***CORR* Insights®: Loss of Cement-bone Interlock in Retrieved Tibial Components from Total Knee Arthroplasties**

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Where Are We Now?

Most surgeons cement the tibial component in total knee replacement surgery. Mid-term registry data from a number of countries, including those from the United Kingdom and Australia, support the excellent survivorship of cemented tibial components. In spite of this success, results can always be improved, and cementing technique can play a role. Cementing technique on the tibia is not standardized, and surgeons still differ about the best ways to deliver cement into the cancellous bone of the upper tibia. Questions remain regarding whether to use a gun or a syringe to inject the cement into the cancellous bone of the tibial plateau [5]. The ideal cement penetration into the tibial

plateau is debated, though most reports suggest that 4 mm to 10 mm is ideal [1, 4]. Thicker mantles are thought to be dangerous due to the risk of bone necrosis, but there is little in the literature to support this contention.

The current paper by Miller and colleagues suggests that the quality of the bone cement interface deteriorates with time, and encourages surgeons to aim for a minimum mantle thickness of 3 mm.

Where Do We Need To Go?

There is still much to be learned about the behavior of the subchondral bone around total joint replacements. The techniques outlined in this paper may allow us to better understand the long-term behavior of the bone-cement interface in total hip replacement surgery, as well as in total knee replacement. We should attempt to correlate findings such as those reported in this paper with clinical information in other studies. We could potentially answer questions that may be hard to determine on purely clinical outcome alone. An example would be the question of whether to cement the keel or just the surface of a tibial base plate. Early results [2, 3] would suggest no clinical difference in the short-term outcome between the two techniques. A study of trabecular interlock from retrieved specimens may give insights into keel fixation and stress shielding in the proximal tibia, guiding earlier clinical decision making rather than waiting for longer-term clinical data.

The ability to image and understand the behavior of the bone adjacent to implants should encourage the study of retrieved implants of the hip and the knee. The quality of the trabecular bone around both cemented and uncemented implants could be studied. These studies would provide a

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better understanding of the role of stress shielding, load transfer, and implant fixation techniques.

How Do We Get There?

The techniques outlined here may be used both in further retrieval analysis, and in animal studies. A more extensive retrieval analysis, performed by multiple labs, could be instigated. Ideally, retrieval laboratories nationally and internationally could cooperate to provide a broader range of implants and potentially provide better clinical data relating to the retrieved components. A better correlation of clinical history and outcomes with a larger group of implants would be of great value, giving us a better opportunity to understand the processes occurring in the tibial plateau and other implants.

Animal studies may be performed to answer a number of the questions raised in this study, particularly the question of mantle thickness and bone necrosis. The findings presented in the current study suggest that the cement-bone interface deteriorated with time is not consistent with the

contention that bone undergoes heat necrosis at the time of surgery. This finding may encourage surgeons to be more aggressive in achieving thicker cement mantles that can better tolerate the long-term changes proposed in this paper.

References

1. Askew MJ, Steege JW, Lewis JL, Ranieri JR, Wixson RL. Effect of cement pressure and bone strength on polymethylmethacrylate fixation. *J Orthop Res.* 1984;1:412.
2. Glasso O, Jenny JY, Saragaglia D, Miehke RK. Full versus surface tibial baseplate cementation in total knee arthroplasty. *Orthopaedics.* 2013;e151–158.
3. Kolisek FR, Mont MA, Seyler TM, Marker DR, Jessup NM, Siddiqui JA, Monesmith E, Ulrich SD. Total knee arthroplasty using cementless keels and cemented tibial trays: 10-year results. *Int Orthop.* 2009;33:117–121.
4. Krause R, Krug W, Miller J. Strength of cement bone interface. *Clin Orthop Relat Res.* 1982;163:290.
5. Lutz MJ, Pincus PF, Whitehouse SL, Halliday BR. The effect of cement gun and cement syringe use on the tibial cement mantle in total knee arthroplasty. *J Arthroplasty.* 2009;24:461–467.