Learning objectives

Description of the normal muscle-tendon anatomy and tendinous insertions, as well as the study of the location and severity of the muscle strain and tendon pathology (tear, avulsion and tendinitis) using magnetic resonance imaging (MRI).

Background

First of all we will discuss the general types of muscle injuries and their complications, and secondly we will focus on the anatomy showing examples of the most frequent tears in the different muscle groups of the upper and lower limbs.

Imaging findings OR Procedure details

The muscle fiber is the basic structural element of striated muscle and it is connected to the tendon or to the bone, on which it acts. The site of connection between muscle fibers and tendon is called myotendinous junction.

There are two types of muscle fibers:

- Type I or slow twitch: more suitable for repetitive contraction since they are more resistant to the fatigue
- Type II or fast twitch: more suitable for quick movements and more adapted to an intense activity of short duration. These muscle fibers predominate in muscles that cross two joints. The muscles that have a higher proportion of fibers II are more likely to be injured.

Muscle contraction might be isotonic (with change of fiber length) or isometric (without change of length). At the same time, the isotonic contraction is divided in concentric action (where the fibers are shortened) or eccentric, where the fibers are stretched.

Muscle injuries are classified into two types:

1) DIRECT MUSCLE INJURY
- **Muscle contusion**: it is due to a direct trauma of the muscle against a hard surface and the bone; they are common in contact sports. Magnetic Resonance (MR) shows increased muscle volume with interstitial edema but without interruption of the fibers.

Morel-Lavallée lesion can occur secondarily to a direct trauma. It is produced as consequence of a tangential trauma to a bone plane with separation of the deep subcutaneous tissue and the underlying muscle fascia producing suprafascial fluid collection especially at the level of greater trochanter and the knee.

![Morel-Lavallée lesion](image)

**Morel-Lavallée lesion**: subcutaneous collection superficial to the left tensor fasciae latae is shown in coronal STIR (a), coronal T1W SE (b) and axial T2W SE (c) images.

**Fig. 1**

**References**: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES
Morel-Lavallée lesion on the medial side of the knee after a motorcycle accident: fluid collection with fatty lobes trapped inside is shown on axial T1W SE (a) and coronal STIR (b) images.

Fig. 2

References: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES

- Muscle laceration: it results from penetrating injuries and it is seen more frequently in polytraumatized patients. It is uncommon in sports injuries.

2) INDIRECT MUSCLE INJURY

Indirect muscle injuries occur predominantly in bi-articular muscles, in eccentric action, with a high proportion of type II fibers and usually close to the muscle-tendon junction (rectus femoris, hamstrings and gastrocnemius).

2.1. Elongation injuries:

They result from an intrinsic strength generated by a sudden muscle contraction. The most elementary lesion is edema, representing a focus of distension without fibrilar strain ("contracture"). The weakest portion in the myotendinous junction depends on the
person’s age. In children the weak area is physeal plate, so an apophyseal fracture-avulsion usually occurs. In young adults the weak zone is the myotendinous junction and in older adults with tendinosis, it often produces degenerated tendon tear.

Elongation injuries are classified into:

- **Strain (grade I):** it occurs when there is an excessive stretching of the muscle fibers, beyond its elastic capability, although without causing rupture. There is no architectural distortion of the muscle. The myotendinous junction is generally normal and pathologically these lesions are microscopic, affecting to less than 5% of the muscle fibers. Patient complains of acute pain, which subsides with rest and increases with movements.

  In MRI they appear as hyperintense areas in fluid-sensitive sequences representing fluid and bleeding. We can see perifascial liquid that appears hyperintense on T2-weighted (T2W) sequences.

- **Partial tear (grade II)** is a more extensive injury where the muscle lengthens beyond the limit of its elasticity, compromising > 5% of the muscle thickness.

  MRI shows thinning or irregularity of the myotendinous junction, with edema or hemorrhage that follows the fascial plane (increased signal on T2W sequences). The hematoma is pathognomonic for this type of injury. When the muscle has a long tendon that extends into the muscle belly (e.g. rectus femoris), the myotendinous injury will occur, therefore, inside the own muscle belly.

  Type II tear also includes partial detachment of the adjacent fascia or the aponeurosis. For instance the medial gastrocnemius separated from the common aponeurosis with the soleus muscle (“tennis leg”).

  In MR there is hyperintensity in acute phase due to edema and bleeding. There may also be perimuscular and fascial fluid.

  The hematoma at the myotendinous junction is characteristic of type II lesions and its appearance varies depending on evolution time and the severity of the rupture:

  * Acute phase (first 48 h): it is isointense relative to muscle on T1W sequence and hyperintense on fat suppression T2W sequence.

