

Treatment of a symptomatic cervical perineural cyst with ultrasound-guided cervical selective nerve root block

A case report

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Abstract

Rationale: Symptomatic cervical perineural cysts are extremely rare, and they cause radicular pain by compressing the cervical nerve root. Several methods have been applied to manage the radicular pain induced by cervical perineural cysts, including medication, percutaneous procedures, and surgery. However, these methods are associated with various outcomes and complications. The percutaneous procedure is simple and easy to perform, but if the perineural cyst wall is punctured, it can lead to secondary complications, which include aseptic meningitis and intracranial hypotension.

Patient concerns: A 51-year-old woman presented with a dull pain in the left shoulder and a tingling sensation in the left dorsal arm, hand, and middle finger.

Diagnosis: The patient was diagnosed with left C7 radicular pain caused by a perineural cyst.

Interventions: The left C7 radicular pain did not respond to treatment with medication. Therefore, a left C7 nerve root block with local anesthetics and steroids was performed under ultrasound guidance. Adjunctively, real-time fluoroscopy with contrast was used to avoid intravascular injection.

Outcome: The symptoms resolved without any complications.

Lessons: In this case, perineural cyst-induced radicular pain, which was resistant to medication, was treated using ultrasound guided cervical selective nerve root block with local anesthetics and steroids. Ultrasound guidance can enable successful cervical selective nerve root block without perineural cystic wall puncture. Therefore, ultrasound-guided cervical nerve root block is an effective treatment option for radicular pain caused by a symptomatic perineural cyst.

Abbreviations: C7 = 7th cervical, CSF = cerebrospinal fluid, MRI = magnetic resonance imaging, NRS = numeric rating scale.

Keywords: cervical spine, epidural analgesia, perineural cyst, selective nerve root injection, ultrasound

1. Introduction

A perineural cyst, also known as a Tarlov cyst, is a cerebrospinal fluid (CSF)-filled sac that is located at, or distal to, the junction of the posterior nerve root and the dorsal ganglion. They occur between the endoneurium that arises from the pia mater and the perineurium that arises from the arachnoid mater, and the walls of these cysts contain nerve fibers. There is only a potential communication between the cyst and the intrathecal space; thus,

CSF cannot influx or efflux freely.^[1] These cysts occur mainly at the sacral region and are typically asymptomatic.^[1,2]

Symptomatic perineural cysts are uncommon and a consensus regarding the treatment of this condition has not yet been established. Furthermore, cervical symptomatic perineural cysts are extremely rare and treatment options are also limited. The incidence of perineural cysts in the lumbosacral area is 4.6%; however, cervical perineural cysts are quite rare, and their incidence has yet to be studied.^[3] Only 5 cases of symptomatic cervical perineural cysts have been reported.^[3–7] This may be attributed to the fact that perineural cysts are typically asymptomatic and are identified incidentally during radiologic examination for other diseases.^[8] Here, we report the first case in which successful treatment of a symptomatic cervical perineural cyst was achieved using ultrasound-guided cervical selective nerve root block with local anesthetics and steroids. Informed written consent was obtained from the patient for publication of this case report and accompanying images.

2. Case report

A 51-year-old woman presented to our clinic with pain in the left shoulder and a tingling sensation in the left dorsal arm, hand, and middle finger that had been present for 5 months without any causative episode. The patient had no significant medical history.

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The authors report no conflicts of interest.

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Before the visit to our clinic, she was treated with oral pregabalin (300 mg/day), duloxetine (30 mg/day), and tramadol (100 mg/day). However, the patient's symptoms did not respond to this treatment. The patient complained of a dull, constant pain that extended over the left 7th cervical (C7) dermatome. The pain was rated as 3/10, continuously, and it periodically increased to 7/10, based on a numeric rating scale (NRS) from 0 (no pain) to 10 (worst pain imaginable). There was no clear aggravating or relieving factors reported during the patient history taking. On physical examination, Spurling test was positive on the left side. The patient showed normal motor and sensory functions. The deep tendon reflexes of the brachioradialis and triceps muscles were normal.

