Biomechanical Assessment Report

Assessment Data Overview

Range of Motion Assessment

Ankle/Foot Range of Motion

Movement	Left	Right	Gold Standard	Left %	Right %	Asymmetry %
Dorsiflexion Range	90°	83°	**20°**	450.0%	415.0%	7.8%
Plantarflexion Range	91°	85°	**50°**	182.0%	170.0%	6.6%

Knee Range of Motion

Movement	Left	Right	Gold Standard	Left %	Right %	Asymmetry %
Flexion Range	89°	89°	**135°**	65.9%	65.9%	0.0%
Extension Range	98°	98°	**0°**	100%	100%	0.0%

Hip Range of Motion

Movement	Left	Right	Gold Standard	Left %	Right %	Asymmetry %
Flexion Range	101°	102°	**120°**	84.2%	85.0%	1.0%
Extension Range	117°	113°	**30°**	390.0%	376.7%	3.4%
Abduction Range	100°	98°	**45°**	222.2%	217.8%	2.0%
Adduction Range	91°	74°	**25°**	364.0%	296.0%	18.7%
Ext Rotation Range	113°	173°	**45°**	251.1%	384.4%	34.7%
Int Rotation Range	98°	40°	**35°**	280.0%	114.3%	59.2%

Shoulder Range of Motion

Movement	Left	Right	Gold Standard	Left %	Right %	Asymmetry %
Ext Rotation Range	118°	118°	**90°**	131.1%	131.1%	0.0%
Int Rotation Range	67°	87°	**70°**	95.7%	124.3%	23.0%
Flexion Range	96°	100°	**180°**	53.3%	55.6%	4.0%
Extension Range	72°	82°	**60°**	120.0%	136.7%	12.2%

Force Production Assessment

Ankle/Foot Force Production

Movement	Left	Right	Left %	Right %	Asymmetry %
Dorsiflexion Force	69	65	23000.0%	21666.7%	5.8%
Plantarflexion Force	71	64	4733.3%	4266.7%	9.9%

Knee Force Production

Movement	Left	Right	Left %	Right %	Asymmetry %
Flexion Force	43	63	2388.9%	3500.0%	31.7%
Extension Force	67	82	2233.3%	2733.3%	18.3%
Hamstring/Quad Ratio	0.4396039603960396	0.41463414634146345	73.3%	69.1%	5.7%

Hip Force Production

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Movement	Left	Right	Left %	Right %	Asymmetry %
Flexion Force	64	45	4266.7%	3000.0%	29.7%
Extension Force	89	87	3560.0%	3480.0%	2.2%
Abduction Force	71	74	5916.7%	6166.7%	4.1%
Adduction Force	40		5000.0%	6125.0%	18.4%
Ext Rotation Force	79	96	13166.7%	16000.0%	17.7%
Int Rotation Force	85	87	17000.0%	17400.0%	2.3%

Shoulder Force Production

unavailable data

Movement	Left	Right	Left %	Right %	Asymmetry %
Ext Rotation Force	*unavailable data*	*unavailable data*	0%	0%	0%
Int Rotation Force	*unavailable data*		0%	0%	0%
Flexion Force	*unavailable data*	*unavailable data*	0%	0%	0%
I ISO	*unavailable data*	*unavailable data*	0%	0%	0%
Y ISO	*unavailable data*	*unavailable data*	0%	0%	0%
T ISO	*unavailable data*	*unavailable data*	0%	0%	0%

Posture Assessment

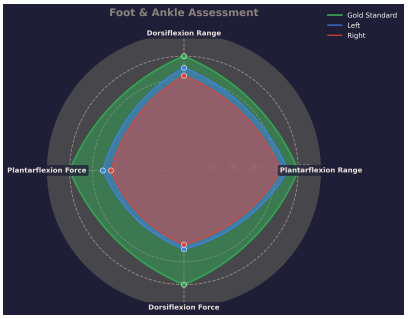
From the postural assessment we found some positive results as well as some areas we could concentrate on for improvement.
Your forward head posture was measured at 3.3cm (normal is deemed 0-3cm). Your thoracic (upper back) curvature was above our gold standard range, you measured 50.0 degrees, normal is considered 30-35. We saw an increased curvature in your lumbar spine, you measured 38.0 degrees with normal being considered 30-35.

These readings indicate you have a sway back posture. So where your forward head posture is slightly increased we could expect increased levels of force and tension being applied to the discs and muscles of your cervical and thoracic spine (neck and upper back). An increased curve in your lumbar spine (lower back) this can be associated with worse force absorption and transference and therefore increased loading through the joints of the spine.

You were able to rotate your spine 39.0 degrees to the left and 38.0 degrees to the right, and could laterally flex (side bend) 38.0 degrees to the left and 31.0 degrees to the right.

The angle of pelvic tilt in quiet standing describes the orientation of the pelvis in the sagittal plane. It is determined by the muscular and ligamentous forces that act between the pelvis and adjacent segments. You were 6.0 (left) and 8.0 (right), normal is 4-7 degrees for males.

