

# Change in gait biomechanics after total ankle replacement and ankle arthrodesis: a systematic review and meta-analysis *by*

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**Objective:** To determine the change in gait biomechanics after total ankle replacement (TAR) and ankle arthrodesis (AA) for osteoarthritis compared to the pre-operative gait status.

**Methods:** Systematic review with meta-analysis of studies investigating changes in gait biomechanics after TAR and AA compared to pre-operative levels. The protocol was registered in the International Prospective register for Systematic Reviews (PROSPERO; registration no. CRD42018110053). Data were pooled at commonly reported times points. Standardized mean differences (SMD) were calculated in meta-analyses for spatiotemporal, kinematic and kinetic parameters.

**Results:** Sixteen studies with a total of 857 patients were included. Moderate evidence showed that all spatio-temporal variables are improved following TAR (walking speed, *SMD*: 1.03; cadence *SMD*: 0.62; step length, *SMD*: 0.78; stance duration, *SMD*: -0.35). In contrast, limited to moderate evidence indicated no improvement in spatio-temporal variables after AA except for walking speed (*SMD*: 0.85). Depending of the type of prosthesis implanted, data pooling indicated no effect ( $\sim 0.61^\circ$ , *SMD*: 0.14)(mobile-bearing TAR) to small effect ( $\sim 2.21^\circ$ , *SMD*: 0.55)(fixed-bearing TAR) in increasing the dorsiflexion ROM of the replaced ankle (Figure 1). Evidence showed after TAR an increase in knee ROM (*SMD*: 0.37) and hip ROM (*SMD*: 0.62). AA group exhibited moderate evidence of improvement in hip ROM (*SMD*: 0.89).

**Conclusions:** Compared to pre-operative levels, TAR seems successful in the management of end-stage ankle osteoarthritis by improving gait mechanics, whether a mobile or fixed-bearing prosthesis was implanted. TAR does preserve, but does not increase the existing

pre-operative ankle ROM. In contrast, improvement in gait mechanics after AA are limited.