

## INTRODUCTION

- Patellar instability results from a complex collection of static and dynamic factors.
- In addition to static bony deformities including tibial tubercle lateralization and trochlear dysplasia, alteration in tibiofemoral rotation (TFR) has been demonstrated between patellar instability patients (increased external rotation of tibia) compared to controls.
- However, it is unclear if this abnormal TFR is present throughout knee range of motion or represents an increased knee screw home mechanism.

## OBJECTIVE

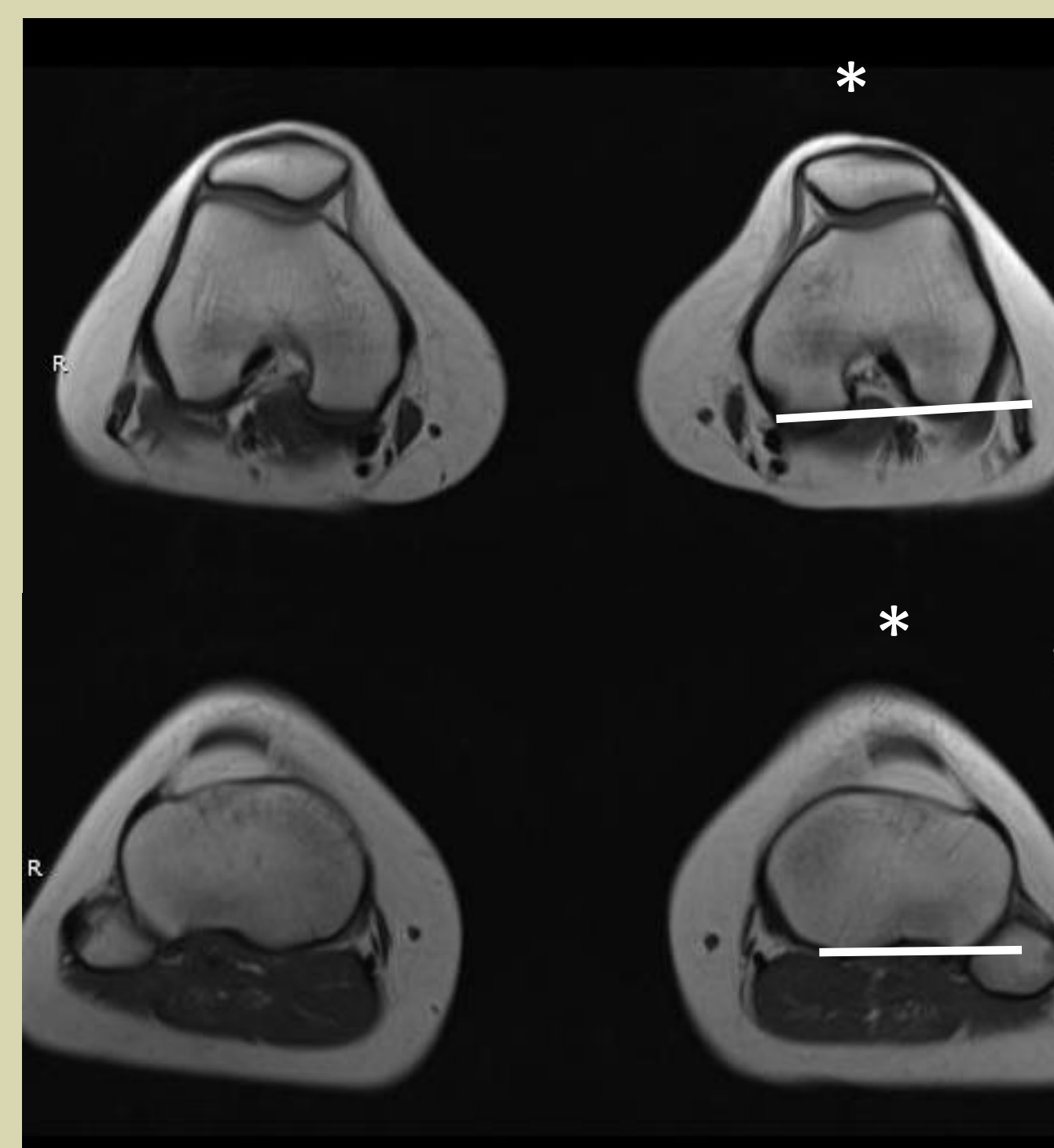
The purpose of the current study was to investigate the TFR profile of knees with patellar instability at 0, 15, and 30 degrees of flexion.

## METHODS

- A total of 20 knees, including 16 with recurrent patellar instability and 4 without patellar instability, underwent MRI imaging with a patellar tracking protocol.
- Static sequences were taken with the knee extended (0°), as well as the knee flexed 15 and 30 degrees.
- The tibial tubercle-trochlear groove (TT-TG) distance and TFR was measured on each knee at each flexion angle (0, 15, 30°).
- TFR values are presented with positive values indicating external rotation of the tibia relative to the femur.

