OBTURATOR neurolysis with alcohol or phenol is a common treatment for hip adductor spasticity resulting from spinal cord injury, stroke, or multiple sclerosis. Unfortunately, chemical neurolysis is associated with the possibility of development of neuritis and deafferentation pain. Cryoneurolysis represents a potential alternative to chemical neurolysis because of the attendant low incidence of neuritis and neuroma formation. Cryoanalgesia also has never been reported for the relief of pain of obturator neuralgia secondary to several diverse origins (e.g., pelvic fractures, malignancy, endometriosis). Using an interadductor approach with fluoroscopy, we report the successful long-term relief of hip adductor spasticity and neuralgic pain without adverse sequelae by cryoneurolysis of the obturator nerve.

**Case Reports**

**Case 1**

A 72-year-old woman with central spasticity resulting from multiple sclerosis was referred for a trial of subarachnoid baclofen, and if successful, implantation of a permanent subarachnoid catheter and implanted programmable pump. Conservative pharmacologic management with oral baclofen, dantrolene, and tizanidine had failed. The trial of subarachnoid baclofen was successful, and implantation occurred. Postoperatively, the patient had reduced spasticity in the lower extremities, except for bilateral hip adductor spasticity, which limited ambulation. Increasing the dose and rate of the baclofen infusion via the programmable pump led to a loss of muscle tone in the lower extremities (including the hip adductors), causing inability to ambulate. It was decided to attempt bilateral cryoneurolysis of the obturator nerves in lieu of chemical neurolysis after successful (but temporary) relief of spasticity with two obturator nerve blocks, each with 10 ml of 0.25% bupivacaine. The patient was brought to the fluoroscopy suite and placed in the supine position with maximal abduction of her hips. Patient monitoring included blood pressure, electrocardiogram, and oxygen saturation. No sedation was given. The C-arm was positioned to obtain an obturator view of the pelvis with visualization of the obturator canal (fig. 1). A skin wheal with 1% lidocaine was made 2 cm lateral and caudad to the pubic tubercle. A 14-g intravenous catheter was inserted perpendicularly through the skin wheal, affixed to the superior ramus of the pubic bone, and redirected to pass underneath it. The needle was directed parallel to the axis of the obturator canal using fluoroscopic guidance until it reached the upper lateral quadrant of the obturator foramen (as viewed fluoroscopically). The needle of the intravenous catheter was removed, and a blunt 1.3-mm diameter cryoprobe was inserted (fig. 1). Minor redirection of the cryoprobe was performed until motor stimulation at 2 Hz induced contraction of the hip adductor muscles at <0.5 V. Two freeze-thaw cycles of 3-min duration were used. A similar technique was used on the contralateral side.

Immediately after the procedure, the patient had a decrease in Ashworth score in the hip adductors from 3 (considerably increased muscle tone, passive movement difficult) to 1 (slightly increased muscle tone; a catch is present on adduction or abduction). Follow-up evaluation revealed continued relief of spasticity for a duration of 5 months.

**Case 2**

A 58-year-old woman with metastatic breast carcinoma and known blastic lesions bilaterally along the posterior pelvic brim (as seen on roentgenography) presented with right medial thigh pain. The pain was described as a constant ache, greatly exacerbated by attempted ambulation, and it radiated from her pelvis to the right medial thigh. By observation, the patient appeared to be in significant pain on transfer from wheelchair to examining table. Passive and active range of motion of the right hip, and internal and external rotation, in particular, elicited pain. Motor strength was 4/5 regarding right hip adduction. Reflex and sensory examination were normal. Multiple blastic lesions were noted in the thoracic spine on magnetic resonance imaging. Other than the blastic lesions noted along the posterior pelvic brim, roentgenography was conspicuous for the absence of lesions around the obturator foramen.

The patient had received palliative radiation therapy and was currently undergoing chemotherapy with tamoxifen. Her current analge-
The obturator nerve descends and emerges from the medial border of the psoas muscle at the pelvic brim. The nerve curves downward and forward along the pelvic wall and leaves the pelvis through the obturator foramen to enter the thigh. Motor branches supply the external obturator and gracilis muscles and the hip adductor muscle group. Sensory branches provide innervation to the hip joint, knee joint, and the medial portion of the thigh.

Spasticity of the lower extremities, and spasticity of the hip adductor muscle in particular, is a major source of disability in patients with a diverse range of neurologic diseases. Physical therapy, oral pharmacologic therapy (dantrolene, oral baclofen, tizanidine), subarachnoid infusion of baclofen,\textsuperscript{10,11} chemical neurolytic blocks,\textsuperscript{1-5} and orthopedic and neurosurgical techniques\textsuperscript{14} have been used in its management. Oral pharmacologic therapy is frequently ineffective or only partially effective or associated with untoward and intolerable side effects. This has led to the increasing popularity of implanted systems for subarachnoid infusion of baclofen.\textsuperscript{10,11} Chemical neurolysis\textsuperscript{1-5} with alcohol or phenol is frequently used to manage spasticity but is associated with the risk of development of neuralgia, deafferentation pain, and unintentional soft-tissue injury by spread of the neurolytic agent to adjacent tissues.\textsuperscript{7,8}

Cryoneurolysis represents an alternative to chemical neuroablative procedures. Alcohol and phenol cause Wallerian degeneration, damaging nerve axons and Schwann cells with attendant disruption of the myelin sheath. Neuritis and deafferentation pain may result.\textsuperscript{7,8} Although Wallerian degeneration occurs with cryoanalgesia, the Schwann cell basal lamina and the epineurium and perineurium remain intact. This assures that regeneration occurs and may decrease the likelihood of development of neuritis or neuroma.\textsuperscript{7,8} Given the popularity of chemical neurolysis for the treatment of spasticity, the applicability of cryoneurolysis is potentially widespread.

Moreover, the amount of soft-tissue damage is minimized with freezing, as damage is dependent on the size of the ice ball at the cryoprobe tip. Size of the ice ball is determined by the size of the cryoprobe tip, the duration of freezing, permeability of the tissue to water, and the presence of a vascular heat sink.

Our case reports are unique for two reasons: (1) we describe the novel use of cryoneurolysis of the obturator nerve for the treatment of spasticity of the hip adductor and obturator mononeuropathy of malignant origin; and (2) the described technique represents a
modification of previously published approaches to obturator neural blockade.\textsuperscript{10} Although use of nerve stimulation is mandatory for cryoneurolysis, fluoroscopic visualization of the axis of the obturator canal in an oblique view (fig. 1) facilitates localization of the obturator nerve via\textsuperscript{13} stimulation. This is important because most regional techniques for obturator nerve block rely on the volume of local anesthetic agent to achieve neural blockade.\textsuperscript{11,15}

Cryoneurolysis of the obturator nerve can be performed successfully for long-term treatment of spasticity of the hip adductors and neuralgia. The technique described in these case reports represents an alternative to chemical neurolysis for the treatment of spasticity and potentially has wider applicability.

References


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