

Cementless Fixation in Fixed-Bearing TKA Shows Promising Early and Midterm Radiological Outcomes Compared to Cemented Constructs

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INTRODUCTION: The choice between cemented and cementless total knee arthroplasty (TKA) remains a subject of ongoing debate. Recent advancements in implant design and biomaterials have revitalized interest in cementless fixation. This study aims to compare short-term outcomes, radiolucency patterns, implant survivorship, and complication rates between cemented and cementless TKAs using the Modern Knee Society Radiographic Evaluation System.

METHODS:

We analyzed patients who underwent cemented or cementless TKA between 2017 and 2020. Data collected included demographics, BMI, comorbidities, prosthesis designs, surgical variables, follow-up duration, and outcomes such as implant survivorship, radiolucencies (assessed using the Modern Knee Society Radiographic Evaluation System), short-term complications, revision rates, periprosthetic fractures, hospital length of stay, and readmissions.

RESULTS:

The study included 600 patients, equally divided into cemented and cementless groups. Age ($p = 0.345$) and sex ($p = 0.342$) were similar, though BMI was higher in the cementless group ($p = 0.001$). Comorbidities were comparable. Radiolucencies and osteolysis occurred in 12 cemented and 10 cementless cases, with no significant differences across femoral and tibial zones ($p \geq 0.479$). All radiolucencies were stable, partial, and non-progressive. No cases of aseptic loosening required revision. Revisions for periprosthetic fractures were rare ($p = 0.218$). Hospital length of stay ($p = 0.623$) and readmissions ($p = 0.216$) were similar between groups.

DISCUSSION AND CONCLUSION:

According to the data presented and a large number of studies in modern orthopedics devoted to this issue, it can be concluded that survival rates along with functional results when comparing cementless and cemented fixation in TKA are similar to each other. In the first models of cementless implants for TKA, there was a problem in the fixation and osseointegration of the tibial component. Against the background of radiostereographic studies of new implants with bioactive coatings and highly porous metals, higher rates of bone tissue osseointegration into the porous structure of the implant have been proven.

Also it is very important to note the role of work Meneghini et al. about modern Knee Society Radiographic Scoring System that standardizes TKA radiographic evaluation, improving documentation of implant alignment, fixation integrity, and zonal classification of radiolucent lines and osteolysis. This framework enhances fixation monitoring, complication detection, and data consistency, enabling the development of implant risk scores.

Conclusion

This study found comparable early outcomes for both methods, with stable radiolucent lines and no aseptic loosening during follow-up. The Modern Knee Society Radiographic Evaluation System facilitates standardized radiographic assessment, enabling precise implant monitoring and improving TKA outcome evaluation. These findings support the equivalence of cemented and cementless fixation in early survivorship.

Group	Age (Mean ± SD)	Sex (M/F)	BMI (Mean ± SD)	Comorbidities (Hypertension/Diabetes/Obesity)	Implant Type	Survivorship (%)	Radiolucency (%)	Osteolysis (%)	Periprosthetic Fracture (%)	Revision (%)	LOS (Mean ± SD)	Readmission (%)
Cemented	68.5 ± 10.2	312/188	28.5 ± 4.5	150/100/100	300	98.5	12.0	10.0	1.0	0.5	5.2	1.5
Cementless	69.0 ± 11.5	312/188	30.5 ± 5.0	150/100/100	300	98.5	10.0	8.0	0.5	0.5	5.5	1.5