Introduction
A fixed cavovarus foot deformity can be associated with anteromedial ankle arthrosis due to elevated medial joint contact stresses. Supramalleolar valgus osteotomies (SMOT) and lateralizing calcaneal osteotomies (LCOT) are commonly used to treat symptoms by redistributing joint contact forces. In a cavovarus model, the effects of SMOT and LCOT on the lateralization of the center of force (COF) and reduction of the peak pressure in the ankle joint were compared.

Material
A previously published cavovarus model with fixed hindfoot varus was simulated in ten cadaver specimen. Closing wedge supramalleolar valgus osteotomies 3cm above the ankle joint level (6 and 11 degrees) and lateral sliding calcaneal osteotomies (5 and 10 mm displacement) were analyzed at 300 N axial static load (half-body weight). The COF migration and peak pressure decrease in the ankle were recorded using high-resolution TekScan pressure sensors.

Results
A significant lateral COF shift was observed for each osteotomy: 2.1 mm for the 6 degrees (p = 0.014) and 2.3 mm for the 11 degrees SMOT (p = 0.010). The 5 mm LCOT led to a lateral shift of 2.0 mm (p = 0.042) and the 10mm LCOT to a shift of 3.0 mm (p = 0.006). Comparing the different osteotomies themselves no significant differences were recorded.

No significant anteroposterior COF shift was seen.

A significant peak pressure reduction was recorded for each osteotomy: The SMOT led to a reduction of 29% (p = 0.033) for the 6 degrees and 47% (p = 0.003) for the 11 degrees osteotomy, and the LCOT to a reduction of 41% (p = 0.003) for the 5mm and 49% (p = 0.002) for the 10mm osteotomy. Similar to the COF lateralization no significant differences between the osteotomies were seen.

Conclusion:
LCOT and SMOT significantly reduced anteromedial ankle joint contact stresses in this cavovarus model. The unloading effects of both osteotomies were equivalent. More correction did not lead to significantly more lateralization of the COF or more reduction of peak pressure but a trend was seen.
PAPER SESSION 2: RESEARCH

Moderators:
Johnny T.C. Lau, MD (Toronto, Ontario, Canada)
Timothy R. Daniels, MD, FRCSC (Toronto, Ontario, Canada)

Clinical Relevance:
In patients with fixed cavovarus feet both, SMOT and LCOT provide equally good redistribution of elevated ankle joint contact forces. Increasing the amount of displacement does not seem to equally improve the joint pressures. The site of osteotomy can therefore be chosen on the basis of surgeon’s preference, simplicity or local factors in case of more complex reconstructions.