

## Anna Tripi, physiotherapist, studies the management of three clinical cases with Cryo Sound technology in order to evaluate restitutio and recovery with this technology combined with functional exercise

### Introduction

Let's analyze the three patients treated with the related clinical cases:

- Patient A: Male, age 56. Trauma from fall.

Performed on 11/09/23 MRI of the right knee which revealed a lesion of the medial component (vastus medialis) of the tendon of the quadriceps femoris.

The muscle ultrasound performed on 09/18/23 outlines the severity of the injury with “rupture of the quadriceps tendon at the muscle-tendon insertion with detachment of the patella tendon extending for 5.5 cm: modest amount of supra-patellar effusion”. (Figure 1-2)

- Patient B: Female, age 64. Affected by osteoarthritis of the left knee.

MRI performed on 04/18/23 with “fair endoarticular effusion with fluid distention of the recess of the gastrocnemius-semimembranosus” (popliteal hollow cyst of the DM of approximately 5.9 cm). (Figure 3)

- Patient C: Male, age 62. Left biceps brachii muscle trauma.

Performed on 09/19/23 Muscle ultrasound showing injury and hematoma (see attachment). (Figure 4)

A therapeutic plan with Cryo Sound of 6 sessions (3-4 times a week) with 20 minute application combined with the relevant specific therapeutic exercise was implemented for each patient in order to evaluate:

- Pain reduction (Vas);
- Recovery of joint range of motion (ROMp);
- Active recruiting ability.

