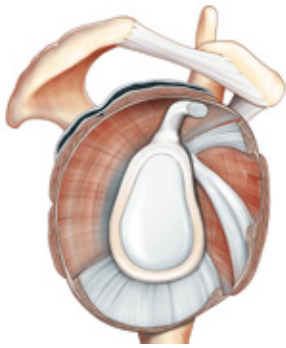
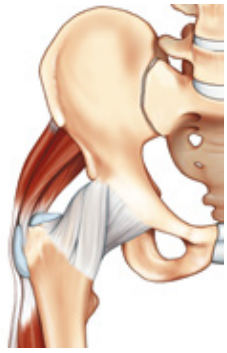


SHOULDER

ELBOW

HAND AND WRIST

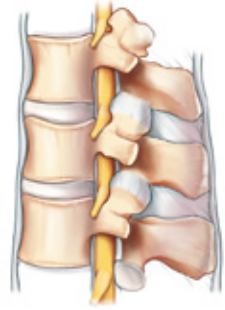


HIP

KNEE

ANKLE AND FOOT

TMJ



SPINE

TENDON

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CHAPTER 1

THE ADVANTAGES OF INJECTION THERAPY IN REHABILITATION

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Key points

The utilization of interventional procedures can provide diagnostic, therapeutic, and preparatory value in the management of physiatrics patients undergoing a rehabilitation program.

The implementation of interventional procedures needs a meticulous clinical and radiological assessment of the specific issue being addressed.

The application of interventional procedures requires an approach rooted in the contemporary principles of precision medicine, involving the careful selection of patients and precise timing of the procedure.

The employment of interventional procedures as part of a patient's surgical preparation can serve as one of the available tools in facilitating a pre-rehabilitation pathway. This approach is characterized by its multidimensional and multidisciplinary nature, aiming to optimize surgical outcomes and minimize peri- and post-surgical mortality and morbidity.

Introduction

Interventional procedures play a significant role in the modern rehabilitation pathways for patients with musculus-tendon and/or osteo-articular pathologies, as well as those with neurological conditions.

The utility of interventional procedures in physiatrics patients encompasses three key phases of a rehabilitation program: the diagnostic phase, the therapeutic phase, and the preparatory phase.

Below, you will find examples of diagnostic applications of various interventional procedures.

These examples are not meant to be exhaustive in terms of the diagnostic framework for the conditions being considered, specifically gonalgia and coxalgia.

Instead, they aim to illustrate the advantages that can arise from using these procedures in diagnosing musculoskeletal issues. Such issues are characterized by the presence of pain along with functional impairments, representing as the initial stage of a rehabilitation program.

Diagnostic use

The clinical evaluation, combined with imaging methods, allows for accurate diagnostic classification in the majority of patients with musculoskeletal problems.

The use of interventional procedures complements the diagnostic process in various subpopulations of patients.

For example, coxalgia is a common painful condition that can indicate pathologies affecting the coxofemoral joint (coxarthrosis), tendon issues (gluteal tendinopathy), or spinal and pelvic problems. It is not uncommon to find concurrent joint and bone problems, as seen in figure 1.

Performing an injection therapy of the coxofemoral joint can help resolve diagnostic uncertainties through careful pre- and post-procedural clinical evaluations.

The intra-articular introduction of an anesthetic drug can provide significant post-procedural relief of coxalgia if the pain predominantly originates from the joint.

The documented case also exempli-

fies an important methodological requirement for the appropriate use of interventional procedures, as emphasized in this introductory chapter and further discussed in subsequent chapters: the co-occurrence of different osteoarticular and/or muscletendon problems necessitates a thorough radiological study before performing interventional procedures.

