Effect of Deformities Below the Ankle on TKA

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What foot and ankle deformities should clinicians be aware of before total knee arthroplasty (TKA)?

Deformities of concern in the coronal plane include those in which the hindfoot is in valgus or varus. These deformities include the pes planus (ie, flat foot) and cavovarus foot. Prior to TKA, decisions should be made on whether to proceed with correction of the hindfoot deformity or the knee or to use bracing pre- and postoperatively.

How do foot and ankle deformities affect the knee after TKA?

The answer to that question is still unknown. A TKA re-establishes mechanical axis. Some studies have looked at how such deformities may affect the performance of a well-aligned TKA. Work presented at the American Academy of Orthopedic Surgeons 2012 Annual Meeting by Norton et al found that a correlation existed between knee and hindfoot deformities. Patients with a varus knee tend to have a valgus hindfoot, and patients with a valgus knee tend to have a varus hindfoot.

Explain the templating process done before TKA. Why is the foot excluded?

The mechanical axis is obtained on standing radiographs of the hip to the ankle. It is the line that connects the center of the femoral head with the center of the ankle. The angle of the femoral cut is the difference between the anatomic and mechanical axis of the femur. A normal alignment is when this line passes through the center of the knee. The hindfoot is considered when measuring the weight-bearing axis of the limb. This measurement includes the ground reaction point of the hindfoot. The hindfoot does not influence bone resection at the femur or tibia to restore the mechanical axis.

What is the role of imaging?

Standard radiographs for preoperative templating for TKA include hip to ankle views. These standard views do not dem-
onstrate alignment of the tibia relative to the calcaneus in the coronal plane. A hindfoot alignment view is obtained with the patient standing and the radiograph’s beam angled toward the floor. Coronal plane alignment of the hindfoot is measured as the horizontal distance between a line drawn along the axis of the tibia and the most inferior point of the calcaneus.

Do foot and ankle deformities affect TKA implant choice?
At this time, the evidence is not conclusive to justify changing your total knee implant. The study by Meding et al1 discussed the concerns about increased polyethylene wear, loosening, and osteolysis in implants with increased conformity and constraints.

What should surgeons do pre-, intra-, and postoperatively for patients with foot and ankle deformities?
No clear consensus exists on how to approach patients with knee arthritis and a foot or ankle deformity. Should the knee be replaced first or should the foot be corrected before the knee surgery? What is the role of orthotics and bracing in patients after TKA? It is fair to say that factors that should be considered include which joint is more symptomatic (the knee or the hindfoot), whether the hindfoot deformity is severe, and whether the deformity is fixed or flexible. Whether patients will be compliant with orthotics or bracing should also be considered. Careful monitoring of patients following a TKA will guide treatment. The subtalar joint may be able to compensate after TKA for deformities that are not fixed or severe.

What happens to individuals with foot and ankle deformities who have undergone TKA if the deformities are not taken into account?
There are 2 primary concerns: Will correcting the knee deformity with a TKA change the deformity at the hindfoot? And will this resulting change in the hindfoot cause pain or a new deformity? Unfortunately, the answers to these questions are not known currently, and no good evidence in the literature suggests what could be a possible outcome. The long-term concern is what happens to the TKA implant when there is deviation of the mechanical axis from the center of the knee when the hindfoot is considered. Will there be a change in the longevity of the TKA?

What research is currently being done for patients with deformities below the ankle who need to undergo TKA?
Our group has started to investigate this problem with computer modeling studies and biomechanical testing with cadaveric specimens. Norton et al3 found a significant correlation between knee and hindfoot deformities in patients with advanced knee arthritis and a greater than 10° knee deformity.

What does the future hold for patients with deformities below the ankle who need to undergo TKA?
Further research in the laboratory and clinically should be performed to evaluate the relationship between the knee, ankle, and foot. In the laboratory, we should look for what could happen with wear simulator studies with knee implants when there is a deformity in the hindfoot. In the clinical scenario, we should look at patients who have had a TKA and have a pre-existing, or have developed, a deformity below the ankle joint, such as flat foot deformity. Long-term follow-up on the longevity of TKAs in these patients will help us understand the effect of deformity below the ankle on TKA.

REFERENCES