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Research Article

The Rectus-Adductor Syndrome: The Role of Manual Therapy and Tailored Exercises in a Comprehensive Rehabilitative Protocol. An Experience with Non-Professional Athletes

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Abstract

A rectus-adductor syndrome is a form of groin pain caused by microtraumas which consist of chronic inflammation in the insertion point onto the pubis, that is, of the tendons of the adductors and rectus abdominis. Effective treatment naturally depends on a correct diagnosis. To make this possible, teamwork is essential to create a coherent and valid plan of care.

Keywords: Public; Groin pain; Rehabilitation groin pain; Rectus-adductor syndrome.

Introduction

The rectus-adductor syndrome, generally called “pubalgia”, is a prevalent pathology in athletes, especially sports that involve rapid accelerations or changes of direction, kicks, or lateral runs. It is no coincidence that soccer, hockey, football, and rugby are among it, which are, in fact, among the most mentioned in the literature, even among non-professionals [1]. Therefore, groin pain in athletes is widespread, making up 5-13% of injuries in male soccer players and 4-5% in female soccer players. However, many types of injuries are often difficult to locate and diagnose. It had been estimated that between 27% and 90% of patients with groin pain have more than one lesion [2]. Effective treatment naturally depends on a correct diagnosis. To make this possible, teamwork is essential to create a coherent and valid plan of care. Acute

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injuries are more easily attributable to a musculoskeletal problem thanks to anamnestic clues (excessive muscle strain following a sudden change of direction or forced contraction during an activity) and the absence of specific physical signs such as pain on palpation at the level of the inguinal canal. Generally, however, it is possible to identify the presence of bruising, muscle swelling and pain on palpation of the muscle with possible loss of substance detectable by touch. In chronic injuries, however, a careful analysis is necessary for a correct differential diagnosis [3] especially if one considers that this manifestation can be present for months or years [4]. The most common location of groin pain is the adductor region of the thigh; the pain is usually caused by overloading the Myo-tendon passage area of the adductor longus. Hernia-related pain, on the other hand, might be excluded; it is usually located in the inguinal region and radiates laterally to the inguinal ligament, muscles, and the opposite side [5]. Among the many causes to know in order to be able to make the correct diagnosis, remember osteitis pubis, hip pain, bursitis, stress fractures, infections, nerve compression and others [6]. All this indicates how difficult it is to define groin-pain according to precise and accepted internationally validated terminology [7]. The most accepted definition to date is, therefore, a generic "groin pain" together with all the subclinical entities that represent it. The onset of the groin-pain syndrome is very high, representing 12-16% of all sports injuries, in particular sports in which, are expected, sudden changes of direction, such as football, hockey, rugby and many others. The incidence can reach 23% of total accidents [5]. According to a study conducted by Walden, et al., taking into consideration both sexes, it was concluded that this type of problem represents 7-13% of total injuries and that males are twice more affected than females [8]. The purpose of this work is to describe evidence and needs of an exercise protocol based on the review of scientific evidence which confirms the efficacy of the conservative treatment of pubalgia [9]. To administer a correct rehabilitation protocol, the rehabilitator must have a good knowledge of the anatomy of the inguinal region as well as sufficient knowledge and ability to carry out a differential diagnosis in order to exclude, first of all, the presence of red flags, identify the primary source of symptoms and possibly the causes suggested by the scientific literature and finally to identify any etiological factors underlying the dysfunction. A systematic review published in the BJSM in 2015 revealed that as many as 33 different terms are used to diagnose groin pain in athletes [5,10].

