Comparative Analysis of Cemented Versus Press-Fit Fixation in Total Hip Arthroplasty

Shanice Cox, MS; Kwame A Ennin, M.D.
Burnett School of Medicine, Texas Center for Joint Replacement

OBJECTIVE

In patients undergoing hip arthroplasty, does the restricted access of the Direct Anterior (DA) approach negatively impact the cementing technique compared to cemented arthroplasty with press-fit fixation, and does this cementing technique decrease the occurrence of loosening and fractures when compared to press-fit fixation utilizing the same surgical approach?

BACKGROUND

The acknowledged benefit of the Direct Anterior (DA) approach is early functional return. However, given the negative track record of some cemented designs, most U.S. surgeons use cementless femoral stems.

Joint replacement registries show *cemented* fixation is associated with a lower risk of revision compared to uncemented fixation, in patients older than 75 years. Despite this, registries have shown an increase in utilization of *uncemented* fixation.

The original rationale behind this shift away from cemented fixation was due to cement failure commonly observed in the young joint replacement patient population.

Less invasive surgical techniques renewed interest in the Direct Anterior (DA) approach around the early 2000s.

METHODS

This is a retrospective case control study. A consecutive series of 341 patients (360 hips) receiving the DA approach between 2016-2018 were reviewed.

There were *203 cementless stems* and *157 cemented stems*. 70% of the patient population was female.

Femoral complications were compared between the two groups using the T-test. Average follow-up was 1.5 years for patients in the cementless group and 1.3 years in the cemented group.

Standard intra-operative and post-operative protocols was used by all surgeons.

Our study shows that cementless stems are most at risk early in the post-operative time frame.

To decrease the risk associated with cementless fixation and enhance early recovery, a simplified cementing technique with a bone locking philosophy was used. Optimal stem position and cement interface were achieved; no cement related complications were identified [Fig 1].

The cementing process used in this series, does not add time or surgical complexity and can be done safely through the DA approach [Fig 2].

Our study answered the questions it was set to address, and the results are consistent with prior literature reports [Refs 1-2]:

- Modern "3rd generation" cementing can be done safely using the DA approach with minimal change in workflow; without adding more time or complexity to the surgical procedure.
- Femoral cementing reduces the number of fractures and revisions compared to a contemporaneous uncemented series with the same patient care protocol and wedge stem design in older patients.

Revision Diagnosis	Cemented Stems		Cementless Stems		P-value
	Number	% primaries revised	Number	% primaries revised	
Fracture	0	0	6	2.95	
Loosening	0	0	2	0.99	0.011
Total	0	0	8	3.94	

Table 2. Summary of Post-operative complications

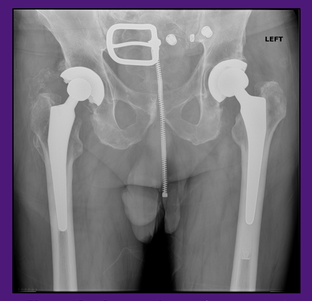
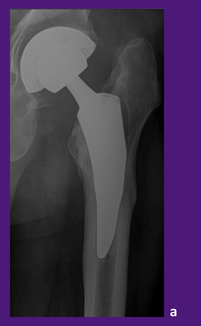
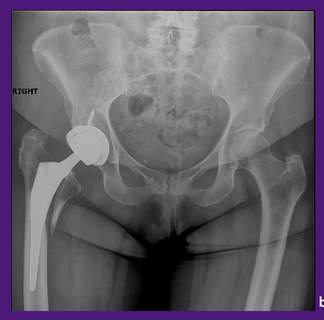


Figure 3: Comparison of cemented and cementless fixation.



a



b

Figure 4a, 4b: Post-operative Radiographic images showing femoral stem loosening and fracture.

