



# Injection of the Hip With Hyaluronic Acid Under Distraction Plus Neurectomy of the Femoral and Obturator Nerve

Antonio Porthos Salas, M.D., José Luis Perez Lara-Albisua, M.D.,  
David Taffinder-Villarreal, M.D., Raúl A. Peña-Tijerina, M.D., Juan Carlos Quispe, M.D.,  
Daniel López-Márquez, M.D., Héctor Velasco-Vázquez, M.D., and Jacek Mazek, M.D.

**Abstract:** The hip is the location for many disorders, such as osteoarthritis, femoroacetabular impingement syndrome, avascular necrosis of the hip, and cartilage injuries, all of which cause chronic pain, disability, and limitation. It is estimated that 10% of the population  $\geq 40$  years of age will present with hip pain. The line of treatment goes from nonsteroidal anti-inflammatory drugs, physical therapy, lifestyle modification, intra-articular injections, and hip surgery. This will depend on the pathology, age, lifestyle, and sport activity of each patient. Currently, hip joint intra-articular injections represent a viable option for those patients who are not candidates for surgery or simply those who do not want surgery. Among the controversial indications for a hip injection is moderate-to-severe arthritis (grades III and IV). Hip injections are considered a diagnostic and therapeutic procedure, with a sensitivity of 87% and specificity of 100% reported, and will differentiate between an intra-articular pathology versus an extra-articular pathology and a neuropathic pain arising from the lumbar spine. Radiofrequency nerve ablation or neurectomy of the femoral and obturator nerve has been implemented more frequently not only for patients with mild-to-moderate osteoarthritis but also in those who present with femoroacetabular impingement syndrome and cartilage lesions who do not wish to undergo surgery.

The hip joint is the location for many disorders such as osteoarthritis (OA), femoroacetabular impingement syndrome (FAIS), avascular necrosis of the hip, acetabular labral tears, chondral injuries, and ligamentum teres injuries, all of which can cause chronic pain, disability, and functional limitation. It is estimated that 10% of the population  $\geq 40$  years of age will present with hip pain. The line of treatment goes from nonsteroidal anti-inflammatory drugs, physical therapy and

rehabilitation, lifestyle and sports modification, intra-articular injections, and surgical procedures like hip arthroscopy and total joint replacement, all of which depend on the evolution of the pathology, the age, activity, and functionality of each patient. Currently, intra-articular injections represent a viable option for those patients who are not candidates for surgery or simply those who do not want surgery. Among the controversial indications is moderate-to-severe OA (grades II and IV) (Fig 1).<sup>1,2</sup>

In 1999, the Food and Drug Administration approved as a treatment the intra-articular injection of hyaluronic acid (HA), also known as viscosupplementation (VS). Since then, it has gained interest in our common practice, even though hip injections are a difficult procedure to perform in the clinic and office with local anesthesia and guided ultrasonography (USG); in addition, this procedure is known to be painful because it is performed with the patient awake. There is another surgical technique that is performed in the operating room with the use of fluoroscopy and a hip distractor, the patient under anesthesia, and with nitinol guide-wires or a cannulated needle (this is the preferred technique by the main author, A.P.S.).<sup>3-5</sup>

Injection of the hip is considered a diagnostic-therapeutic procedure, with a sensitivity of 87% and

From Hip Arthroscopy Mexico, San Pedro Garza García, México (A.P.S., D.L.-M., H.V.-V.); San Pedro Orthopedic Group, San Pedro Garza García, México (J.L.P.L.-A., D.T.-V., R.A.P.-V.); Loma Linda California University, Loma Linda, California (J.C.Q.); and Ortopedika Hospital Hip Unit, Warsaw Poland, Collegium Medicum Jan Kochanowski University, Orthopaedic and Trauma Clinic Hospital, Kielce, Poland (J.M.).

