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C-arm guided caudal epidural block with steroid for management of peripheral nerve sheath tumor-related chronic back pain

Abstract

Peripheral nerve sheath tumors in the pelvis are a severe back and buttock region pain condition. It is characterized by severe dull aching, throbbing-like, and recurrent pain, often triggered by movement or continuous sitting. Surgical excision is used to treat large symptomatic lesions like neurofibromas, although this procedure carries risks. Other treatment options for Peripheral nerve sheath tumors include medical, peripheral nerve blocks, and interventional procedures but C-arm guided caudal epidural block with steroid is a minimally invasive procedure. This procedure is less invasive, safe, and provides immediate results and minimal side effects.

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Keywords: nerve sheath tumor, pain, caudal epidural block

Introduction

Peripheral nerve sheath tumors are soft-tissue sarcomas that originate from peripheral nerves or cells associated with the nerve sheath, such as Schwann cells or perineural cells, and account for approximately 6% of all soft-tissue sarcomas [1]. To peak age of onset is between 30–40 years [2]. Peripheral nerve sheath tumors are rare tumors with a bad prognosis; they make up 5–10% of soft tissue sarcomas, with an incidence of 0.001% in the general population [3].

About 50% of cases are associated with neurofibromatosis type 1 (NF-1), which carries a significant risk for the growth of cancer [4].

Tumors arising from peripheral nerves that are classified as sarcomas; pre-existing tumors that have undergone differentiation; or tumors associated with neurofibromatosis type I (NF I) syndrome. Increased Ras proto-oncogene signaling causes the neuroectodermal autosomal dominant disease NF1, which changes the composition of muscle, bone, and nerve. Peripheral neurofibromas may form in up to 25–50%

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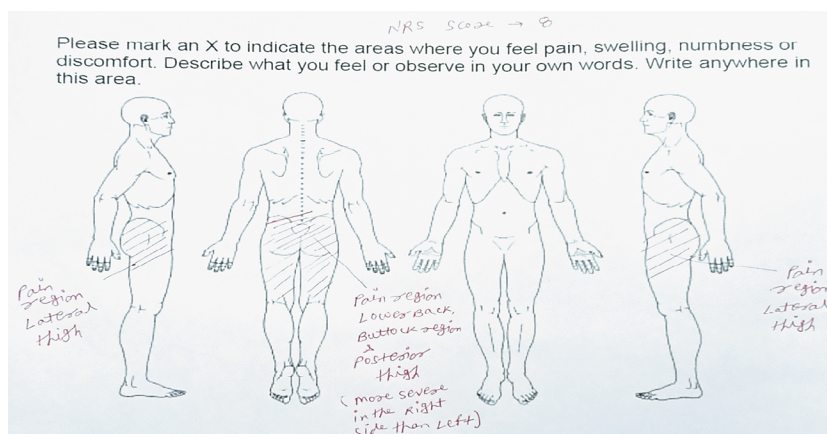


Figure 1. Pain diagram before procedure [11]

of NF1 patients, which can result in a variety of pain manifestations in NF1 patients [5]. Multiple plexiform neurofibromas throughout the body are a clinical manifestation of NF1 syndrome, along with the deletion of the tumor suppressor gene and multiple neurofibromas in the skin and nerves. Malignant peripheral nerve sheath tumors are 8–13% likely to occur in a patient with neurofibromatosis 1 over their lifetime. Common symptoms from the patient include pain, paresthesia, weakness, and other neurological impairments. The sciatic nerve roots are most often impacted. Surgery is necessary if the size exceeds 5 cm due to the possibility of lung metastasis and its malignant potential. Rarely do pleural and bone metastases occur [6].

Non-headache NF1 pain is typically radicular in character due to the involvement of either the peripheral or central nerve [7]. For pain associated with NF1, there are currently no authorized therapies. In the past, patients have sought treatment with non-steroidal anti-inflammatory drugs, such as paracetamol, either by itself or in conjunction with prescription painkillers like opioids, anticonvulsants, and antidepressants [8]. Prolonged low back pain is a significant medical and social issue. One of the most used treatments for low back pain is caudal epidural steroid injections. Indications for caudal epidural steroid injections include various diagnostic dilemmas, Spinal stenosis, axial pain (internal disc disruption), radicular leg pain, localized neural irritation, and postsurgical syndromes. The usefulness of this approach in treating radicular and low back pain is well-supported by the research [9].

