Exercise & Sports Biomechanics
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Week 02
Lecture 10

Muscle Origin, Insertion & Action

[Hello, everyone! Welcome back to this course. In this video, we will cover the muscles in the lower limbs. We will start with the quadriceps].

Quadriceps:

Quad means four, ceps means head, which is a four-headed muscle. The first one is the rectus femoris.

What does rectus mean?

It is a Latin word that refers to straight. Femoris means femur. It originates from the inferior iliac spine on the anterior side and the ilium. Above the acetabulum, and it inserts at the tibial tuberosity.

Let us look into the rectus femoris muscle. It originates from the inferior iliac spine on the anterior side and the ilium, above the acetabulum.

What is the acetabulum?

It is similar to the glenoid cavity, which we saw in the previous lectures on the scapula. Like that, it is a kind of cavity in the hip bone known as the acetabulum.

The rectus femoris originates just above the acetabulum in the ilium. It inserts at the base of the patella and tibial tuberosity of the tibia. When it comes to action, as we discussed before, it moves from insertion to origin, which means there will be hip flexion with the help of the rectus femoris.

[Next, we move on to the vastus lateralis.]

What is meant by vastus lateralis?

It means huge, and the lateralis means it is on the lateral side. It originates from the greater trochanter of the femur and inserts at the tibial tuberosity.

[Next is the vastus intermedius]

Vastus intermedius:

Vastus intermedius is known as the middle muscle. It originates from the anterior and lateral surfaces of the femur and inserts at the tibial tuberosity. The last one in the

quadriceps group is the vastus medialis. Medialis means which is towards the inside or inner side of the muscle.

It originates from the intertrochanteric line and medial lip of the linea aspera and inserts at the tibial tuberosity. If you notice, all the quadriceps muscles insert at the single point known as the tibial tuberosity. We will look into all three muscles, which are the vastus lateralis, vastus intermedius, and vastus medialis.

The first one is the vastus lateralis. It originates from the greater trochanter of the femur. When it comes to the intermedius, it originates from the anterior and lateral surface of the femur. Lastly, the vastus medialis originates from the intertrochanteric line and medial lip of the linea aspera.

All three muscles insert at the base of the patella and tibial tuberosity of the tibia. When it comes to action, if it moves from the insertion to the origin, all three muscles support the movement of knee extension.

[Next, we move on to the Sartorius muscle]

Sartorius muscle:

It means tailor, because it mimics the cross-legged sitting position that tailors traditionally used while sewing. It originates from the anterior superior iliac spine and inserts at the medial to the tibial tuberosity. Let us explore the sartorius muscle.

It originates from the anterior superior iliac spine. In the previous muscle, we have already discussed this, the inferior iliac spine. The sartorius muscle originates from the superior iliac spine and it inserts at the proximal part of the tibia and medial to the tibial tuberosity. When it comes to action, from the insertion to the origin, the sartorius muscle helps in knee flexion movement.

[Next, we move on to the tensor fascia latae].

Tensor fascia latae:

The word tensor means stretch. It is a fascia located on the lateral side of the leg. It originates from the anterior iliac crest and inserts at the lateral condyle of the tibia. Let us understand the muscle a little bit deeper.

The tensor fascia lata originates from the anterior iliac crest and it runs all the way to the tibia. It inserts at the lateral side of the tibia, which is the lateral condyle of the tibia. When it comes to action from the insertion, if it is moved towards the origin, the leg moves outward, which is known as abduction.

[In this image, you can clearly see the movement of abduction, and it also performs the hip flexion movement].

[The next muscle is the gluteus medius]

Gluteus medius:

Gluteus medius means middle. It is in between the maximus and the gluteus minimus. It originates from the surface of the ilium, but it is between the posterior and anterior gluteal lines.

It inserts at the lateral and superior surface of the greater trochanter. Let us explore the gluteus minimus muscle. Let us understand the exact origin and insertion of it. First, you need to understand the surface of the ilium; this is the anterior gluteal line, and this one is the inferior gluteal line. The gluteus medius originates between the anterior and inferior gluteal lines and inserts at the anterior surface of the greater trochanter of the femur. In action, the gluteus medius functions similarly to the gluteus minimus, which is the abduction and internal rotation of the hip.