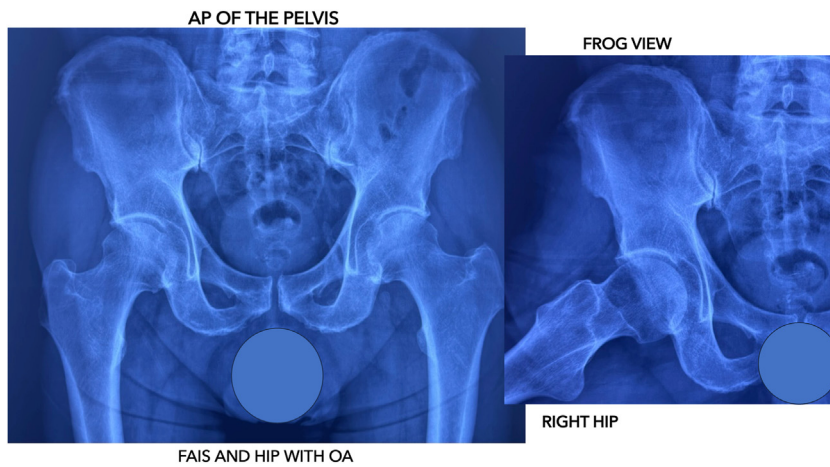
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Address correspondence to Antonio Porthos Salas, M.D., Hip Arthroscopy and Preservation Mexico, Montes Rocallosos 209, 66290 San Pedro Garza García, Nuevo Leon, Mexico. E-mail: [hip.arthros@gmail.com](mailto:hip.arthros@gmail.com) or [dr.porthosalas@gmail.com](mailto:dr.porthosalas@gmail.com)

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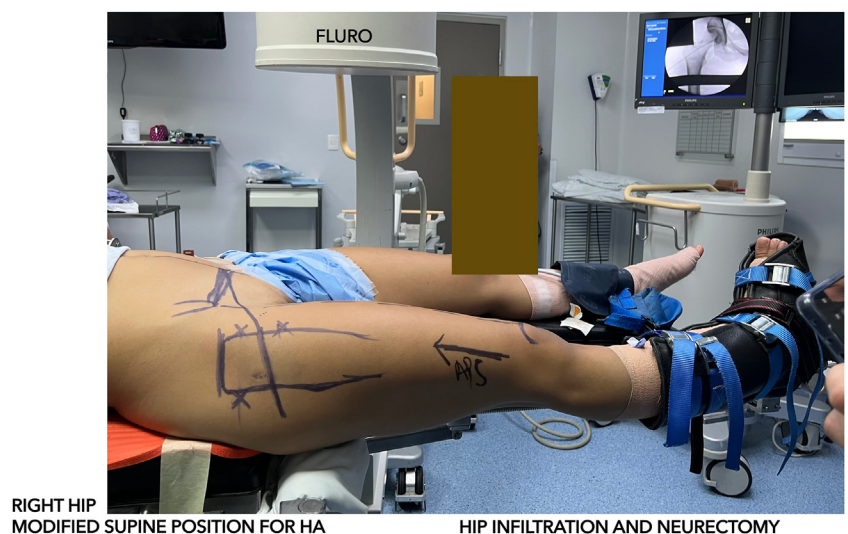
**Fig 1.** Anteroposterior (AP) of the pelvis and frog view in a patient with right hip pain. Tönnis grade II arthritis is observed.

specificity of 100%, and it helps to differentiate between an intra-articular pathology versus an extra-articular pathology or a neuropathic pain. There are multiple lines of treatment, which include corticosteroids, VS with HA, and injections with platelet-rich plasma. Most of the HA-VS cocktails produce immediate pain relief seconds after their application compared with cortisone injected alone. The use of steroids carries clinical importance in the orthopaedic and joint-preservation field, and it has been found in some clinical trials to have chondrotoxicity; however, in recent publications, this has not been demonstrated in vivo. Care must be taken when patients are scheduled for hip surgery after the injections, because of the high risk of infection.