Gonalgia, another frequently encountered painful problem, often occurs

FIGURE 1 Female patient, 81 years old. Right coxalgia. Radiographic image showing right coxarthrosis with concomitant osteosclerotic remodeling affecting the right iliac wing, extending to the ileum and ischio-pubic branch, compatible with Paget's disease

with joint effusion. Clinical observations such as patellar swelling and ballottement, along with ultrasound evidence of anechoic distension of the supra patellar recess (fig. 2), help diagnose and classify inflammatory arthropathy accurately. In cases where routine blood tests and imaging methods are insufficient for an accurate diagnosis or when therapies do not yield desired results, synovial biopsy can provide precise characterization of rheumatological conditions.

Therapeutic use

Here are some examples of therapeutic applications of various interventional procedures.

Draining a tendon bursa and subsequently introducing a cortisone derivative into the bursa or around the tendon, as shown in figure 3, allows for the treatment of bursitis or tenosynovitis in cases of inflammation of the synovial sheath surrounding a sliding tendon.

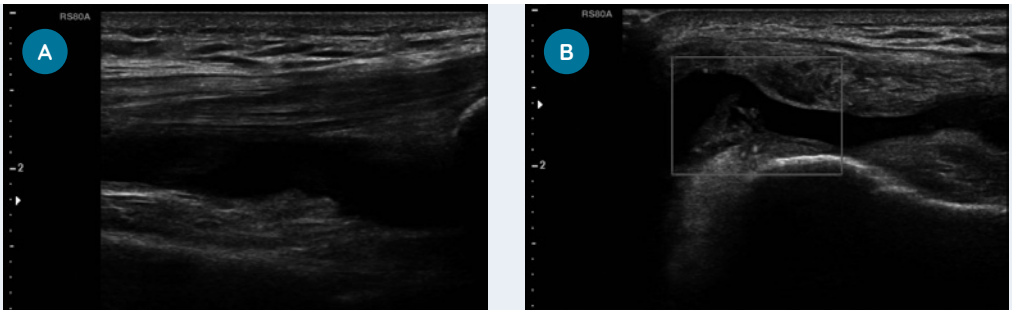

FIGURE 2 Male patient, 71 years old. Right gonalgia. Ultrasound image showing joint effusion (notable anechoic distension of the suprapatellar recess in both the longitudinal axis image, section A, and the transverse axis image, section B) and synovial hypertrophy with a pattern of mild hypervascularization on power Doppler examination (documented in the transverse axis image, section B). Analysis of the synovial fluid, which revealed the presence of calcium pyrophosphate crystals, combined with a thorough radiographic examination of the knee, which detected meniscal calcifications and calcifications at the femoropatellar joint, led to the diagnosis of co-occurring gonarthrosis and calcium pyrophosphate arthritis

FOCUS ON

Understanding joints from the inside

It is essential to have a good understanding of the patient's joint pathology before performing injection treatments to avoid therapeutic failures.

The following are various arthroscopic images of joint pathologies obtained in vivo.

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OSTEOARTHRITIS

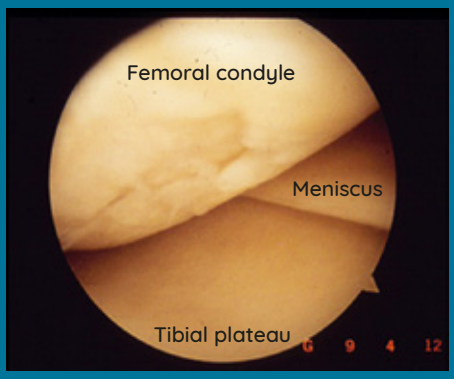

FIGURE 1 Medium-sized osteochondral defect on the femoral condyle

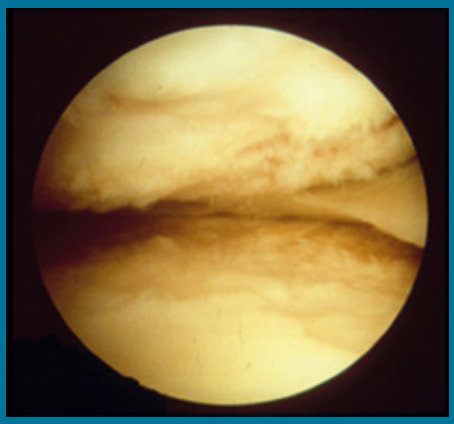

FIGURE 2 Severe and extensive osteochondral defect on the femoral condyle, tibial plateau, and meniscal degene-ration

