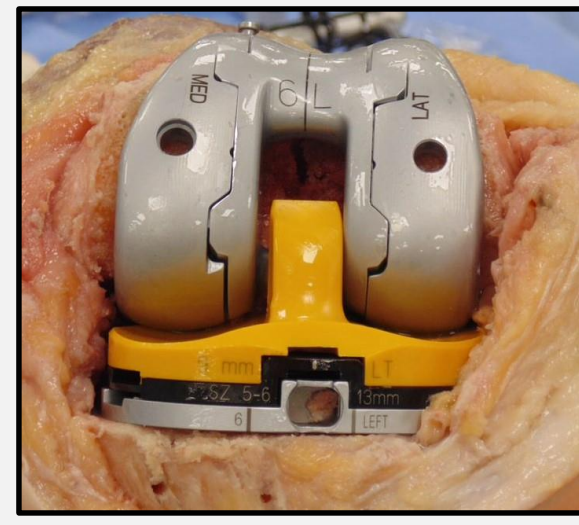


SOFT TISSUE DAMAGE DURING CONVENTIONAL TOTAL KNEE ARTHROPLASTY

Rico Paridaens, ir. Stijn Herregodts, Prof. Dr. Jan Victor
Rico.Paridaens@ugent.be

Introduction

(Knee) osteoarthritis is the most common joint disorder. It is a frequent cause of pain, loss of function and disability. Severe cases are treated by replacing the joint with a prosthesis (total knee arthroplasty, TKA).



During this procedure the bone is cut using an oscillating saw, which can lead to unintended excursion of the oscillating saw outside the bone. This can damage the surrounding tissues, leading to post-operative pain and instability.

Damage to the medial collateral ligament is a well known complication (1-8 % off all cases), however no studies research damage to the other surrounding ligaments.

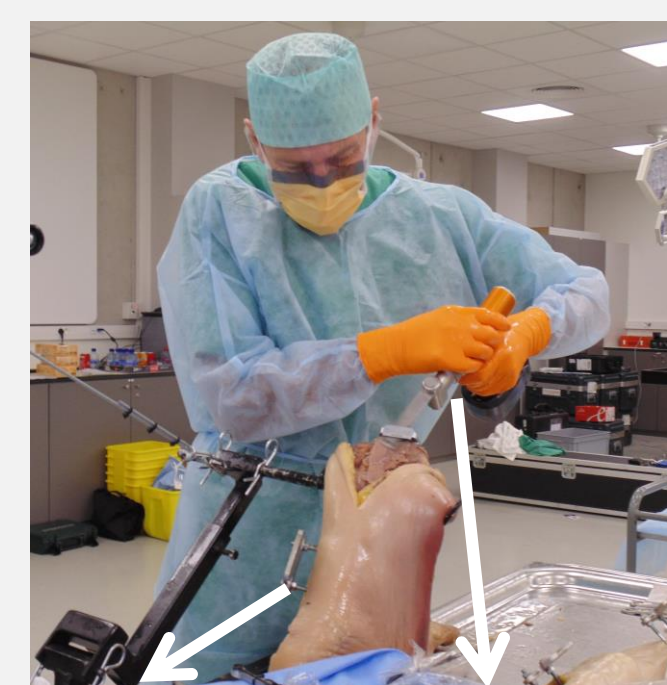
Objective

Quantify the saw excursion of the tibia during the total knee arthroplasty.