Caudal entrance into the epidural space has the advantages of being relatively easy to access and having a low chance of unintentional dural puncture. Although they are uncommon, potential side effects from an epidural steroid injection include bleeding, infection, allergic reaction, nerve damage, numb-

ness and tingling in the lower or upper extremities, headache from a positional dural puncture, epidural hematoma, epidural abscess, pain in the back or lower extremities, steroid side effects (brief hot flashes or flushing, weight gain, increased blood sugar, and mood disturbances). Epidural steroid injection contraindications include bleeding diathesis or complete anticoagulation, localized infection at the injection site or systemic infection, severe allergic reaction or hypersensitivity to corticosteroids, anesthetics, or contrast localized cancer, Diabetes mellitus not under control, congestive heart failure, and pregnancy (caused by fluoroscopy) [10].

Case presentation

An 18-year-old female came to the Palliative Medicine Department of Sawai Man Singh (SMS) Hospital Jaipur with the chief complaint of lower back pain for 8 months. Pain increased in the last 2 months. The pain was continuous in nature and radiated to the buttock and lower limb bilaterally. The pain worsened at night. The patient described the pain as dull aching, throbbing, and severe in intensity. Pain was assessed with a NRS (Numerical Rating Scale) score — 8 out of 10 (Figure 1) [11]. Pain was associated with tingling numbness in the lower limbs in the lateral and posterior aspects of the thigh. Pain is aggravated by continuous sitting for more than half an hour, movement, and activity and is relieved temporarily by rest. No past medical history of trauma or injury to this area. No complaints of fever, chills, bowel dysfunction, bladder dysfunction, and weight loss.

Physical examination was notable for tenderness over the piriformis region; right side positive straight leg raises tests. Flexion, ABduction, and External Rotation (FABER) tests were positive, and tenderness was present in the bilateral sacroiliac region. Lumbar

radiculopathy was highest on the differential given the patient's radicular complaints and positive dural tension signs. Piriformis syndrome was also considered given the tenderness to palpation and reproducibility of pain with muscular stretch.

Contrast-enhanced computed tomography (CECT) whole abdomen and magnetic resonance imaging (MRI) of the pelvis were ordered for further evaluation. CECT whole abdomen showed right exiting nerve root of S2-tubular cystic dilatation extending into the pelvis and measuring approximately 5 cm × 1.5 cm in size and also lobulated mildly enhancing subcutaneous lesion measuring approximately 32 mm × 20 mm is seen in the pelvis on right side extending into sacral neural foramina. MRI pelvis showed findings revealing an elongated T2 hyperintense lesion along the right S1 exiting nerve root appearing hypo-intense extending into the presacral region up to the greater sciatic foramen measuring approximately 5.8 cm in length and 1.8 cm × 2.1 cm in axial plane, these findings suggest a possibility of nerve sheath tumor.

The patient has been diagnosed with peripheral nerve sheath tumor 4 years prior. The patient was prescribed tablet tramadol (37.5 mg) with paracetamol (325 mg) orally three times per day, and tablet gabapentin 300 mg orally twice per day, tablet etoricoxib 90 mg orally per day but showed minimal improvement and few side effects such as dizziness and somnolence. Then the patient is planned for a C-arm guided caudal epidural [8] steroid injection at the Palliative Medicine Department in SMS Hospital Jaipur. An example of medical imaging equipment that uses X-ray technology as its foundation is the C-arm machine. During a procedure, this fluoroscopy instrument is utilized to view the anatomy of the patients in the operating room.

Before they signed a consent document, patients were made aware of any possible risks related to the procedure and the use of steroids. Along with answering questions about the distribution of their symptoms, patients also filled out a pain diagram. In order to analyze the target spinal osseous structure, a multidirectional, high-resolution C-arm was used after the operation theater (OT) had been cleaned and the patient had been positioned in a prone position on the OT table. Vital signs (electrocardiogram, blood pressure monitoring, and pulse oximetry) are monitored throughout the entire procedure. In the patient's right arm, an 18 gauge intravenous catheter was placed and then given intravenous analgesia to increase patient comfort and reduce anxiety.