Methods and study

Retrospectively evaluated the totality and uniformity of the approach described below in all 13 patients, non-professional athletes followed in 2021 for adductor myalgia or rectus adductor syndrome in order to develop the protocol subsequently described and elaborated based on scientific evidence. For each, the standardized approach first provided the exclusion of fractures or injuries of any kind and a first generic constant, early diagnosis of "functional overload". Thanks to that, it was then possible to recommend a first conservative approach for a medium-short

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period, based on rest, administration of non-steroidal anti-inflammatory drugs (NSAIDs) and instrumental physical therapy (i.e., ultrasound and Tecar-therapy). Followed up again at our Outpatient Rehabilitation Unit at 2-4 weeks; outcome and residual pain were assessed. For all patients, as sportsmen, even if not professional, an MRI of the pelvis was recommended for a more in-depth study of the pubic symphysis and the proximal III of the adductor group (adductor major and adductor longus) [11]. This study always confirmed the persistence of oedema at four weeks, with 4 cases of osteitis pubis already clinically diagnosed. In cases where the pain persists beyond four weeks, the choice was always a new therapeutic strategy characterized by the association between a rehabilitation protocol and minimally invasive therapy. The proposed protocol includes at least one session of ultrasound-guided peri-tendon and periosteal pubic infiltrations with local anesthetics, cortisone and 5% glucose (prolotherapy)-followed by a cycle of physical therapy based on ten shock wave sessions peri-tendon along the course of the proximal III of the adductor muscles up to their pubic insertion every four days. The contextual physiotherapy treatment was based on assisted exercises of cautious stretching and plyometrics of the adductors, psoas, and abdominals [12]. In all patients, despite this initial approach, alternating plantar support of the feet on the ground was clinically found to be non-symmetrical and balanced, with consequent alteration of the classic kinematic parameters and a sensation of dynamic pubic stress at the moment of heel support on the ground, with clinical evidence of moments of force created in the pelvis. This clinical observation justified the pain based on consistent pathophysiological reflections. In particular, it is known that primary afferent nociceptors can "listen" to immune cells by sensing cytokines released at the site of acute inflammation or maintained inflammatory processes in case of chronic pain disorders. However, nociceptors also send signals to immune cells, such as macrophages or lymphocytes, by releasing glutamate or neuropeptides to modulate their activity [13] locally.

This bidirectional interaction between the sensory nervous system and the immune system is causally involved in inflammation and a hyper-functional pain pathway as a consequence of disorders leading to a disbalance of pro- and anti-inflammatory processes. Thus, pain is one of the cardinal symptoms of inflammation, but the activity of nociceptors also actively contributes to balancing the inflammatory reaction [13]. In this process, nociceptors can release excitatory amino acids, neuropeptides, cytokines, chemokines, and micro-RNAs, from peripheral or central terminals or cell bodies to affect resident immune cells, such as macrophages, neutrophils, mast cells, microglia, and dendritic cells [13].

The bidirectional communication between the two systems plays such a critical role in processes initiating and promoting pain disorders, first at the lesion site and later at all levels of the pain pathway, from the neuronal cell body in the dorsal root ganglion (DRG) and its central process to spinal circuits as well as brain areas involved in sensory and

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emotional processing of pain signals up to descending inhibitory controls.

Protocol

Given the above, usual approach for patients with groin pain from rectus adductor syndrome begins, as mentioned, with an initial ultrasound-guided infiltration with 4 ml of 1% lidocaine, 5-10 ml of 5% glucose and 40 mg of triamcinolone in the peri-osseous pubic site (in correspondence with the site where osteitis pubis is often highlighted on MRI) and along the entire middle III of the longus and adductor significant muscles. Thus obtain a sufficient and sometimes persistent reduction or abolition of pain, the patient is subjected to a cycle of conservative rehabilitation therapy aiming at correcting the muscular imbalance around the pubic symphysis through a program of progressive exercises consisting in stretching and strengthening the pelvic muscles. Several stages can be identified:

1. Improved lumbopelvic stability.
2. Strengthening of the pelvic, abdominal and buttock muscles.
3. Eccentric hip exercises, sidestep with bands, lunge and squat exercises and sport-specific training (also phase 4).

The conservative approach is based on manual therapy associated with postural rebalancing exercises, stretching and muscle strengthening and revision of technical-specific motor patterns. Before starting the treatment, the first approach with the patient was through first palpation of the symphysis, and the execution of clinical tests, such as the single adductor test (Figure 1) the bilateral adductor test and the Squeeze or compression test such as the bilateral adductor test and the Squeeze or compression test (Figure 2) [14].