Ankle Assessment



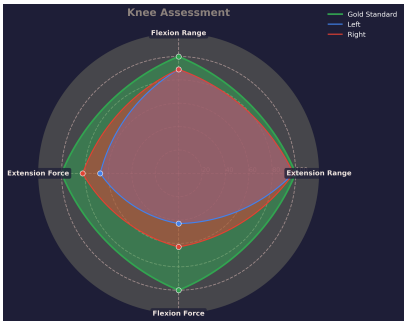
1. The Left foot: Your left rear foot was in a slightly everted position, with the center of mass lateral to the 2nd metatarsal. With your ankle in a state of dorsiflexion (knees over toes), you couldn't evert and dorsiflex further than your resting position, indicating poor pronation capabilities. Your left ankle had good range but poor strength in both dorsiflexion and plantarflexion. You also need to start building some more control and awareness.
2. The Right foot: Your right foot was very similar from a resting position, with the center of mass slightly lateral to the 2nd metatarsal as well. However, you were able to access more pronation capabilities compared to your left foot.
3. Foot and Ankle summary: Asymmetry is present in both range and strength at the ankle joint, specifically dorsiflexion. What was most notable was your inability to effectively articulate the bones of the mid-foot and dorsiflex the ankle, both of which go hand in hand in the gait cycle. There is a lack of movement and control through the fascia on the sole of the foot. Subconscious movement (not controlled gym based movement but more dynamic gait cycle movements) should be introduced along with motion to promote lengthening of the tissues in your foot. In order to generate force or contract, we must first lengthen the tissue through articulation. Specific training recommendations include prioritizing building strength primarily through overcoming isometrics and focusing on midfoot articulation and fascial control.

Knee Assessment

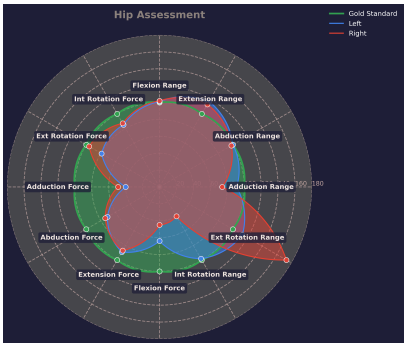
The Left knee achieved sufficient range, 11% below our gold standard in flexion (distal hamstring), and was 2% below our gold standard in extension (distal quadriceps). Your left knee was very weak in both flexion and extension with a poor hamstring to quad ratio.

The Right knee also achieved sufficient range, 11% below our gold standard in flexion and was 2% below our gold standard in extension. The main difference to the left knee comes when we profiled your force as your right knee was 46% stronger in both flexion and extension. While your hamstring to quad ratio is poor at the knee, the total force needs to be brought inline with the left knee.

Knee summary: There is some good range available at the knee but we need to work on your knee flexion strength. We would like to improve force at the left knee through primarily high stability movements and focus on improving the distal hamstring.



Hip Assessment



The Left hip showed great range of motion with only flexion scoring below our gold standard. Force production was lower than expected across all movements, significantly affecting hip joint integrity and movement patterns.

The Right hip showed notable deficits in adduction and internal rotation range of motion, which is important for proper alignment during functional activities. The right hip also had a larger deficit in external rotation compared to the left side, creating asymmetries that affect energy transfer during both closed and open-chain movements.

Hip summary: Significant reduction in hip extension range of motion compromises pelvic stability. Hip extension helps stabilise the pelvis and when range of motion and strength are poor this influences proper alignment of the lower limb. Hip extension strength is essential for propulsion and preventing excessive back extension, leading to inefficient movement patterns and increased injury risk.

Large deficits in external rotation and flexion strength affect functional capacity. External rotation in closed & open-chain movements plays important roles in squatting and deadlifting activities. Having range and strength here is vital for maintaining hip joint integrity and stability. The flexor mechanism also plays a role in force transmission from hip muscles to the lower limb and ultimately to the ground. Optimising external rotation mechanics will allow for more efficient energy transfer during both closed and open-chain movements. It's necessary to reduce the current asymmetry present at the hip, particularly focusing on improving internal rotation range of motion and strength.

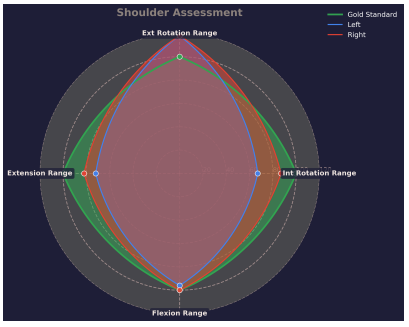
The large inverse relationship in ROM highlights femur positioning changes that may affect optimal movement patterns and joint stability.

Shoulder Assessment

The Left Shoulder had a good range of motion in all movements but notably reduced internal rotation and notable reduction in extension when compared to the gold standard. When we tested force, the left shoulder was equal bilateral in external rotation but significantly weaker in internal rotation.

The Right Shoulder had a slightly greater range of motion in flexion and extension when compared to the left, other than internal rotation which was good but below the gold standard. The right shoulder was stronger in external rotation but weaker in internal rotation when compared to the left.

Shoulder Summary: Your transverse plane range is biased towards external rotation (mirroring the hip). We should work through both shoulder mobilisation drills but equally scapula mobility and strength while increasing sagittal plane mechanics. Increasing your shoulder internal rotational force will help with the tennis elbow. The right scapula has very little range and is not gliding, limiting your shoulders ability to access extension. We recommend loading through range after some soft tissue work and scapula mobility.



Note: *All values are normalized to the patient's body weight and compared to gold-standard ranges. Range measurements are in degrees, force measurements are relative to body weight. "Unavailable data" indicates measurements that could not be obtained during the assessment. Asymmetry percentages: Green (0-10%), Yellow (11-20%), Red (>20%)*