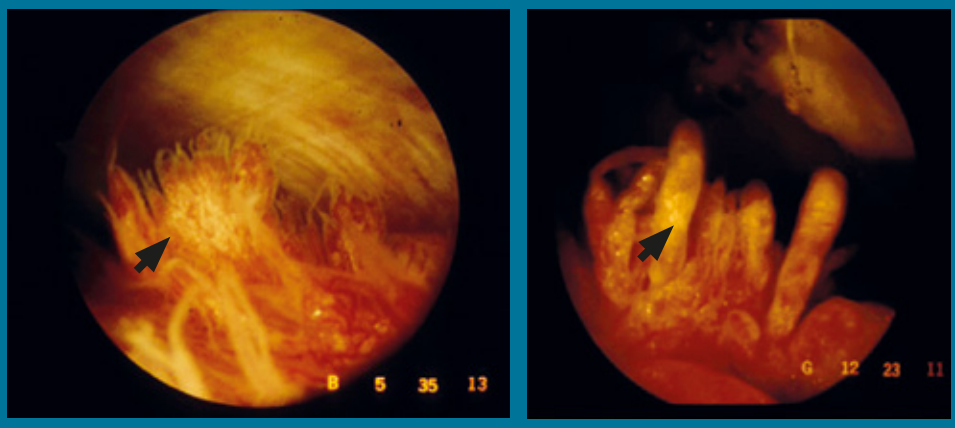

FIGURE 3 Synovitis characterized by typical filiform synovial villi in an osteoarthritic condition

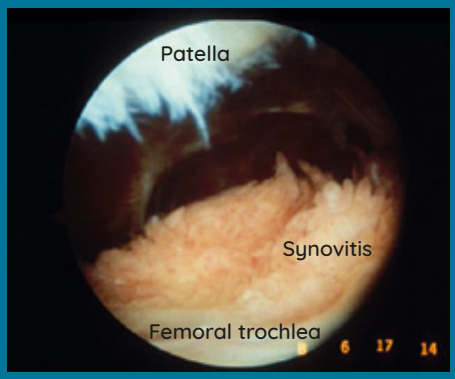

FIGURE 4 Severe and extensive osteochondral defect on the femoro-patellar joint and hypertrophic synovitis invading the femoral trochlea (disto-proximal view from the subquadricipital notch)

