Short-Term Results of Primary Total Knee Arthroplasties Performed with a Mini-Incision or a Standard Incision

Young-Hoo Kim, MD, Keun-Soo Sohn, MD, and Jun-Shik Kim, MD

Abstract: A consecutive series of 144 patients who underwent 288 primary total knee arthroplasties (144 with use of a mini-incision [≤10 cm, quadriceps-sparing approach] and 144 with use of a standard incision [16-25 cm, standard medial parapatellar approach]) were studied. No significant differences were found between the groups with respect to the knee score, range of motion, hospital data, and radiographic parameters. An iatrogenic tear of quadriceps tendon occurred in 0% of the standard incision cases; however, it occurred in 100% of the mini-incision cases. Although there was no difference in all parameters in both groups, most patients favor a shorter scar. Therefore, we recommend a standard approach with as short an incision as possible, unless patients are markedly overweight, heavy-muscled, and large individuals. **Key words:** standard incision, mini-incision, total knee arthroplasty.

Mini-incision and "quadriceps-sparing" approaches for total knee arthroplasty have been developed to minimize soft tissue damage of knee joint and enhance early rehabilitation [1-5]. Early results that were reported by an innovator of mini-incision total knee arthroplasty indicated less intraoperative blood loss, less pain, better early motion, and a shorter hospital stay, with similar implant accuracy to standard incision total knee arthroplasty [1-5].

As a non-innovator of this technique, we designed this prospective, controlled study to determine whether there was a difference in surgical parameters, component positioning, and safety of the mini-incision technique compared with the standard incision technique for total knee arthroplasty.

Materials and Methods

The senior author performs an average of 700 to 800 total knee arthroplasties each year, and he performed about 30 total knee arthroplasties using the quadriceps-sparing approach before this study was started. Before the senior author performed total knee arthroplasties using the quadriceps-sparing approach for his patients group, he attended a cadaver laboratory once and observed the innovator's live surgery twice.

Between January and April 2003, the senior author performed 72 consecutive primary bilateral total knee arthroplasties in 72 patients (144 knees) using a standard incision technique. Between May and September 2003, the senior author again performed 72 consecutive primary bilateral total

From the Joint Replacement Center of Korea, Ewha Womens' University Dong Dae Mun Hospital, Seoul, Korea.
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Reprint requests: Dr. Young-Hoo Kim, MD, The Joint Replacement Center at Ewha Womans University Dong Dae Mun Hospital, 70, ChongRo 6-Ga, ChongRo-Gu, Seoul 110-783, Korea.

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knee arthroplasties in 72 patients (144 knees) using a mini-incision technique. All 144 patients were enrolled in the present study. The bilateral total knee arthroplasties were performed during the same anesthetic session, with one side treated immediately after the other. The study was approved by our institutional review board, and all patients provided informed consent.

Patient demographic characteristics and procedure data are summarized in Table 1, and these parameters were not significantly different ($P > .05$) between the standard-and mini-incision groups. Predominant female sex and small stature of our patient population is related to ethnic specificity. Therefore, this is typical for a consecutive knee arthroplasty study in this particular ethnic group. One hundred twenty-two patients (85%) had had no previous knee operation, and 22 patients (15%) had had arthroscopic debridement of one or both knees.

In the standard incision group, all procedures were performed through a midline skin incision measuring 16 to 25 cm in length, with a standard medial parapatellar approach into the joint (the extent of an incision of the quadriceps tendon is 2 to 3 cm from the level of the superior pole of patella) (Fig. 1). In the mini-incision group, all procedures were performed through a midline skin incision measuring 10 cm or less in length, with a so-called quadriceps-sparing approach into the joint (the extent of an incision of the quadriceps tendon is limited to the level of the superior pole of patella) (Fig. 2). In the standard incision group, suprapatellar pouch was opened, but it was not opened in the mini-incision group. The suprapatellar fat pad was not resected in either technique. The anterior-and posterior cruciate ligaments were excised in all knees. The Nexgen LPS prosthesis (Zimmer, Warsaw, Ind) was implanted in all knees. The patella was not everted in the standard incision group, and it was not everted in the mini-incision group.

Ligamentous balancing was done, and an attempt was made to resect 10 mm of tibial bone distally from what was considered to be the intact

Table 1. Patient Demographic Characteristic and Procedure Data

	Standard-Incision Group	Mini-Incision Group	*P*
No. of knees	144	144	–
No. of patients	72	72	–
Age* (y)	67.4 (58-84)	68.6 (57-85)	.2928
Sex (male/female) (% male)	8/64 (13%)	7/65 (11%)	.1883
Average height (cm)	152.6	151.1	.0527
Average weight (kg)	65.5	62.3	.0625
Average body mass index†	28.1	27.2	.5661
No. (%) of patients with body mass index of ≥30	16 (22%)	15 (21%)	.5773
Preoperative diagnosis (n [%] of patients)			
Osteoarthritis	68 (94)	70 (97)	.6738
Osteonecrosis	4 (6)	2 (3)	.7146
No. of procedures with cement (%)	72 (100)	72 (100)	–
Average preoperative ASA score‡	1.8	1.9	.8176
No. of procedures done with regional Anesthesia/no. with general anesthesia (% with regional anesthesia)	68/4 (94%)	64/8 (89%)	.189

*The values are given as the average with the range in parentheses.

†Body mass index = weight (in kilograms)/height (in meters)^2.

‡ASA indicates American Society of Anesthesiologists [6].

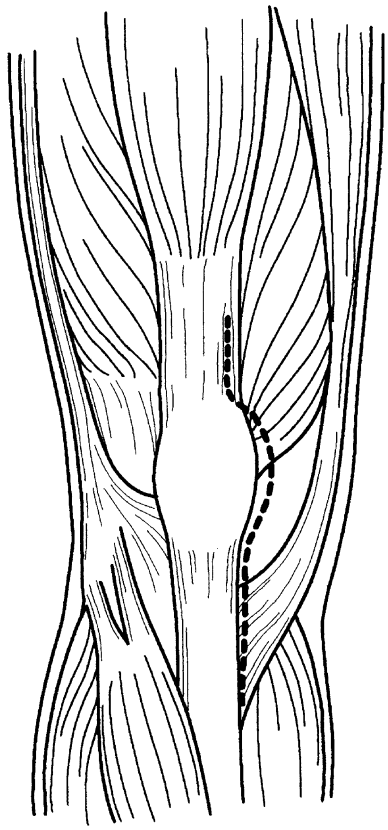

Fig. 1. Standard incision approach. Medial parapatellar approach into the joint. The extent of an incision of the quadriceps tendon is 2 to 3 cm from the level of the superior pole of patella.