Does Patellectomy Jeopardize Function After TKA?

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Abstract

Background The patella provides important mechanical leverage to the knee extensor mechanism. Patellectomy does not exclude the development of tibiofemoral arthrosis. **Questions/purposes** We asked whether (1) TKA provides improvements in clinical outcome scores in patellectomized knees and (2) the scores of TKA in patellectomized knees are comparable to those in knees with intact patellae. **Methods** We evaluated 50 patients (52 primary TKAs) with patellectomized knees and a control group of 52 patients (52 primary TKAs) with intact patellae matched for age, sex, implant, and surgical year between 1984 and 2009. We compared the preoperative and latest postoperative SF-12, WOMAC, and Knee Society score (KSS).

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Each author certifies that his or her institution has approved the human protocol for this investigation, that all investigations were conducted in conformity with ethical principles of research, and that informed consent for participation in the study was obtained.

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Minimum followup was 24 months (mean, 69 months; range, 24–204 months).

Results The mean WOMAC score in the control group improved from 41.8 (range, 7.5–72.4) preoperatively to 69.1 (range, 17.0–100.0) postoperatively, while that in the patellectomized group improved from 35.8 (range, 5.2–62.2) to 61.3 (range, 17.5–96.2). The mean KSS improved from 80.4 (range, 4.0–143.0) preoperatively to 161.4 (range, 69.0–200.0) postoperatively in the control group and from 76.9 (range, 5–134) to 136.8 (range, 7–199) in the patellectomized group. Mean postoperative WOMAC scores were comparable between the two groups, while the mean KSS was lower in the patellectomized group. The mean SF-12 scores were not different after TKA or between groups.

Conclusions Despite the mechanical disadvantage to the knee extensor mechanism rendered by a previous patellectomy, TKA for tibiofemoral arthrosis in these patients relieved pain and restored function, but function was on average lower than that in patients with intact patellae.

Level of Evidence Level III, therapeutic study. See Instructions for Authors for a complete description of levels of evidence.

Introduction

While the importance of the patella in the normal function of the knee is currently well recognized [7], patellectomy was a common and accepted treatment for patellofemoral pathology, most commonly for patellar fracture or severe osteoarthritis, until the last few decades [17]. Patients with prior patellectomy can nonetheless develop tibiofemoral arthrosis, for which the mainstay of treatment is TKA. However, comparison studies on these patients suggest

inferior function after TKA relative to patients with intact patellae [10, 13, 14]. Quadriceps and hamstring torque and strength [14], rate of complication, and knee outcome score [13, 14] are all reportedly worse in patients with TKA who have had previous patellectomy.

Although patellectomized patients have outcomes after TKA that are less likely to be satisfactory and have a higher rate of complications, improvements in pain and function can be achieved [10, 13, 15]. However, the studies on the outcomes of TKA after previous patellectomy [2, 5, 10, 11, 13–16, 18] have all been small (the largest studies numbering 22 patients) with variations in the types of prosthesis and a mixture of primary and revision cases. These studies also vary in their use of outcome measures, making comparison between results difficult. Thus, while the literature suggests worse function, it remains unclear to what degree these patients improve.

We therefore asked whether (1) TKA provides improvements in clinical outcome scores in patellectomized knees and (2) clinical outcomes of TKA in patellectomized knees are comparable to those in knees with intact patellae.

