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Cervical Neuroplasty in a Patient with Postlaminectomy Syndrome after Epidural Infection - A Case Report

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Abstract **Case Report**

Epidural neuroplasty is an available procedure for various causes of pain. Cervical epidural neuroplasty has a higher risk of side effects than that of lumbar, which can be a challenge for the operator. A 56-year-old female came to the pain clinic with severe neck pain caused by postlaminectomy syndrome. We inserted an epidural catheter from T3-4 level to C4-5 level. Confirming that contrast medium spreading epidural space at C7-T1, and then authors injected medication. The patient's pain was effectively reduced without side effects. In an area where it is not expected to secure an approach to the lesion, injection to the target point with steerable catheters is very helpful in relief of pain as a performing cervical epidural neuroplasty.

Keywords: Cervical; Epidural infection; Neuroplasty; Postlaminectomy syndrome.

INTRODUCTION

Epidural neuroplasty, in other words epidural adhesiolysis, was first introduced by Racz (Racz *et al*., 1989). This procedure relieves pain by performing direct injection of medications through a catheter to a lesion that physically compress nerve roots such as scar tissue or herniation of intervertebral discs etc. Prior to the introduction of epidural neuroplasty, several procedures were attempted to reduce pain, but medications did not spread effectively to lesions. Adhesion was attributed to as one of the most common causes (Bosscher *et al*., 2010). Recently neuroplasty as a means of physical adhesiolysis, in addition to traditional chemical adhesiolysis, is becoming of growing interest. In the procedure, cervical vertebrae have more various and higher rates of complications than lumbar vertebrae, and the complications can sometimes be fatal (Bogduk *et al*., 2008; Scanlon *et al*., 2007). Therefore, epidural neuroplasty tends to be less performed in cervical vertebrae. In this case, we report a case of effective cervical epidural neuroplasty in a patient with postlaminectomy syndrome caused by epidural abscess in the cervical area and further research related literatures about neuroplasty.

CASE REPORT

Before the publication of this case, written informed consent was obtained from the patient. A 56-year-old female patient visited the pain clinic with persisting posterior neck and bilateral shoulder pain after a spine surgery. The intensity of pain at the time of the visit was 7 on numerical rating scales (NRS). The patient was diagnosed with diabetes mellitus (DM) eight years prior to visit and was on oral hypoglycemics with no other specific medical history. 8 months before the patient's visit, fever was observed at 39℃ with pain spreading from the neck area to both upper and back. The patient was diagnosed with cervical-thoracic epidural abscess (Fig-1A, Fig-1B), C1-T4 level by using magnetic resonance imaging (MRI), and cervical-thoracic posterior laminectomy & abscess removal was performed by neurosurgery department.