Figure 1: (a) Single adductor test; (b) Squeeze tests.

Both palpation and tests confirmed the anamnesis reported by the patient himself. PHASE 1 (Figures 2-10) aims to improve lumbopelvic stability (1-2 weeks) [15-17] aims to improve lumbopelvic stability (1-2 weeks) [15-17].

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Figure 2: Symphysis pubis pumping-with arms crossed and palms placed medially to the SIAS, then apply tension directed outwards on both sides.

Figure 3: Pompage of the hip-decoapt the hip by exerting traction in the caudal and lateral directions.

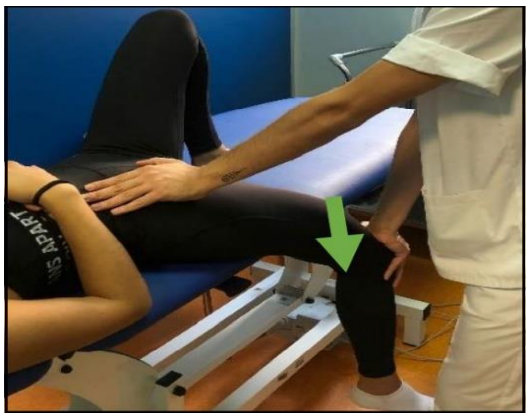

Figure 4: Iliopsoas pumping and stretching-with the proximal hand, then stabilize the pelvis at the level of the anterior-superior iliac spine, while with the distal one, placed at the level of the knee, exert a downward push.

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Figure 5: Pompage of the quadratus lumborum-using slight traction, then move the ribs away from the iliac crest. considered it appropriate to try to de-attach the affected area through a passive stretching of adjacent structures, such as iliopsoas, piriformis, quadratus lumborum (double rotations), excluding that of the adductor and ischiopubic muscles.

Figure 6: Piriformis stretching 53 In this phase, also tried to work on the recruitment of the transversus abdominis.

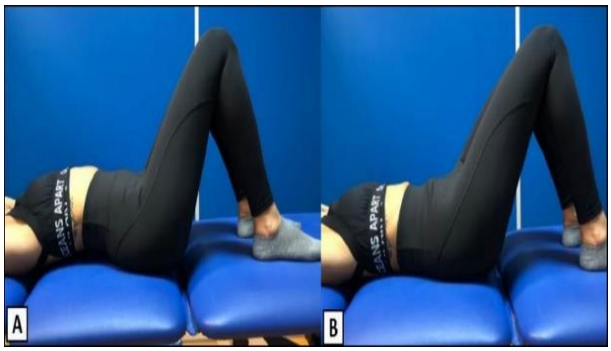

Figure 7: (a) Initial position; (b) Final position.

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Figure 8: Patient to remain in balance by working with the pelvis, involving all muscles responsible for this function.

Figure 9: Exact requests as in the previous exercise but in this case, then ask the patient to catch the thrown ball in order to increase the functional request.

After an initial period of rest in which aim to reduce oedema through instrumental physical therapy (i.e., ultrasound), now, implement the protocol specially adapted for our patients. The first thing focus on is the decanting of the symphysis pubis through some supine hip pumping techniques, followed by soft mobilizations of the hip and lumbar spine so as not to overload the affected joint right away and, above all, to put patients at ease. Then decide to associate the pumping of the psoas and quadratus lumborum [15-17].

Last but not least, include some exercises for lumbopelvic stability, some performed with the Bobath ball or near the wall or with the patient sitting on it. The second phase (Figures 10-24) is muscle strengthening and lengthening, lasting an average of 3-4 weeks.

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Figure 10: Adductor reinforcement.

Figure 11: Adductor reinforcement-ask the patient to perform the "bridge" and at the same time to tighten the cylinder.