Patients and Methods

We retrospectively reviewed a prospectively collected database of TKAs performed at our institution, identifying 60 primary TKAs performed on previously patellectomized knees in 57 patients between 1984 and 2009. The indications for prior patellectomy were patellofemoral dysfunction (34), trauma (15), and infection (two for tuberculosis, one for hardware infection, one for osteomyelitis). Two patients had insufficient data collected preoperatively on two knees (one of the two patients remained included for the opposite patellectomized knee, for which there was sufficient preoperative data). Six patients were lost to followup. The remaining 52 knees in 50 patients were followed for a minimum of 24 months (mean, 69 months; range, 24–204 months) (Table 1). There were eight deaths; as all eight had been followed for at least 24 months, the data from these patients were included in the analysis. All TKAs were performed for pain secondary to tibiofemoral arthrosis. Forty-eight of 52 knees received a posterior-stabilized (PS) implant, with the remaining four receiving cruciate-retaining (CR) implants. The implants used were four AMK[®] (DePuy Orthopaedics Inc, Warsaw, IN, USA), two Congruency[®] (DePuy), two Coordinate[®] (DePuy), six Genesis[®] I (Smith & Nephew Inc, Memphis, TN, USA), 17 Genesis[®] II (Smith & Nephew), seven Genesis[®] II Oxinium (Smith & Nephew), one Miller/Galante[®] (Zimmer, Inc, Warsaw, IN, USA), two Miller-Galante II[®] (Zimmer), one Natural-Knee[®] I (Zimmer), one Natural-Knee[®] II (Zimmer), two PCA[®]

(Howmedica Inc, Rutherford, NJ, USA), two SAL[®] (Sulzer AG, Winterthur, Switzerland), and five Sigma[®] (DePuy). No patients were recalled specifically for this study; all data were obtained from medical records.

Using the same database, we created a set of 52 control knees in 52 patients with intact patellae matched for age, sex, implant, and surgical year (Table 1).

Patients were evaluated both preoperatively and at latest clinic visit, with followup postoperatively at 6 weeks, 3 months, 6 months, 1 year, 2 years, and then annually or biannually thereafter. Radiographs were taken and assessed at each visit. Knees were examined on all parameters used in the Knee Society Clinical Rating System [8]. Measurement of ROM and extensor lag was performed either with a goniometer or by clinical judgment at the clinician's discretion. Clinical outcome scores used were the Knee Society score (KSS) [8], SF-12 score [6], and WOMAC score [3]. Knee scores were calculated according to the KSS, with a score for pain with a maximum of 50 and a total score including function and knee scores with a maximum of 200. For TKAs performed after 1995, SF-12 and WOMAC questionnaires were filled out by patients both preoperatively and at latest clinic visit and the scores calculated. SF-12 and WOMAC scores were available for 31 of 52 knees in the study group and 29 of 52 knees in the control group.

Table 1. Details of patients undergoing primary TKA with and without prior patellectomy

Variable	Patellectomy	Control
Number of patients (number of knees)	50 (52)	52 (52)
Number of males:females	19:31	20:32
Age at surgery (years)*	59 (41–74)	60 (41–74)
BMI*	31 (16–43)	31 (20–43)
Followup (months)*	69 (24–204)	81 (24–252)
Flexion arc (°)*		
Preoperative	100 (5–130)	103 (62–135)
Postoperative	104 (50–130)	110 (55–135)
Maximal flexion (°)*		
Preoperative	105 (5–130)	111 (85–135)
Postoperative	108 (60–130)	111 (60–135)
Flexion contracture (°)†		
Preoperative	6 (0–30; 58%)	6 (0–30; 71%)
Postoperative	3 (0–15; 35%)	0 (0–15; 2%)
Extensor lag (°)*		
Preoperative	3 (0 to > 20)	0 (0–5)
Postoperative	6 (0 to > 20)	0 (0–5)

* Values are expressed as mean, with range in parentheses; † values are expressed as mean, with range and percentage of patients with contracture in parentheses.

We performed statistical analyses to identify differences in mean preoperative and postoperative total outcome scores within groups using the paired Student's *t*-test and in mean total outcome scores between groups using Student's *t*-test. A Bonferroni correction was used such that the overall alpha equaled 0.05. All statistical analyses were performed using Excel® (Microsoft Corp, Redmond, WA, USA).