To keep away too much betadine and alcohol from irritating the genitals and perineum, gauze pads are inserted in the space between the buttocks prior to sterile preparation. The skin is then sterilely

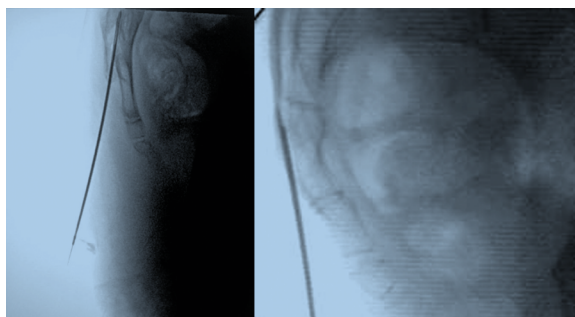


Figure 2. Fluoroscopy C-arm guided caudal epidural block. Proper needle tip placement [12]

treated using povidone-iodine, rinsed with alcohol, and covered with a fenestrated drape. Following that, aseptic precautions were taken throughout the affected area on the affected side. Lidocaine 2% was used to anesthetize the skin and subcutaneous area. Placing the patient in a prone position allows for the palpation and fluoroscopic visualization of the sacral hiatus. Evaluation of the epidural anatomy to determine where to insert the needle. Initially, the C-arm unit is oriented appropriately, and a radiopaque marker is used to indicate the intended puncture site on the skin. The sacral hiatus is reached by ventrally and rostrally advancing a 22-gauge, 3.5-inch spinal needle at the midline (Figure 2) [12].

After inserting a needle through the sacral hiatus in the midline, contrast material is visible throughout the sacral epidural area (approximately 5 mL of contrast agent is administered prior to the radiographs being taken). Injection depot methylprednisolone 80 mg along with 4 mL of 0.25% bupivacaine local anesthetic is administered following the documentation of opacification of the caudal epidural space and the exclusion of venous or intrathecal opacification. To record the injectate's distribution, post-injection films are acquired. Once the procedure was done, the patient was monitored for 30 minutes after the procedure. Post-procedure, the patient was again monitored for 50 minutes in the postoperative unit. The patient's NRS score immediately came down to 4 out of 10. She reported pain relief in 60% and no side effects were reported. After one month a similar procedure was planned for a C-arm guided caudal epidural steroid injection with epidurogram. After the second procedure, she reported pain relief of 80–85%. The patient was pain-free 80 to 90% in the follow-up period (Figure 3) [11].

Discussion

The patient was experiencing uncontrolled lower back and buttock region pain. Pain aggravated on mo-

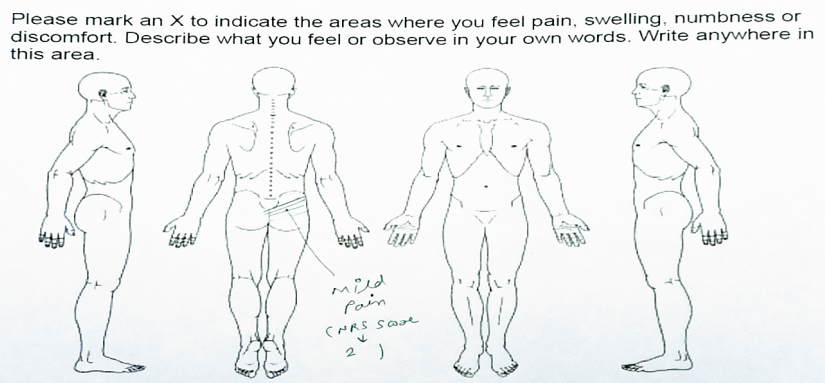


Figure 3. Pain diagram after procedure [11]

