Case series report: Early cement–implant interface fixation failure in total knee replacement


“The purpose of this case series is to report and identify possible causes for these early failures.” Two total knee systems were used: Smith and Nephew Genesis/Legion and DePuy Synthes P.F.C.™ SIGMA® Rotating Platform.

Highlights:

• “This mechanism of failure was observed infrequently during a five-year period at one high volume TKR hospital among six experienced TKR surgeons using two TKR implant systems and three types of bone cement.”

• “A total of 3048 primary TKRs were performed at one hospital by six surgeons from May 2005 to December 2010. Eleven of these TKRs were revised for early aseptic loosening of the tibial component (0.36%). All were observed to have de-bonding and loosening at the tibial implant-cement interface.”

• “Intraoperative evaluation of the failed nine TKRs revealed gross loosening and fixation failure of the tibial implant-cement interface in all cases. In all cases there was observed nearly complete absence of cement adherence to the tibial tray at the time of implant removal.”

• ‘This series reports aseptic failure of nine TKRs with failure mechanism identical to the above case series. In all cases, there was fixation failure at the cement-implant interface with an intact cement–bone interface in all cases in which there was no tibial implant subsidence”

Failure at the Tibial Cement-implant Interface With the Use of High-Viscosity Cement in Total Knee Arthroplasty


Highlights:

• “At the time of revision, all patients had a grossly loose tibial component that could easily be lifted off of the cement mantle during intraoperative assessment. The cement mantle remained fixed to the underlying bone. As noted…the tibial baseplate was removed without any trace of cobalt cement adherence to the underside of the tibial component”

• “In our case series, all TKAs demonstrated debonding at the tibial base plate-cement interface, but without disruption of the cement-bone interface”
Influence of time in-situ and implant type on fixation strength of cemented tibial trays – A post mortem retrieval analysis


“The purpose of this study was to assess the mechanical stability of tibial trays that had been in service in vivo.”

Highlights:

• “A mean of 70% of the tray surface failed at the implant–cement interface. In 12 of 16 samples more than 50% of the tray surface failed at the implant–cement interface.”

• “Deeper cement penetration was also found to be related to increased pull-out force…”

• “…pull-out failure was predominantly at the stem–cement interface, demonstrating a robust bone–cement interface.”

• “The main finding that pull-out forces decrease with time in-situ encourage further efforts in improving the cement fixation of tibial trays.”

Key points of 3 articles:

• A “clean” tibial base refers to a removed tibial base that has minimal residue of bone or cement on it, or both.

• A clean tibial base occurs when the tibial cement mantle remained intact and adhered to the underlying tibial bone.

• Uhlenbrock et al. showed NO correlation between total pull out strength and the appearance of bone cement on the baseplate.

• The images from the Uhlenbrock study show that the clean tibial base occurs across multiple brands and multiple cement types.