

Subcutaneous Fat Thickness as a Risk Factor for Return to OR in Total Knee Arthroplasties

Pooja Prabhakar*, Ajay Narayanan*, Matthew Swann, Kenneth Estrera
 UT Southwestern Medical Center, Department of Orthopedic Surgery, *These Authors Contributed Equally

UT Southwestern
 Medical Center

Background

- Total knee arthroplasty (TKA) is an increasingly common procedure performed in the United States. Post-operative complications after TKA, such as unplanned returns to the operating room for an infection or implant failure, can result in high morbidity for patients and significant medical expenditures.
- Presently, several patient factors are used to identify higher risk patients prior to surgery, such as body mass index (BMI), although these have limitations.
- The amount of subcutaneous tissue at the surgical site affords an objective evaluation of the degree of surgical exposure required at the time of the operation. Increased amounts of subcutaneous tissue may lead to a prolonged dissection and more dead-space volume, which may increase rates of infection and component malposition which could, in turn, result in unplanned returns to the OR.
- The aim of this study is to determine whether subcutaneous fat thickness, as measured on pre-operative radiographs, is a risk factor for return to OR for TKAs.

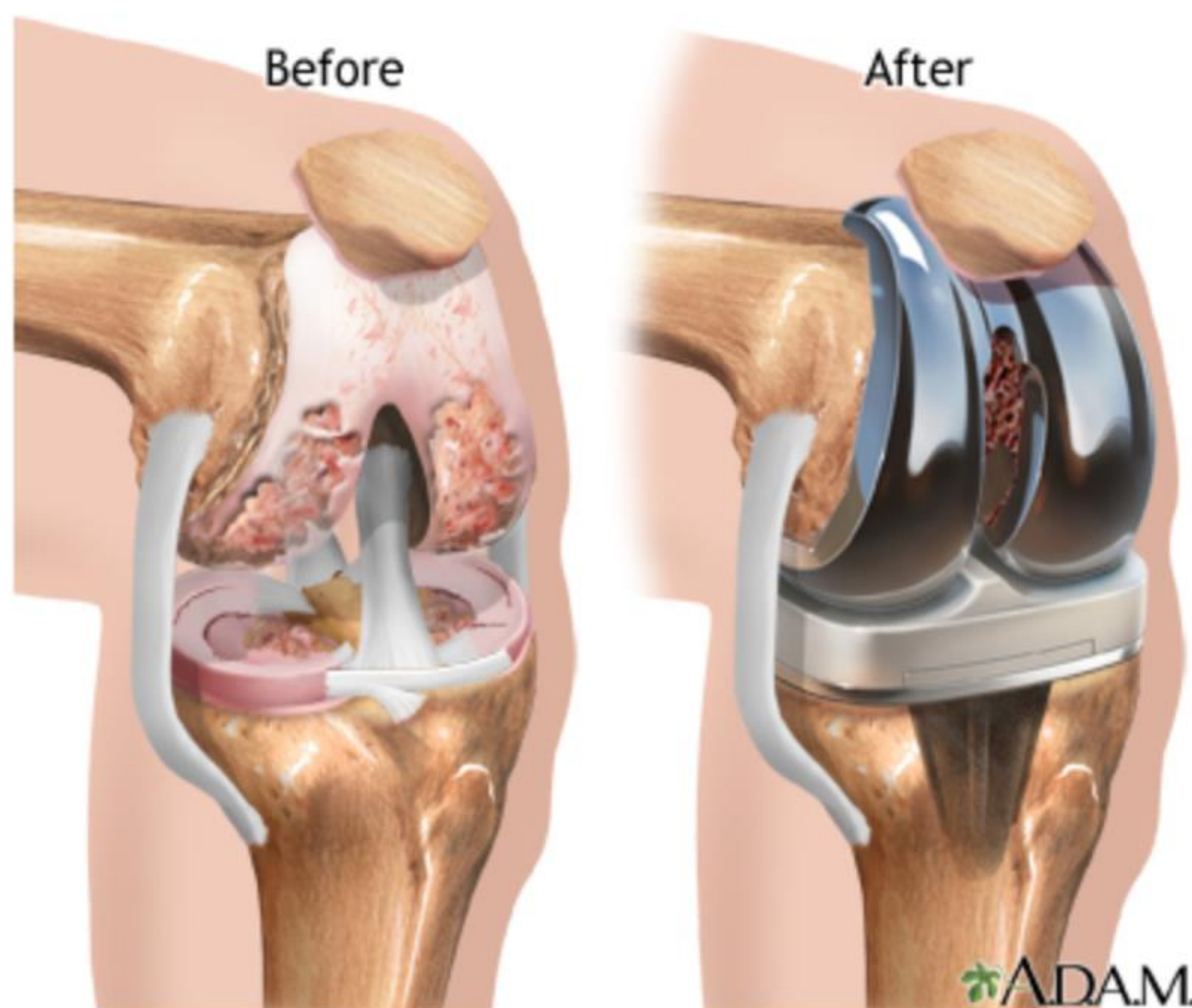


Figure 1. A knee joint before and after Total Knee Arthroplasty (TKA). Cartilage at the joint interface becomes worn down with use, requiring replacement with a prosthesis.

Image taken from: <http://www.jointimplantsurgeons.com/knee-replacement/>

Methods

- This is an IRB-approved, retrospective review of a series of 596 total knee arthroplasties at two hospitals in a large urban setting over a 2-year period (2010-2011).
- Pre-operative AP knee radiographs were reviewed and measurements were taken using the same imaging software. A medial knee adipose tissue (MKAT) score was calculated using the ratio of the total width of the distal femoral metaphysis perpendicular to the anatomic axis and the width of the medial adipose tissue along the same plane (**Figure 2**).
- Additional variables recorded included gender, ethnicity, diagnosis, laterality, pre-operative BMI, date of last follow-up, return to OR, date of return to OR, revision, and deceased status.
- Only patients with unplanned returns to the OR within 3 months of the operation were considered in this subgroup analysis.

