

## Successful relief of hip joint pain by percutaneous radiofrequency nerve thermocoagulation in a patient with contraindications for hip arthroplasty

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### Introduction

Hip arthroplasty has been the most common surgical method for the treatment of pain in the hip joint due to coxarthrosis. However, the operation is contraindicated for some patients in view of the presence of concurrent somatic diseases. Several authors have proposed denervation of the hip joint to eliminate pain, depending on the share of the obturator nerve in the innervation of the hip joint [1–4]. Recently, peripheral nerve block of the articular branch of the obturator nerve was reported to be useful to relieve hip pain and to help determine the origin of the pain [5]. In order to eliminate pain due to coxarthrosis in patients with contraindications for hip arthroplasty, we performed percutaneous radiofrequency thermocoagulation of the articular nerve branches of the obturator nerve and the femoral nerve successfully for long-term treatment of the hip joint pain.

### Case report

A 59-year-old woman with a history of severe left coxalgia and lymphedema of her left lower extremity presented to our pain clinic. It was suggested that the severe lymphedema was a complication of radiation therapy for uterine cancer. Her left lower extremity had been infected several times, rapidly developing to destructive coxopathy in her hip joint. She had been complaining of constant and severe pain in her thigh, back,

and groin for years. She experienced gradually worsening pain in the inguinal, thigh, and hip area to the level that she could not walk, sit, take care of herself at home, and sleep well. She was only able to ambulate with a wheelchair. The pain was constant, severe, sharp, and deep in her thigh, groin, and hip. It radiated to the left anterior knee at times. Past conservative drug therapy had failed. Hip arthroplasty was contraindicated because of the presence of severe lymphedema and the high risk of infection. The hip x-ray indicated severe bilateral hip joint destruction. MRI of pelvis also indicated severe bilateral hip joint degeneration and destruction.

A block test using local anesthetics with 3 ml of 1% lidocaine and 1 ml of contrast medium was performed on the left articular nerve branches of the obturator nerve through the anteromedial approach. After diagnostic block, the pain in her groin and anterior thigh disappeared immediately, but the pain in her back and lateral thigh did not improve significantly. One week later, we performed a combined block test using local anesthetics with 3 ml of 1% lidocaine and 1 ml of contrast medium on the left articular nerve branches of the obturator nerve and the femoral nerve through the anteromedial and anterolateral approaches. After combined diagnostic block, the patient immediately noted improvement of pain and ability to walk with a cane and sit on a chair. Rest pain disappeared and motion pain decreased from 9–10 to 1–2 on a visual analogue scale (VAS). We decided to perform percutaneous radiofrequency thermocoagulation of these two sensory nerves under assessment of block test after obtaining informed consent. For thermocoagulation of articular nerve branches of the obturator nerve, the patient was placed supine with her left leg in slight abduction on the fluoroscopy table. A 22 gauge Sluiter-Mehta-Kit needle (Radionics, Burlington, MA, USA) 100-mm electrode with a 4-mm exposed tip was used to coagulate the nerve using current supplied by a Radio Frequency

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**Fig. 1.** X-ray showing proper placement of needle to the articular nerve branches of the obturator nerve

Generator (Radionics model RFG-34f). A skin wheal was raised lateral to the pubic bone and below the inguinal ligament, using 2 ml of 1% lidocaine, and the needle was advanced perpendicularly through the skin wheal until it reached the superior ramus of the pubic bone and was redirected to pass underneath it. The position of the needle was moved so that its tip traveled slightly until it entered the obturator canal. Precise needle placement was verified by electrical stimulation of the target nerve. At less than 0.7 V, with sensory stimulation at 50 Hz, attempts were made to cause paresthesia and elicit exact or close reproduction of the patient's usual pain to her left groin and anterior thigh area. If the patient felt stimulation at a threshold of less than 0.7 V, this was accepted as confirmation that the needle tip was close to the nerve. After the stimulation criteria had been met, the position was checked by negative aspiration and the injection of 1 ml of contrast medium, and the nerve was anesthetized with 2 ml of 2% lidocaine. Then a radiofrequency lesion of the obturator nerve was carried out at 90°C over 180 s exposure (Fig. 1).

