Reassessing Contemporary Cementless Total Knee Arthroplasty: Unveiling the Crucial Role of Femoral Component Fixation

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INTRODUCTION:

Cementless total knee arthroplasty (TKA) has undergone a resurgence in the past decade, with notable advancements focused on optimizing tibial implant fixation which have translated into improved clinical outcomes. However, most femoral components have remained unchanged during this time, and are still generally composed of cobalt chromium with non-enhanced porous ingrowth surfaces. To date, there remains a paucity of literature regarding radiographic and clinical outcomes as they relate to the femoral component in uncemented designs.

METHODS:

This retrospective study included 268 cementless TKA performed at a single academic institution with a minimum of one-year of radiographic follow up. Patient demographics (Table 1) and clinical outcomes were recorded, and follow-up radiographs were assessed for radiolucent lines using the Knee Society Radiographic Evaluation and Scoring System. The Knee Injury and Osteoarthritis Outcome Score (KOOS) was collected, and linear regression modeling was performed to determine the relationship between KOOS and radiolucent lines.

RESULTS:

Radiolucent lines were significantly more prevalent on the femoral bone-implant interface (177/268; 66.0%) compared to the tibial bone-implant interface (114/268; 42.5%) ($p<0.0001$) (Figure 1). Aseptic loosening was the leading cause of revision surgery (6/268; 2.2%), with femoral component loosening accounting for five out of six cases requiring aseptic revision. There was no correlation between the presence of radiolucent lines and KOOS (Figure 2).

DISCUSSION AND CONCLUSION:

Our findings suggest that femoral radiolucent lines were common in the clinical practice of one contemporary cementless TKA design. While revision for femoral component loosening was the most common indication of revision, the vast majority of cases with radiolucent lines did not require revision and were not associated with inferior patient reported outcomes. The common occurrence of radiolucent lines and infrequent aseptic failures associated with the femoral component, stands in stark contrast to the historical problems of cementless TKA design involving the tibial component. This calls for increased radiographic scrutiny and continued monitoring of femoral component fixation.

FIGURE 1:

Figure 1. Distribution of RLL in different zones

	n	%
A) Lateral Femoral Zones		
1	125	47.7%
2	68	26.0%
3	78	29.8%
3A	128	48.9%
3P	69	26.3%
5	38	14.5%
Any femoral zone (lateral only):	**177**	**67.6%**
B) Lateral Tibial Zones		
1	59	22.5%
2	50	19.1%
3A	38	14.5%
3P	4	1.5%
5	48	18.3%
C) AP Tibial Zones		
1	22	8.4%
2	27	10.3%
3M	1	0.4%
3L	2	0.8%
5	29	11.1%
Any tibial zone (AP and Lateral):	**114**	**42.5%**

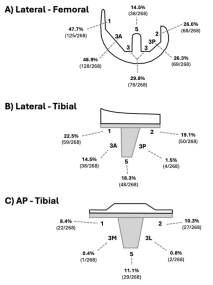

FIGURE 2:

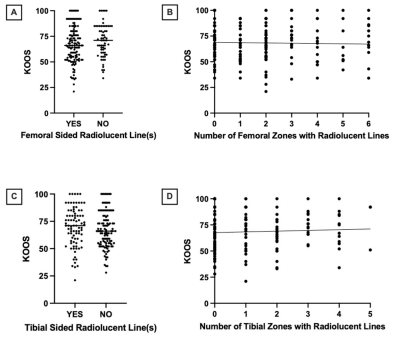

Table 1. Demographic information.

	All cementless knees (n=268)
Age (*years; mean, SD*)	59.2 (7.9)
Sex (*female; n, %*)	138 (51.5%)
ASA Score (*mean, SD*)	2.5 (0.5)
BMI (*kg/m²; mean, SD*)	34.6 (5.9)
Operative time (*minutes; mean, SD*)	87.0 (16.2)
Laterality (*left; n, %*)	129 (48.1%)