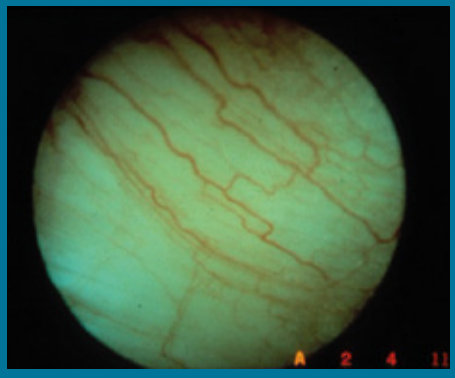

FIGURE 5 Normal vascular network of the synovial membrane

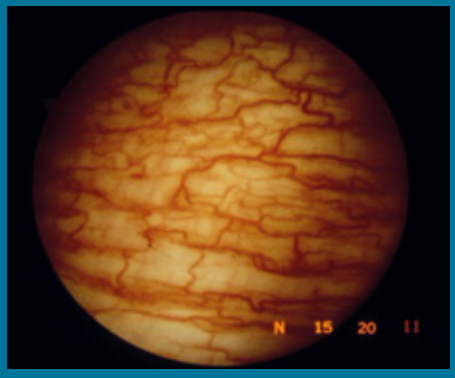

FIGURE 6 Abundant vascular network of the arthritic synovial membrane

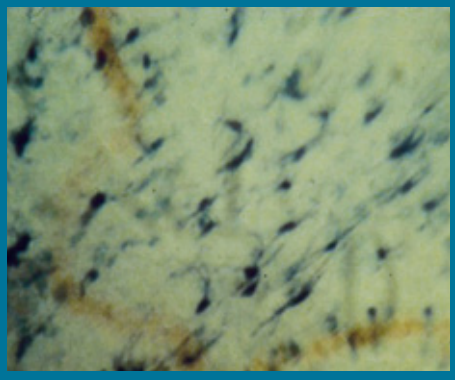

FIGURE 7 Cellularity of the normal synovial membrane

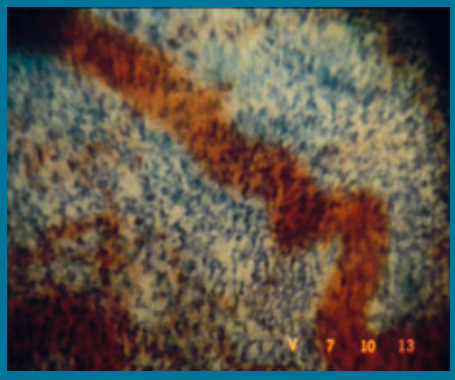

FIGURE 8 Hypercellularity of the arthritic synovial membrane