Results

We observed increases in the mean WOMAC score and the mean KSS in both the control and patellectomized groups after TKA (Table 2). The mean overall WOMAC score in the control group improved ($p < 0.001$) from 41.8 (range, 7.5–72.4) preoperatively to 69.1 (range, 17.0–100.0) postoperatively, with an increase seen in all three subcategories of pain, stiffness, and function (Table 3). It similarly improved ($p < 0.001$) in the patellectomized group from 35.8 (range, 5.2–62.2) preoperatively to 61.3 (range, 17.5–96.2) postoperatively, also with increases in all three subcategories. The mean total KSS in the control group improved ($p < 0.001$) from 80.4 (range, 4.0–143.0) preoperatively to 161.4 (range, 69.0–200.0) postoperatively, with an increase in the pain, function, and knee scores. It similarly improved ($p < 0.001$) in the patellectomized group from 76.9 (range, 5–134) preoperatively to 136.8 (range, 7–199) postoperatively, with an increase in all subcategory scores. The mean SF-12 score was not different in either the control group ($p = 0.024$) or the patellectomized group ($p = 0.032$) after TKA.

The mean postoperative overall WOMAC scores were similar ($p = 0.203$) between the control and patellectomized groups. However, the mean total postoperative KSS was lower ($p = 0.001$) in the patellectomized group than in the control group. With respect to the mean SF-12 score,

there was no difference ($p = 0.194$) between the control and patellectomized groups.

In the control group, seven of the 52 knees (13.5%) had subsequent revision, one for patellofemoral arthritis (1.9%), one for infected hardware (1.9%), and five for instability or polyethylene wear requiring polyethylene exchange or upsizing (9.6%). In comparison, the patellectomized group had 10 knees go on to require revision (19.2%), one for pain (1.9%), two for infected hardware (3.8%), one for sepsis (1.9%), two for instability requiring polyethylene upsizing (3.8%), and four for polyethylene wear requiring polyethylene exchange (7.7%). Of the two revisions for infected prosthesis, one knee ultimately went on to an arthrodesis due to recurrent infection and pain. In addition to the implant revisions, one patient required an extensor mechanism reconstruction for extensor lag, while two patients had postoperative manipulation under anesthesia for knee stiffness, with successful treatment of all three.

Discussion

Patellectomy results in loss of mechanical leverage to the knee extensor mechanism but does not prevent development of tibiofemoral arthrosis. Historically, studies on TKA in patellectomized knees have been small and have shown mixed results [2, 5, 10, 11, 13–16, 18]. We therefore asked whether (1) TKA provides improvements in clinical outcome scores in patellectomized knees and (2) clinical outcomes of TKA in patellectomized knees are comparable to those in knees with intact patellae.

Certain limitations of our study should be noted. First, our study was retrospective and nonrandomized. However, the two groups seemed well-matched according to demographic data (Table 1). Second, although this is the largest reported series of postpatellectomy TKA, it remains small

Table 2. Preoperative and postoperative total outcome scores for patients undergoing primary TKA with and without prior patellectomy

Scoring system	Control		Patellectomy		p value (control vs patellectomy)	
	Preoperative	Postoperative	Preoperative	Postoperative	Preoperative	Postoperative
WOMAC (points)	41.8 ± 14.3 (7.5–72.4) $p < 0.001$	69.1 ± 25.2 (17.0–100.0)	35.8 ± 15.3 (5.2–62.2) $p < 0.001$	61.3 ± 22.4 (17.5–96.2)	0.120	0.203
SF-12 (points)	84.0 ± 13.7 (55.7–105.4) $p = 0.024$	91.1 ± 17.7 (56.5–116.0)	79.6 ± 11.9 (59.6–96.6) $p = 0.032$	85.3 ± 16.6 (55.8–114.7)	0.194	0.194
KSS (points)	80.4 ± 30.8 (4.0–143.0) $p < 0.001$	161.4 ± 34.1 (69.0–200.0)	76.9 ± 30.4 (5–134) $p < 0.001$	136.8 ± 40.4 (7–199)	0.575	0.001

Values are expressed as mean ± SD, with range in parentheses; KSS = Knee Society score.

