Total knee arthroplasty preoperative synovial fluid volumes and their continuing relationship to patient reported outcomes

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Introduction: Total knee arthroplasty (TKA) for end stage osteoarthritis is now one of the most performed elective surgeries in modern medicine with estimates predicting 1.26 million annual TKA surgeries by 2030. Even though medical technology and surgical techniques have advanced since TKA surgery was implemented decades ago, TKA surgery recipients still have poor satisfaction. As a result, the continuing impact of SF volume was the focus of the study. The volume of synovial fluid retrieved ranged from 0 mL to 10 mL, with an average of 4.5 mL. Seventy-three KOOSJR scores have been collated at less than one-year post-op while eighteen have been collected after one year. Patients with less than 2 mL SF had an average score of 81.3 ± 16.1 at < 1 year (n=56) and 85.1 ± 15.2 at > 1 year (n=14). Statistical analysis found that patients with at least 2 mL of preoperative SF have significantly higher KOOSJR scores than patients with less than 2 mL of SF. The KOOSJR scores of patients with less than 2 mL of synovial fluid were compared to those of patients with at least 2 mL of synovial fluid using a Mann-Whitney test.

Methods: IRB approval was first obtained for our study and patient consent was obtained prior to surgery. One hundred twenty-two human SF samples were collected in the operating room using a 10cc syringe at the time of TKA. The SF retrieved was after superficial exposure and before the arthrotomy. Maximal fluid was attempted to be aspirated first in the medial gutter and if no fluid was present then it was attempted in the superior patellar pouch or intercondylar notch. The fluid was measured in the syringe and recorded before electrochemical testing was done. If the patient had more than 10 mL of SF, the volume was recorded as 10 mL. The patient’s stiffness, pain, and daily function were self-reported using a Knee injury and Osteoarthritis Outcome Score, Joint Replacement (KOOSJR) survey after three to twelve months post-op and again after one year.

Results: The KOOSJR scores of patients with less than 2 mL of SF and at least 2 mL SF volumes and patient satisfaction scores.

Discussion: Ongoing data shows a correlation between a patient’s preoperative SF volume and their satisfaction with TKA outcome over the span of the first 1-2 years of the implant. We will continue to enroll patients to evaluate the correlation between preoperative SF volume (along with other properties) and patient satisfaction over the lifespan of the implant. Future research will aim to better understand the cause of this relationship.

Significance: There is a group of patients that are unsatisfied with the results of their total knee arthroplasty. The cause of this dissatisfaction may be multifactorial. It is important to consider environment in which the implant is being placed and factors which may lead to lower patient satisfaction with TKA outcomes.

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References

Figures: Average KOOSJR score of patients with less than 2 mL of SF and at least 2 mL SF. Scores obtained less than one year post-op are on the left while score obtained over one year post-op are on the right. * The means of the two groups are significantly different (p < 0.05).

References