

The Posterior Cruciate Ligament in Total Knee Arthroplasty A Commentary

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The debate continues as to whether the posterior cruciate ligament (PCL) should be spared and utilized during total knee arthroplasty (TKA), or released and substituted for its function with a cam and post mechanism. The fact that this debate has been in progress for almost two decades indicates that one can reasonably argue the case for both designs. Indeed, the data speak for the equivalency of these prostheses. Long-term results with excellent survivorship in both posterior cruciate-retaining and substituting devices have been reported.

If the overall survivorship data are essentially equivalent, we must look to peripheral issues to support substituting or sparing the PCL. Again, the peripheral issues may balance on either side. However, being a surgeon who has used both posterior cruciate-sparing and substituting devices, I can express my preference for a substituting device based on these peripheral issues. These include the ease of surgical technique, consistency of final result, and reduced intraoperative dependence on surgical experience and judgement. Being a pragmatist, if all other long-term and survivorship results are equivalent, these issues will sway the decision.

If we first look at surgical technique, there is a general consensus that posterior-retaining devices are technically more demanding. With cases of great deformity, it is difficult to effectively or predictably "balance" the PCL. In the face of any deformity, it is more difficult to debride the posterior osteophytes and posterior space with the posterior cruciate intact. It is also very difficult to precisely recreate the joint line, recreating anatomic relationships that are consistent with reasonable posterior cruciate function, and to protect this ligament from accidental avulsion or rupture. It is so much easier to cut a central box, remove the ligament, avoid the constraints of perfect joint line reconstruction, and enjoy the ease with which loose bodies and debris may be removed from the posterior aspect of the joint. The only price in surgical technique that is paid with a central box is the possibility of fracturing a condyle with undersized or

angulated box cuts. This potential complication, although reported, is rare and has been significantly reduced with smaller box resections in some of the newer prosthesis designs.

Consistency of results is also easier to achieve with the posterior cruciate-substituting device. Although knee range of motion in most series is almost equivalent or slightly favors the posterior-substituting devices, the standard deviations of range of motion are almost always narrower with the posterior cruciate-substituting devices. This may be due to the vagaries of being able to perfectly balance the PCL and achieve all the intraoperative surgical requirements that are inherent in preserving a functioning PCL.

This leaves us with a third difficulty in saving the PCL, which is the surgical experience and judgement required to balance the PCL. After all of the osteotomies have been completed and the debris in the back of the joint has been removed, the time comes to fit and balance the prosthesis. If the PCL is too loose, it may not affect immediate knee function, but you may get the paradoxical motion and inconsistent wear patterns of an ineffective PCL. If, on the other hand, it is too tight, you will have posterior tethering, potentially limited motion, and the potential for catastrophic wear in the posterior corners of the polyethylene tibial tray. Therefore, correct balancing of this ligament becomes essential and this requires surgical experience and judgement. Recessing the ligament may be required, but it is easy to over-release or leave too little PCL remaining. This need for intraoperative surgical judgement is completely eliminated with substitution of the ligament.

To summarize, satisfactory results can be demonstrated with both substitution and retention of the PCL, with experienced orthopaedic surgeons describing excellent long-term survivorship in both groups. Being a pragmatist, and looking for the easiest, most consistent result with the least intraoperative problems and potential pitfalls, I can recommend that most of us consider the posterior-substituting total knee device.