  * Subacute stage: hemoglobin is transformed into methaemoglobin with increased signal on T1W sequences.
* Chronic phase: it shows hipointensity on T1 and T2 sequences by the presence of hemosiderin or fibrosis. In gradient echo sequences, the hemosiderin has magnetic susceptibility artifact with intense hipointensity.

Fig. 3

References: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES

- Complete tear (grade III): it affects the entire thickness of the muscle, with muscular discontinuity at the myotendinous junction and with retracted tendon and interposition of a hematoma. The presence of bruising is more common than in the partial tear and a palpable defect may exist in the physical examination, as a "hack".

The functional incapability is instantaneous and lasting, preventing any further exercise.

Hematoma: it is the hallmark of the muscle rupture secondary to direct contusion or related to myotendinous injury. MR shows its size and location. It determines whether the tear is intramuscular or intermuscular, depending on the integrity of the fascia (in the former the fascia is torn while in the latter is intact).
Fig. 4

References: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES
Axial fat-suppressed T1W SE (a) and axial T2W SE (b) MR images showing a *intermuscular hematoma* (→) between the medial head of the gastrocnemius muscle and the soleus muscle due to a tear in the plantaris tendon of the right calf.

**Fig. 5**

*References:* UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES
Fig. 6

**References:** UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES

Axial STIR (a) and axial T1W SE (b) showing a subfascial hematoma in the medial gastrocnemius of right leg (↓). The mass effect and the deformity of the muscle belly can be appreciated.
2.2. Delayed onset muscular soreness (DOMS)

It consists in muscle pain beginning hours or days after a strenuous or unaccustomed exercise that lasts 5-7 days and is self-limited. In RM it manifests as a low grade muscle injury with hiperintensity on T2W sequence.

2.3. Compartment syndrome:

It can be acute or chronic. It is caused by increased pressure in an inelastic anatomic space that damages its content, which reduces venous flow further increasing the interstitial pressure.

MR findings include swelling of the affected limb and alteration in the compartment muscle signal. Advanced stages could reach myonecrosis.
COMPLICATIONS OF THE MUSCLE INJURIES:

- **Fibrosis / Scar**: it is the result of the healing of a partial or complete tear.

In MRI, it appears as a hypointense image on T1W SE and T2W SE sequences, retractable, associated with decreased volume and signs of muscle atrophy in the surrounding areas of the scar. Muscle scar is not elastic, so contractile function and mobility of the muscle will be limited, predisposing to new injuries.
Fibrosis in the fascia separating the medial gastrocnemius and the soleus muscles of the left calf, secondary to a remote partial myofascial tear is shown on axial (a) and coronal (b) T1W SE images.

Fig. 9

References: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES

- **Myositis ossificans / heterotopic ossification**: muscle contusions with intramuscular hematoma may calcify and ossify.

The most common locations are the thigh and the pelvis.

In MRI, its appearance is variable and nonspecific.

In acute - subacute stage appears as a poorly defined lesion with unstructured muscle fibrillar pattern. It is isointense with the muscle on T1W sequences and heterogeneous on T2W sequences. Often there is an extensive area of perilesional edema and at this stage that can be difficult to differentiate from a soft tissue neoplasm.

More mature lesions are better defined, with the presence of early ossifications in the periphery of the lesion, without continuity with the adjacent bone, and having fat signal on T1 and T2 sequences, with little or no edema.
**Ossificans myositis**: calcifications can be seen in the root of the right thigh on coronal T1W SE (a) and coronal T2*(b) images and its correlation with plain radiography (c) and CT (d).

**Fig. 10**

**References**: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES

- **Muscle herniation**: it consists on a focal muscle herniation through a defect in the fascia that surrounds it. It occurs most frequently in the lower extremities, especially in the anterior compartment of the leg.

The diagnosis is made by ultrasound or dynamic MRI, while the patient contracts the affected muscle.
**Muscle herniation** because of a defect in the superficial fascia of the vastus lateralis is shown on axial T1W SE (a) and STIR (b) images.

**Fig. 11**

*References:* UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES

- **Muscular atrophy:** decrease in the size of the muscle belly and fatty infiltration visible on T1-weighted sequences as hyperintense areas.
Most of muscle injuries occur in the **LOWER LIMBS**, the muscles being affected more frequently the hamstrings, quadriceps, adductors, medial gastrocnemius, soleus, plantaris and popliteus muscles.