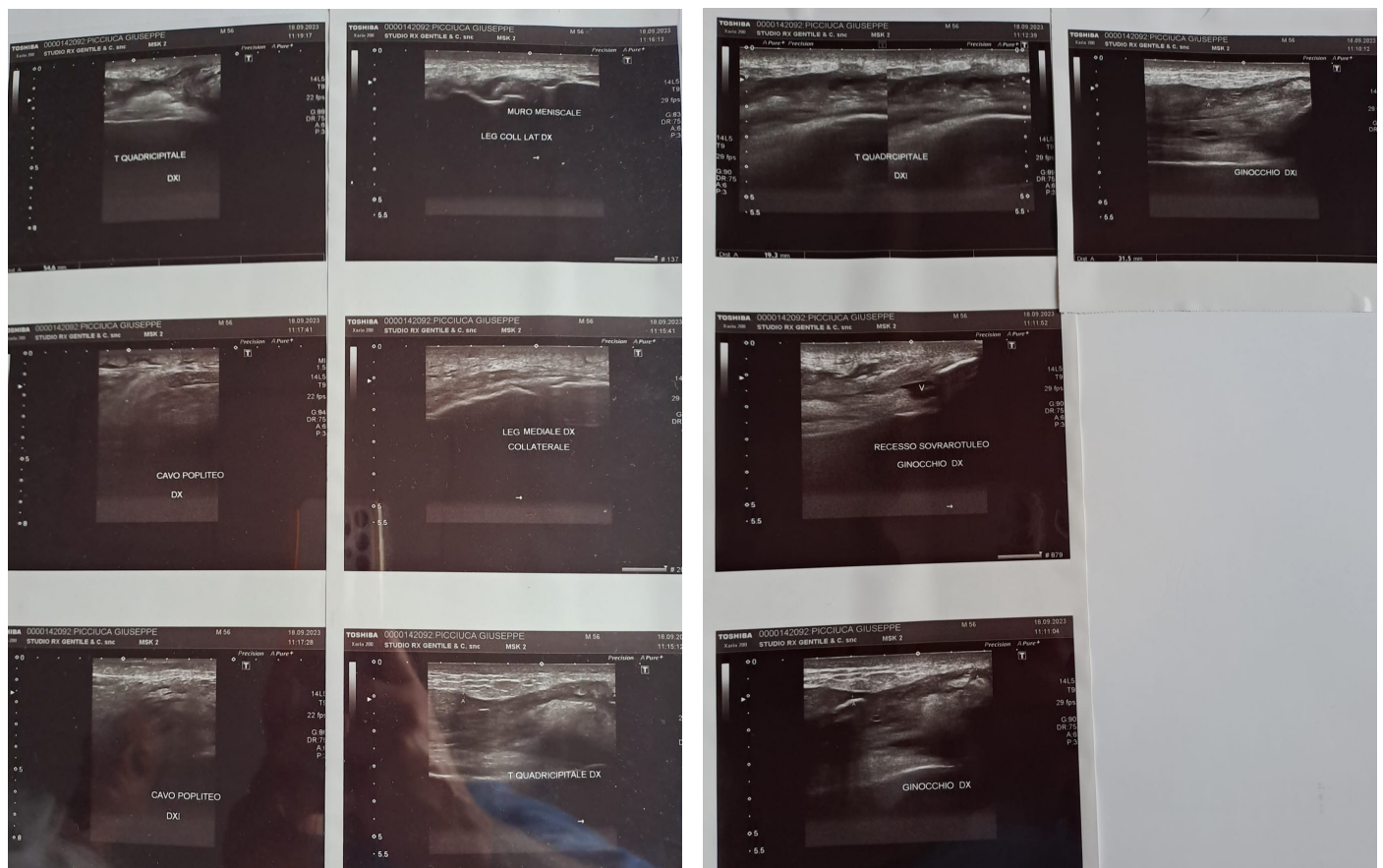
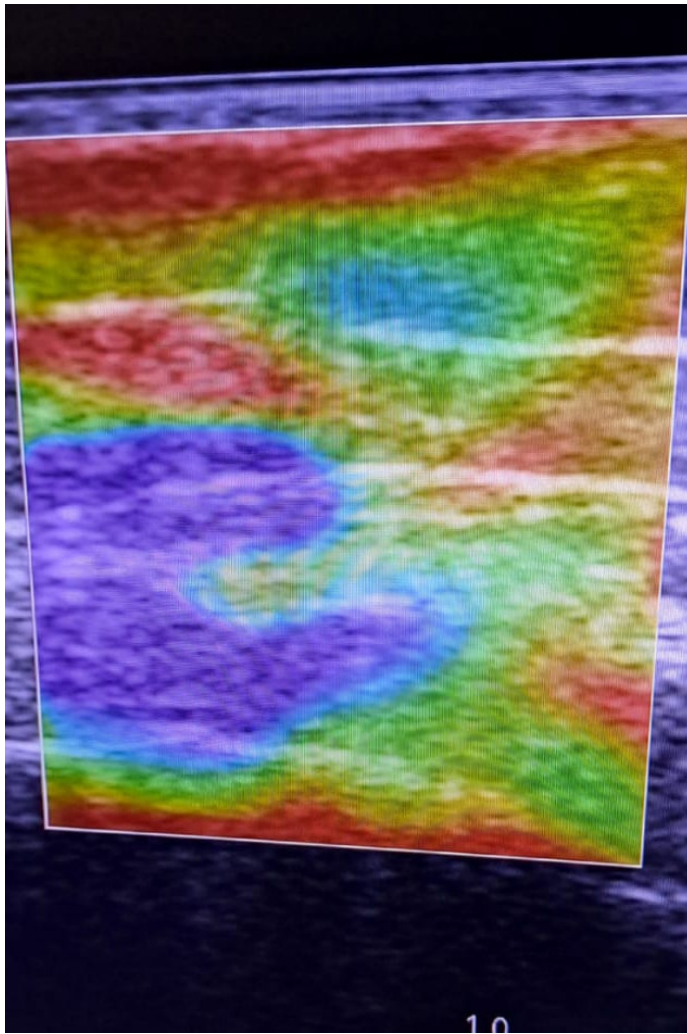
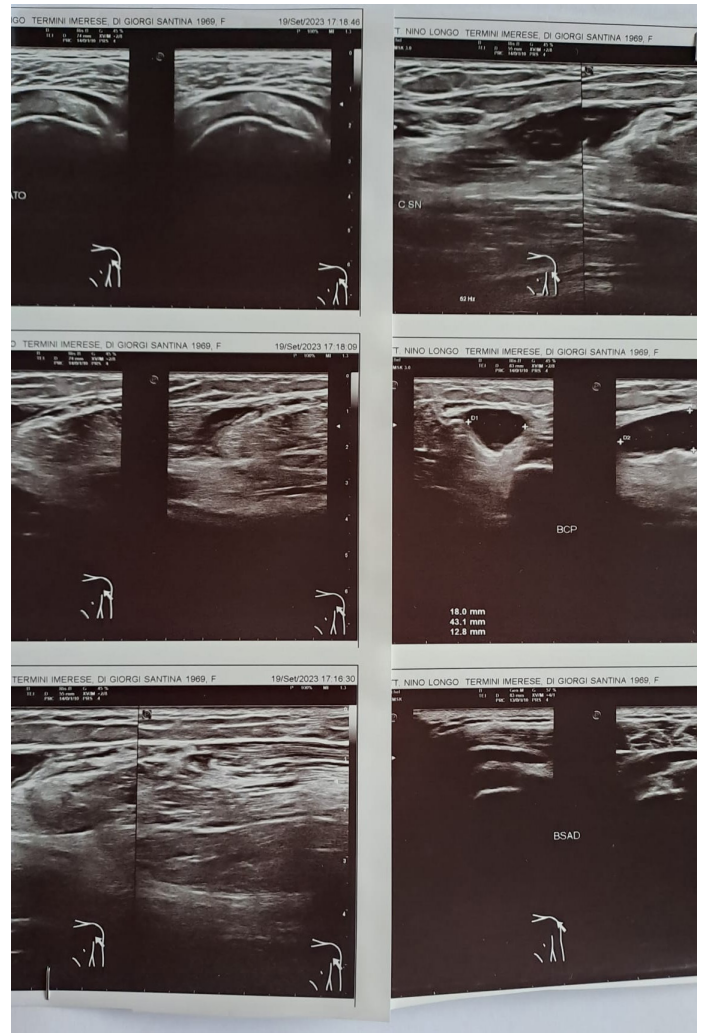