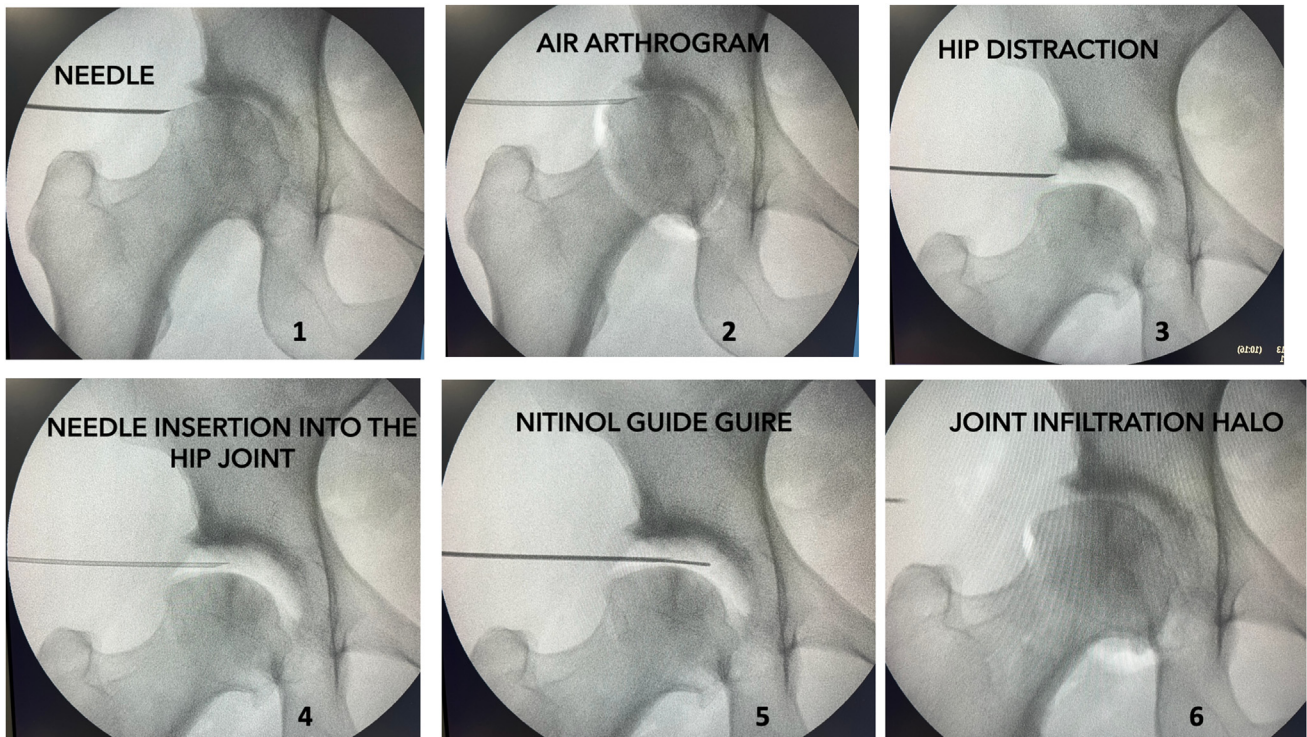
It has been shown that HA-VS injection reduces the inflammation cascade in an arthritic joint; likewise, it will improve the symptoms of patients with FAIS and labral tears, as described in this Technical Note.<sup>6</sup>

Radiofrequency nerve ablation has been studied and has begun to be implemented more frequently in patients with mild OA and also those with high comorbidities and those who do not wish to undergo surgery. Radiofrequency is an interventional technique consisting of the emission through an electrode capable of producing heat waves and an electromagnetic effect on the surrounding tissue. The femoral nerve and the obturator nerve have been studied as the main sources of innervation of the hip capsule, and these nerves and their branches are responsible for the cause of pain perceived in the inguinal, posterior, and lateral region of the thigh that frequently radiates to the knee (Fig 1). Nerve blocks with conventional or pulsed radiofrequency of the hip include the blockage of these 2 sensory nerves. It has been found that the ligamentum teres also represents a cause of joint pain due to the pressure of proprioceptive and nociceptive fibers attached to the ligament fibers.<sup>7-11</sup>

**Fig 2.** Modified supine position (hip arthroscopy position) for hip infiltration under distraction plus neurectomy of the femoral and obturator nerve.



