BioPoly® RS Knee Case Report

Functional outcomes at 4 years after treatment of femoral bicondylar lesions with novel permanent defect replacement implants (BioPoly® RS Partial Resurfacing Knee): a case report

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CASE REPORT

A 63-year-old male reported for consultation with complaints of pain in the knee. The patient was an otherwise healthy individual with a BMI of 34 and no concomitant health problems, who was active in recreational sports prior to experiencing knee problems. With the gradual, non-traumatic onset of knee pain approximately 4 years prior, his activity decreased to a sedentary level.

Diagnostic imaging and arthroscopy within the prior 3 years confirmed femoral bicondylar lesions (ICRS Grade 3D) of the medial condyle and (ICRS Grade 4A) of the lateral condyle in an otherwise healthy knee. The meniscus appeared intact and the tibial cartilage appeared normal; however, the trochlear was shown to have a small grade I/II lesion on the central aspect. Unsuccessful attempts to treat the condyle lesions over the prior 3 years included articular surface surgery, abrasion, and microfracture. Due to the size of the lesions and lack of arthritic progression in the joint, treatment with total knee arthroplasty was avoided in favor of partial hemiarthroplasty using novel focal defect replacement implants.

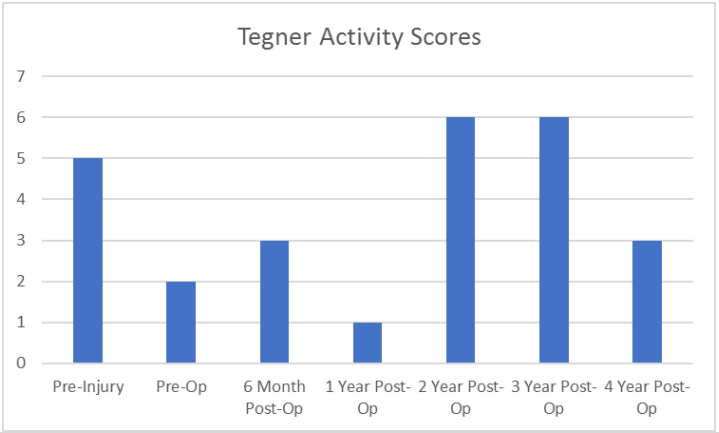
At surgery, the joint was evaluated under arthroscopy which confirmed a 20 mm chondral lesion (ICRS Grade 3D) of the medial condyle and a 20 mm chondral lesion (ICRS Grade 4A) of the lateral condyle. The tibia, patella and ligaments were normal; however, the lateral meniscus had received a 1/3 partial meniscectomy during a previous treatment. In order to accommodate the partial hemiarthroplasty implants (BioPoly® RS Partial Resurfacing Knee Implants, 20 mm diameter), defect beds were prepared using specially designed instruments, and the BioPoly implants were, subsequently, press-fit into place.

The patient participated in a post-operative rehabilitation program which involved immediate weight bearing as tolerated with crutches for support. He now can walk to the beach and play football and cricket with his grandsons.

OUTCOME

At 24 months, the patient's activity level exceeded his pre-injury level as evidenced by the Tegner scores in Figure 1. He was mobile and able to accomplish his desired activities. His Tegner scores remained stabled at 36 months and regressed slightly at 48 months but still remain above pre-operative levels. Radiographs through 24 months shown in Figure 2 revealed stable implants with no peri-implant radio-translucencies or device migration. The patient's recovery was remarkable with steady improvement of his functional activity levels. Early issues with swelling and stiffness quickly resolved with a physiotherapy program. Compared to the alternative

option of total knee replacement the patient has a far greater functional recovery and pain improvement. Preoperatively, the knee quality of life (KOOS subscore) revealed extreme knee problems which by 6 months post-op indicated no knee problems (KOOS Quality of Life subscore of 100). At 1 year KOOS, VAS pain, and Tegner scores all showed a reduction. This marked reduction in scores was due to lack of patient compliance as he was involved in the remodel of his house during the first 12 months post-surgery and therefore had less time with rehabilitation. After that time, he became more compliant and showed continued improvement in all of his scores through 36 months. Although 6 months was the first formal time point for data collection, the patient was virtually pain free with increased activity by 6 weeks after surgery and has been very satisfied with his surgery.