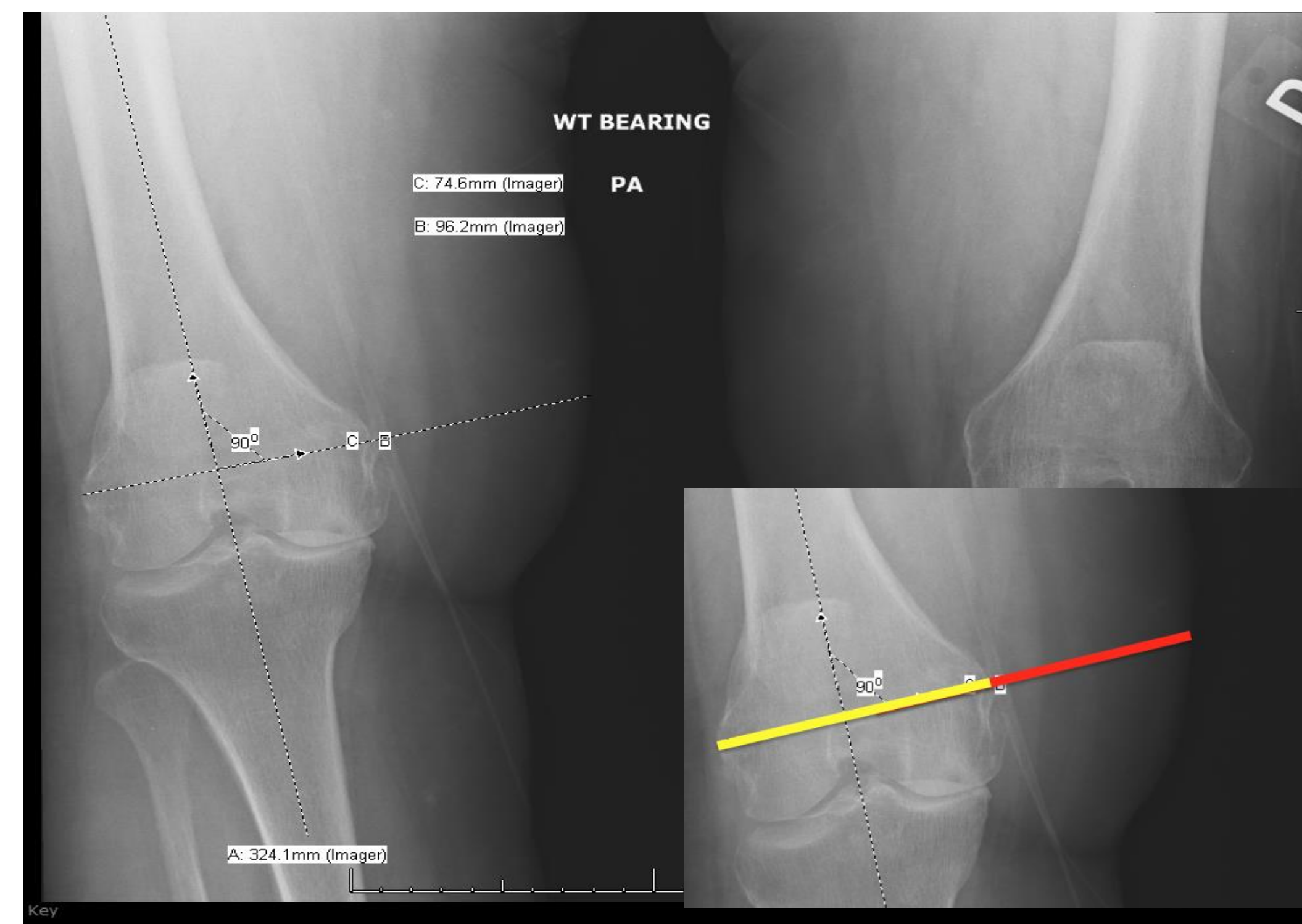


Figure 2. A line was drawn down the femur to establish the anatomic axis. The lengths of the distal femoral metaphysis (yellow) and the medial adipose tissue (red) were measured along the same plane, perpendicular to the anatomic axis, and an MKAT ratio was calculated as the medial adipose tissue length / distal femoral metaphysis length.

Results

- 596 patients consisting of 214 (35.9%) males and 382 (64%) females were included in the analysis.
- 24 patients (4%) consisting of 9 (37.5%) males and 15 (62.5%) females had an *unplanned return to the OR within 3 months of the index operation*. Reasons for return include periprosthetic infection, wound complications, and arthrofibrosis.
- In this group, the average pre-op BMI was 32.9 and the average MKAT was 0.46. 21 patients (87.5%) had osteoarthritis, 2 (0.8%) had traumatic arthritis and 1 (0.4%) had rheumatoid arthritis.
- The remaining 572 patients had an average BMI of 32.5 and an average MKAT of 0.45.
- The medial knee adipose tissue score was **not** significantly associated with return to OR ($p = 0.15$). Age and BMI were the only variables that were significantly associated with return to OR ($p = 0.01$ and 0.005). (**Figure 3**)

Source	Wald Chi-Square	Degrees of Freedom	Significance (p-value)
Gender	0.118	1	0.731
Facility	0.000	1	0.996
Diagnosis	2.195	2	0.334
Race	1.398	4	0.845
Age	6.694	1	0.010*
BMI	7.973	1	0.005*
MKAT	2.036	1	0.154

Figure 3. Only 24 out of 596 patients had an unplanned return to the OR within 3 months of the index operation. Of the seven variables tested for association, Age and BMI were significantly associated with return to OR following TKA. The MKAT ratio was **not** significantly associated with return to OR ($p = 0.15$).

Conclusions

- Medial subcutaneous fat thickness on pre-operative AP knee radiographs is not significantly associated with increased return to OR after primary TKA.
- The limitations of this study include its retrospective nature and small study population. Unplanned returns to the OR after total knee arthroplasty is rare, so it is possible that increased study numbers may find a statically significant correlation between subcutaneous fat about the knee and unplanned returns to the OR.
- As this was a novel measurement system, we were unable to perform a power analysis to determine an appropriate study population number.
- Although we did not find a statistically significant difference between the two groups, this data is useful in that it can assist with surgical decision making. This data suggests that patients with increased subcutaneous tissue about the knee are not at increased risk of return to the OR after primary TKA.

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