Magnetic resonance imaging (MRI) of the cervical spine revealed a perineural cyst that was compressing the left C7 dorsal root ganglion. The cyst appeared hyperintense on the T2-weighted image, and it was hypointense on the T1-weighted image (Fig. 1). Because no improvement was observed in response to the previously prescribed medications, we decided to perform a left C7 selective nerve root block. The procedure was performed under the guidance of real-time ultrasound to avoid fenestration of the perineural cyst. First, a high-frequency linear array transducer was used to identify the left C7 transverse process through the axial sonographic view. The left C7 nerve root and perineural cyst were then identified by sliding the transducer slightly upwards. A 22-gauge sharp needle (Hakko Co., Chikuma-shi, Nagano-ken, Japan) was inserted using an in-plane technique from an initial posterolateral position to a more anteromedial position; using real-time ultrasound guidance, it was placed close to the left C7 nerve root, avoiding puncture of the cyst and surrounding vessels (Fig. 2). After confirmation of no intravascular injection, using real-time fluoroscopy with contrast (Fig. 3), a mixture of 0.5% lidocaine (4 mL) and dexamethasone (5 mg) were injected around the nerve root. After 2 weeks, the pain was completely absent and no complications were observed. At the 2-month follow-up, after the left C7 selective nerve root block, the patient remained symptom free.

3. Discussion

MRI is the most sensitive imaging modality used to detect perineural cysts.^[8] In the present case, cysts were located near the dorsal root ganglion with a hypointense signal through T1-weighted imaging, a hyperintense signal through T2-weighted imaging, and with no gadolinium enhancement. Because these cysts are filled with CSF, the signal intensity is equal to that of CSF.^[9] These are characteristic MRI findings of perineural cysts.

Perineural cysts can be distinguished from other meningeal cysts, which are located proximal to the dorsal root ganglion, contain no nerve fibers on the cystic wall, and sometimes have free communication with the subarachnoid space.^[1] The etiology of perineural cysts is still unclear; however, inflammation, trauma, and congenital causes have been suggested.^[10]

To date, most reports regarding the treatment of perineural cysts have suggested conservative therapies, such as oral medications, percutaneous procedures, and surgeries in the sacral region. A consensus regarding the treatment of perineural cysts has not been achieved because of the variety of outcomes and complications for each method. Percutaneous CSF drainage and lumboperitoneal shunts have only temporary effects.^[11] Percutaneous aspiration of a perineural cyst can cause headaches owing to intracranial hypotension.^[8] Fibrin glue placement of perineural cysts is associated with several complications including aseptic meningitis and CSF leakage.^[12,13] Surgical excision of these cysts can also result in complications involving neural damage, pseudomeningocele, and intracranial hypotension.^[14] Furthermore, secondary complications such as intracranial hypotension, aseptic meningitis, CSF leakage, and neural damage can result from cyst wall fenestration.^[15] Among these various treatment options, epidural steroid injection has been reported to be an effective treatment for perineural cysts, resulting in the relief of symptoms for >3 months without complications.^[14,16]

In the present case, the patient was diagnosed with left C7 radicular pain caused by a perineural cyst based on the history, physical examination, and MRI findings. Given that symptomatic cervical perineural cysts are extremely rare,^[17] only 5