Table 3. Preoperative and postoperative subcategory scores for patients undergoing primary TKA with or without prior patellectomy

Subcategory	Control		Patellectomy	
	Preoperative	Postoperative	Preoperative	Postoperative
WOMAC (points)				
Pain	43.4 ± 15.5 (15–70)	70.7 ± 24.0 (15–100)	37.1 ± 16.4 (0–75)	63.9 ± 23.7 (25–100)
Stiffness	34.1 ± 17.0 (0–75)	64.6 ± 27.3 (0–100)	31.5 ± 19.9 (0–75)	59.4 ± 27.1 (0–100)
Function	44.4 ± 17.3 (6–74)	69.8 ± 25.7 (18–100)	36.7 ± 17.7 (0–69)	59.9 ± 22.9 (13–94)
SF-12 (points)				
MC	52.8 ± 11.1 (30.5–67.3)	51.1 ± 11.3 (24.0–63.9)	52.1 ± 11.4 (36.1–68.0)	47.7 ± 15.0 (11.6–62.3)
PC	31.2 ± 7.0 (20.7–48.8)	40.0 ± 11.1 (20.7–56.8)	27.5 ± 4.9 (17.8–41.3)	36.9 ± 11.0 (16.6–53.4)
KSS (points)				
Pain	13.1 ± 11.2 (0–45)	43.1 ± 13.2 (10–50)	12.5 ± 8.6 (0–30)	38.4 ± 14.1 (10–50)
Function	40.7 ± 19.2 (–20 to 70)	74.2 ± 22.4 (15–100)	38.2 ± 21.2 (–20 to 80)	58.8 ± 26.9 (–10 to 100)
Knee	40.1 ± 16.9 (–4 to 84)	87.1 ± 17.2 (24–100)	38.4 ± 14.9 (–2 to 69)	78.2 ± 19.5 (17–100)

Values are expressed as mean ± SD, with range in parentheses; MC = mental component; PC = physical component; KSS = Knee Society score.

compared to series of intact-patella TKA. Third, multiple implants were used, with varying lengths of followup. The groups were too small to perform a multivariable analysis to determine whether any given implant was associated with lower scores. Fourth, our patellectomized group contained bilateral TKAs in two patients while our control group had none. While the functional scores will to some degree reflect the function of both knees, bilateral arthroplasties might lead to worse function. However, two patients would not affect the means to any major degree. Finally, multiple comparisons also risked the possibility of differences being found by chance, although this was mitigated by use of a Bonferroni correction.

In our study, patellectomized patients who underwent TKA showed improvement as measured by the WOMAC score and the KSS. Comparison of our results against other postpatellectomy TKA studies is difficult, given the lack of common outcome measures (Table 4). The mean ± SD KSS knee score in our patellectomized group was 78.2 ± 19.5 (range, 17–100), which is similar to the scores from two other studies that also used the KSS. Kang et al. [11] reported a mean knee score of 85.6 ± 7.2 in their postpatellectomy primary TKA group, while Paletta and Laskin [16] reported a score of 89 ± 6 in their postpatellectomy PS TKA group. No studies used the WOMAC or SF-12. Using categorical scores of “good” or “excellent”

based on a KSS knee score grading system [1] for comparison purposes, 38 of 52 patellectomized knees (73%) in our study had “good” or “excellent” results, compared to 44 of 52 controls (85%). While the patellectomized group had fewer such results compared to controls, these numbers are consistent with the higher end of reported categorical results. Joshi et al. [10] reported “good” or “excellent” results in 14 of 19 knees (74%) and Cameron et al. [5] in 11 of 16 knees (69%). Martin et al. [15], however, reported such results in only 13 of 22 knees (59%), Larson et al. [13] in only seven of 14 knees (50%), and Lennox et al. [14] in only five of 11 knees (45%).

