



Lower Extremity Orthoses: A Primer

ABBY AMPIL, PT, DPT



Outline

- Define orthosis
- Common reasons to use an orthosis
- Different types of orthosis
 - Design
 - Rationale and indications
- Review additional considerations



What is an orthosis?¹

- Externally applied device that is designed and fitted to the body to achieve one or more of the following goals:
 - Control biomechanical alignment
 - Correct or accommodate deformity
 - Protect and support an injury
 - Assist rehabilitation
 - Reduce pain
 - Increase mobility
 - Increase independence



Why do YOU care?

- Your kids may have orthoses!
 - Familiarity of language
 - General understanding of rationale
 - Be able to help take them off/on

Get ready for acronyms!!

- UCBL

- University of California Biomechanics Laboratory

- SMO

- Supramalleolar orthosis

- AFO

- Ankle foot orthosis

- KAFO

- Knee ankle foot orthosis

- FRAFO

- Floor reaction ankle foot orthosis



Types of orthoses

- Foot orthosis
- UCBL
- SMO
- Posterior Leaf Spring AFO
- Hinged AFO
- Solid AFO
- Floor Reaction
- KAFO



Reasons to use an orthosis²

- Improves stability during walking by blocking problematic joint motions
- Improve foot clearance (not catching feet on the floor) by assisting joint motions
- Improves efficiency of gait pattern to minimize energy expenditure
- Preventing deformity and secondary orthopedic issues by providing optimal skeletal alignment
- Preventing contracture (muscle shortening) by holding a joint in position where the muscle is lengthened

Foot Orthosis (FO)³



- Indication:
- Arch support in patients who are pronated (flat feet)

UCBL³



- Indications:
 - Arch and heel support
 - Higher level of support than foot orthoses

SMO³



- Can help control pronation (flat feet) AND supination (arches too high)
- Relatively rigid control, but ankle and knee motion still allowed

Posterior Leaf Spring AFO^{2,3}



- Controls foot drop (toe pointing down)
- Allows the ankle to come forward when the foot is on the ground during walking
- Helps push foot off the floor before it swings through

Hinged AFO^{2,3}



- Very versatile design; can add stops or springs to block or assist many different motions at ankle or knee
- Commonly used to prevent walking up on toes, while still allowing the ankle to come forward

Solid AFO^{2,3}



- Locks ankle in a fixed position
- Prevents walking on toes
- Prevents “crouch gait” (hips and knees bent, ankle forward)
- Prevents drop foot
- Prevents hyperextension at knees
- Can be used at rest to prevent calf muscle shortening

Floor Reaction AFO^{2,3}



- Designed to prevent crouch gait (knee buckling)



KAFO^{2,3}



- Commonly used in paralysis or profound weakness
- Locks at knee joint keep it straight when upright, but unlock to allow sitting
- Typically used alongside an assistive device (crutches or walker)
- Can be used at rest to prevent calf and hamstring muscle shortening



Additional considerations³

- Possible issues
 - Overbracing
 - Underbracing
- How long do they wear the brace for?
 - Lifespan of brace
 - Fit issues
 - Day vs. night use

A stylized illustration of a bright yellow sun with a small blue circle in the center, partially obscured by light blue and white clouds. The background is a solid blue color with a subtle pattern of lighter blue squares.

Movie time!

<https://www.youtube.com/watch?v=sPctE4DFpdU>



THANKS!

Questions?

References

- 1. About orthoses and prostheses. (n.d.). Retrieved April 1, 2016, from <https://www.aopa.org.au/careers/what-are-orthoses-and-prostheses>
- Novacheck, T. F., Kroll, G. J., Gent, G., Rozulmalski, A., Beattie, C., & Schwartz, M. H. (2009). Orthoses. In Gage, J.R., Schwartz M.H, Koop S.E., Novacheck, T.F. *The Identification and Treatment of Gait Problems in Cerebral Palsy* (pp. 327-348) (2nd ed.). London: Mac Keith Press.
- 3. Foundations of Pediatric Orthotics. (n.d.). Retrieved April 1, 2016, from <https://pediatricapta.org/includes/fact-sheets/pdfs/Orthotics.pdf>