

## **Exploring the effects of limb dominance and injury history on weight-bearing dorsiflexion asymmetry: A Clinical Case Series.**

**Dolan, K.E., Gordon, J.R., Hummel, C., McKeon, P.O.**

### **Background:**

As athletic trainers, it is critically important to select appropriate outcome measures to track the effectiveness of treatment decisions associated with athletic injuries. There is mounting evidence to suggest that deficits in weight-bearing dorsiflexion are associated with increased risk of lower extremity injuries. Bilateral dorsiflexion asymmetries can indicate improper biomechanical loading in the lower extremity during functional activities. These asymmetries may be attributed to previous ankle pathology as well as indicate an increased risk for future re-injury (Hoch & McKeon, 2011). In order to determine whether weight-bearing dorsiflexion is an important outcome measure, it is first necessary to understand the typically occurring asymmetries that exist in our athletes. The purpose of this case series was to establish the normally-occurring weight-bearing dorsiflexion asymmetry in collegiate football players.

### **Methods:**

Sixty-seven Division III collegiate football players, aged 17 to 22, with and without previous ankle injury were evaluated for weight-bearing dorsiflexion asymmetry during off-season spring training. Leg dominance, defined as the preferred kicking leg, and lower extremity injury history were also collected. All athletes were additionally asked to rate their ankles in a percentage ranging from 0% (inability to function) to 100% (perfect ability to function). The Weight Bearing Lunge Test was utilized to capture weight-bearing dorsiflexion range of motion and was measured in increments of 0.5cm. To perform this test, athletes were given the goal of touching the wall with their knee while keeping their heel in contact with the floor. If the athlete was successful in keeping heel and knee in contact with the respective surfaces, the test leg was moved away from the wall. Data was collected at the last measured trial before the heel came off of the ground (Hoch & McKeon, 2011). To evaluate trends in dorsiflexion asymmetry, athletes were stratified into four groups – 1) those with no history of lower extremity injury, 2) those with a bilateral history of injury, 3) those with a history on the dominant leg, and 4) those with history on the non-dominant leg. Asymmetry was defined as the difference between the dominant and non-dominant limbs. A positive asymmetry value indicated more dorsiflexion on the dominant limb whereas a negative value corresponded to greater dorsiflexion on the non-dominant limb.

### **Results:**

Athletes with no previous history of lower extremity injury (37 athletes - 55% of the whole), demonstrated an average dorsiflexion asymmetry of  $0.4 \pm 1.6$  cm. Seven (19%) exhibited no asymmetry, 16 (43%) displayed greater dorsiflexion on the non-dominant limb, and 14 (38%) had greater range of motion on the dominant side. Athletes with bilateral injury history (10 athletes -15%) demonstrated an average asymmetry of  $0.7 \pm 1.7$  cm. Two (20%) had no asymmetry, 3 (30%) had more dorsiflexion in their non-dominant limb, and 4 (40%) presented with greater dorsiflexion in the dominant limb. Athletes with a previous history of injury on the

non-dominant side (11 athletes-17%) had an average dorsiflexion asymmetry of  $0.8 \pm 1.6$  cm. One (9%) presented with no asymmetry, 3 (28%) had increased dorsiflexion on their non-dominant side, and 7 (63%) showed more range of motion on their dominant side. Athletes with dominant sided previous history of injury (9 athletes - 13%) had an asymmetry of  $-0.1 \pm 0.7$  cm. 9 athletes had previous injuries on their dominant side. Three (33%) showed no asymmetry, 3 (33%) had more dorsiflexion in their non-dominant ankle, and 3 (33%) showed more dorsiflexion in their dominant ankle.

### **Conclusions:**

Based on the results of this clinical case series, there is no clinical significance in leg dominance relating to asymmetries that exist in ankle dorsiflexion. The majority of athletes evaluated had no history of lower extremity injury. However, forty-five percent of the athletes did have a history of injury which was equally dispersed among bilateral and unilateral injuries. The typically occurring asymmetry values found within the healthy group were similar in magnitude and variability to the previously injured groups. Based on these findings, it is apparent that previous history of injury and limb dominance do not help to identify those with a potentially pathological dorsiflexion asymmetry. Taking this into account, we can now use the Weight Bearing Lunge Test as an outcome measure to prospectively track the effects of lower extremity injury and rehabilitation on weight-bearing dorsiflexion asymmetry in future athletes.

### **References:**

Hoch, M.C., McKeon, P.O. (2011). Normative range of weight-bearing lunge test performance asymmetries in healthy adults. *Manual Therapy*, 16, 516-519.