In comparison to patients with intact patellae, our patellectomized group had lower scores post-TKA measured with the knee-specific and physician-derived KSS. Only four other studies have included an intact-patella comparison group [10, 13, 14, 16]. Paletta and Laskin [16] also looked at the KSS and found the mean knee score in patellectomized knees with CR implants (67 ± 10) to be lower than that in knees with intact patellae using either CR (88 ± 5) or PS (90 ± 4) implants, although this difference was eliminated in patellectomized knees with PS implants (89 ± 6). Lennox et al. [14], Larson et al. [13], and Joshi et al. [10] all noted fewer “good” or “excellent” categorical outcomes in the patellectomized groups compared to controls post-TKA. From a patient perspective, however, our study may not

Table 4. A summary of studies on PP TKA

Study	Number of patients (number of knees)	Implant type	Primary or revision	Comparison groups	Outcome measures	Followup (years)*	Results	Complications	Conclusions
Bayne and Cameron [2] (1984)	14 (14)	10 CS (4 revised to hinge, 2 to another CS) 2 unlinked hinge 2 hinge	14 primary at outset, but 6 evaluated after revision	14 PP	Toronto Rating System	2.5 (1.2–4)	2 good (> 80%), 3 fair (70%–80%), 1 poor (< 70%) in the CS knees (4 primary, 2 revised from CS) versus 1 excellent (> 80%), 1 poor in the unlinked hinge knees versus 2 excellent, 3 good, 1 poor in the hinge knees (2 primary, 4 revised from CS)	6 revisions for pain (2 to CS, 4 to hinge) from the CS group, 1 revision for infection ultimately leading to an arthrodesis from the hinge group	Absence of the patella may reduce AP stability of the knee, placing greater importance on the cruciate; recommend retention of cruciate when possible, with use of a hinge prosthesis in situations of cruciate damage
Lennox et al. [14] (1987)	11 (11)	8 CR 3 CS	11 primary	11 PP 11 control	Standard 100-point patient-derived TKA rating scale (50 for pain, 10 for stability, 10 for deformity, 20 for mobility, 10 for quadriceps strength), quadriceps and hamstring torque, ROM	3.8 (1.1–8)	5 good or excellent (> 80 points, no definition of good vs excellent), 6 unacceptable ($\leq$ 80 points) in PP group versus 11 good or excellent in control group	2 converted to arthrodesis for intractable pain in PP group	Appropriate patient selection recommended to improve results of PP TKA; factors identified for success with PP: few previous knee procedures, increased severity of tibiofemoral arthrosis, a reasonably functional quadriceps mechanism
Railton et al. [18] (1990)	6 (7)	7 CS	7 primary	7 PP	London Hospital Score	4 (2–8)	6 pain-free, 1 moderate pain at rest/walking; 3 no restriction in walking, 3 not able to walk > 5 minutes	None reported	Satisfactory results can be obtained in TKA in PP patients with unconstrained CS implants, but results are inferior to those of patients with intact patellae

Table 4. continued

Study	Number of patients (number of knees)	Implant type	Primary or revision	Comparison groups	Outcome measures	Followup (years)*	Results	Complications	Conclusions
Larson et al. [13] (1991)	22 (26)	20 CR 1 PS (in revision group) 5 hinge (all in revision group)	14 primary 12 revision	14 primary PP 14 primary control 12 revision PP	Modified HSS	Primary: 8.5 (2.7–14.3) Revision: 7.6 (2.5–14.3)	1 excellent (score > 85), 6 good (score 70–84), 2 fair (score 60–69), 5 poor (score < 60 or required revision) in primary PP group versus 1 excellent, 6 good, 2 fair, 3 poor in revision PP group versus 5 excellent, 6 good, 3 fair, 0 poor in primary control group	3 revisions in the primary PP group for aseptic loosening or subsidence, 2 revisions in the revision PP group for aseptic loosening, no complications in the primary control group	Both primary and revision TKA provide adequate pain relief in PP patients to recommend TKA in these patients, though to a lesser degree than in those with intact patellae; knees with traumatic arthritis in the PP setting may be more prone to failure
Kang et al. [11] (1993)	32 (32)	Primary: 18 CR Revision: 14 PS	18 primary 14 revision	18 primary patellectomy (note: 8 PP, 2 intraoperative patellectomy, 8 post-TKA patellectomy) 14 revision patellectomy (all intraoperative patellectomy) 13 primary control	KSS	Primary: 4.1 (2.0–10.1) Revision: 3.1 (2.0–8.9)	8 excellent (> 85%), 8 good (70%–84%), 1 fair (60%–69%), 1 poor (< 60%) in the primary patellectomy group (results of PP group not separately listed), with a mean knee score of 85.6 and function score of 65.0 in the PP versus 7 excellent, 5 good, 1 fair, 1 poor in the revision patellectomy group versus 13 excellent in the control group	1 revision for instability and pain with a subluxed tibia in the primary patellectomy group (PP), 1 revision for infection, 1 for aseptic loosening ultimately leading to arthrodesis in the revision patellectomy group, no complications in control group	Overall results of primary and revision TKA in patellectomized patients are generally satisfactory with a low rate of failure despite lower knee and function scores

