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SYMPOSIUM: CURRENT ISSUES IN KNEE RECONSTRUCTION

The Outerbridge Classification Predicts the Need for Patellar Resurfacing in TKA

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Abstract Patellar resurfacing (PR) in total knee arthroplasty (TKA) is controversial. The Outerbridge classification of cartilage defects in the patella is commonly used in the literature. The purpose of this study was to determine if the Outerbridge classification can predict the need for PR as part of total knee arthroplasty. Between 1995 and 2000, we performed a prospective, randomized study of 500 TKAs. We carried out PR depending on the Outerbridge classification of the patella at the time of surgery. Patients with Outerbridge Grades I, II, and III formed Group A, whereas patients with Grade IV formed Group B. Within each group, resurfacing was completed on half of the patients. Group A had 328 patients (164 with PR, 164 without PR). In Group B, there were 172 patients (86 with PR, 86 without PR). An identical prosthetic design was used for both groups. The minimum followup was 5 years (average, 7.8 years) for both Group A and Group B. At the end of followup, we assessed the number of patients in each group that required secondary resurfacing as a result of patellofemoral pain. Patients in Group A required fewer revisions for PF pain. In Group A, only one patient required a secondary PR (0.6% rate), whereas in Group B, 10 patients needed PR (11.6% rate). In Group B, the risk of need of a patellar resurfacing was 21.5 times greater than in Group A. On the basis of these findings, we recommend PR in Outerbridge Grade IV patellae, but not in Grades I, II, and III.

Level of Evidence: Level II, therapeutic study. See Guidelines for Authors for a complete description of levels of evidence.

Introduction

Since the 1970s, when the first TKAs were performed, patellar resurfacing (PR) has had its defenders and detractors. Commonly accepted indications for PR are rheumatoid arthritis, patellar cysts, hard patellar bone, and loss of congruence between the patella and the trochlear design of the prosthesis. Other indications are patients with osteoarthritis over 65 kg in body weight and those over 160 cm tall [23]. The anterior knee pain that some patients experience after TKA without PR led to the idea of performing PR in every patient [1, 7, 12–14, 19–21, 23, 25–28, 32].

Although PR initially garnered enthusiasm, because it decreased the degree of anterior knee pain in the majority of cases, it became associated with complications such as patellar fracture, failure of the patellar component, osteonecrosis, patellar instability, patellar tendon rupture, and patellar clunk syndrome [2, 3, 5, 6, 10, 11, 24, 32]. The majority of the aforementioned complications were accounted for by poor surgical technique or inadequate prosthetic design [2, 3, 15, 16, 18, 22, 29, 31, 32]. In fact,

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Each author certifies has his or her institution has approved the human protocol for this investigation, that all investigations were conducted in conformity with ethical principles or research, and that informed consent for participation in the study was obtained.
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the results improved significantly when surgical technique and patellar designs improved [8, 30, 34].

The majority of these initial studies were retrospective and their findings were often conflicting [33]. Thus, today, PR in TKA remains a controversial issue. Outerbridge classification of cartilage defects in the patella is the most commonly used scale in the literature [27]. The purpose of this study was to determine when PR should be performed depending on the degree of cartilage involvement of the patella, according to Outerbridge classification. The aim of this study was to compare the need for revision surgery performed to resurface the patella during the followup period as a function of the assigned Outerbridge classification. Specifically, we wanted to assess if an Outerbridge grade of IV predicted higher risk of need for revision surgery to resurface the patella in patients undergoing TKA without initial patellar resurfacing.

Patients and Methods

Between 1995 and 2000, we performed a prospective randomized study of 500 TKAs. Each patient was assigned an Outerbridge classification of the patella at the time of surgery (Table 1) [25]. Based on the assigned Outerbridge class, the population was segregated into two groups. Patients with Outerbridge Grades I, II, and III formed Group A, whereas patients with Grade IV formed Group B. Within each group, resurfacing was completed on half of the patients. The incidence of revision surgery performed to resurface the patella during the followup period was assessed and compared.

The inclusion criteria were primary TKA in patients with degenerative osteoarthritis of the knee, older than 65 years of age, and less than 85 kg body weight. Exclusion criteria were previous surgery on the knee and intraoperative maltracking of the extensor mechanism, which required a lateral release.

Group A had 328 patients (164 with PR, 164 without PR). In Group B, there were 172 patients (86 with PR, 86 without PR). We used the same prosthetic design in both groups. The minimum followup was 5 years for both Group A and Group B (average, 7.8 years; range, 5–12 years). Groups A and B were statistically comparable preoperatively regarding to age, gender, function, symptoms, and comorbidity.