CHAPTER 18

INJECTION TECHNIQUE FOR THE ELBOW

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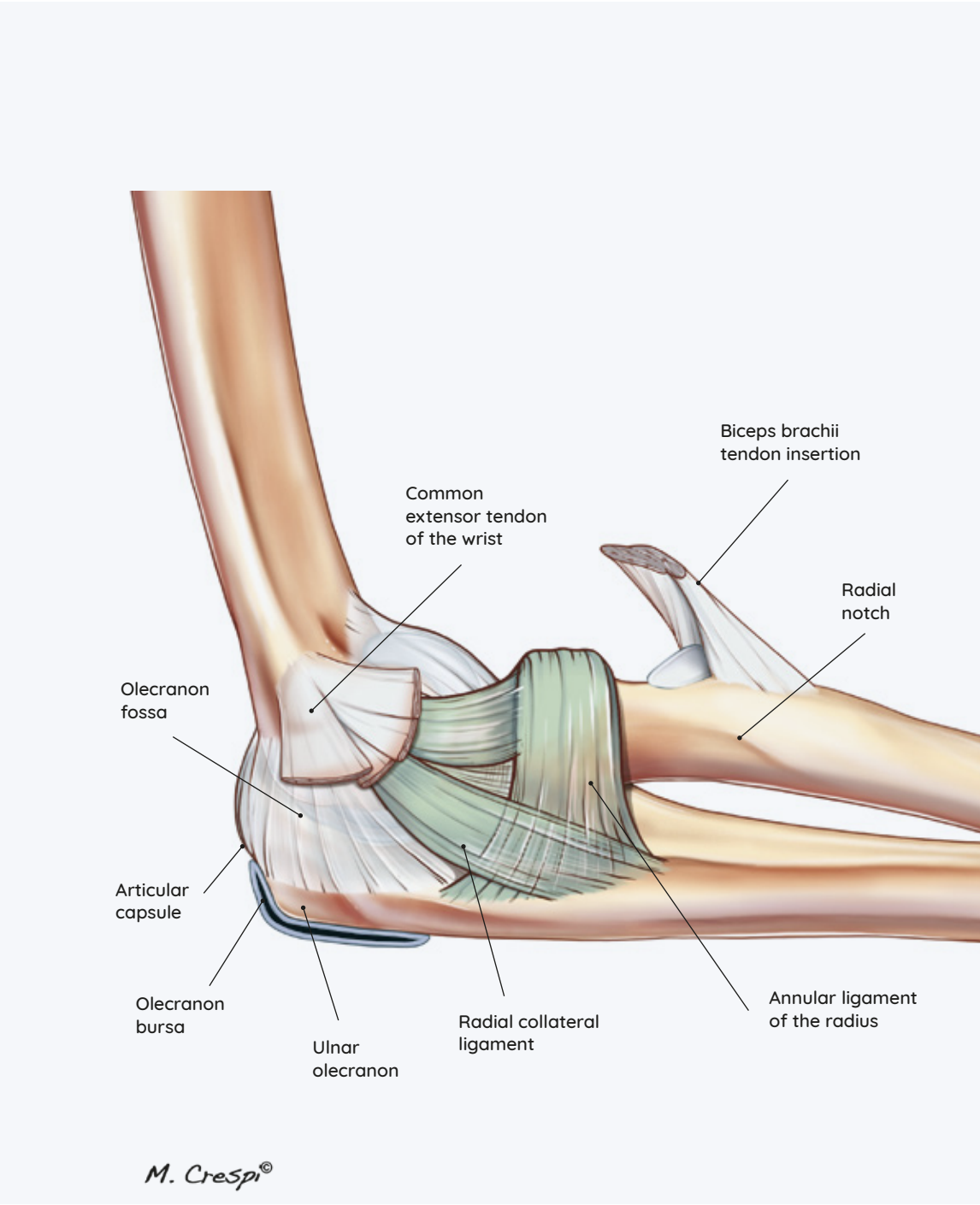
Biceps brachii
tendon insertion
Common
extensor tendon
of the wrist
Radial
notch
Olecranon
fossa
Articular
capsule
Olecranon
bursa
Ulnar
olecranon
Radial collateral
ligament
Annular ligament
of the radius
M. Crespi©