Table 4. continued

Study	Number of patients (number of knees)	Implant type	Primary or revision	Comparison groups	Outcome measures	Followup (years)*	Results	Complications	Conclusions
Joshi et al. [10] (1994)	19 (19)	10 CS 9 CR	19 primary	19 PP 19 control	Pain relief, arc of movement, stability	5.3 (1.8–9.5)	9 excellent (stable, no pain, > 90° arc), 5 good (stable, no pain at rest, mild pain on walking, 60°–90° arc), 5 poor (moderate to severe pain at rest or on walking +/- stable) in the PP group versus 15 excellent, 3 good, 1 poor in the control group	1 revision for aseptic loosening, 1 revision for infection, 1 extensor mechanism rupture in a patient converted from arthrodesis eventually requiring rearthrodesis	More complications, less successful results in PP patients, but results good enough to recommend TKA in these patients
Martin et al. [15] (1995)	22 (22)	21 PS 1 CR	22 primary	22 PP	HSS	7 (3–15)	6 excellent (score > 85), 7 good (score 70–84), 4 fair (score 60–69), 3 poor (score < 60), 2 failed (required revision)	1 revision for traumatic loosening, 1 revision for infection ultimately leading to arthrodesis	Patients with severe tibiofemoral disease and quadriceps mechanism intact are good candidates for TKA, with improvements in pain and function, but results may be inferior to those with intact patellae
Paletta and Laskin [16] (1995)	22 (22)	9 PS 13 CR	22 primary	9 PP with PS TKA, 13 PP with CR TKA, 9 intact patella with PS TKA, 13 intact patella with CR TKA	KSS	5	Mean total knee score of 89 in PP PS TKA versus 67 in PP CR TKA versus 90 in intact-patella PS TKA versus 88 in intact-patella CR TKA; mean pain score of 43, 37, 45, 45, respectively	None reported	PS implants offer outcomes in PP patients similar to TKA in patients with intact patellae and superior outcomes compared to CR implants in PP patients

Table 4. continued

Study	Number of patients (number of knees)	Implant type	Primary or revision	Comparison groups	Outcome measures	Followup (years)*	Results	Complications	Conclusions
Cameron et al. [5] (1996)	16 (16)	16 PS	16 primary	16 PP	HSS, ability to climb stairs, pain	No mean listed (2–9)	9 excellent (score > 85), 2 good (score 70–84), 2 fair (score 60–69), 3 poor (score < 60)	2 revisions for pain, 1 involving polyethylene upsizing; 1 additional knee requiring exploration and tissue excision for severe pain	Suggest PS knee is a reasonable implant choice for PP patients
Current study	50 (52)	48 PS 4 CR	52 primary	52 PP 52 control	KSS, WOMAC, SF-12	5.75 (2–17)	Mean KSS score of 136.8 in PP group versus 161.4 in controls; mean WOMAC score of 61.3 in PP group versus 69.1 in controls; mean SF-12 of 85.3 in PP group versus 91.1 in controls	1 revision for pain, 2 for infected hardware, 1 for sepsis, 2 for instability requiring polyethylene upsizing, 4 for polyethylene wear requiring exchange	Although physician-based outcome measures of TKA are worse in PP patients compared to controls, TKA provides improvement in pain and function in PP patients with osteoarthritis; patient perception of pain relief and functional improvement after TKA in PP patients may be comparable to controls