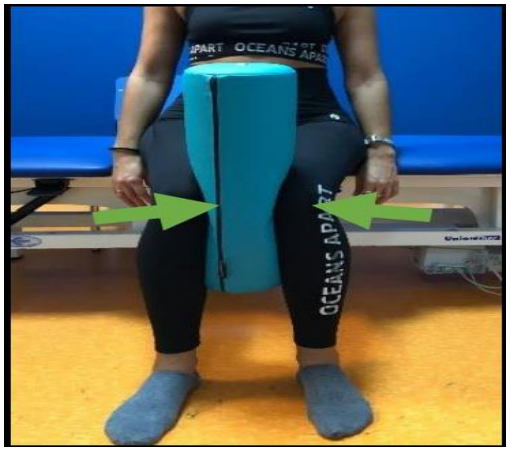

Figure 12: Adductors strengthening-with the patient seated, then ask to tighten the cylinder. The adductor strengthening exercises can also be performed with an elastic band with one end attached to the table and one around the patient's ankle, therefore, ask to adduct.

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Figure 13: Abdominal Strengtheners: A. Crunch; B. Plank (TA); C. Lateral Plank; D. Climbing; E. Alternating Scissors exercises are also among the core-stability exercises.

Figure 14: Glutes strengthening: (a) Monopodolic gluteus bridge; (b) Hip extension with leg straight; (c) Hip extension with the knee flexed.

Figure 15: Square lumbar bracing asks the patient to extend the hip and simultaneously extend the contralateral shoulder.

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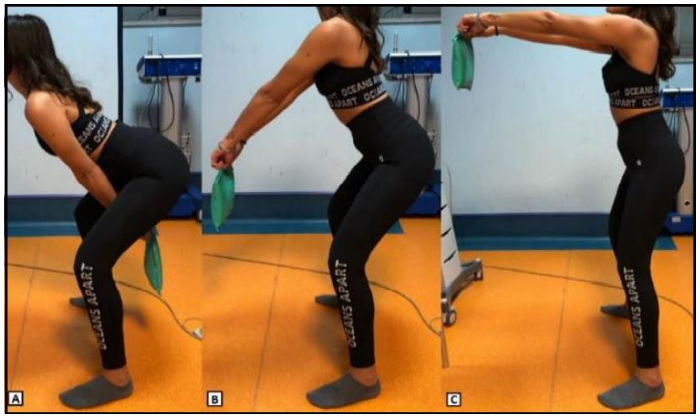

Figure 16: Square lumbar strengthening:(A) Initial position. (B) Intermediate position. (C)Final position the exercise must be performed in a single movement. Given the reduction in pain and the significant reabsorption of the oedema, educated the patient to perform active stretching exercises of the adductors, psoas, and abdominals.

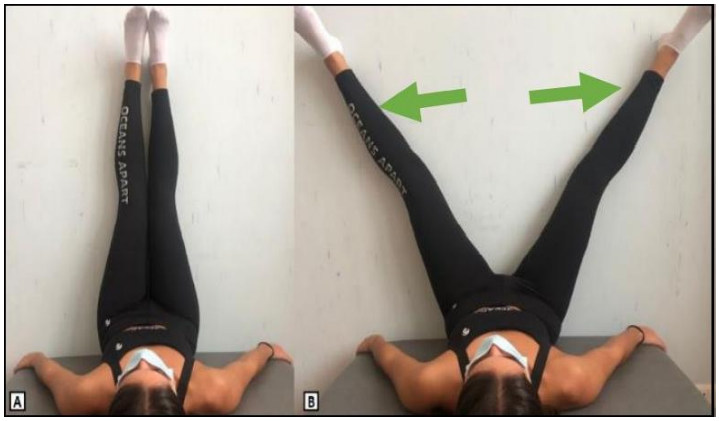

Figure 17: Active adductors stretching: (A) Initial position; (B) Final position.

Figure 18: Active adductors stretching-then ask the patient to favour the lengthening of muscles by exerting a downward thrust on the knees.

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Figure 19: Active adductor stretching-then ask to patient to try and touch toe.

Figure 20: For active adductor stretching, then ask to patient to push towards the floor with patient hands placed on knees. This exercise can also be done in old relaxation.

Figure 21: Active iliopsoas stretching, then ask to patient bring the knee to chest. The exercise can also be performed with the contralateral hip and knee flexed to stabilize the pelvis better and avoid any compensation.