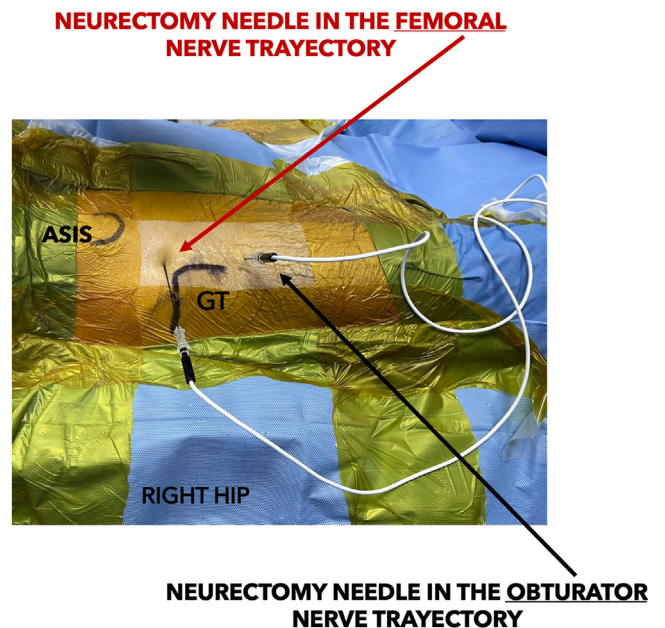




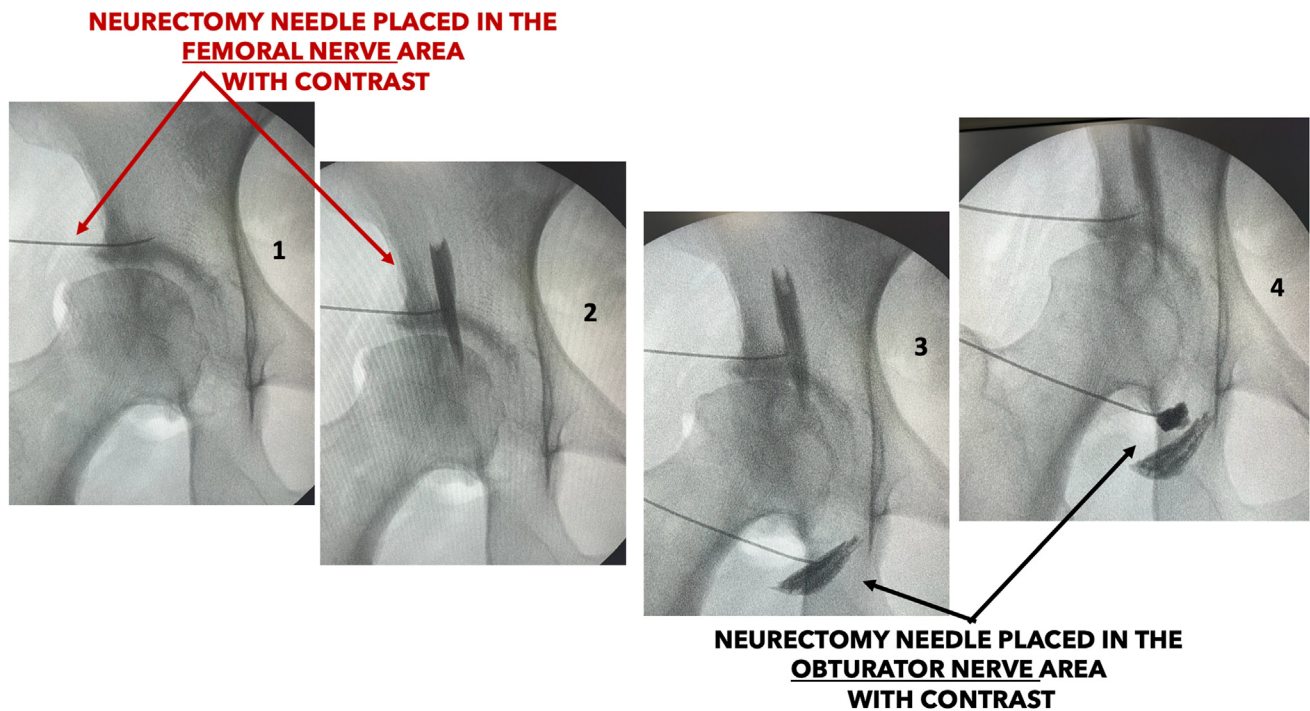
**Fig 3.** First step of the procedure: Injection of the hip joint with hyaluronic acid under hip distraction. From left to right, 1-6: the needle is directed to the hip capsule (1), air arthrogram is used to break the suction seal (2), fine distraction (3), needle insertion into the hip joint (4), nitinol guidewire is introduced through the cannulated needle (5), and removal of the needle and the distraction (6).

