

ROBODOC TKA

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Even though conventional total knee arthroplasty (TKA) is in general a very successful operation, TKA is an attractive application for computer assistance because it eliminates knee mal-alignment of more than 3° in the frontal plane that has been correlated to early failures. In these computer assisted systems, robotic systems provide further precision to execute the bone cut for TKA and most robotic systems use preoperative CT images to determine the implant design, size, and position and the so called independent bone cut is performed. Some, however, claim that this is a drawback of robotic TKA because it is difficult to check the ligament balance and to recut for balancing like navigation except for abandoning the robotic procedure. The ROBODOC is an active system and is applicable to TKA based on preoperative planning using CT images. Therefore, the skill and method to make a plan for TKA based on CT images are the most critical part for the successful results of TKA with the ROBODOC. We developed the modified transepicondylar axis dependent method for ROBODOC TKA¹⁾. This matches the flexion-extension axis of the single-radius component with the modified TEA and maintains the original contours of the condyle, resulting in maintenance of the flexion-extension balance, though slight sagittal rotation of the femoral component around the modified TEA is needed.

We performed 117 TKAs using this method. Scorpio Superflex (Stryker) was in 82 knees and Scorpio NRG (Stryker) was in 35 knees. On the preoperative planning, mean 6.5 degrees of the femoral component flexion to the femoral sagittal axis was required to avoid the anterior notch formation. The DigiMatch surface registration was used. After the bone cut and release of the contracture, varus-valgus and flexion-extension balances were measured using the knee balancer (Stryker). The varus-valgus balances in extension and 90 degrees of flexion were 0.7 degree (SD 0.7 degree) and 0.9 degree (SD 0.7 degree), respectively. There was no case showed 2 degrees or more of the varus-valgus imbalance. 51 knees showed no difference in gap between extension and 90 degrees of flexion. Flexion gap was mean 1.8mm larger than extension gap in 43 knees, while Extension gap was mean 1.8mm larger than flexion gap in 23 knees. There was no significant difference in flexion angle of the femoral component among these three groups. Postoperatively, there was no complication associated the ROBODOC procedure. The ROM of the knee at three months was -1 degree of extension and 112 degrees of flexion on average. There was no coronal mal-alignment more than 2 degrees. These suggest that our modified transepicondylar dependent method of CT based planning using the Scorpio systems provide good ligament balances for ROBODOC TKA.

References

- 1) Hananouchi T, Nakamura N, Kakimoto A, Yohsikawa H, Sugano N. CT-based planning of a single-radius femoral component in total knee arthroplasty using the ROBODOC system. *Comput Aided Surg.* 2008 Jan;13(1):23-9.