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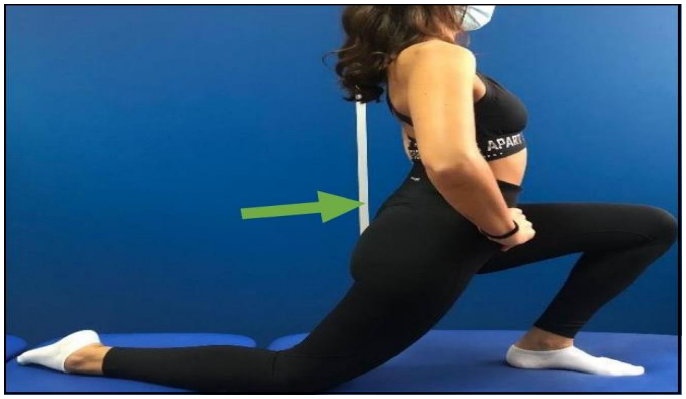

Figure 22: Active iliopsoas stretching-after assuming the horseman position, then ask the patient to bring patient pelvis forward**.**

Figure 23: Active Abdominal Stretches-Straights and Obliques (especially with the photo on the left).

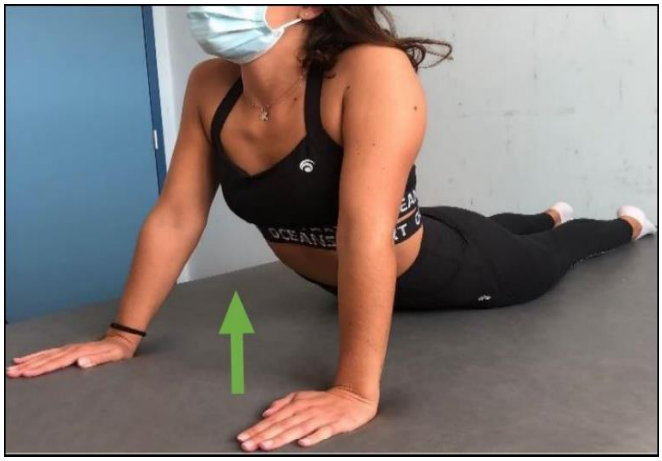

Figure 24: Active abs-rectus and oblique stretching.

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In this phase, acting gradually, focus on strengthening exercises of the adductors, abdominal muscles, transversus abdominis, glutes, pelvic muscles, and posterior chain muscles such as the quadratus lumborum (as it stabilizes the hip) and multifidus. In this phase, the exercises include core-stability [14-17] exercises. The third PHASE includes proprioception, maintenance, and prevention 5-7 weeks, (Figure 25-26). The continuation of muscle strengthening training continues through concentric and eccentric exercises and active stretching, interspersed, however, with passive stretching exercises to avoid functional overload. It is in this phase that usually deem it appropriate to introduce proprioceptive exercises, with a unique platform, in mono and bipodal support, administering exercises for balance on an unstable surface while keeping the pelvis neutral and exercises for balance on an unstable surface during the launch and catching a ball [14-17]. As far as prevention is concerned, illustrated to the patient some general rules to always keep in mind: proprioceptive work, strengthening and stretching work, and pre-competition or pre-training warm-up, according to existing cited literature [5,12,17].

Figure 25: (a) Monopodalic stanc; (b) Bipodalic stance.

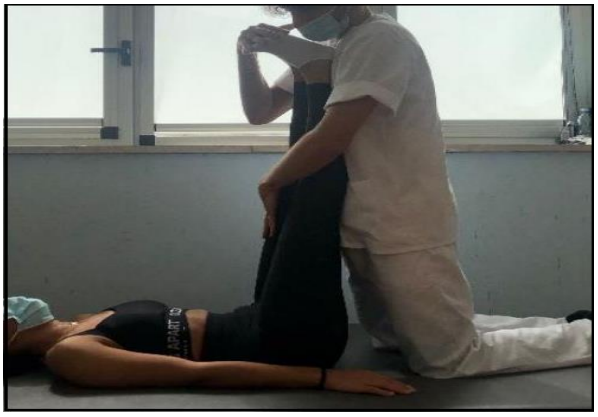

Figure 25: Hamstring stretches.