Method

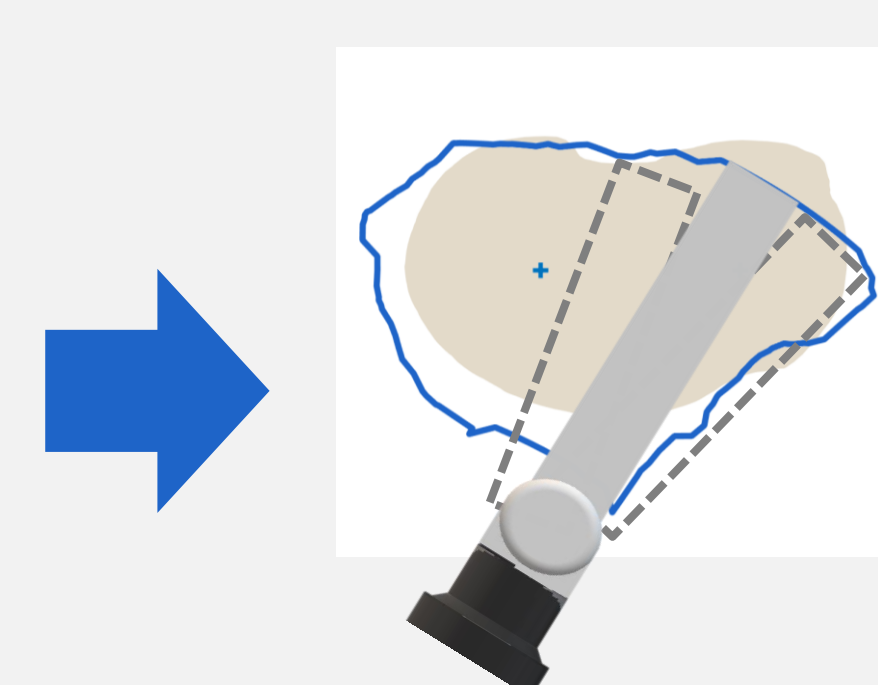
- 12 TKA procedures by 6 orthopedic surgeons
- Tracing of the saw and bone using active optical tracking
- Saw excursion = the distance between the tip of the saw blade and the edge of the bone
- Using a theoretical model the measurements were divided in regions of interest (locations where ligaments may be located).

Trace



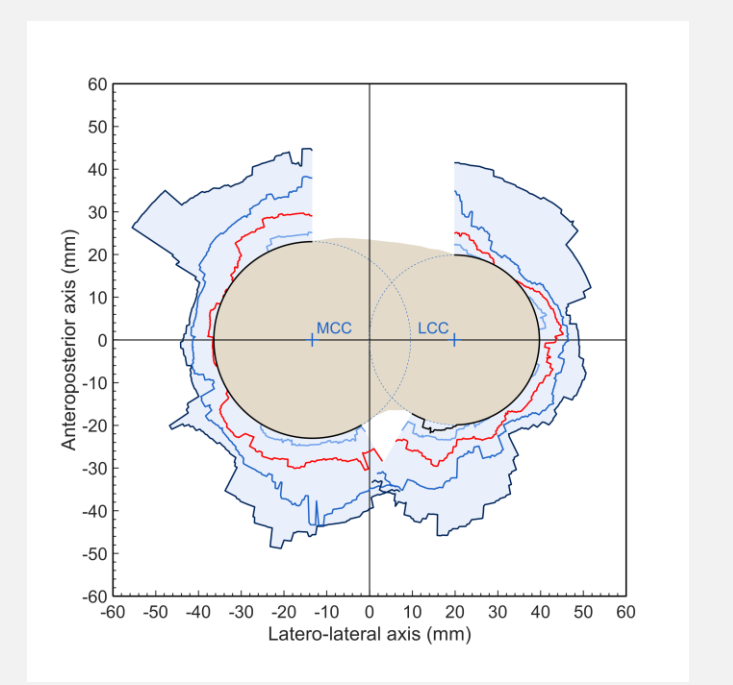
bone + oscillating saw markers
→ high precision tracing