Figure 1-2: Patient A



**Figure 3: Patient B**  
**Patient A**



**Figure 4: Patient C**

### MUSCLE ULTRASOUND OF THE RIGHT KNEE REPORT dated 09/18/2023:

Rupture of the quadriceps tendon at the muscle-tendon insertion with detachment of the tendon from the patella, extending for approximately 5.5; the muscle fibers of the proximal stump appear raised and bundled with evident diastases and liquid collection in the same site, as well as a further small amount of liquid in the synovial sheath, in the distal site.

The finding is compatible with an almost certainly total rupture (the patient has undergone a further MRI examination which does not describe the details of the lesion) and is worthy of orthopedic surgical consultation, even if in relation to the neurological pathology it is necessary to evaluate possible conservative treatment.

- Moderate effusion layer in the suprapatellar recess.
- The patellar tendon is normal.
- Collateral ligaments are regular.
- Protrusion and hyperechogenicity of the lateral meniscal wall compatible with meniscosis; minimal protrusion of the medial meniscal.
- Absence of Baker's cyst in the popliteal cavity.
- Finding compatible with gonarthrosis.

The patient reports that he was injured on 08/29/2023 following an accidental fall caused by weakness of the left lower limb following post-traumatic hemiparesis, the patient did an echo and MRI of his right knee.

Eol: the patient walks independently with the help of a crutch, moderately altered gait pattern (result of hemorrhagic stroke).

The clinostatism is noted: right knee normally extended, patellar rolling +/-, active flexion 120°; active knee elevation possible starting from a sitting position; upon palpation, no areas of minus can be noticed in the suprapatellar area which may refer to interruption of the quadriceps tendon.



There is currently no surgical indication. It is prescribed: to insist on the rehabilitation protocol that's already been successful, paying particular attention to the control of the residual inflammatory process and the optimal recovery of ROM muscle tone.



**Figure 5:** Patient A treated with Cryosound

### **Patient B**

#### **MRI KNEE AND LEFT LEG**

#### **REPORT:**

The MRI examination of the left knee, performed using sagittal T1W and STIR, axial DE and coronal STIR scan planes, highlighted:

#### **MEDIA BEHAVIOUR**

- in fibrocartilage meniscosis, a degenerative lesion of the posterior horn near the tibial attachment with medial displacement of the body; there is an area of minimal intraspongious edema in the corresponding underlying medial-posterior region of the tibial hemiplateau
- osteochondral alteration with perilesional intraspongious edema affecting the femoral condyle
- outcomes of traumatic capsulo-ligamentous involvement of the proximal third of the collateral ligament, which appears to be inserted

#### **CENTRAL PIVOT**

ACL and PCL inserted

minimal, hazy area of intraspongious edema corresponding to the intercondylar spines