vement, working, and associated with throbbing type. The pain was mainly occurring due to a nerve sheath tumor. A nerve sheath tumor (nervous system neoplasm) is mainly composed of the myelin sheath that surrounds nerves. Malignant peripheral nerve sheath tumors are a type of high-grade malignant neoplasm that ranges from benign tumors like schwannomas. In the peripheral nervous system, a nerve sheath tumor is known as a peripheral nerve sheath tumor (PNST) [13]. Schwannomas and neurofibromas are examples of benign peripheral nerve sheath tumors. Because a central or peripheral nerve is involved, nerve sheath tumor pain is typically radicular in nature. Peripheral nerve sheath tumors such as NF1-related discomfort currently have no approved therapies. Sometimes, surgical excision is used to treat large symptomatic lesions like neurofibromas, although this procedure carries risk. Plexiform neurofibromas, in contrast to solitary neurofibromas, carry a considerable surgical morbidity risk. Surgical resection of nerve sheath lesions is limited to tumors causing considerable impairments, as the primary surgical goal for these tumors is symptomatic therapy [14].

According to the patient's history management with either non-steroidal anti-inflammatory drugs, paracetamol, alone or in combination with adjuvant analgesic pain medicines, she has been prescribed tablet tramadol (37.5 mg) with paracetamol (325 mg) orally three times per day, and tablet gabapentin 300 mg orally twice per day, tablet etoricoxib 90 mg orally per day but showed little improvement, while a small number of people encountered adverse symptoms like sleeplessness and lightheadedness. There is limited data on the effectiveness of C-arm guided epidural block and ultrasound-guided perineural region steroid injection, although a few papers describe the use of ultrasound-guided peripheral nerve blocks as a regional anesthetic in NF1 patients before surgical lesion excision [9]. To the best of the authors'

knowledge, this hasn't been extended to treat benign peripheral nerve sheath tumors like the neurofibromas that are present in NF1.

Injections of epidural steroids have been used to treat pain. When used as directed, they are an excellent non-surgical treatment for neck pain that radiates to the arms and, less frequently, low-back pain that radiates to the lower limbs. The steroids must enter the epidural space for an epidural steroid injection to be performed successfully. A successful epidural steroid injection relieves discomfort, restores function, and allows the patient to resume physical therapy as necessary. The transforaminal, interlaminar, and caudal approaches are the three methods for administering epidural steroids. The superior efficacy of caudal epidural steroid injections over interlaminar epidural injections; the capacity to reach the epidural space in challenging situations like postlumbar laminectomy syndrome; and the capability to insert a fiberoptic endoscope via the sacral hiatus into the epidural space [15]. The standard of treatment is to use fluoroscopy or, less frequently, computed tomography (CT) guidance to make sure the needle is positioned correctly utilizing contrast flow. The department's faculty members scheduled a C-arm guided caudal epidural steroid injection for the treatment of chronic back and buttock pain based on the patient's symptoms and physical findings and imaging reports. To the best of the authors' knowledge, this is the first account of neurofibroma-related pain that has been effectively managed with a steroid caudal epidural block. Surgical surgery has significant risks; caudal epidural block with steroids is a safer alternative for managing chronic pain. In order to treat benign nerve sheath tumors such as those observed in NF1 patients, more study is required to determine the effectiveness of fluoroscopy C-arm guided caudal epidural steroid injection. The quality of life improvements after caudal epidural block procedures. Nowadays caudal

epidural block is the best approach for relieving pain management in the peripheral nerve tumor-related chronic back pain.

Conclusions

Fluoroscopy C-arm guided caudal epidural block is a minimally invasive treatment for peripheral nerve sheath tumor-related chronic back pain. It provides adequate pain relief and improves the quality of life. It is a safe and effective alternative method to other surgical procedures and should be considered a treatment option for patients with peripheral nerve sheath tumor-related chronic back pain. Good knowledge of imaging techniques and anatomy is required for successful treatment. In the future there is a need to conduct single or multicentric studies, having a large sample size with a long follow-up period using even better scales, to get more authentic, conclusive, and accurate results.

Article information and declaration

Acknowledgments

None.

Author contributions

The authors have contributed equally.

Conflict of interest

The authors declare no conflict of interest.

Ethics statement

This procedure is done after the appropriate consent given by the patient. In the form, the patient has given her consent for her images and other clinical information to be reported in the publication journal.

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Supplementary material

None.

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