### Surgical Technique

All patients are positioned in the hip arthroscopic modified supine position (Fig 2). All patients undergo anesthesia under full cardiovascular monitoring by the anesthesiologist. In addition, hip portals or punctures are anesthetized with a local lidocaine injection. The hip is prepared and draped in a standard and sterile fashion, fluoroscopic control is mandatory for needle placement, and fine and gross hip distraction is performed with the use of the specialized hip distraction table (ArthroMEX; San Pedro Garza, Garcia, NL, Mexico). A guide pin system (GPS) with a 16-gauge needle (Parcus Medical, Sarasota, FL) is introduced toward the hip joint with the use of fluoroscopy, venting the joint is necessary to break the suction seal of the joint. This is done with a 20-mL air syringe. Posteriorly, the nitinol guidewire is passed through the cannulated needle toward the acetabular fossa and cartilage until resistance is felt, which is corroborated with fluoroscopy (Fig 3) (this assures that you are exactly in the hip joint). Posteriorly, 4 mL of Cingal Hyaluronic acid solution (cross-linked sodium hyaluronate 88 mg and triamcinolone hexacetonide 18 mg; Anika Therapeutics, Sarasota, FL) plus 2 mL of 7.5 mg ropivacaine (2 cc) (PISA Farmaceuticos, Guadalajara, Jalisco Mexico), with a total of 6 mL of solution is administered inside the hip joint (Fig 3).



**Fig 4.** Right hip in the modified supine position. The anterosuperior iliac spine (ASIS) and the greater trochanter (GT) are marked as anatomical landmarks. Observe that the femoral nerve probe is located at the anterolateral (AL) portal for hip arthroscopy and the obturator nerve probe is located at the distal anterolateral accessory (DALA) portal for hip arthroscopy.



**Fig 5.** Second step of the procedure: Neurectomy of the femoral and obturator nerve. (1) The needle is directed to the anterior-inferior iliac spine. (2) Contrast material is injected at the fat pad of the femoral nerve. The needle is directed toward the anterior border of the ischium toward the obturator nerve (3) and injection of contrast material to the obturator nerve fat pad is performed (4).

After this, traction is removed and fluoroscopic control is taken. When one observes a halo shadow in the hip joint, posteriorly range of motion of the hip is applied by the surgeon to distribute the medication inside of joint. Then, hip distraction is removed and we proceed to anatomically and fluoroscopically to localize the femoral nerve passage near the anterior inferior iliac spine with a 15-cm neurectomy cannula with a 10-mm active tip. This is placed 1 cm superior and 1 cm medial from the greater trochanter, close to the anterolateral portal in hip arthroscopy. Posteriorly, the cannula is directed toward the acetabulum at the anterior inferior iliac spine, contrast material is applied to observe the femoral nerve fat pad, and posteriorly sensory stimulation is performed from 0.5 to 1.5 Hz as we seek to emulate the pain area. If positive, motor stimulation is performed from 0.5 to 1.5 Hz; when no motor response is found, 2 mL of ropivacaine is injected and the neurectomy starts at 65°C for 2 minutes. Posteriorly the cannula is directed toward the obturator nerve, which is located at the anterior ischial tuberosity border at the inferior region of the acetabulum, a teardrop with an anterior to posterior and medial inclination (located at the distal anterolateral accessory portal for hip arthroscopy) (Fig 4). Sensory stimulation is performed from 0.5 to 1.5 Hz as we seek to emulate the pain area. If positive, motor stimulation is performed from 0.5 to 1.5 Hz; when no motor response is