**a) HAMSTRINGS:**

They are formed by the biceps femoris, semimembranosus and semitendinosus muscles.

**Anatomy:**

The *biceps femoris* has a short head and a long one. The long head arises from the medial margin of the ischial tuberosity with a common tendon attachment with the semitendinosus through so-called conjoined tendon. Distally it is inserted into the head of the fibula.

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**Fig. 12**

**References:** UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES

Muscle atrophy with fat infiltration in the cranial portion of the right gluteus maximus muscle (*a* and *b*) and the right gluteus minimus (*c* and *d*) are shown on coronal and axial T1W SE images.
The short head is not biarticular but has a proximal insertion on the lateral margin of the linea aspera below the gluteal tuberosity and is distally inserted into the head of the fibula.

The *semitendinosus* is a biarticular muscle with proximal common origin in the conjoined tendon with the long head of the biceps femoris. Its distal tendon inserts into the proximal medial tibia posterior to the sartorius muscle.

The *semimembranosus* presents a proximal insertion on the ischial tuberosity anterior to the conjoined tendon. The distal insertion is in posteromedial side of the tibial plateau using tendon expansions (oblique popliteal ligament insertion, posterior oblique ligament expansion and popliteal fascia expansion).

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1. Anterior: semimembranosus tendon insertion on the ischial tuberosity
2. Posterior: conjoined tendon of the biceps femoris and semitendinosus

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**Fig. 13**

**References:** UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES
**Fig. 14**

**References:** UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES

1. Conjoined tendon of the biceps femoris and semitendinosus
2. Adductor magnus tendon
Fig. 15

References: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES

b) QUADRICEPS:

Anatomy:

It is composed by rectus femoris and vastus intermedius, lateralis and medialis muscles.
Rectus femoris: proximally its direct head inserts into the anterior inferior iliac spine and its indirect or reflected head emerges above the superior acetabular rim and hip joint capsule. Both heads form a conjoined tendon a few centimeters below their origins. The direct portion forms the most superficial part of the conjoined tendon while indirect portion forms the majority of the posterior component of conjoined tendon which becomes intramuscular along 2/3 of the length of the muscle.

Within the quadriceps, the rectus femoris is the most susceptible to injury at the myotendinous junction because of its superficial location, predominance of type II fibers, and eccentric muscle action and extension between two joints.

Vastus lateralis: the proximal attachments are numerous and include the intertrochanteric line, lateral gluteal tuberosity, lateral margin of the linea aspera and lateral intermuscular septum. Distally it inserts on the lateral border of the patella and patellar tendon.

**Fig. 16**

**References:** UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES
**Vastus intermedius:** its proximal insertion is into the upper 2/3 of the anterior lateral femoral surface and distally it inserts on the superior aspect of the patella and patellar tendon.

**Vastus medialis:** it originates in the whole extension of the linea aspera and medial intermuscular septum and distally inserts in the superior and medial patellar margin and the patellar tendon.

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**Fig. 17**

**References:** UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES

Fibrosis affecting the tendon of the indirect head of the rectus femoris due to an extensive and evolved tear showing thickening and hypointensity of the tendon both on axial T1W SE (a and b) and coronal STIR (c) images.
The quadriceps tendon presents a multilayered structure, generally trilaminar, where the anterior surface represents the rectus femoris, the deep layer corresponds to the vastus intermedius and the vastus lateralis and medialis contribute to the intermediate layer in variable proportion.

Fatty transformation affecting the myotendinous junction of right rectus femoris secondary to evolved partial tears is shown on axial T1W SE (a) and T2W SE (b) images.
Normal quadriceps tendon showing its characteristic trilaminar structure: the superficial layer corresponding to the rectus femoris, the intermediate layer to the vastus lateralis and medialis and the deeper layer corresponding to the vastus intermedius, visualized on sagittal T2W SE (a) and fat-suppressed PDW (b) images.

Fig. 19

References: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES
Complete rupture with desinsertion of the quadriceps tendon at its insertion in the patella is shown on sagittal STIR image.

**Fig. 20**

*References:* UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES
The patellar tendon is mainly composed of fibers of the rectus femoris which are continuous over the front of the patella. Patellar tendinopathy is frequent.
Normal patellar tendon is shown on sagittal fat-suppressed PDW image.

**Fig. 22**

**References:** UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES
Patellar tendinitis with thickening and hyperintensity on the proximal and lateral aspect of patellar tendon, bone edema and adjacent soft tissue edema are shown on sagittal (a) and axial STIR (b) images.