Quantify



calculate saw excursion

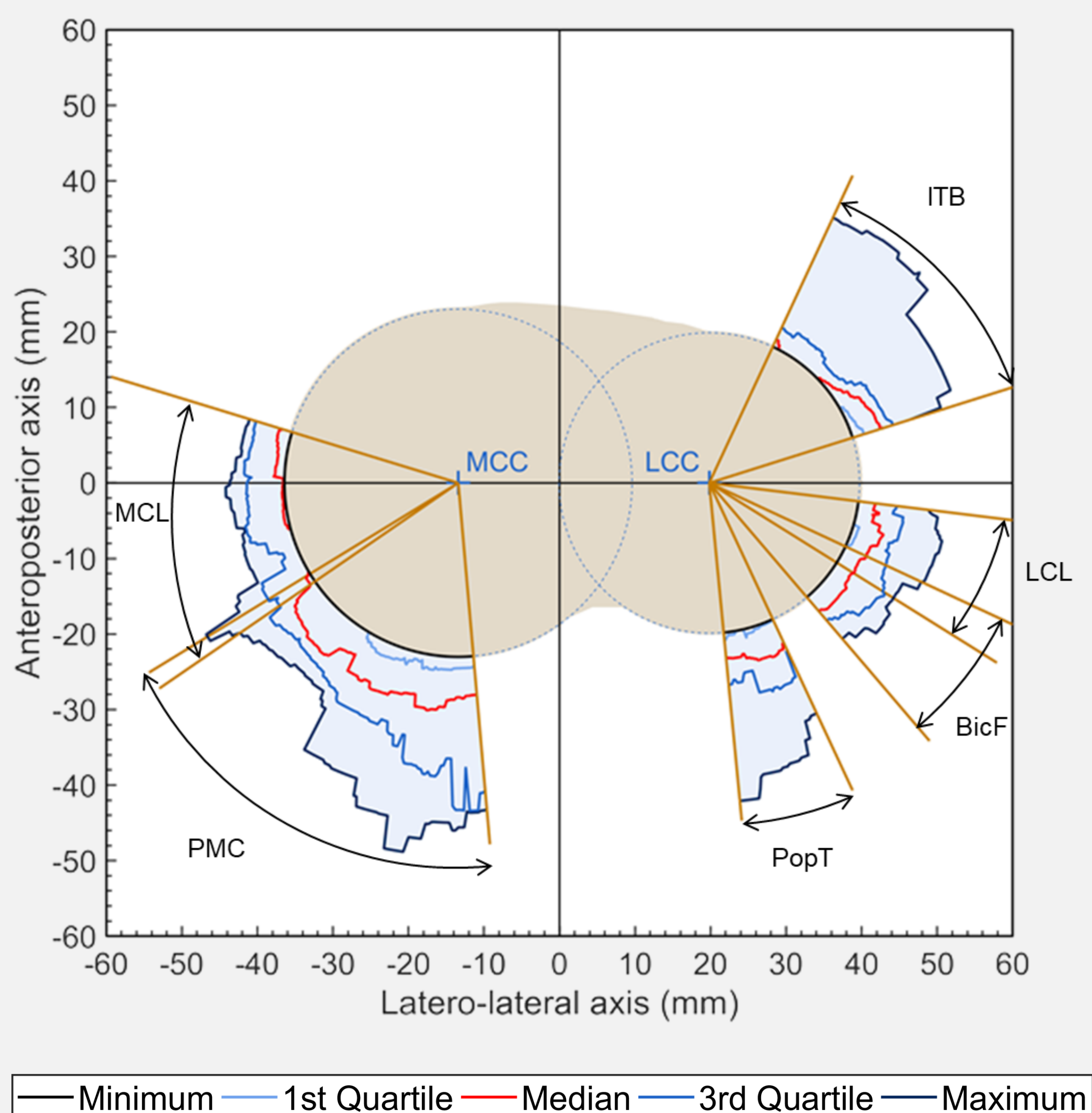
Analyse



filter out regions of interest (ligaments)