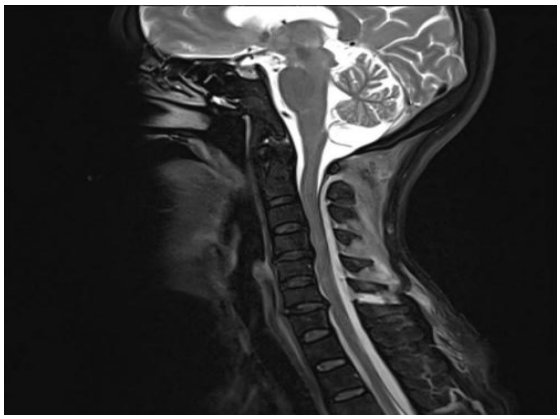

Fig-1A: Epidural abscess C1-T4 level, T2 sagittal view

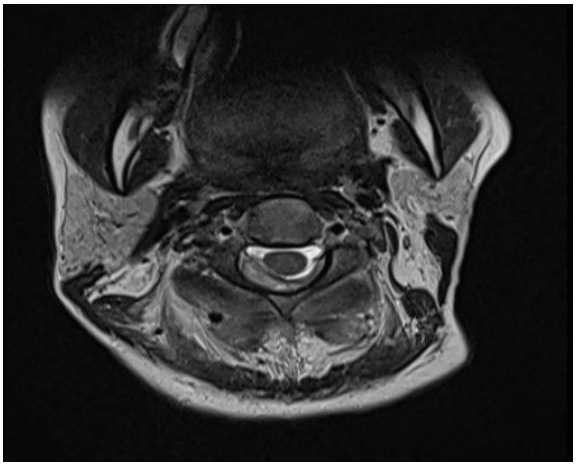

Fig-1B: Epidural abscess C1-2 level, T2 axial view

A month later, MRI was examined again due to persisting high fever above 38.5°C and pain score of NRS 9. Re-filmed MRI confirmed that of diffuse fluid collection at the C5–T3 level (Fig-2), and wound revision & abscess removal, C7 Laminectomy was performed, also by neurosurgery department. The neurosurgery was successful, but pain score of NRS 7 persisted whatsoever. Thus patient was referred to pain clinic.

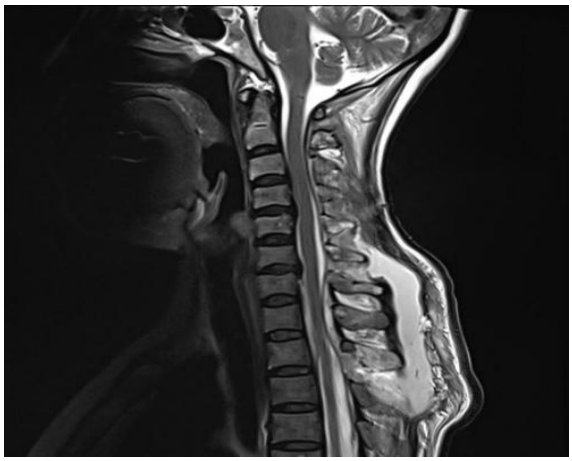

Fig-2: Epidural abscess and fluid collection C5-T3 level, T2 sagittal view

At the time of the visit, the patient suffered from severe pain in both shoulders when picking up objects or raising arms. Body temperature was normal, physical examination of upper extremity showed motor both; G5, Left (Lt.); tingling sense, and numbness, C5,6,7,8 dermatome: tenderness(+), redness(-+), and heating sense(-+). Lab tests showed no unusual findings. Both suprascapular nerve block (SSNB) and both intercostal nerve block (ICNB) were performed in the clinic, but no significant improvement was shown.

A month after the visit, due to pain that persists from neck to left fingertip, a cervical epidural block (CEB) was performed at C6-7 level using C-arm. However, the epidural space was difficult to identify, and contrast medium was spread to intrathecal area, thus the procedure was discontinued. Therefore we decided to proceed with cervical epidural neuroplasty.

Since the site of the epidural abscess formation was between the C1-T4 level, we planned to approach the epidural needle from the thoracic vertebrae, and advance the catheter toward the cervical vertebrae. An epidural needle was inserted into the midline by left para vertebral approach at the T3–4 level under close monitoring of patient including checking vital signs. Needle was advanced until loss of resistance (LOR) was determined using normal saline, then we used C-arm to verify that contrast medium (Omnipaque 300 mgI/ml) is distributed in the epidural space on anteroposterior (AP.) and lateral (Lat.) view (Fig-3A, Fig-3B).