Coagulation of the articular nerve branches of the femoral nerve was carried out at the point of its exit from the hip joint capsule (Fig. 2) [6]. The needle was inserted by the anterolateral approach. Under fluoro-



**Fig. 2.** X-ray showing proper placement of needle to the articular nerve branches of the femoral nerve

scopic control, redirection of the needle was performed until stimulation of the nerve by less than 0.7 V at 50 Hz reproduced the usual pain of the patient's left hip and lateral thigh area. The position was checked by the injection of 1 ml of contrast medium, and the nerve was anesthetized with 2 ml of 2% lidocaine. Then a radiofrequency lesion of the articular branch of the femoral nerve was carried out at 90°C over 180 s of exposure.

After the procedure, the patient had dramatic relief of pain. Rest pain disappeared and motion pain decreased from 9–10 to 1–2 on a VAS score. The patient had immediate analgesia and improved ability to ambulate with a cane for 6 months. The patient was able to return to her usual activity at home and sleep well without the use of nonsteroidal antiinflammatory drugs (NSAIDs). Satisfactory pain relief was noted, which lasted for more than 4 months. There were no complications related to the procedure.

The patient reported a gradual recurrence of pain 6 months following the treatment and needed NSAIDs for recurrent pain. However, 2 years after radiofrequency thermocoagulation treatment, severe pain was still in remission and the patient was able to ambulate with a cane and take care of herself at home and sleep well with NSAIDs.

## Discussion

According to the report by Gardner et al. [6], the hip joint is supplied by articular branches of the obturator nerve, the femoral nerve, and the superior gluteal nerves from the sciatic nerve (the articular branch of the nerve to the quadratus femoris). Among these nerves, the most important innervations to the hip joint are branches of the obturator nerve and the femoral nerve [6].

The obturator nerve travels along the obturator canal into the thigh, dividing into posterior and anterior branches. The anterior branch supplies an articular branch to the hip joint and to the anterior adductor muscles and cutaneous branches to the lower inner thigh [6].

The articular branch of the obturator nerve supplies the anteromedial portion of the capsule and pubofemoral ligament [6,7]. The articular branch of the femoral nerve arises from the nerve to the pectineus [6]. Additionally, the anterior hip joint capsule is innervated by sensory articular branches from the femoral nerve [6,7].

Typically obturator nerve blockade is used to relieve or diagnose hip joint pain [5]. Akatov et al. reported percutaneous radiofrequency destruction of the obturator nerve for treatment of pain caused by coxarthrosis [1]. However, it sometimes has only a minor effect in resolving symptoms. Other anatomical studies [6,7] have demonstrated that obturator nerve block is insufficient for the treatment of hip joint pain. Effective neural blockade of the hip joint had to include the articular branch of the femoral nerve in our patient. In our case, peripheral nerve test blocks of the articular branch of the obturator or femoral nerve were used to help determine the origin of the pain.

In our case, the patient selected for denervation was one who had not been relieved by standard conservative therapy, and surgical operation for coxarthrosis was contraindicated in view of the presence of lymphedema. When there is a good anesthetizing effect of a diagnostic test nerve block, radiofrequency thermocoagulation of the articular branch of the obturator or the femoral nerve is indicated. We were able to eliminate pain due to coxarthrosis by performing percutaneous radiofrequency thermocoagulation of the articular nerve branches of the obturator nerve and the femoral nerve. The patient did not have residual motor deficits consequent to radiofrequency lesioning. Because we did not

completely destroy the articular branches of the obturator nerve, as is done in facet thermocoagulation [8], the patient did not experience motor deficit.

Our case is the first report of successful percutaneous radiofrequency thermocoagulation of the articular nerve branches of the obturator nerve and the femoral nerve in a patient suffering from chronic coxarthrosis. Our case report is significant for two reasons. First, chemical neurolysis is associated with the possibility of development of neuritis and deafferentation pain [4]. Compared with nerve destruction by chemical substances [4], percutaneous radiofrequency thermocoagulation is superior in this respect. Second, percutaneous radiofrequency thermocoagulation using a 22 gauge needle is less invasive than cryoanalgesia [4], which requires a 14 gauge needle. This is an advantage in a patient with severe lymphedema and a high risk of infection.

In summary, we reported a patient with contraindications for hip arthroplasty in whom percutaneous radiofrequency thermocoagulation of sensory nerves innervating the hip joint was effective for the treatment of severe chronic pain induced by osteoarthritis. Well-controlled studies may be needed to determine the overall effectiveness of this form of therapy in patients who have intractable hip pain.

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