Fig. 23

References: UNIDAD DE RESONANCIA, GALARIA. COMPLEJO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES

c) ADDUCTORS:

Anatomy: it includes superficial muscle structures (pectineus, gracilis and adductor longus), intermediate (adductor brevis) and deep structures (adductor magnus).
Adductor muscles:
1.- Adductor longus
2.- Adductor brevis
3.- Adductor magnus
4.- Gracilis

Fig. 24

References: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES

The adductor magnus has an anterior head (arising from the ischial ramus and inserted in the linea aspera) and a posterior head (arising from the anteroinferior ischiatic tuberosity and inserted in the adductor tubercle of the distal femur).

The adductor brevis arises from the anterior margin of the inferior pubic ramus and inserts distally in the proximal third of the linea aspera.
The adductor longus arises from the medial portion of the horizontal pubic ramus and it inserts distally in the middle third of the linea aspera.

Gracilis arises from the symphysis pubis and inferior ramus of the pubis and inserts into the tibia with pes anserinus tendon.

d) GASTROCNEMIUS:

The medial and lateral heads of the gastrocnemius muscle arise from the posterior margin of the distal femur, just above the ipsilateral femoral condile. Distally the heads form a flat aponeurosis and join the soleus aponeurosis forming the Achilles tendon. The medial head of the gastrocnemius is injured more frequently than the lateral one.
Lesions affecting the medial head, in the proximal and medial portion of the calf, might occur as an isolated injury or in combination with tear of the soleus and plantaris muscles. These lesions are called “tennis leg”. MR findings include edematous changes in the myotendinous junction, intramuscular hematoma, perifascial fluid collections and complete tear with tendon retraction.
Tennis leg: extensive edema of the medial gastrocnemius muscle (红星) with a fluid fascial collection (白线) between the gastrocnemius and the soleus muscles secondary to myofascial tear. The hematic collection (红箭头) between the medial gastrocnemius and the soleus muscles is due to a plantaris tear. Axial fat-suppressed PDW (a and b) and coronal T1W SE (c).

Fig. 28
References: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES
A hemorrhagic fluid collection between the soleus and the medial gastrocnemius muscles can be appreciated in the right calf associated with a laminar fluid collection in the deep aspect of the subcutaneous adipose tissue. The plantaris tendon is intact (_experience). Axial STIR (a), axial T1W SE (b) and coronal T1W SE (c) images.

Fig. 29

References: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES
Hematic fluid collection between the medial gastrocnemius and the soleus muscles because of a tear of the plantaris muscle in the right calf is shown on axial fat-suppressed T1W SE image.

**Fig. 30**

*References:* UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES

The lesions of the medial gastrocnemius may also happen at the knee level. In patients with posterior instability, these lesions might happen isolated or associated to semimembranosus tendon tears.
Lesions of the lateral gastrocnemius muscle might be associated to lesions of the posterolateral complex of the knee and frequently associate to popliteus tendon, biceps tendon and plantaris tears.

Fig. 31

References: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES

Traumatic grade II tear of the semimembranous tendon at its insertion is shown on consecutive axial STIR images.
Fig. 32

References: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES

Traumatic complete rupture of the biceps femoris tendon (→) in a patient with posterolateral corner injury of the knee is shown on fat-suppressed PDW (b) image and compared to a normal biceps tendon (a).
Edema in the left biceps femoris muscle secondary to traumatic fibrilar tear is shown on axial STIR (a) and T2W SE (b) images.

**Fig. 33**

*References:* UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES
e) SOLEUS MUSCLE:

The soleus muscle arises from the posterior aspect of the proximal tibia and fibula and locates deep to the gastrocnemius muscle. Soleus and gastrocnemius muscles gradually join to form the Achilles tendon, 8 to 10 cm above its distal insertion in the calcaneus.

We show examples of gastrocnemius-soleus complex injury and Achilles tendon pathology (tendinosis and tendon tear).
Myotendinous junction of the right soleus lesion with hyperintensity is shown on axial STIR (a) and T2W SE (b) images with mild edema in the deep aspect of the soleus muscle.

Fig. 35

References: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES
Gastrocnemius-soleus complex tear with edema of the left soleus muscle (/umd) and an hemorrhagic collection with an elongated morphology interposed between the medial gastrocnemius and the soleus muscles (/umd), secondary to partial tear of the intermuscularis fascia, shown on axial STIR (a), axial T1W SE (b) and coronal STIR (c) images.