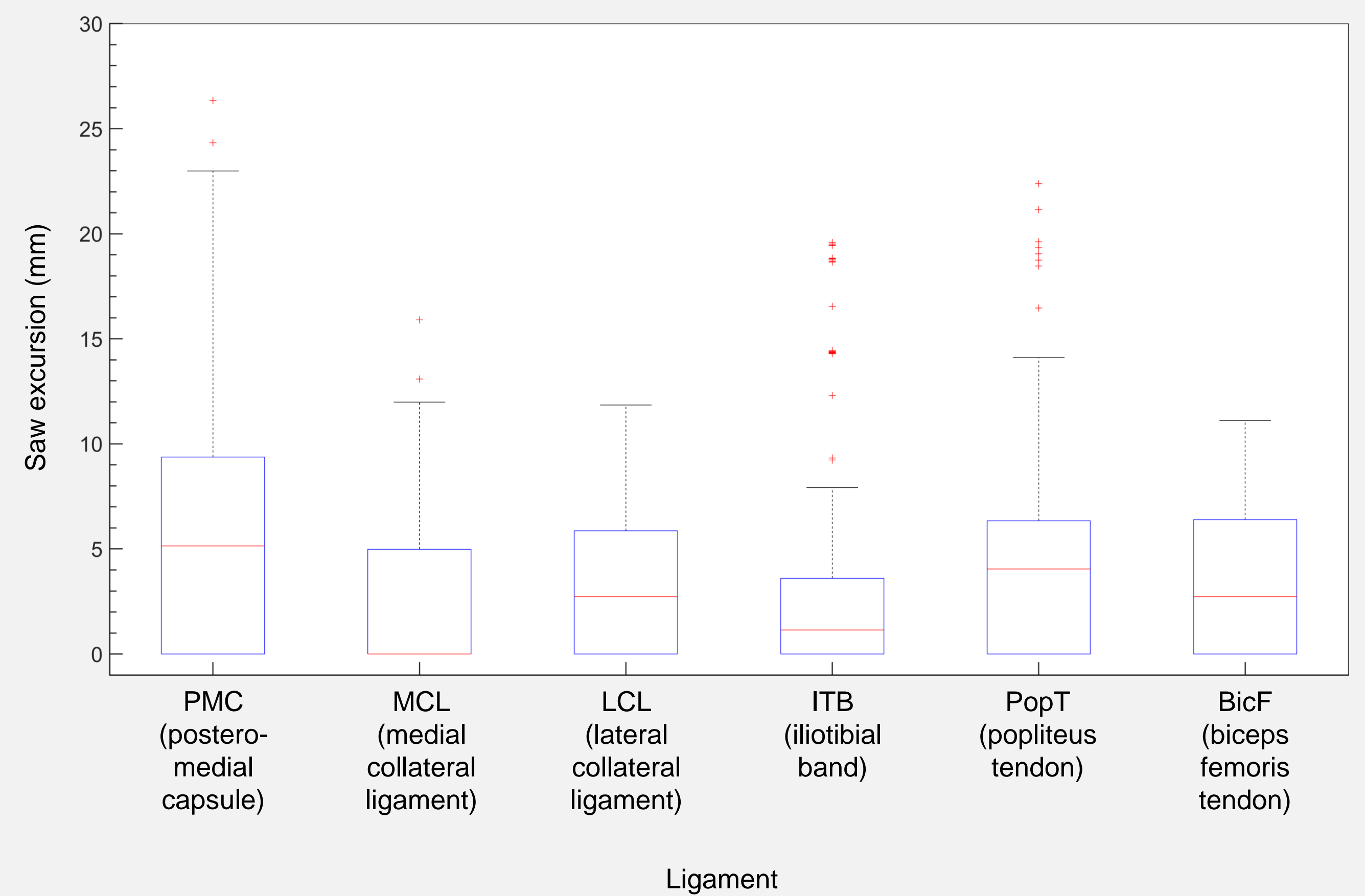
Results

Visualization of tibial saw excursion



- All ligaments are at risk for damage during the tibial cut (median total excursion = 3.57 mm)
- The saw excursion was biggest for the posterior ligaments (posteromedial capsule, popliteus tendon, biceps femoris tendon) (max excursion of 26.35 mm, max excursion of 19.59 mm for other ligaments)
- The posteromedial capsule had the biggest overall saw excursion (median = 5.14 mm, max = 26.35 mm)

Boxplot of tibial saw excursion



Conclusions

1. All ligaments, and especially the posterior ligaments, are at risk for damage during total knee arthroplasty
2. Because cadavers were used:
 - surgeons may have sawn less accurate thus potentially inducing bias
 - saw excursion could not be quantitatively linked to pain
3. Damage to the surrounding soft tissue is not unlikely. Surgeons should be aware of the risk of damaging ligaments during the cutting process
4. Computer-assisted sawing techniques may help to decrease the risk for damage