pain can be exacerbated by sliding the examiner's finger from the lateral to the anterior region of the radial head while performing elbow supination. Pain localized on the postero-lateral aspect of the elbow can be increased by the examiner's thumb pressure at the joint level while extending the patient's elbow.

Injection technique

In the case of a confirmed diagnosis of epicondylar tendinopathy, injection therapy with a steroid suspension or Prp is performed with the patient's elbow in a semi-flexed and fully supinated position. The extent of the lesion is determined based on the exact location of the pain. The needle entry point is at the tendon-periosteum junction, specifically 5-10 mm distal to the epicondyle. The needle is directed vertically downward (fig. 1) until the leathery consistency of the tendon-bone junction is felt. Then, 1 ml of steroid suspension or 3 ml of Prp is injected in small droplets while moving the needle with a series of small movements forward, backward,

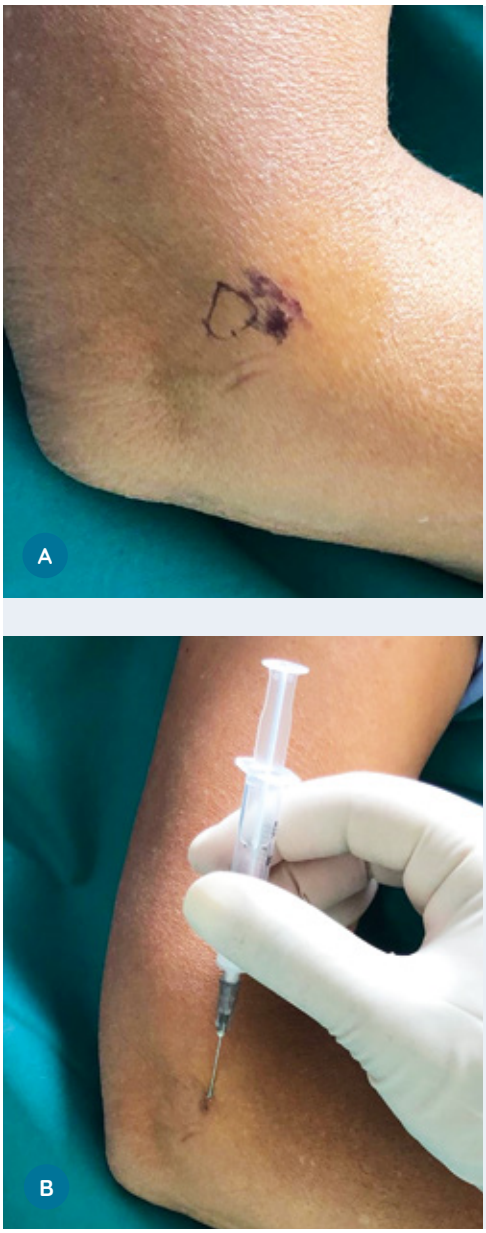

FIGURE 1 Injection with steroid suspension at the epicondylar level with the needle perpendicular to the tendon fibers

superficially, and deeply to inject the entire cubic extension of the lesion (video 18.1).

The advantages of this injection technique include precise penetration of the steroid suspension droplets into the painful area and a low risk of cutaneous atrophy. The disadvantage is the risk of injecting an excessive amount of medication into the tendon fibers. Steroid suspension inhibits tenocyte proliferation and the recruitment of tendon progenitor cells, thereby reducing the synthesis of type I collagen. Moreover, it promotes the injection of adipose tissue and cartilage-like tissue into the tendon, which, with repeated injections, can weaken the tendon and lead to rupture.

Another injection technique, using the same needle entry point described earlier, involves directing the needle in a proximal-distal direction almost tangential to the tendon fibers (fig. 2). This allows for a more superficial injection of steroid suspension at the paratenon level while performing small anterior-posterior and proximal-distal needle movements to inject the entire cubic extension of the lesion. The advantage of this injection technique, when using a steroid suspension, is a lower likelihood of injecting an excessive amount of medication into the tendon fibers.

Preparation and execution of injection with steroid suspension in the epicondylar region

