Ankle dorsiflexion is needed for everyday activities, as well as sport-specific movements, such as walking, running, climbing stairs, squatting, and jumping. Various lower extremity musculoskeletal pathologies have been associated with a lack of dorsiflexion.\(^1\)\(^-\)\(^6\) Thus it is imperative that clinicians understand and are able to accurately assess ankle dorsiflexion. Typically, dorsiflexion range of motion (ROM) is measured with a long arm goniometer; however, the large intrapatient variation, improper alignment of the goniometer, and nonidentification of bony anatomic locations may all increase goniometric measurement error.\(^7\) The use of a fluid-filled bubble inclinometer has been reported to have higher reliability when compared with the long arm goniometer when assessing dorsiflexion ROM.\(^7\)

Dorsiflexion ROM can be performed in nonweight bearing and weight bearing. Assessment of dorsiflexion in the nonweight-bearing or weight-bearing position can be performed with the knee extended, as well as with the knee flexed. Assessment of dorsiflexion in these positions allows clinicians to assess all components of the triceps surae complex.\(^8\) Traditionally, nonweight-bearing measurement techniques have been used to assess dorsiflexion; however, measurement of dorsiflexion in a weight-bearing position may provide clinicians with a better indicator of an athlete’s functional ROM.

In this column, we discuss the use of a fluid-filled bubble inclinometer as a clinical tool to assess dorsiflexion ROM in a weight-bearing position. We will present the benefits and indications of each position, a brief description of how to position the patient for each dorsiflexion ROM measurement, and the reported reliability of the measures.

**MEASUREMENT TECHNIQUES**

When assessing dorsiflexion with the knee extended, the limb that is being assessed is slid back from the wall with the foot perpendicular to the wall. The patient is instructed to slowly lean forward, keeping the measured knee extended and the heel in contact with the ground (Figure 1A). Measurement of dorsiflexion with the knee extended enables clinicians to evaluate the flexibility of the gastrocnemius muscles. Assessment of dorsiflexion in a weight-bearing position with the knee extended is a reliable method, \((ICC_{2,4}) = 0.91-0.97.\)\(^9\)

In the flexed position, the patient is instructed to flex the knee and hip joints, bringing the knee of...
the measured limb over the toes as much as possible (Figure 1B). Measurement of dorsiflexion with the knee flexed removes the influence of the 2 joint gastrocnemius muscles and provides clinicians with valuable information regarding soleus muscle flexibility. Weight-bearing dorsiflexion with the knee flexed has been found to be reliable \((\text{ICC}_{2,3}) = 0.90-0.99\).^{10}

**PRACTICAL TIPS FOR ASSESSMENT**

When performing weight-bearing measurements of dorsiflexion, the angle of interest is the angle between the floor and shank. During weight-bearing assessment, patients should stand on a firm surface, placing their hands on the wall in front of them to help maintain balance.

The fluid-filled inclinometer is secured on the lateral aspect of the shank, just above the lateral malleolus with a hook-and-loop strap.\(^{11}\) The inclinometer should face in the lateral direction, with the zero parallel to the floor (Figure 2).\(^{11}\) It is imperative to instruct patients to keep the heel on the floor and the foot perpendicular to the wall. During the flexed knee measurement, patients should be instructed not to simply do a squat given that the angle of interest is between the floor and the shank.

**CONCLUSION**

Assessment of dorsiflexion ROM in a weight-bearing position should not be performed when bearing weight is contraindicated. If bearing weight is contraindicated, the traditional non-weight-bearing assessments of dorsiflexion should be measured. The methods of assessment described in this column provide clinicians with a valuable clinical tool that can be used to assess a patient’s functional dorsiflexion ROM.

**REFERENCES**


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Figure 2. Bubble inclinometer position during weight-bearing range of motion measurement. The inclinometer is placed on the lateral aspect of shank, with the zero parallel to the floor.