Fig. 36
References: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES
Fig. 37

References: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES

Acute insertional Achilles tendinosis is shown on sagittal STIR image with hyperintense retrocalcaneal bursa.
Chronic Achilles tendinosis with focal tendon enlargement and anterior tendon convexity is shown on sagittal T1W SE (a) and sagittal STIR (b) images.

Fig. 38
References: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES
f) PLANTARIS MUSCLE:

It arises cranial to the lateral femoral condile, just above the lateral head of the gastrocnemius. It has a long and thin tendon that goes down the calf, in between the medial gastrocnemius and the soleus. It inserts in the calcaneus, anteromedially to the Achilles tendon or directly in the tendon itself.
Fig. 40

References: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES
Normal plantaris tendon at the level of distal tibio-fibular joint and talar dome, directing to its insertion in the Achilles tendon, shown on axial T1W SE images.

Fig. 41

References: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES

According to the grade of the lesion, MR findings include: pathologic increase of the signal in the T2 weighted sequences affecting the injured muscle or the myotendinous junction; myotendinous junction complete tear with proximal retraction of the muscle with mass effect between the lateral gastrocnemius and the popliteus tendon; lesion associated with partial tear of the proximal insertion of the lateral gastrocnemius; fluid collection between the medial gastrocnemius and the soleus muscles (figure 5) associated to ACL and arcuatus complex tear; and bone contusion in the lateral compartment.

g) POPLITEUS MUSCLE:

The popliteus muscle is the main stabilizer of the posterolateral quadrant of the knee and its tear is frequently associated to lesions of soft tissues and bone such as ACL and PCL, medial and lateral menisci and tear of the arcuatus-fibular lateral complex.
It might be avulsions of its femoral insertion, but the most frequent lesions affect the muscle belly and the myotendinous junction, showing an increase in signal in the T2W sequences. MRI allows the differentiation between partial interstitial tear and full-thickness tear, as the latter has fiber retraction.

Fig. 42

References: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES

UPPER LIMBS:

The traumatic pathology is less frequent. We show examples of traumatic tendinous tears of the pectoralis major muscle, rotator cuff, distal biceps and triceps.

Pectoralis major:

It arises from three origins: the clavicular head, from the anterior surface of the medial two thirds of the clavicle; the sternal head, from the anterior surface of the manubrium
and the sterna body and a small abdominal head, arising from the aponeurosis of the external oblique muscle of the abdomen.

Its distal insertion is at the humerus.

Fig. 43

References: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES

Triceps brachii:

The triceps brachii is composed of three heads (medial head, lateral head and long head).

The long head arises from the infraglenoid tubercle of the scapula; the lateral head arises from the superior third of the dorsal surface of the humerus and the medial head arises from the distal two thirds of the dorsal surface of the humerus.

The three heads join together forming a common tendon, broad and flat, that inserts into the superior surface of the olecranon process.
Fig. 44

References: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES

Biceps brachii:

The biceps brachii is a two-headed muscle (short and long heads) that join together and distally form a single tendon that inserts into the bicipital tuberosity of the radius.
Supraspinatus:

It arises from the internal two third of the supraspinous fossa running laterally and caudally to insert though a single tendon into the superior aspect of the greater tubercle of the humerus.

Complete rupture of the distal biceps brachii tendon with tendinous retraction is shown on consecutive axial T2W SE images (a, b and c) and coronal STIR (d) image with visualization of the tendinous stump (→).

Fig. 45

References: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES
Acute full-thickness tear of the supraspinatus tendon with edema in its muscular belly. Coronal fat-suppressed T2W SE (a) and sagital T2W SE (b) images.

Fig. 46

References: UNIDAD DE RESONANCIA, GALARIA. COMPLEXO HOSPITALARIO UNIVERSITARIO DE VIGO. - Vigo/ES

Images for this section:
Acute insertional Achilles tendinosis is shown on sagittal STIR image with hyperintense retrocalcaneal bursa.

Fig. 37
Chronic Achilles tendinosis with focal tendon enlargement and anterior tendon convexity is shown on sagittal T1W SE (a) and sagittal STIR (b) images.

Fig. 38
Type 3 Achilles tendon rupture with tendinous gap (→) and retraction is shown on sagittal fat-suppressed PDW (a) and sagittal T1W SE (b) images.
Conclusion

Muscular and tendinous lesions are frequent in sports injuries.

MRI is the image modality of choice as it offers the best resolution, high reproducibility, excellent anatomical details and soft tissue contrast. It allows to evidence though the images the muscular and tendinous lesion’s location, extent and degree, as well as the associated bone and ligamentous lesions and the lesion’s follow-up imaging after the treatment.

References


Personal Information