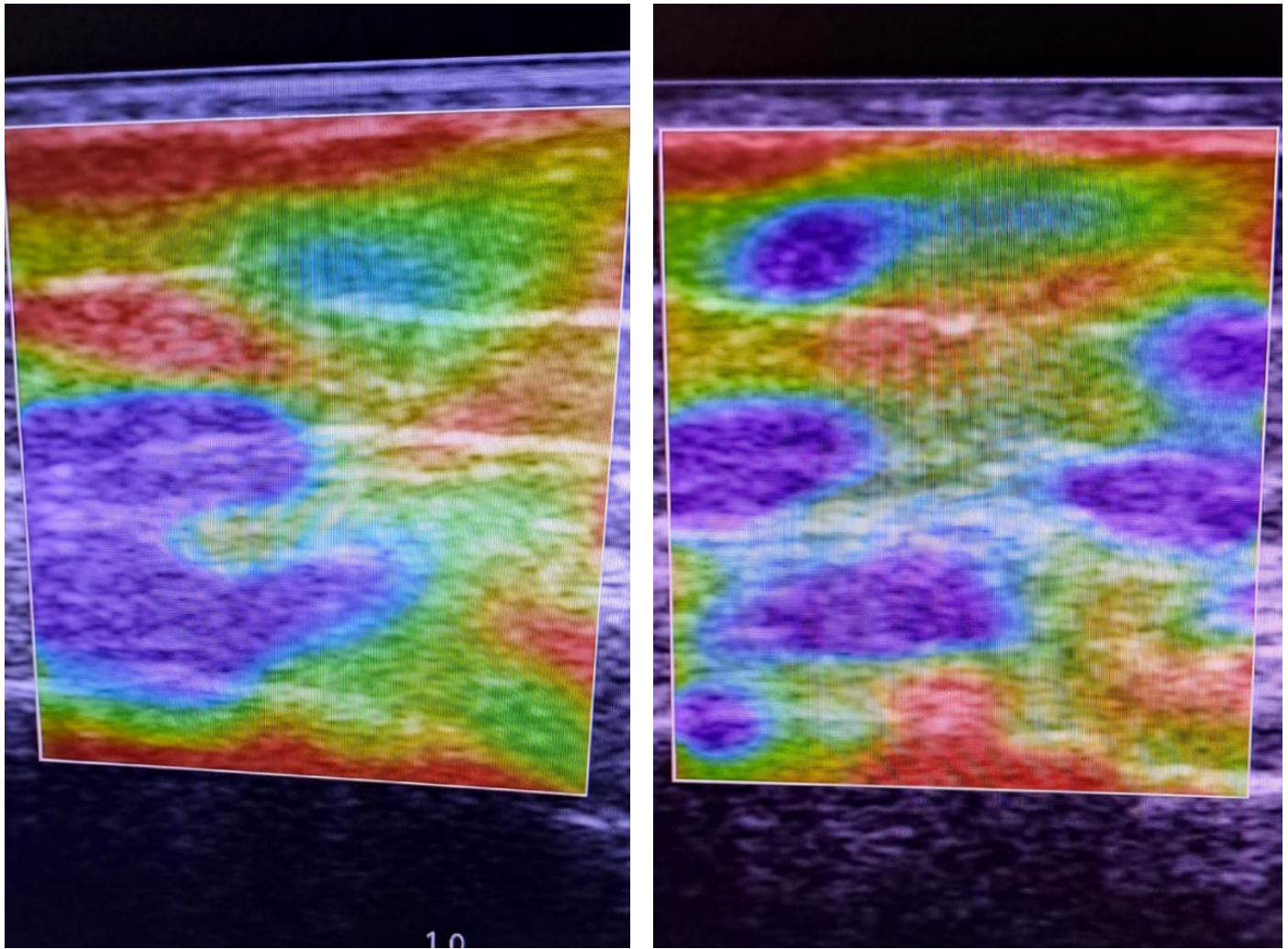
#### **SIDE COMPACT**

- meniscal fibrocartilage meniscosis
- collateral ligament inserted

Discrete endoarticular effusion with fluid distension of the recess of the gastrocnemius-semimembranosus (cyst of the popliteal cavity with a maximum diameter of approximately 5.9 cm).

Enthesopathy of t. quadriceps. Signs of proximal patellar enthesitis.

Moderate edematous imbibition of the superficial prepatellar soft tissues. Minimal fluid unlamination of the deep infrapatellar bursa.