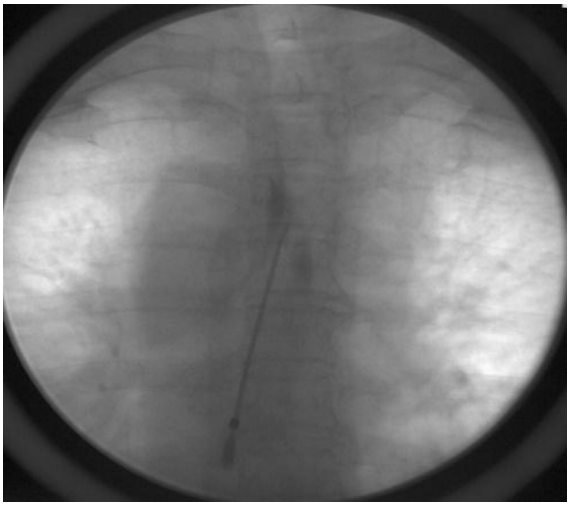

Fig-3A: Epidural needle insertion T3-4 level, AP view

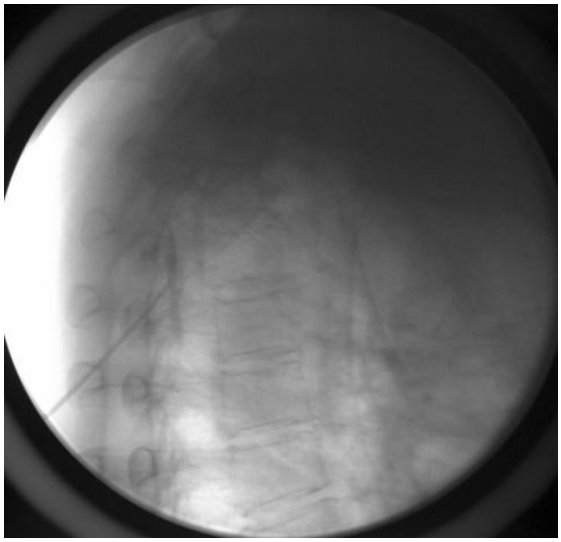

Fig-3B: Epidural needle insertion T3-4 level, Lat. view

SIM-C epidural catheter (Seawon Meditech CO., limited, Gyeonggi-do, Korea, Catheter Name SWCATH22; Length 200 mm; catheter O.D 1Ø) was used, and it was advanced to C4-5 level. After which, 1 mL of contrast medium was injected. However, spread to intrathecal area was observed (Fig-4A, Fig-4B, Fig-4C).

