A Novel Bone/Ligament Sparing Prosthesis for the Treatment of Patellofemoral and Medial Compartment Osteoarthritis

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Introduction

Arthritis localized to the medial compartment and patellofemoral joint is not uncommon in patients over 40 years of age. In one investigator's study of 100 consecutive patients, 73/100 patients displayed this pattern of cartilage degeneration (Figures 1 & 2).

The current treatment for such patients is either the combination of a unicompartmental knee in conjunction with a patellofemoral implant, or the use of a total knee implant which requires the removal of the healthy lateral condyle.

One solution is a hybrid femoral component that preserves the healthy lateral condyle as well as the ACL-PCL and only replaces the medial compartment and patellofemoral joint in conjunction with an unicompartmental tibial tray (Figure 3).

In addition to preserving the healthy bone and soft tissue, this type of implant requires a smaller incision and preserves the cruciate ligaments which should help preserve the natural kinematics. This is a well instrumented surgical procedure, similar to today's contemporary total knee.

Pre-clinical testing

Because the hybrid knee preserves the intact lateral condyle, there is a transition between the implant and cartilage over which the patella must articulate, similar to a current patellofemoral implant. The effect of the patella articulating across the bone/implant interface transition zone was examined using laboratory and cadaver studies to determine the effect on patellar tracking. Additionally, the contact area of the patella against either bone or femoral implant surfaces was examined (Figure 4).

Clinical implantation method

The surgical technique for the hybrid knee femoral is similar to a total knee and uses similar instruments and alignment guides. The main advantage with the hybrid knee is that the technique can be done less invasively, utilizing a 4"-5" incision with little difficulty while preserving both the ACL, PCL, and the lateral joint. Pictures of the special distal cutting block and subsequent implantation are shown in Figures 5-8.

Clinical outcome (10 patients)

A preliminary trial was performed on 10 patients with an average pre-op knee pain score of 45 out of 100. All patients were able to walk with minimal limp without assistive devices at 2 weeks post-op. The patients had an average ROM of 120, and had high satisfaction ratings.

Conclusions

- This novel hybrid knee design may address patients who show signs of patellofemoral and medial compartment osteoarthritis
- The hybrid knee design can be done through a 4"-5" incision, and does not require resection of the PCL or ACL or the lateral joint
- A preliminary 10 patient trial study has shown good results, with high patient satisfaction
- Results were comparable to a unicompartmental knee with patients experiencing less blood loss, quicker rehabilitation, and a more natural feel