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Result

After a couple of monitored physiotherapy weeks, patient continued the indicated rehabilitation therapy, which included ongoing described training. All the patients took daily medication at the beginning of the exercise protocol and continued that therapy with no change in dosages for its duration. All patients treated reported a reduction in the intensity of their pelvic pain and exercise confidence, according to clinical data collected from day 1 through the last days. Patients reported a significant improvement from entry through the whole follow-up period. The efficiency data were higher according to our anecdotal experience with previous analogue patients treated without a specific and tailored pelvic muscle protocol. Good pain relief was achieved without clinically relevant complications (Pain Vas effectiveness=6.5 StS1,65), with patients reporting a good improvement in muscle pain during core-specific sports exercises. Analysis of self-Questionnaire data was made within the first and end weeks, and less severe pain was associated with better sleep quality.

Discussion

The underlying mechanism of rectus adductor syndrome can be triggered by direct trauma or indirect trauma: an intense and rapid muscle contraction in the joints and frequent changes of direction, cumulative microtraumas caused over time with practice, often even inexperienced [5,12]. Groin pain in athletes is a common and very complex problem regarding differential diagnosis due to the complex anatomy and correct terminology, where the same term can have multiple interpretations. Hence the need to create a single standard terminology. In this regard, to try to deal with this situation, a meeting was held on Nov 4, 2014, in Doha, which was attended by 24 international experts from 14 different countries, including sports doctors, physiotherapists, general surgeons, Orthopaedics, and a radiologist [5] Lesions can therefore be classified into two classes: open kinetic chain or closed kinetic chain [5]. The former involves kicking and jumping and represents the minority of such injuries, accounting for 41%. This type of movement involves the transition from hip extension and abduction to flexion and adduction with the addition of an external rotation [18].

Therefore, changes of direction and lateral movements, representing the remaining 59% of all, fall into the second class injuries. Patient characterized by hip extension coupled with abduction and external rotation. This would occur because the adductors attempt to slow down the abruptly extending and abducting thigh [19] through an eccentric contraction, then contracting concentrically in adducting and flexing the hip. From this point of view, the pubis can be considered a pivot subjected to the opposing forces of the adductors caudally and rectus abdominis in the cranial direction [15].

In addition to the muscular contractions and the forces to be derived, it is possible to identify forces of an ascending type coming from the lower and descending limbs which impact the pelvis from the spine by gravity. To ensure good stability, abdominal and adductor forces equal to about six times the

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body's weight are required to compensate for the multiple and continuous stress directed at the symphysis during the practice of a sport [5]. It is, therefore, easy to understand that an alteration of this functionality causes an imbalance structures. In a study by Verral, the sum of internal and bilateral external rotation was lower in patients with chronic groin dysfunction [20,21]. Magnetic resonance, thanks to its high spatial resolution and its multilinearity, is the first choice as a diagnostic test in groin pathologies, as it allows the accurate evaluation of the alterations at the level of the pubis and of the myo-tendon structures that originate from it [5,21-23].

Conclusion

The rectus-adductor syndrome is an overload disease that, in many cases, tends to become chronic, which is "why" it is essential to identify a correct diagnosis and subsequent effective treatment. The rectus abdominis and the long adductor are important stabilizers of the pubis in the vertical direction. which means that any overload of one of t structures can cause damage to the other and, consequently, a general weakness to adjacent structures. Therefore, the effectiveness of a correct diagnosis is essential. In case you opt for a conservative treatment, the combination of physical and manual therapy is certainly a trump card not only for solving the problem but also for the general well-being of the patient, going to work not only on the structure directly involved but also on the adjacent ones. In our group of patients, there was sometimes associated osteitis pubis. This way why focused on inflammation (resolved with infiltrations and shock waves) and on a muscle strengthening program with a suitable exercise protocol tailored to the individual patient.

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