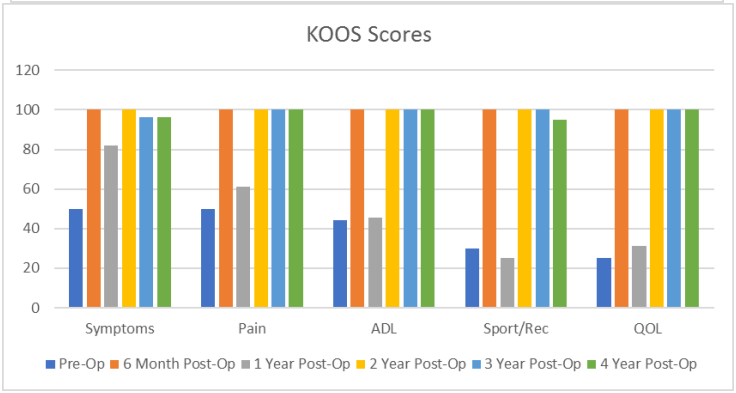


Figure 1: Partial hemiarthroplasty patient's Tegner and KOOS scores

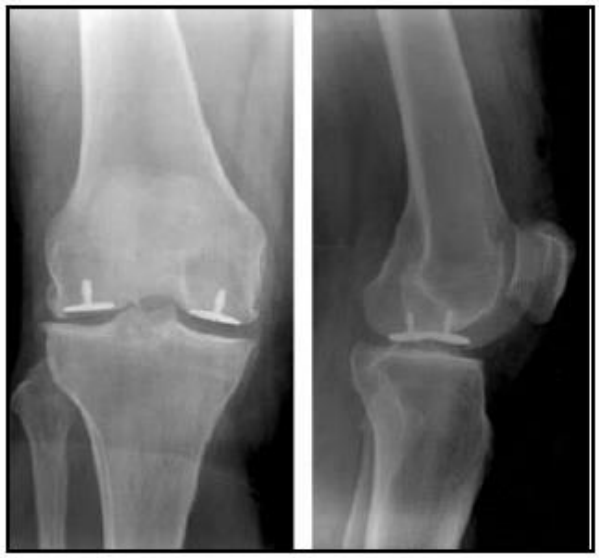


Figure 2: Partial hemiarthroplasty patient's post-operative radiographs at 2 years

DISCUSSION

At 48 months, extraordinary outcomes have been achieved with this novel partial femoral surface replacement implant called BioPoly® RS Partial Resurfacing Knee Implant (BioPoly LLC, Fort Wayne, Indiana, USA). Even with his relatively high BMI, the patient's outcome scores show remarkable improvements out to 48 months. As mentioned above, however, his scores did drop at the 12 month timepoint, providing evidence of the sensitivity of the outcome measures being collected. Since the patient was not being compliant between 6 and 12 months with physiotherapy due to a remodel of his house his scores reflected a level of deterioration. Following recommencement of his physical therapy program, he regained and improved in nearly every outcome measure from 12 to 24 months.

BioPoly® implant material is derived from a proprietary combination of ultra-high molecular weight polyethylene (UHMWPE) and hyaluronic acid (HA), thus, creating a robust, biocompatible hydrophilic (water attracting) polymer. This allows BioPoly® implants to be used to fill cartilage defects as an analog material, providing an immediate

bearing surface that supports anatomical loads whilst articulating with native cartilage without damage to itself or the native tissues. Therefore, BioPoly® devices are implanted with minimally invasive techniques such that joint biomechanics and tissues are preserved.

The unique BioPoly® implant has afforded this patient who has failed other chondral treatments with a very good result that includes pain free activity without the limitations of a more invasive total knee arthroplasty. Even though his outcome is outstanding over 48 months thus far, he will continue to be monitored through 60 months post-surgery.