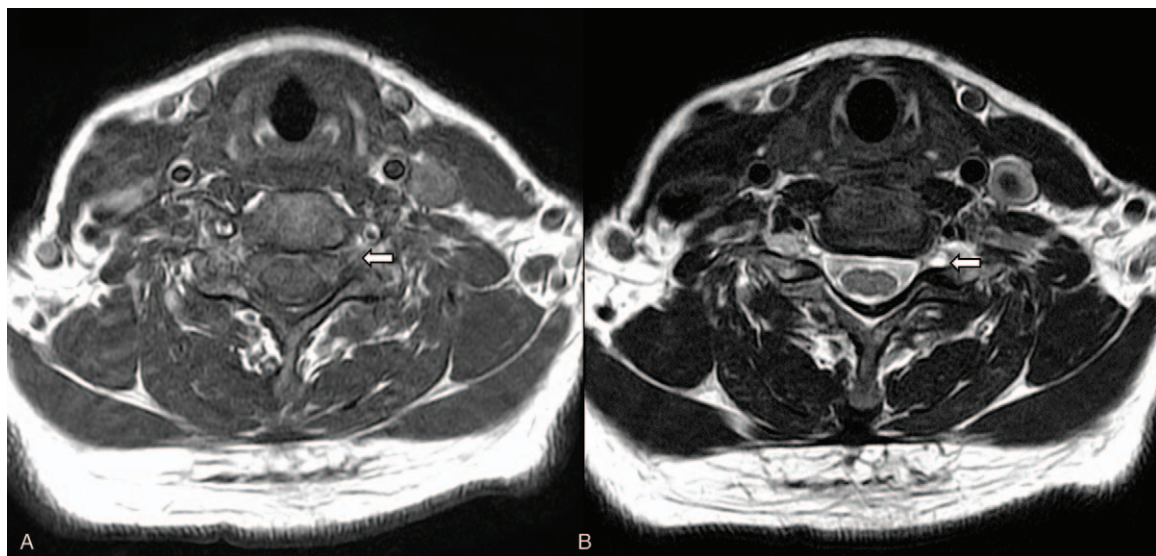


Figure 1. Magnetic resonance image of the cervical spine. Axial images (T1-weighted [A]) and T2-weighted [B]) at the neural foramen between 6th and 7th cervical spines. The perineural cyst (arrow) is hypointense on the T1-weighted image and hyperintense on the T2-weighted image.

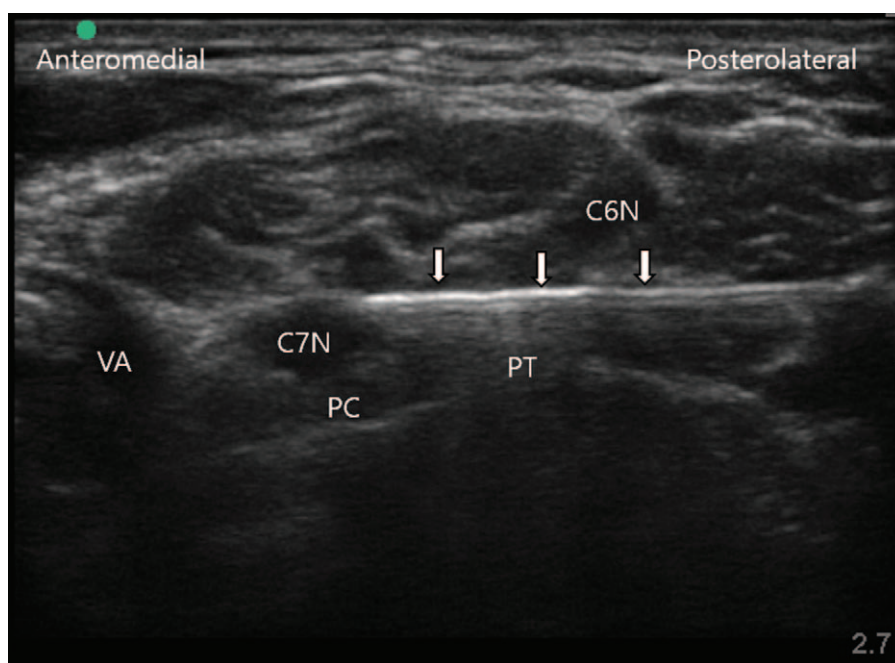


Figure 2. Axial ultrasound image showing 7th cervical (C7) selective nerve root block. The needle tip (arrows) was placed close to the C7 nerve root. C6N = 6th cervical nerve root, C7N = 7th cervical nerve root, PC = perineural cyst, PT = posterior tubercle of the transverse process, VA = vertebral artery.

