

An Orthopaedic Surgeon Double-Triage System

Failed to Reduce the Conversion Rate from Index Knee Arthroscopy to Total Knee Replacement

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INTRODUCTION:

Total knee replacement (TKR) has become the gold standard for the treatment of patients with severe pain and/or limited function caused by osteoarthritis (OA) (1). TKR may be delayed or avoided if the rate of cartilage loss is decreased in patients with symptomatic OA (2), and arthroscopic debridement could play an important role in this context. Although many studies have outlined the indications, efficacy, and outcomes for index knee arthroscopy and TKR, few have placed emphasis on reducing the conversion rate between index knee arthroscopy and TKR. Prospective randomized trials have shown that arthroscopic debridement for arthritis should be avoided in many cases because this intervention often fails to achieve measurable improvements over placebo effects and/or control groups (3,4). Nevertheless it is common to have patients who benefit from arthroscopy for meniscal pathology (e.g., mechanical symptoms) in the setting of underlying arthritis. For example, arthroscopic partial meniscectomy may lead to excellent results in patients with minor OA (\leq grade 2 Outerbridge classification) (5), and 81% satisfactory results have been achieved even in patients over 70 when Outerbridge and radiographic Kellgren-Lawrence grades do not exceed 2 (6). However, in the context of how often these patients are converted to TKR, Spahn et al. (7) reported a 19% conversion rate from arthroscopy to TKR within a mean period of seven months in patients with medial compartment osteoarthritis (Outerbridge grade 2) and meniscal pathology requiring total or subtotal meniscectomy. In patients over 70 undergoing arthroscopic partial meniscectomy, 23% and 45% conversion rates have been reported when Outerbridge grades are 0-2 and grades 3-4, respectively (6). In our clinic we attempted to reduce these high arthroscopy-to-TKR conversion rates by using a two-surgeon triage system. We hypothesized that this system would achieve an arthroscopy-to-TKR conversion rate of $<10\%$ by at least three years post-arthroscopy in cases with symptomatic meniscal pathology in the setting of mild OA. We studied patients ≥ 50 years old that had been evaluated independently by two fellowship-trained surgeons (JGS and KCB) who concluded that knee arthroscopy was the most appropriate treatment for meniscal pathology. Despite this double-triage system, we observed an unexpectedly high rate (24%) of readmission for TKR during a minimum three-year follow-up.

METHODS:

With IRB approval, we studied 42 patients (age range: 50-87) that had failed conservative medical treatment for knee pain that was considered to be primarily caused by meniscal pathology. The patients were evaluated in a private practice clinic from 2001-2008 by two orthopaedic surgeons using a "double-triage system". In this system the patients were initially seen by the knee replacement surgeon (KRS = KCB) and were referred by him to the knee arthroscopy surgeon (KAS = JGS). As part of the double-triage system, an agreement was made that when a patient did not require a TKR but had significant mechanical symptoms suggestive of meniscal pathology, the KRS would refer him/her to the KAS for independent evaluation. After the referral there was no discussion between the two surgeons regarding the patient's care. All that was known to the KAS is that the KRS felt that arthroscopic intervention should be considered for what appeared to be clinically significant meniscal pathology in accordance with clinical criteria described by Miller (8). However, at their discretion each surgeon was allowed to order magnetic resonance imaging (MRI) scans of the knee. This was not an inclusion criterion because both surgeons felt adept at diagnosing significant meniscal pathology and distinguishing it from articular cartilage pathology (e.g., arthritis) using clinical history, physical examination findings, and radiographic analysis. The fact that the study group were patients that all had arthroscopy also allowed for the accurate description of intra-articular pathology. All patients received pre-operative Knee Society scores and Kellgren-Lawrence radiographic grades (higher grade = worse OA). Retrospective analysis of the operative notes and photographs of arthroscopic findings were used to determine Outerbridge OA grades in the medial femoral condyle, medial tibial condyle, lateral femoral condyle, lateral tibial condyle and patellofemoral region: grade 0 = normal; grade 1 = softening and swelling of cartilage; grade 2 = fragmentation and fissuring <1 cm; grade 3 =

fragmentation and fissuring >1 cm; and grade 4 = erosion of cartilage to bone. Outerbridge OA grades were also grouped as: 0 to 2 = "no arthritis to mild arthritis" and 3 to 4 = "moderate arthritis to severe arthritis." One-way ANOVA Kruskal-Wallis Z-tests were performed to detect significant differences between double-triage patients that received only knee arthroscopy and those that went on to TKR in terms of many parameters, most of which are listed in the Table below.

