Custom Knee Replacements

Total knee arthroplasty (TKA) is one of the most successful orthopaedic procedures, restoring a significant degree of function in arthritic knees in most cases. However, errors in surgical technique and component placement can compromise the long-term performance. Achieving accurate alignment in TKA remains a concern. One of the most important factors influencing the longevity of implants in TKA is the restoration of the alignment of the knee, as deviations of even a few degrees may lead to poor survivorship because of the accelerated wear as a result of abnormal stresses at the bearing surfaces. Patient-specific instrumentation (PSI) produced using preoperative 3D models can be developed to offer patients a reliable, efficient and a customized TKA procedure. In fact, these implants are designed and manufactured specific to a patient's knee anatomy. Pre-operative planning of the TKA procedure is performed to identify the anatomical landmarks needed for component alignment on 3D models. Once complete this information is then transferred to patient-specific instruments that can be used during surgery. These instruments, created by laser sintering, can be produced in individual sizes and dimensions and are thus, patient specific. The goals of these customized components are to return the knee to a more “normal” feeling and provide a functional outcome that is closer to that of a native knee.

Today, over five million people are living with total knee replacements. More and more, the clinical evidence is confirming that one in five of those patients are not satisfied with their results. Research has been performed demonstrating that customized components may demonstrate advantages compared to standard implant systems. When custom components are compared to standard implant systems research has demonstrated that the motion pattern and stability of the custom components more closely behave like a normal knee. Replicating the motion of a patient's knee is critical to achieving a more stable, natural feeling knee and achieving normal function. The potential benefits also include a higher likelihood of early discharge from the hospital and a lower chance of discharge to a rehab facility. Lower blood loss and a lower rate of blood transfusion have been documented with this technology as well. Most interestingly, reported patient satisfaction with customized components is remarkable with reports of “normal feeling” knees as early as a few months from surgery.

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