* Values are expressed as mean, with range in parentheses; CR = cruciate-retaining implant; CS = cruciate-sacrificing implant; PS = posterior-stabilized implant; PP = postpatellectomy; HSS = Hospital for Special Surgery knee score; KSS = Knee Society score.

indicate worse outcomes post-TKA in patellectomized patients compared to those with intact patellae. The post-operative scores for the WOMAC and SF-12, both patient-derived outcome measures, were similar between the two groups. This may reflect lower perceived starting baseline function in these patients, even in the absence of tibiofemoral arthrosis; Peeples and Margo [17], in their followup of 34 patients postpatellectomy, found more than ½ reported some limitation in activity.

The change in alignment of the patellar and quadriceps tendon with patellectomy and consequent loss of reinforcement against AP translation of the flexed knee has been cited as a possible cause for worse results in patellectomized patients [20]. Some authors have thus recommended the use of more constrained implants such as PS or hinged prostheses [2, 5, 16]. Paletta and Laskin [16] reported predictably good results with a PS prosthesis in patellectomized patients, which were comparable to results with intact patellae, while Cameron et al. reported superior results in a series with PS implants [5] compared to a previous series with cruciate-sacrificing implants [2]. Most knees in our series had PS implants, with only four CR prostheses, and this may have contributed to our better clinical results. Interestingly, three of the CR TKAs (two from the same patient) had total KSSs of greater than 160 while the remaining knee had a score of 7. A less constrained implant does not by itself predict worse outcomes. However, further conclusions cannot be drawn, given the small number of patients with this prosthesis in the study.

Other studies have stressed the importance of patient selection and that the patellectomized patient with severe tibiofemoral arthritic changes is a better candidate for TKA than the same patient with pain in the presence of only minimal or moderate arthritic changes [14, 15]. The indication for surgery in our study was pain secondary to tibiofemoral arthrosis, as opposed to pain alone. The resultant patient selection may have contributed to the better categorical outcomes in our series.

In terms of complications, the number of patients that went on to revision surgery was not markedly higher in the patellectomized group, with 10 knees going on to revision compared to seven controls. The relatively high revision rate in both groups may be secondary to several factors, including the use of multiple implants and the wide range in length of followup (upwards of 21 years). At 15 to 20 years of followup, especially with older-model implants and noncrosslinked polyethylene, polyethylene wear may be substantial and revision for polyethylene exchange would not be unexpected. That five of seven control and four of 10 patellectomized revisions were for polyethylene wear may reflect this.

Another three patellectomized knees required further procedures in the form of extensor mechanism repair for

extensor lag in one knee (1.9%) and manipulation under anesthesia for stiffness in two (3.8%). Prior surgery is a known risk factor for postoperative stiffness in TKA [4, 19] and patellectomized patients have at least one and often additional other prior knee procedures. As such, it would not be unexpected to see an increased prevalence of stiffness in the patellectomy group. Compared to larger series of primary TKA with intact patellae, there appears to be a higher incidence of postoperative stiffness in our patellectomized group. Various criteria have been used for knee stiffness, with a wide range in reported prevalence post-TKA [9, 12]. Kim et al. [12] defined knee stiffness as flexion contracture of greater than 15° or full flexion of less than 75° and reported an incidence of 1.3% in a series of 1000 primary TKAs. In contrast, Ipach et al. [9] defined it as full flexion of less than 90° and reported an incidence of 4.54%. Using these two different definitions, post-TKA stiffness rates in our study group were higher at 3.8% and 9.6%, respectively, versus control rates of 1.9% and 3.8%, respectively.

While physician-based outcome measures of TKA in patellectomized patients are lower compared to those in patients with intact patellas, the chance of achieving “good” or “excellent” scores is likely higher than historically reported. Additionally, patient perception of the pain relief and functional improvements is comparable to that of patients with TKA with an intact patella. Surgical indication and choice of implant type should factor into consideration for TKA in these patients. For the patellectomized patient with tibiofemoral arthrosis, TKA is an option that can provide marked improvements in pain and function.

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