## RESULTS

30 degrees  
knee flexion



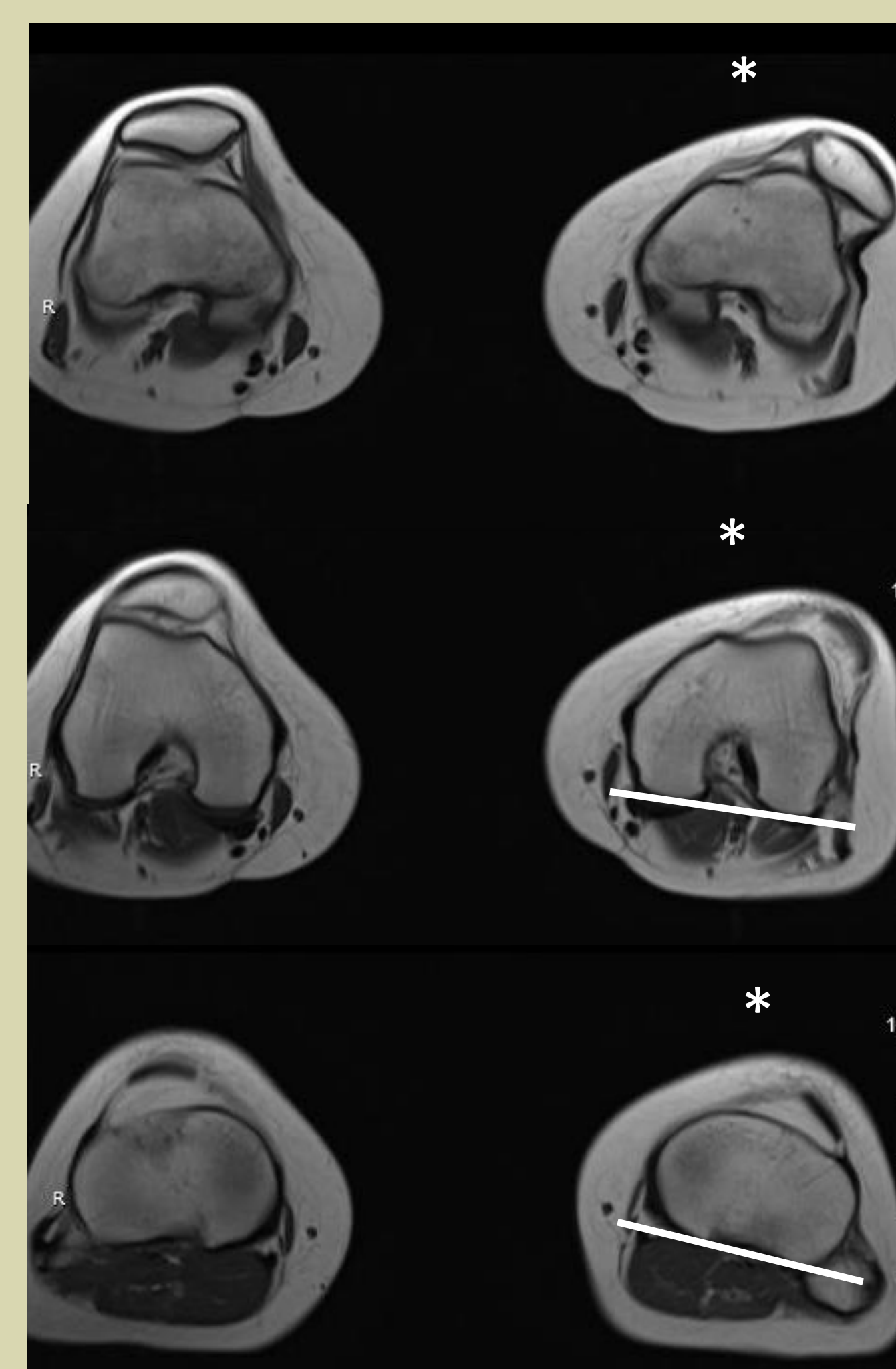
### Case example

Left patellar instability

Increased ER of tibia present in 30 degrees of flexion, that worsens with terminal knee extension and screw home mechanism

2 degrees  
tibial  
external  
rotation

15 degrees  
knee flexion



7 degrees  
tibial  
external  
rotation

0 degrees  
knee flexion



7 degrees  
tibial  
external  
rotation

## RESULTS

- In both groups, the TT-TG distance decreased with knee flexion to 30° (13.4 mm), compared to 15 and 0 degrees of flexion (15.4 and 15.1 mm, respectively).
- Similarly, the TFR decreased with knee flexion of 30° (2.7°), compared to 15 and 0° of flexion (5.4 and 4.6°, respectively).
- This represents relative internal rotation of the tibia in 30° of flexion, compared to relative external rotation of the tibia in 15 and 0° of flexion.
- The pattern of TFR change between 0 and 30° of knee flexion was variable with 25% (n=4) having an increased external rotation of the tibia greater than 5 degrees during terminal knee extension only, 31% (n=5) having persistent external rotation greater than 5° of the tibia throughout the 0 to 30° arc, and 44% (n=7) having less than five degrees of abnormality for each of these two components.
- The pattern of TFR change did not correlate with the TT-TG distance at 0°.

## CONCLUSIONS

- Abnormal TFR plays a role in patellar instability and is partially responsible for abnormal TT-TG values.
- In the current study, we demonstrate that altered TFR with the knee extended can result from external tibial rotation throughout knee range of motion (31%) or an exaggerated screw-home mechanism (25%), or a combination of mild components of both (44%).