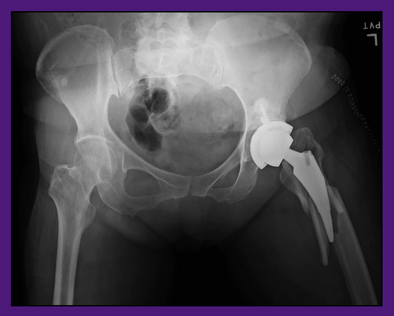


Figure 5: Femoral Stem Fracture: All femoral fractures occurred within the first 31 days post-surgery

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2. Wechter J, Comfort TK, Tatman P, Mehle S, Gioe TJ. Improve survival of uncemented vs cemented femoral stems in patients aged <70 years in a Community Total Joint Registry. *Clin Orthop and Relat Res* 2013; 471:3588-3595.
3. Claus M, Luem M, Ochsner PE, Ilchmann T. Fixation and loosening of the cemented Müller straight stems: A Registry based analysis of 828 consecutive cases with a minimum follow-up of 16 years. *Acta Orthopaedics 2013; 84:353:359.*
4. Claus M, Luem M, Ochsner PE, Ilchmann T. Fixation and loosening of the cemented Müller straight stem: a long-term clinical and radiologic review. *The Bone and Joint J* 2009; 91B:1158-1163.
5. McLaughlin JR, Lee KR. Total hip arthroplasty with an uncemented tapered femoral component. *J Bone Joint Surg* 2008; 90:1290-1296.
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RESULTS

The *cementless* group had **higher femoral complications; 8 versus 0 (P=0.011)**. There were 6 fractures and 2 loose stems, all requiring revision. There were no complications in the cemented group.

Fractures occurred about 14.5 days and loosening about 10 months postoperatively. The periprosthetic fractures in the *cementless group* were all *Vancouver B2*. They were treated with Open Reduction and Internal Fixation (ORIF) and femoral component revision with a long-stem prosthesis.

	No. of Patients	No. of Hips	Male/Female	Average Age (years)
Cementless Stems	195	203	78/117	75
Cemented Stems	146	157	24/122	76
Total	**341**	**360**	**102/239**	**75**

Table 1. Patient Demographics

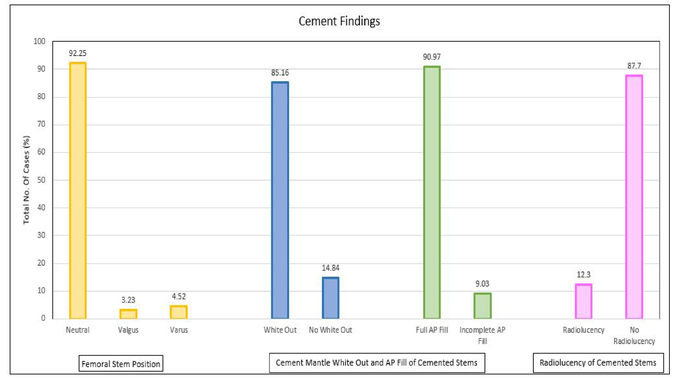

Figure 1: Cement findings: Stem and plug position, cement mantle white out, AP fill, Radiolucency and Subsidence were analyzed

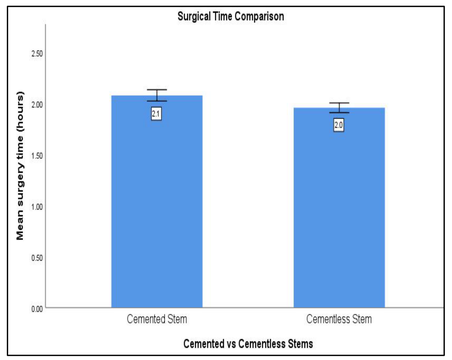

Figure 2: Surgical Time Comparison between cemented and cementless cohorts

FUTURE DIRECTIONS

Our experimental results from the current study will form the basis of future research which will consist of a prospective study to follow long-term complications and mortality of press fit vs cemented stems in THA.