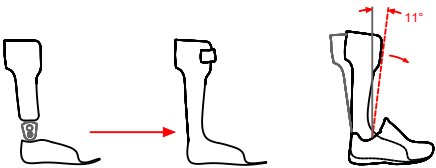


A Proposed Evidence-Based Algorithm for the Adjustment and Optimization of Multi-Function Articulated Ankle-Foot Orthoses in the Clinical Setting

LeCursi N, Janka B, Gao F, Orendurff M, He Y, Kobayashi T

STEP 1 : Bench Adjustment

Align ankle to incline shank. Adjust plantarflexion and dorsiflexion resistance thresholds to maximum (AFO solid with ROM = 0°)



AFO ADJUSTMENT

Adjust PF and DF resistance thresholds to Maximum

AFO ADJUSTMENT

Align ankle joint to incline shank near 11° SVA

STEP 2: Static Alignment

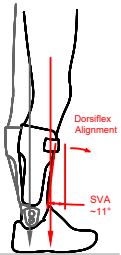
Adjust ankle alignment with AFO solid (ROM = 0°)

Gait Deviation

Shank reclined with knee extended and weight line toward heel

AFO Adjustment

Dorsiflex alignment to incline shank and shift weight line toward mid foot

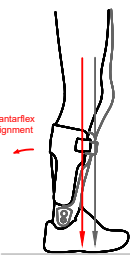


Gait Deviation

Shank inclined with knee flexed and weight line toward forefoot

AFO Adjustment

Plantarflex alignment to recline shank and shift weight line toward mid foot



Quiet Standing

STEP 3: Swing Phase Alignment (Iterate with STEP 2)

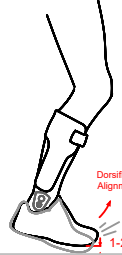
Iteratively adjust ankle alignment with AFO solid (ROM = 0°)

Gait Deviation

Not enough toe clearance in mid swing

AFO Adjustment

Dorsiflex alignment to increase toe clearance

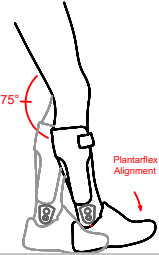


Gait Deviation

Not enough knee extension at terminal swing with or without shortened step length

AFO Adjustment

Plantarflex alignment to increase knee extension and make step length equal left to right

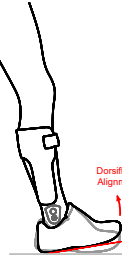


Gait Deviation

Foot to floor angle too low at initial contact

AFO Adjustment

Dorsiflex alignment. Make foot to floor angle symmetrical for left and right foot

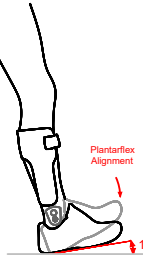


Gait Deviation

Foot to floor angle too high at initial contact

AFO Adjustment

Plantarflex Alignment. Make foot to floor angle symmetrical for left and right foot



Mid Swing

Terminal Swing

Initial Contact

STEP 4: Early Stance Phase Adjustment

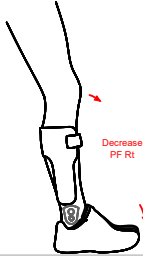
Adjust plantarflexion resistance threshold (Rt). If foot to floor angle at initial contact decreases with decreased PF Rt, then return to the previous Rt setting. If maximum Rt does not correct deviation, increase spring stiffness (K). (DF ROM = 0°)

Gait Deviation

Rapid knee flexion in 1st rocker with limited ankle plantarflexion

AFO Adjustment

Decrease plantarflexion resistance threshold (Rt) to reduce rapid knee flexion in 1st rocker

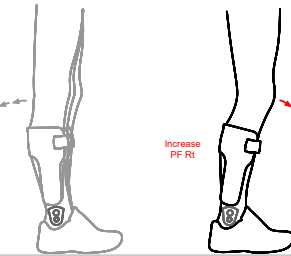


Gait Deviation

Knee hyperextension before mid stance

AFO Adjustment

Increase plantarflexion resistance threshold (Rt) to reduce knee hyperextension before mid stance



1st Rocker

STEP 5: Late Stance Phase Adjustment

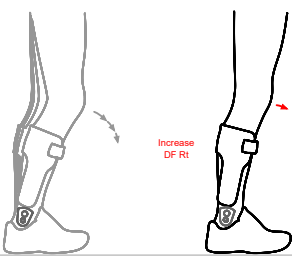
Adjust dorsiflexion resistance threshold (Rt).

Gait Deviation

Excessive knee flexion after mid stance

AFO Adjustment

Increase dorsiflexion resistance threshold (Rt) to reduce knee flexion after mid stance

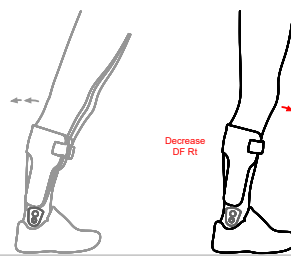


Gait Deviation

Knee hyperextension after midstance

AFO Adjustment

Decrease dorsiflexion resistance threshold (Rt) to reduce knee hyperextension

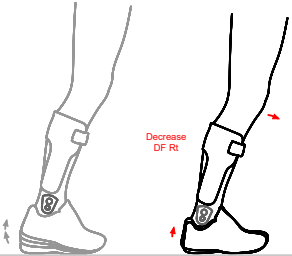


Gait Deviation

Early heel rise with or without knee hyperextension

AFO Adjustment

Decrease dorsiflexion resistance threshold (Rt) to delay heel rise

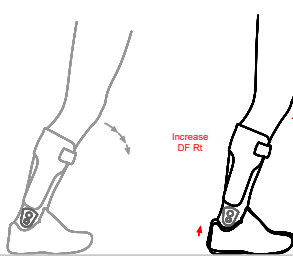


Gait Deviation

Late heel rise with or without knee flexion

AFO Adjustment

Increase dorsiflexion resistance threshold (Rt) accelerate heel rise



2nd Rocker

3rd Rocker