[The next muscle is the gluteus minimus].

Gluteus minimus:

The term minimus means small. It originates from the surface of the ilium between the anterior and inferior gluteal lines. It inserts at the anterior surface of the greater trochanter. Now, let us understand the gluteus medius muscle. This is the anterior gluteal line, and the above one is the posterior gluteal line. The gluteus medius originates between these two gluteal lines and it inserts at the lateral and superior surface of the greater trochanter. When it comes to action, the gluteus medius supports abduction and internal rotation of the hip.

[The next muscle is the gluteus maximus].

Gluteus maximus:

Gluteus is a Greek word that means buttock. Maximus means large. It originates from the surface of the ilium, which is posterior to the posterior gluteal line, and the posterior inferior surface of the sacrum and the coccyx. It inserts at the gluteal tuberosity of the femur. The last one is the gluteus maximus. [So, from the previous videos, we know this is the inferior line, anterior line, and this is the posterior line].

The gluteus maximus originates from the posterior to the posterior gluteal line, the inferior surface of the sacrum and coccyx, and it inserts at the gluteal tuberosity of the femur. When it comes to action, the gluteus maximus supports hip extension movement, abduction of the hip, and lateral rotation of the hip.

[The next muscle is the biceps femoris]

Biceps femoris:

The biceps femoris is the part of the hamstring. So, everybody knows bi means two, cep means head, and femoris means femur.

The biceps femoris is a two-headed muscle, which has a long head and a short head. The long head originates from the ischial tuberosity, and the short head originates from the linea aspera of the femur. It inserts at the head of the fibula and the lateral condyle of the tibia. Let us go into a little bit of depth regarding the origin.

In the pelvis, this is the ischial tuberosity where the biceps femoris originates. There is a line in the femur, which is the linea aspera of the femur. It inserts at the head of the fibula. [So, you can see the two bones. This is the tibia, and the lateral part is the fibula]. The biceps femoris inserts at the head of the fibula and the lateral condyle of the tibia.

[The next muscle is the semimembranosus].

Semimembranosus:

Semi means half, and membranous refers to a flat tendon, which originates from the ischial tuberosity and is inserted at the posterior medial condyle of the tibia. This is the ischial tuberosity where the muscle originates, and it inserts in the posterior and medial Condyle of the tibia.

[The last one in the hamstring group is the semitendinosus].

Semitendinosus:

Semi means half, and tendinosus means a long tendon, which originates from the ischial tuberosity and inserts at the proximal tibia. Medial to the tibial tuberosity, which is on the anterior side.

So, you know the ischial tuberosity, where it is common, and it inserts at the proximal part of the tibia. [So, this is the tibia, and this is the proximal part. Medial to the tibial tuberosity. So, the tibial tuberosity is on the anterior side, and it inserts on the medial side of the tibia]. When it comes to action, from the insertion to the origin, all three muscles—biceps femoris, semimembranosus, and semitendinosus—all three muscles support the knee flexion movement.

[The last muscle is the gastrocnemius].

Gastrocnemius:

If we divide the word gastrocnemius, gastro means stomach, which is derived from the Greek word. Nemius means leg, which means stomach of the leg. Since it refers to the bulging appearance of the calf muscle, it is known as gastrocnemius.

The medial head originates from the medial condyle of the femur, and the lateral head originates from the lateral condyle of the femur. Both muscles insert at the calcaneus bone. When it comes to action, the calf muscle supports knee flexion and plantar flexion of the ankle.

[The next one is the soleus],

Soleus:

It is a part of the calf muscle. It originates from the proximal half of the posterior surface of the tibia and the proximal one-third of the posterior fibula. It also inserts at the calcaneus bone. When it comes to action, from the insertion to the origin, the soleus muscle supports the plantar flexion of the foot. Let us explore the calf muscle. It has two heads.

The first one is the medial head, originating from the medial condyle of the femur, and the lateral head originates from the lateral condyle of the femur. When it comes to the soleus, it originates from the proximal part of the tibia from the posterior side along the soleal line. It also originates from the proximal one-third of the posterior fibula. Both muscles insert at the calcaneus bone.

[So, thank you. And see you in the next video.]