**Figure 6:** Patient B Elasto, pre and post therapy

### **Patient C**

#### **ULTRASOUND OF THE LEFT SHOULDER REPORT**

The ultrasound examination performed with a small parts linear transducer at high frequency on the left shoulder shows a subtotal rupture of the biceps brachii in correspondence with the proximal tendon with the presence, at the level of the rupture site, of a large area referable to a hematoma which presents a medial sac in which the fibers appear to be largely interrupted along their course, with the exception of a small number of survivors in the posterior area, from a subtotal rupture, and a lateral sac which is longitudinally for approximately 43 mm, with DT mx of approximately 18 mm and DAP of 12 mm, close to the muscle belly.

Marked increase in thickness with uneven hypoechogenicity of the capillary tendon biceps brachii with loss of the normal fibrillar pattern due to multiple tiny hypochoic areas in which the tendon fibers appear rarefied, as if from intratissue ruptures.

Furthermore, a thin anechoic peritendinous layer of fluid type is appreciated.

Evident fluid distention of the subacromiodeltoid bursa.

Inhomogeneous hypoechogenicity of the suprapinosus tendon of tendinotic type.

The subscapularis tendon was never visible.

### **Conclusions**

#### **Patient A**

At VAS 8 assessment; ROMp 40°; notable difficulty walking with flexum attitude and widespread edema of the lower limb.



While waiting for the surgical consultation, the objective of the treatment was to manage the increased tension of the flexors, of the edema and pain and improve the joint ROMp.

The treatment with Cryo Sound is carried out with a frequency of 1Mhz with a temperature of  $-2^{\circ}$  and a dose of W/Cm<sup>2</sup> of 1.80 (variable per session by monitoring the FEG).

Each session is combined with specific therapeutic exercise with the aim of limiting the increase in muscle tone of the flexors (consequent to the flexum attitude).

From the second session, a reduction in VAS of 6-7 and ROMp of  $65^{\circ}$  can be seen until reaching ROMp  $85^{\circ}$ , at the fourth session, with a notable reduction in VAS which goes up to 5.

The session is carried out using Cryo Sound in:

1. Static mode on the lesion and passive mobilization of the tibio tarsal to stimulate the lengthening of the posterior kinetic chain with relative and synergistic manual therapy;
2. In active mode with synergistic mobilization of the patella and flexion-extension of the knee;
3. Passive mode on the posterior compartment (patient prone-lateral decubitus).

Closed kinetic chain exercise with controlled ROM is included during each work session, to maintain the result achieved at a neurophysiological level, and counteract the excessive muscle tone of the flexors as a mechanism resulting from the injury.

While waiting for a new Echo, at the surgical consultation, the specialist doesn't want to proceed with surgery, but he decided to continue with conservative treatment.

### **Patient B**

Significant functional limitation with pain VAS 8, knee edema and ROMp  $35^{\circ}$ .

We proceed with treatment with Cryo Sound with a frequency of 1Mhz with an average temperature of  $0^{\circ}$  and a W/Cm<sup>2</sup> dose of 2.00 in the posterior compartment and 1.50 in the suprapatellar compartment.

During manual work combined with instrumental technology, a joint pump was performed synergistically with passive patellar and joint mobilization techniques and stimulation of the correct recruitment of the quadriceps.

We start with the third session, post-treatment, horizontal exercise bike with wireless electrostimulation in synergy on the quadriceps for 15 minutes.

At the ultrasound check, after the sessions carried out, the cyst of the popliteal cavity reduced from 5.9 cm to 3 cm.

Furthermore, during the treatment the elastic tissue compartment (FEG) was monitored and changed after each session.

Pain reduction VAS 3-4, ROMp  $90^{\circ}$ . The specialist proceeds with a cycle of infiltrative therapy with hyaluronic acid.

### **Patient C**

At evaluation patient with pain VAS 7-8 with major functional limitation in extension and edema.

Treatment carried out with a frequency of 1Mhz with a temperature from  $2^{\circ}$  to  $-2^{\circ}$  with W/Cm<sup>2</sup> of 1.50.

The treatment was carried out in static, passive dynamic and light resistance-resisted modes in extension across the entire biceps muscle.

Post-treatment, ETC is required to be performed on panels with the aid of Taping, in order to stimulate the muscular synergies of the upper limb between agonist and antagonist. Post-treatment VAS 4. Almost complete recovery of ROM.

Awaiting ultrasound evaluation.