RESULTS:

One in four double-triaged patients (24%) was converted from their index knee arthroscopy to a TKR at a minimum of 3 years follow-up (range of follow-up 3-9 years). There were no significant differences in average ages, BMI, and gender between the index knee arthroscopy-only group (n=32) and the arthroscopy-TKR group (n=10). Patients that received arthroscopic surgery followed by TKR showed significantly higher Outerbridge OA grades on the medial femoral condyle ($p<0.01$) and -1 radiographic grade worse with respect to OA. No significant difference was found in terms of Outerbridge OA grades of the other anatomical regions of the knee or in the other parameters.

| Two-surgeon Triage Patients | Groups | | | p values 2 vs. 3 |
|--------------------------------|----------------|------------------|-------------------|---------------------|
| | 1 | 2 | 3 | |
| | Total Group | Arthroscopy Only | Arthroscopy + TKR | |
| No. of knees | 42 | 32 | 10 | |
| Gender | 12 M / 30 F | 10 M / 22 F | 2 M / 8 F | |
| Age (at time of arthroscopy) | 67 \pm 9 | 70 \pm 6 | 66 \pm 9 | $p = 0.3$ |
| BMI | 30.8 \pm 6.2 | 30.8 | 30.7 | $p > 0.5$ |
| Kellgren-Lawrence Grade | 1.1 \pm 1.2 | 0.9 \pm 1.1 | 1.7 \pm 1.3 | $p = 0.05$ |
| Medial Femoral Chondrosis | 1.7 \pm 0.4 | 1.7 \pm 0.5 | 2 \pm 0 | $p = 0.02$ |
| Medial Tibial Chondrosis | 1.3 \pm 0.5 | 1.3 \pm 0.5 | 1.4 \pm 0.5 | $p > 0.5$ |
| Lateral Femoral Chondrosis | 1.4 \pm 0.5 | 1.4 \pm 0.5 | 1.3 \pm 0.5 | $p > 0.5$ |
| Lateral Tibial Chondrosis | 1.2 \pm 0.4 | 1.3 \pm 0.4 | 1.2 \pm 0.4 | $p > 0.5$ |
| No. No - Mild O.A. | 7 | 7 | 0 | $p < 0.05$ |
| No. Moderate - Severe O.A. | 35 | 25 | 10 | $p < 0.05$ |
| Patello-femoral Chondrosis | 1.6 \pm 0.5 | 1.6 \pm 0.5 | 1.6 \pm 0.5 | $p > 0.5$ |

DISCUSSION:

The high conversion rate from index knee arthroscopy to TKR that has been reported in the literature could perhaps be explained by the suggestion of Wai et al. (9) that arthroscopic debridement may be over-utilized in elderly patients where primary TKR may be the most appropriate treatment. Additionally, medial meniscal damage is a common incidental finding in middle-aged to elderly patients, and discrimination of its contribution to overall painful symptoms may be complicated by the presence of osteoarthritis (10). Clearly, surgeons often find it difficult to determine the relative contributions of articular vs. meniscal pathology to overall knee pain in middle-aged to elderly patients who are being evaluated for what appear to be degenerative changes. A variable that may have contributed to our higher than expected readmission rate for TKR is the fact that the KRS (who first triaged the patient) has a clinical practice that focuses on knee replacement; hence all patients who are triaged have underlying arthritis. Compared to other studies of more general orthopaedic populations, this would tend to skew our patient population toward having relatively more significant articular pathology. In view of these issues and the outcome of our study, we now more strongly consider obtaining preoperative MRI scans of patients who enter the double-triage system. This would allow for a more critical discernment of the degree of OA of the medial femoral condyle, which is the only location where the magnitude of chondrosis was significantly different between the groups. We are now investigating the possibility that the radiographic magnitude of OA and MRI-based medial femoral chondrosis can be incorporated into one aggregate score that is sufficiently sensitive for helping to determine which patients should avoid knee arthroscopy and go straight to TKR.

REFERENCES: (1) Zeni et al., 2010 BMC Musculoskel Disord. 11:86-; (2) Cicunitt et al., 2004 Ann Rheum Dis. 63:1124-; (3) Moseley et al., 2002 NEJM. 347:81-; (4) Kirkley et al., 2008 NEJM. 359:1097-; (5) Kruger-Franke et al., 1999 Knee Surg. Sports Traum. Arth. 7:81-; (6) Crevoisier et al., 2001 Arthroscopy 17(7):732-; (7) Spahn et al., 2006 Arthroscopy 22:1233-; (8) Miller, 1996 Arthroscopy. 12:406-; (9) Wai et al., 2002 JBJS 84-A:17-; (10) Englund et al., 2008 NEJM 359:1108-.