CHAPTER 21

INJECTION TECHNIQUE FOR THE KNEE

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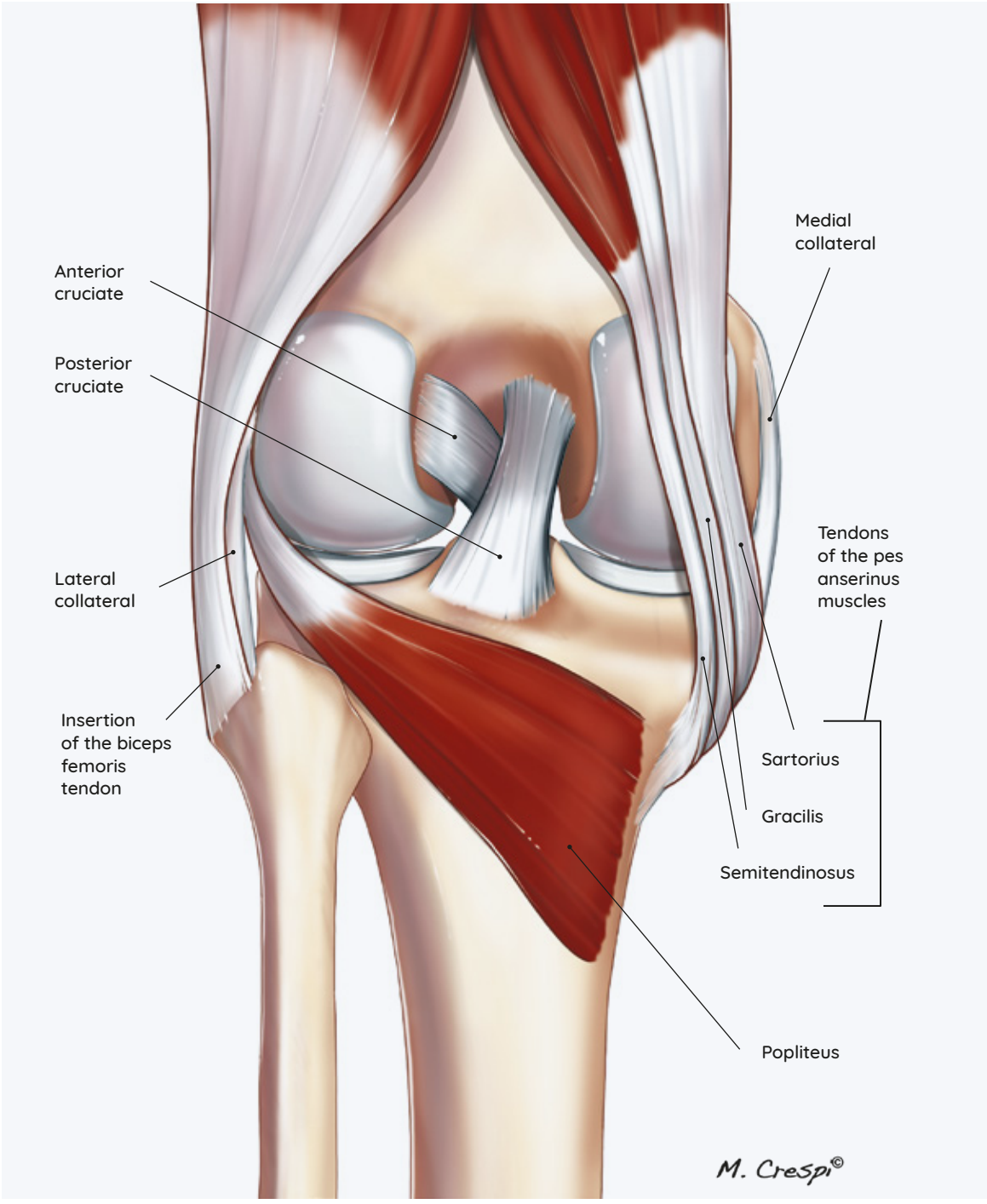
Anterior cruciate
Posterior cruciate
Lateral collateral
Insertion of the biceps femoris tendon
Medial collateral
Tendons of the pes anserinus muscles
Sartorius
Gracilis
Semitendinosus
Popliteus
M. Crespi©

Injection technique

There are five main approaches for performing intra-articular knee injection:

- superolateral approach;
- medial-lateral approach;
- medial-medial approach;
- anterolateral approach;
- anteromedial approach.

The superolateral approach

The superolateral approach is preferably used when there is effusion in the suprapatellar recess. The success rate reported in the literature is 91%.

The patient is placed in a supine position with the lower limb extended.

The borders of the patella and two peri-patellar lines are identified: a horizontal line at the upper pole of the patella and a vertical line 1 cm laterally from the lateral border of the patella.

The needle is inserted at the intersection point of the two peri-patellar lines, directed towards the center of the patella and slightly upward towards the articular surface of the patella.

FIGURE 1 Superolateral access route

Medial-lateral approach

The medial-lateral approach has a success rate reported in the literature ranging from 76% to 93%, depending on the severity of knee osteoarthritis.
The disadvantage of the medial-lateral approach is that it can often be painful for the patient.
The patient is placed in a supine position with the lower limb extended.
After identifying the borders of the patella and the lateral border of the lateral femoral condyle, the needle is inserted parallel to the surface of the examination table, between the articular surfaces of the patella and femur, at the middle portion of the lateral patellar margin.
To facilitate needle insertion and reduce patient discomfort, it is advisable to mobilize the patella laterally using the non-dominant hand.

Medial-medial approach

The medial-medial approach has a success rate reported in the literature of only 56% and is therefore less commonly used.
The injection is performed similarly to the medial-lateral approach, but the

FIGURE 2 Mid-patellar lateral access route

Intra-articular knee injection with superolateral access

FIGURE 3 Mid-patellar medial access route