This study compares the usage of cemented versus press-fit acetabular components in total hip arthroplasty performed secondary to oncologic bone disease. In many of these cases, patients received localized radiation to the hip joint as part of oncologic treatment. There was an increased number of patients with acetabular involvement in the cemented cohort. Average operative time as well as average estimated blood loss were higher in the cemented cohort. Complications were minimal in both groups and not statistically different. 4 patients in the cemented cohort required revision surgery, while 1 patient in the press-fit cohort required revision surgery. One-year survival was higher in the cemented cohort. The optimal method of fixation cannot be determined by this retrospective non-randomized study design. However, these data demonstrate that cemented and non-cemented constructs have similar outcomes. Surgeons caring for oncologic disease and post-radiated bone should have familiarity with both techniques as certain patients, specifically those with acetabular disease, may benefit from cemented fixation.

Figure 1: Cemented versus Press-Fit Acetabular Fixation in Oncologic Reconstruction Data

	Cemented	Press-Fit
N	23	21
Average Age	65	64
Sex		
Male	8	12
Female	15	9
Average BMI	30.0	28.1
Tumor Histology		
Breast	6	4
Lung	4	5
Renal	6	2
Myeloma	4	3
Prostate	1	3
Colorectal	1	1
Bladder	1	0
Esophageal	0	1
Giant Cell Tumor	0	1
Uterine	0	1
Tumor Location		
Acetabulum	19	3
Femur	0	14
Both	4	4
Radiotherapy		
Neoadjuvant	8	5
Adjuvant	8	4
Both	3	3
None	4	9
Acetabular Cage	17	N/A
Femoral Fixation		
Cemented	18	17
Press-Fit	5	4
Average Operation Time (min)	238	178
Average Estimated Blood Loss (cc)	966	574
Total Survival	6 (26.1%)	7 (33.3%)
1-year Survival	17 (73.9%)	11 (52.3%)
Average Length Survival for Deaths (days)	445	448
Post-Op Complication	1 (4.3%)	0
Revision Surgery	4 (17.3%)	1 (4.8%)
Average Time to Revision (days)	578	993