Table 1. Outerbridge classification [25]

Grade	Pathology
I	Softening and swelling of articular cartilage
II	Fragmentation and fissuring of articular cartilage affecting an area of less than 0.5 inches
III	Fragmentation and fissuring of articular cartilage affecting an area greater than 0.5 inches
IV	Cartilage erosion to bone

The randomization process was as follows. Intraoperatively, we classified the damage of the patellar cartilage according to Outerbridge classification. Those patellae with Grade I, II, and III formed Group A, whereas patellae with Grade IV formed Group B. Then, in both groups, we implanted the patellar component in odds patients (1, 3, 5, …) and did not resurface the patella in even patients (2, 4, 6, …). The Outerbridge classification was determined by the senior surgeon. No tests for interobserver reliability were performed.

The process used to assign patients to PR versus non-patellar resurfacing (non-PR) was random. In Groups A and B, half of the patients underwent PR and half underwent retention of the patella.

The surgical procedure was performed by a classic approach with a central longitudinal skin incision and a medial parapatellar approach long enough to evert the patella. The type of prosthesis that we used was cemented NexGen PS (Zimmer, Warsaw, Indiana).

At the end of followup, we assessed the number of patients in each group that required a secondary resurfacing because of severe patellofemoral pain. Taking into account that the degree of pain is the most important parameter for secondary patellar resurfacing, we decided not to include other clinical and functional results.

The criterion that led to secondary patellar resurfacing after the primary surgery was patellar pain greater than 7 points on the Visual Analog Scale (VAS; minimum pain 0, maximum pain 10). Two surgeons(C R-M, P C-G) involved in the study assessed this pain at followup blinded to whether or not the patella had been resurfaced. The criterion to indicate secondary patellar resurfacing was patellar pain greater than 7 points on the VAS.

Fisher's exact test was used to compare the incidence of the need for revision patellar resurfacing in Groups A and B. The odds ratio assessing the need for revision was also calculated. The level of statistical significance was $p = 0.05$.

Results

Revision surgery to resurface the patella because of patellar pain was required more often in Group B than Group A ($p = 0.001$). In Group A, only one patient required a secondary PR (0.6%), whereas in Group B, 10 patients needed PR (11.6%). The odds ratio value was 21.5 indicating that in Group B, the risk of needing a revision for patellar

resurfacing resulting from anterior knee pain was 21.5 times greater than in Group A.

In the patient who was reoperated in Group A, we observed a deterioration of the patellar cartilage. The cartilage was initially Grade II and at reoperation it became Grade III.

Discussion

The purpose of this study was to compare the need for revision patellar resurfacing as a function of the intraoperative findings of patellofemoral degenerative change as assessed by the Outerbridge classification. We found clear evidence that the need for primary patellar resurfacing could be judged based on the intraoperative findings regarding the severity of patellofemoral disease. Patients with Outerbridge Class IV patellofemoral findings were 21 times more likely to require revision for patellar resurfacing than patients in whom Outerbridge Class I, II, and III findings were documented.

The limitations of this study include the fact that other possible confounding variables were not accounted for. This may be why other reports did not find a correlation with the extent of cartilage damage and interobserver reliability tests were not performed regarding the grade of Outerbridge involvement of the patellae.

Barrack et al. [4], in a prospective, randomized, double-blind study, observed that the clinical results of PR were similar to those of non-PR. They also observed height, weight, degree of preoperative pain, and the degree of chondromalacia of the patellar articular cartilage did not influence the results. The aforementioned authors stated non-PR is a reasonable option but taking into account that 10% of osteoarthritic knees without PR must be revised because of anterior knee pain. However, patients with PR must accept the risk of complications of the procedure and sometimes pain that is difficult to resolve. In contrast to the findings of our study Barrack et al. observed the degree of chondromalacia of the patellar cartilage did not influence the results. In other words, PR and non-PR had similar clinical results unrelated to the grade of patellar articular cartilage [4]. In our study there is clear evidence that Class IV patellar cartilage degeneration will be at greater risk of requiring secondary resurfacing for pain in contrast to unresurfaced Classes I, II, or III.

In 2004, Burnett et al. evaluated the results of resurfacing and nonresurfacing the patella [9]. Intraoperative cartilage quality was not found to be a predictor of outcome. Also in 2004, a meta-analysis of national joint replacement registry data of bilateral TKA studies, selective resurfacing reports, and randomized clinical trials was done by Bourne and Burnett [7]. The authors concluded that although the evidence seems to support patellar resurfacing, this issue remains inconclusive because of problems generalizing from one implant to another and the short-term nature of available studies. Based on existing data, patellar resurfacing seems reasonable in most TKAs. Not resurfacing the patella might be considered in selected younger patients (younger than 60 years) with mild or no patellar arthritis, a well-tracking extensor mechanism, and particularly if a patella-friendly femoral component is used. Helmy et al. have developed a decision model based solely on the data of randomized, controlled trials [17]. The authors' model showed patellar resurfacing is the best management strategy for the patella at the time of primary TKA. We feel that our study contributes important evidence that the degree of patellar involvement can be used to assist in the decision to perform PR during TKA.

In conclusion, the findings of this prospective comparative study make us recommend patellar resurfacing in Outerbridge Grade IV patellae, but not in Grades I, II, and III when using a NexGen PS (posterior-stabilized) design for TKA.

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