found, 2 mL of ropivacaine is injected and we proceed to perform neurectomy at 65°C for 2 minutes. For study purposes, we always apply 1 cc of contrast material solution to corroborate the location of the femoral nerve and obturator nerve fat pad in these anatomical areas (Fig 5, Video 1).<sup>12-15</sup>

## Discussion

HA joint injection does not have better results in terms of pain reduction when compared with placebo or steroid use; steroids have been shown to reduce pain earlier, whereas HA is more important in decreasing pain and the progression of OA long term. Kumar et al.<sup>6</sup> reported that there are multiple nociceptive endings both in the labrum and in the joint capsule, in addition to the fact that the anterosuperior and posterosuperior part of the acetabular labrum has a greater number of nociceptive cells. They report that the anterosuperior portion of the joint capsule is the portion with less sensitivity and is known as the “safe zone,” although the anterior portion of the hip joint is the one with the greatest proportion of nerve endings. They also report that the use of a fluoroscope optimizes the site injection and improves the certainty of nerve blockade, which is why most of the studies report greater efficacy when using a fluoroscope.

Cortiñas-Saénz et al.<sup>4</sup> mention that the sensory innervation of the hip joint is complex. Conventional



radiofrequency blockade or neurectomy of the sensory articular branches of the obturator and femoral nerves could be effective in treating pain caused by hip disease and therefore could be an option in certain circumstances. Additional studies of high methodologic quality, preferably randomized and with a long-term follow-up period, are needed to corroborate the published results. Chandrasekaran et al.<sup>7</sup> in their review found that the application of steroids significantly improved pain and range of motion in patients with OA and that the improvement was maintained at the 6- and 12-week follow-up. In one group, they administered a dose of 40 mg of steroids and in another 80 mg, and they observed that the 80-mg group had greater improvement at 12 weeks compared with the 40-mg group. In patients with FAIS, the indiscriminate use of steroids is not recommended because of the risk of chondrotoxicity.

Kapural<sup>8</sup> compared nerve blockage or neurectomy versus radiofrequency as therapeutic options for hip pain management. No difference was shown between groups, with the author able to use both techniques, both options significantly improved pain, and both techniques were reproducible and effective. Bardowski and Byrd<sup>14</sup> published their experience with a USG-guided joint injection as a diagnostic-therapeutic procedure without the application of anesthesia in subcutaneous cellular tissue to discriminate between articular versus extra-articular pathology that could be masked with the use of subcutaneous anesthetic. The recommendation they make for joint injection is to direct it from the most lateral region to reduce the risk of contact with the neurovascular bundle. In addition, they refer to the disadvantages of USG, mentioning it as an operator-dependent study with poor precision in patients with obesity. Villanova-López et al.,<sup>15</sup> in a comparative analysis between the use of platelet-rich plasma versus hip infiltration with HA, found similar benefits between the use of both compounds when used in the initial stages of hip OA grade I-II.

HA injections to the hip in conjunction with femoral and obturator nerve blocks have proven to be effective in reducing pain, gaining hip mobility, and improving quality of life in patients with hip pain. The technique performed by the senior author (A.P.S.) in the operating room is considered safe, minimally invasive, and 100% effective as a result of the use of a cannulated needle and nitinol guidewire. This technique is performed with a more lateral access with a reduced risk of neurovascular structure damage with minimal complications such as pain at the puncture site. To our knowledge, is the only technique performed through lateral access in the operating room and with hip distraction to enter the hip joint and in conjunction with neurectomy or nerve blockage.

## Disclosures

The authors report no conflicts of interest in the authorship and publication of this article. Full ICMJE author disclosure forms are available for this article online, as [supplementary material](#).

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