Defining Risk Factors for Medial MeniscusPosterior Root Repair Surgical Failure

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INTRODUCTION:

Recent studies have shown that there is a good cost-benefit in attempting to repair the medial meniscus posterior root, even in degenerative cases, since, due to conservative treatment or partial meniscectomy leading to a more pronounced progression of knee osteoarthritis, repair can protect the knee for a period, delaying the evolution of degenerative changes in the compartment.

Some factors indicating a poor prognosis of the medial meniscus posterior root repair are already known, such as grade 3 or higher arthrosis in the medial compartment according to the Kellgren-Lawrance classification or grade 3 or higher chondral injuries according to the Outerbridge classification, varus axis deviation, mainly above 5º and high body mass index (BMI). However, other factors, such as the number of sutures used, type of suture used, number of tunnels, and fixation methods, among others, have not yet been studied in detail. Another factor that seems to influence the results greatly is the patient's compliance with rehabilitation, although this has also not been studied in detail.

Thus, the objective of the study is to evaluate the risk factors for failure of medial meniscus posterior root repair, including the patient's preoperative factors, factors related to surgery and rehabilitation, already excluding the known factors of failure such as uncorrected varus axis deviation and advanced degenerative changes in the medial compartment. We hypothesize that degenerative changes, even if not so advanced, and non-compliance with rehabilitation will be related to worse functional outcomes.

METHODS:

This study was approved by the Institutional Review Board, and the informed consent was obtained from the patients. Patients submitted to medial meniscus posterior root repair from January 2015 to April 2022 were evaluated retrospectively, although with prospective data collection. Patients of any age with acute or chronic injuries submitted to reinsertion of the medial meniscus posterior root through a transtibial tunnel with at least 24 months of follow-up were evaluated. Patients with associated ligament procedures at the time of root repair were excluded from the analysis. Patients submitted to osteotomies or associated chondral procedures in the medial compartment were included. Patients with previous knee surgeries were also included.

Meniscus root repair was performed arthroscopically using high-strength sutures or tapes and fixation through one or two transtibial tunnels in the anterior tibial cortical with a button or an anchor. Four surgeons with training in knee surgery and experience in this pathology performed all surgeries in this series.

All patients were instructed to follow the same rehabilitation protocol, no weight-bearing for six weeks and loaded as tolerated from the seventh week and with a range of motion from 0º to 90º for four weeks and free from that period. The patient's compliance with postoperative rehabilitation guidelines was evaluated.

Data were collected prospectively during follow-up. The following parameters were collected: age, sex, BMI, time from injury to surgery, follow-up time, previous knee surgery, procedure associated with root repair, degree of osteoarthritis according to the Kellgren-Lawrance scale, degree of femoral and tibial chondral injury according to the Outerbridge classification, number of sutures used (2 or 3), material used for repair (high-strength sutures or tape), type of fixation in the tibia (button or anchor), number of tunnels used (1 or 2), patient's compliance with rehabilitation guided by the medical and physiotherapeutic team, postoperative scales of subjective International Knee Documentation Committee (IKDC) and Lysholm functional scale, Forgotten Joint Score (FJS) and Global Perceived Effect (GPE) and meniscus root repair failure, considered as documented failure of the root reinsertion observed by magnetic resonance imaging (MRI) or arthroscopy, new arthroscopic surgery on the same meniscus, need for osteotomy, unicompartimental arthroplasty or total knee arthroplasty due to pain and increased degenerative changes, important progression of arthrosis even if no new surgery has been performed or chronic knee pain.

RESULTS:

One hundred and thirty-five patients were submitted to medial meniscus posterior root repair during the study period, but ten (7.4%) were excluded based on the criteria adopted by this study, totaling 125 for the final analysis.

Among the patients evaluated, 28 (22.4%) were considered failures, and 97 (77.6%) were successful. Among the patients considered as failure, 16 had a repair loss observed in the MRI examination, five patients had progression of arthrosis in the medial compartment, six were submitted to a new surgery on the same meniscus for flaps resection, and one patient evolved with chronic neuropathic pain.

Comparing the groups, patients who were considered repair failure presented as pre- and intraoperative factors a higher proportion of female patients ($p = 0.0004$), higher BMI ($p = 0.0009$), a greater number of associated procedures (0.02) and a greater number of femoral chondral injuries (0.0005). The follow-up time had a mean of three months longer in patients who had repair failure ($p = 0.002$), probably not clinically relevant. Patients with repair failure were submitted to surgery with more sutures ($p = 0.02$), although only repairs with two or three sutures were included. They also had worse

compliance with rehabilitation ($p = 0.0001$) when compared to patients who had a successful repair. Patients with repair failure also showed worse results on all functional scales evaluated, including IKDC ($p = 0.0001$), Lysholm ($p < 0.00001$), FJS ($p < 0.00001$), and GPE ($p < 0.00001$).

DISCUSSION AND CONCLUSION:

Medial meniscus posterior root repair with transtibial tunnel has 77.6% good results with a mean follow-up of around four years. Female sex, high BMI, osteotomies or cartilage procedures concomitant with root repair, more pronounced femoral chondral injury, repair with three sutures instead of two, and poor patient compliance with rehabilitation were factors related to repair failure.