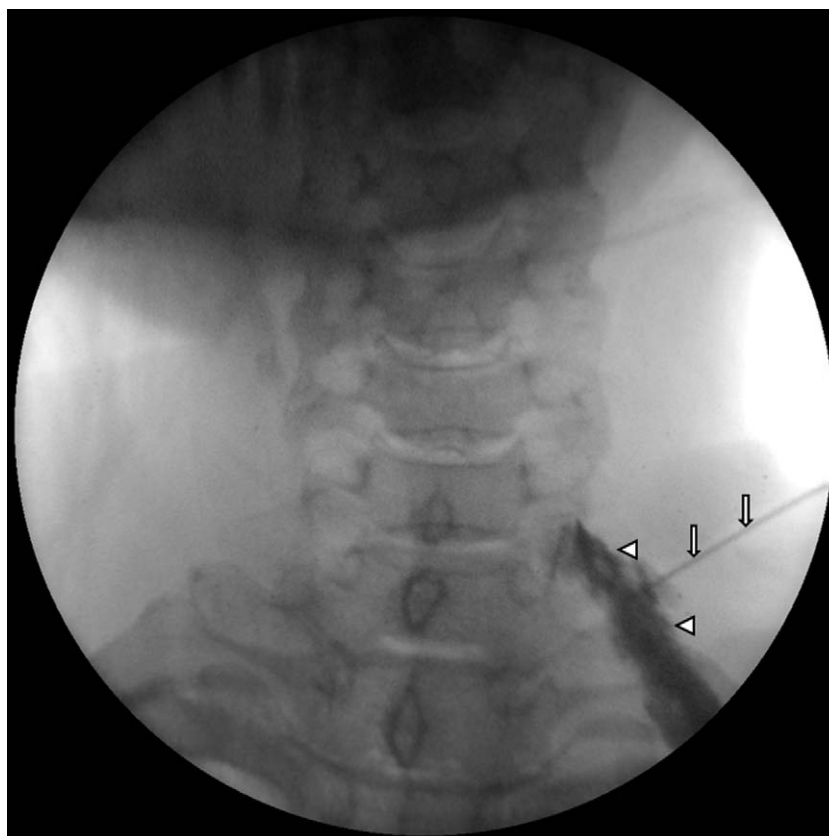


Figure 3. Fluoroscopic image of the cervical selective nerve root block showing spinal needles (arrow) located at the left neural foramen between 6th and 7th cervical spines. Contrast medium is filled along the 7th cervical (C7) nerve root, which shows there was no intravascular injection.

symptomatic cervical perineural cysts have been reported, and the symptoms were treated with oral steroids, nonsteroidal anti-inflammatory drugs, a neck collar, transforaminal epidural steroid injections, or surgical excision.^[3–7] However, in the present case, oral medication did not reduce the neuralgic pain, and we sought alternative treatment options. Nerve root block with steroids and local anesthetics is widely used for the treatment of radicular pain. The postulated mechanisms of action of steroids in the treatment of radicular pain include membrane stabilization, inhibition of neural peptide synthesis or action, blockade of phospholipase A2 activity, and suppression of the sensitization of the dorsal horn neurons. Therefore, nerve root block with steroids has been used to reduce neuropathic pain, inflammation, swelling, and nerve scarring.^[18] Hence, we decided to perform a left C7 selective nerve root block.

During a C7 selective nerve root block, it is possible to puncture the perineural cyst under fluoroscopic guidance because the perineural cyst is not visible through fluoroscopy, and the typical needle position of the cervical nerve root block is near the posterior region of the dorsal root ganglion where the perineural cyst occurs. In previous reports of fluoroscopy-guided transforaminal epidural injection in the treatment of symptomatic cervical perineural cysts, a puncture had occurred.^[3] To avoid this complication, we performed an ultrasound-guided cervical selective nerve root block. This is the first report to describe the use of ultrasound-guided cervical selective nerve root block for the treatment of symptomatic cervical perineural cysts. Ultrasound guidance allows the identification of surrounding vessels, nerves, and soft tissues, and it provides real-time visualization of the trajectory of the needle.^[19] Therefore, we were able to identify the location of the cyst and verify that the block needle did not contact the cyst wall. However, the visualization of small and deep vessels, such as radicular and segmental medullary arteries, is difficult with ultrasound imaging, and there is a risk that intravascular steroid injection through arteries can cause detrimental complications.^[20] Therefore, real-time fluoroscopy with contrast injection should be performed before steroid injection to exclude intravascular injection,^[21] which is what we did in this case study.

In this case, we were able to identify the perineural cyst using ultrasound. However, even if the cyst is not visible using ultrasound owing to a positioning under the bone structure, there is still a benefit to using this imaging modality. The purpose of using ultrasound is not to identify the cyst, but to ensure that the needle does not contact the cyst or puncture it.

In this case, by using the ultrasound-guided selective nerve root block, cervical radicular pain caused by the symptomatic perineural cyst was observed to be relieved without complications during the 2-month follow-up period. However, further follow-up should be conducted to determine the long-term effects of ultrasound-guided selective nerve root block on the symptomatic cervical perineural cyst.

In conclusion, symptomatic cervical perineural cysts are extremely rare. Some of the secondary complications that result from the use of several procedural treatments are related to puncturing the cyst. In the present case, radicular pain caused by perineural cysts was treated by ultrasound-guided cervical

selective nerve root block using local anesthetics and steroids without fenestration of the cyst. Therefore, ultrasound-guided cervical selective nerve root block is a safe and effective procedural option for the treatment of symptomatic cervical perineural cysts.

Author contributions

Methodology: Kilhyun Kim.

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