Functional Results After Revision of Well-Fixed Components for Stiffness After Primary Total Knee Arthroplasty

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Abstract: Between 1990 and 2001, 16 well-fixed, aseptic, primary total knee arthroplasties were revised in 15 patients for a diagnosis of stiffness. Patients were followed for a mean of 42 months (range, 2-6 years). Of 15 patients, 10 (66%) were satisfied with the results of the procedure. The mean Knee Society pain score improved from 28 to 65 points, and the mean functional score improved from 45 to 58 points. The mean arc of motion improved from 40° preoperatively to 73° postoperatively. Recurrent stiffness required additional intervention in 4 knees (3 patients, 25%). The results of revision of a well-fixed, stiff, primary total knee arthroplasty were mixed in our hands and provided only modest improvements in pain, function, and arc of motion. **Key words:** knee, arthroplasty, stiffness, revision, arthrofibrosis.

Stiffness remains a frustrating complication of primary total knee arthroplasty (TKA). If attempts at nonoperative management, extensive physiotherapy, and manipulation under anesthesia have failed, and the patient remains symptomatic, surgery is often the only remaining option. Arthroscopic arthrolysis techniques have been used with mixed results [1-5]. Recent reports have documented the generally poor results of open arthrolysis and isolated tibial polyethylene insert exchange for stiffness [6,7]. Despite these therapeutic options, occasionally patients will continue to be dissatisfied with their range of motion (ROM) and revision of well-fixed components may be contemplated. There is a paucity of data evaluating the outcomes of revision for stiffness after TKA [8-10]. This retrospective review was done to determine results and complications associated with the revision of well-fixed primary TKAs for symptomatic stiffness.

Materials and Methods

Between 1990 and 2001, 16 TKAs were revised in 15 patients for a diagnosis of stiffness. Only primary TKAs were studied, and in every case all components were well fixed. Patients were identified by our institution's total joint registry and institutional review board approval was obtained for this retrospective review. Isolated tibial polyethylene exchanges were excluded. A preoperative infection work-up including complete blood count, sedimentation rate, and C-reactive protein serologies, and a joint aspiration was negative for

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infection in all patients. There were 6 men and 9 women with a mean age of 67 years (range, 44-85 years). Patients were followed until death, component revision, or for a minimum of 2 years. One patient died before completing the 2-year follow-up. The mean follow-up for the remaining 14 patients (15 knees) was 42 months (range, 2-6 years). Function and radiographs were evaluated using the Knee Society criteria [11,12]. The original TKAs were of a cruciate retaining design in 14, and a posterior stabilized design in 2. Fourteen index arthroplasties were cemented, and 2 were uncemented. The original diagnosis was osteoarthritis in all patients.

The mean time interval from the index TKA to revision was 24 months (range, 3-42 months). The original ROM of the arthritic knee was not known in the majority of patients because of the referral nature of our practice. Of 15 patients, 11 (73%) had had additional attempts to improve motion before formal revision. Of 15 patients, 8 had manipulations under anesthesia, 3 had arthroscopic lysis of adhesions, and 2 had open lysis of adhesions with polyethylene insert exchange. All patients had had a trial of supervised physical therapy, yet remained dissatisfied with their ROM at presentation. The mean preoperative arc of motion was 40° (range, 0° to −70° of extension to 40°-80° of flexion). All patients had an arc of motion of less than 65°. All patients presented with complaints of stiffness, and all but one patient complained of pain. The pain was typically moderate to severe, generalized, and present with extremes of ROM.

Pre-revision radiographs were available for review in 13 of 16 knees (81%). In 3 knees the radiographs were lost, but the radiologist's and treating surgeon's notes documented no radiographic abnormalities. Of 13 knees with pre-revision radiographs, 2 were unremarkable. Of 16 knees, 11 (69%) had a radiographic abnormality noted preoperatively including 2 knees with tibial varus (10°) and anterior heterotopic bone; 1 knee with tibial varus (10°) and femoral valgus (10°); 1 knee with excessive tibial slope (15°), heterotopic bone, and an excessively thick patellar resurfacing; 1 knee with tibial varus (5°); 1 knee with femoral varus (5°); 1 knee with tibial malrotation; 1 knee with an undersized patellar button; 1 knee with an asymmetrically resurfaced patella; and 2 knees with anterior heterotopic bone proximal to the femoral component flange.

All knees were revised to a cemented posterior stabilized design including 13 Pressfit Condylar Sigma, 1 Low Contact Stress (Johnson and Johnson, Warsaw, Ind), 1 Nexgen (Zimmer, Warsaw, Ind), and 1 Duracon (Stryker, Howmedica, Osteonics, Allendale, NJ). The decision regarding complete vs isolated component revision was at the discretion of the treating surgeon and was typically based on component compatibility issues and the ability to balance flexion and extension gaps. Ten (69%) patients (11 knees) had revision of both femoral and tibial components, 4 patients had isolated femoral component revision, and 1 patient had isolated tibial component revision. In 10 patients (11 knees) the original patellar component was retained. Three patients had a previously unresurfaced patella resurfaced at the time of revision. One patient had revision of a well-fixed patellar component because of excessive patellar thickness. Dense scarring was noted in the operative reports in all patients. In 7 patients an exposure more extensile than that used for a routine TKA was necessary including a quadriceps snip in 6 and a medial femoral epicondylar osteotomy in 1. Prophylactic intravenous antibiotics and antibiotic impregnated cement were used in all patients. The type and duration of anesthesia is summarized in Table 1. All patients used continuous passive motion machines while hospitalized and all had supervised outpatient postoperative physical therapy. Thromboembolic prophylaxis with warfarin sodium or low-molecular-weight heparin was used at the discretion of the treating surgeon.

Results

Of the 15 patients, 10 (66%) were satisfied with the outcome of their revision. Patient data are summarized in Table 1. The mean Knee Society pain score improved from 28 points (range, 0-54 points) preoperatively to 65 points (range, 17-94 points) postoperatively. The mean Knee Society functional score improved from 45 points (range, 0-80 points) preoperatively to 58 points (range, 28-90 points) postoperatively. The mean arc of motion improved from 40° preoperatively to 73° postoperatively.

There were 2 intraoperative complications including 1 nondisplaced lateral femoral condyle fracture and 1 perforation of the distal femur that occurred during femoral preparation. Both were treated with bypass of the defect with a cemented stem. Four patients had recurrent symptomatic stiffness postoperatively. Of 16 knees, 3 (18%) required a manipulation under anesthesia and 1 patient, dissatisfied with her result, was revised for recurrent stiffness 18 months postoperatively at