

# GENESIS<sup>◇</sup> II Total Knee Arthroplasty: Five-to-Eight Year Results

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## Abstract

A consecutive series of 562 knees using the GENESIS<sup>®</sup> II Total Knee Arthroplasty system were performed by the same surgeon. This implant system featured a design that allowed for neutral implantation of the femoral component while still creating a balanced flexion/extension space. Of the 530 cases that were followed through a 60 to 105 month period, survivorship was at 98.9%, and 98.2% had excellent or good results. Two knees were revised for late sepsis. Four other knees required surgery – three for anterior knee pain (AKP) and one for popliteus tendonitis.

## Introduction

The GENESIS II Total Knee System was introduced in 1997. The system sought to address several problems identified with second generation knee implant systems, such as high lateral release rates, poor patellar tracking and implant wear. The femoral component was uniquely designed to have "built-in" external rotation. External rotation of the femoral component is widely acknowledged to accomplish two things: one, a balanced flexion space and two, lateralized patellar tracking in extension. However, possible problems associated with external rotation of the femoral component include patellar maltracking in deep flexion, rotational malalignment of the femoral and tibial components in flexion, undersizing of the tibial component, which in turn could lead to a greater chance of posterior medial wear, and the possibility of anterolateral notching.

The GENESIS II femoral component design sought to reduce the possibility of wear and improve patellar tracking by modifying the implant design so that the component could be implanted neutral to the posterior condyles while still retaining a balanced flexion/extension space. The component featured a lateralized trochlear groove for lateralized patellar tracking in extension. The component's medially-thinned posterior condyle allowed the trapezoidal space that resulted from the neutral bone cuts to become a balanced rectangular space by putting in less metal back on the medial posterior side.

The purpose of this study was to evaluate the clinical outcomes of TKA using this design and to evaluate re-operations for extensor mechanism problems and implant wear. Five hundred sixty-two (562) consecutive total knee replacements using the GENESIS II total knee replacement prosthesis were included in this series. Of that group, there was a minimum of 60 month follow up in 530 knees

in 487 patients (472 unilateral and 29 bilateral patients). Twelve patients died, and 20 were lost to follow-up.

This prospective study reviewed all 530 knees at 1-2 year intervals. Clinical evaluation included Knee Society Scores, SF-12, patient satisfaction, and pre- and post-operative radiographs. Mean follow up was 77.6 months, with a range of 60 months to 105 months.

## Patient Demographics

Of the 562 patients, 215 were female and 272 were male. The mean age was 69.4 years (range 36-91) at time of surgery. Mean weight was 190.9 lbs (86.8 kg) (range 106-307 lbs). Five hundred eighteen (518) of the patients were diagnosed with osteoarthritis, ten with rheumatoid arthritis, and two with AVN. Co-morbidities included prior open surgery (11.4%); NIDDM/IDDM (9.8%); eTOH abuse hx (6.4%); PAD (3.6%); inflammatory disease (2.4%); and morbid obesity (1.8%).

Mean preoperative Knee Score was 41.7 with a range of 20-62. Mean preoperative range of motion was 97°; knees with a range of motion less than 70° was 3%. Mean preoperative Function Score (FS) was 44.8. The majority of patients (421) had mild deformities (5 degrees varus to 10 degrees valgus); with 78 having varus greater than 5 degrees and 31 with valgus deformities greater than 10 degrees.

## Demographics and Diagnosis

Male	272
Female	215
Mean Age	69.4 years (range 36-91)
Mean weight	190.9 lbs (range 106-307)
OA	518
RA	10
AVN	2

## Materials and Methods

In 420 cases, a cruciate-retaining non-porous femoral component was used. The remainder were posterior-stabilized (66) or porous cruciate retaining (40) components. A dished insert which offered more anterior/posterior stability was used in 462 cases. In two instances, a cruciate-retaining CoCr component was used with an all-poly baseplate. Toward the end of the evaluation period, a new advanced bearing surface for knees, OXINIUM material, was introduced to the market as an

exclusive technology by Smith & Nephew. Three cruciate-retaining GENESIS II components with OXINIUM® Oxidized Zirconium were implanted with a dished insert, and one was implanted with an all-poly baseplate.

In every case, the patella was resurfaced. Fifty-two point four percent (52.4%) received a resurfacing, three-peg patella, and 47.6% received a biconvex, inset patella.

Soft tissue balancing was performed in all cases, with a medial release for varus cases and lateral release for valgus cases. The posterior cruciate ligament was recessed if the knee was tight in flexion. A POLO test for flexion/extension was performed, and patellar tracking was assessed using the "no thumbs" rule.

In the majority of cases, a 30° to 45° lateral patellar chamfer resection was performed to help prevent patellar facet impingement. A SLG "preserving" lateral release was done in 19 knees (2.5%). These were typically performed on any knee with limited preoperative ROM and/or severe valgus.

## Results

The average postoperative Knee Score was 93.4, with a range from 70-100. Mean postoperative ROM was 118.6° (range -10° to 145°). The average postoperative ROM for cruciate-retaining knees was 116.2° and 124.8° for posterior-stabilized knees. Postoperative FS was 81.7. Ninety-eight point two percent (98.2%) of patients had good or excellent results. Twenty three patients or 4.3% had postoperative anterior knee pain, with 17 exhibiting mild pain and 6 moderate.

	Pre-op	Post-op
Mean ROM	97°	118.6°
Function Score	44.8	81.7
Knee Score	41.7	93.4

VTE occurred in 5.4%. Infection occurred in 0.4%. Death occurred due to MI in 0.2% of cases. Complete patellar radiolucencies occurred in 0.6%. Reoperation was performed in 6 cases (1.1%). Patellar tilt greater than 10° was seen in 10 knees (1.9%).

Of the reoperations, two were due to late sepsis (MSSA at two years out; beta strept three years out after direct trauma). Three were for extensor mechanism problems, with late lateral patellar facet

excision performed. In one case, popliteus release was performed. Of the six patients with moderate anterior knee pain, three had clear lateral facet impingement prior to chamfering. All three were relieved with open excision.

No revisions were done for aseptic loosening or reinfection; patellar dislocation, subluxation, osteonecrosis, or fracture; poly wear or osteolysis, flexion instability, or femoral notching and/or fracture.



Post-op follow-up – 105 months

## Conclusion

At a mean follow-up of 77.6 months, the GENESIS II Total Knee System exhibited no adverse effects of the modification of the component to achieve a balanced flexion extension space through "built-in" external rotation. No reoperations were done for poly wear or extensor mechanism complications other than AKP.

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