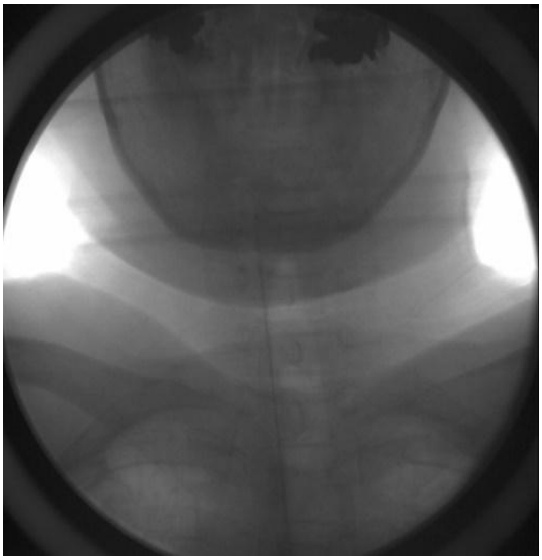

Fig-4A: Catheter placed at C4-5 level, AP view

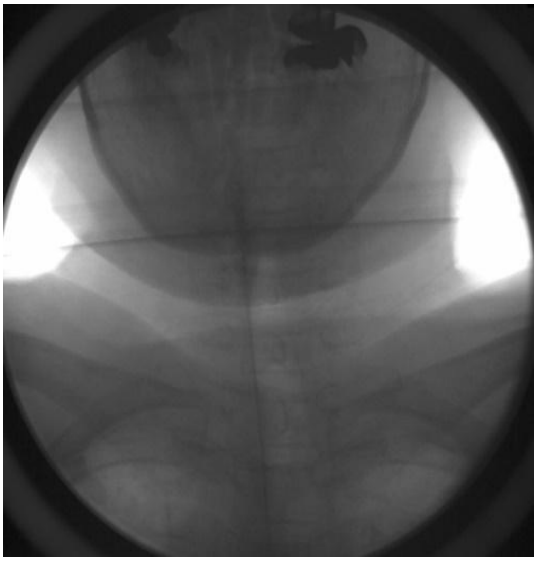

Fig-4B: Catheter placed at C4-5 level after dye injection, AP view

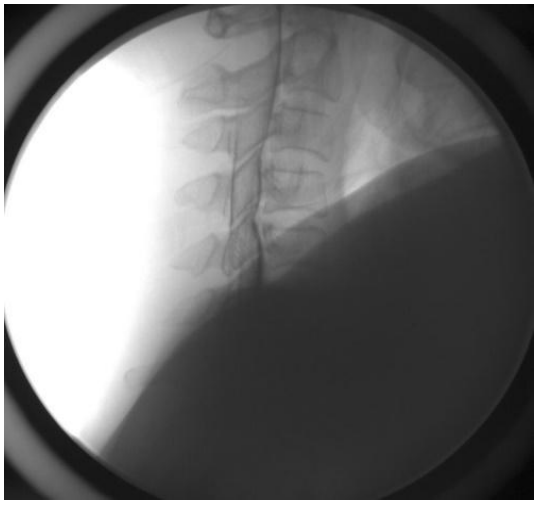

Fig-4C: Catheter placed at C4-5 level after dye injection, Lat. view

The catheter was withdrawn to C5-6 and C6-7 level using fluoroscopy, and we repeated contrast medium injection, but it also spread to intrathecal respectively. Finally, the catheter was withdrawn to the C7-T1 level using fluoroscopy, and 1 mL of contrast was injected again. We confirmed entry into the epidural space, showing no suspicious findings of intravascular or subarachnoid injection. (Fig-5A, Fig-5B).

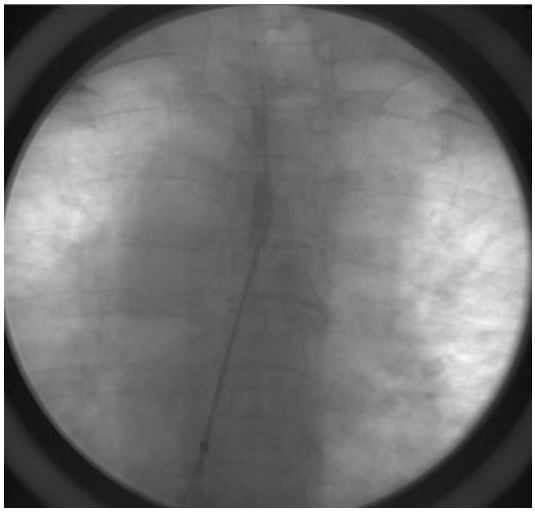

Fig-5A: Catheter placed at C7-T1 level, AP view

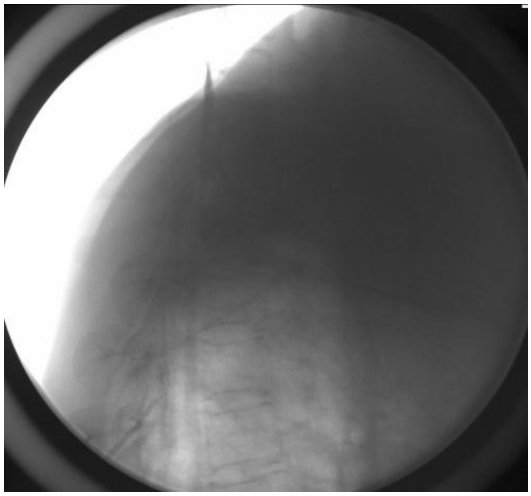

Fig-5B: Catheter placed at C7-T1 level after dye injection, Lat. view

Then, mixture of dexamethasone 2.5 mg, and 0.075% ropivacaine 5 ml, followed by mixture of hyaluronidase (1,500 IU/ml) 2 ml and 0.075% ropivacaine 3 ml, were administered. A total of 10 ml was administered over 10 minutes, waiting a minute after each 1 ml of injection. No complications nor specific findings were observed from the patient, and pain was reduced to NRS 3. The patient was discharged the day after the procedure. A month later, pain in the arm and shoulder was reduced to 2 on NRS, and the patient is under observation on regular outpatient visits.

DISCUSSION

Epidural neuroplasty was first introduced by Racz in 1989 (Racz *et al*., 1989) and has been used as an effective treatment for patients with adhesion or fibrosis in epidural space. Epidural neuroplasty is safer and more effective than epidural block because medications can be administered to localized lesions using steerable catheters, especially, in patients with a postoperative adhesion. This procedure in cervical lesions is lesser used than in lumbar lesions, but some studies have reported usefulness of the cervical epidural neuroplasty (Kim *et al*., 2015).

In this case, direct injection of medications into epidural lesion was impossible because the tissue in epidural space was severely distorted due to epidural infection and surgery. Thus, the authors demonstrated that cervical epidural neuroplasty can be effectively used in this situations like this case where the anatomical structure is severely distorted by adhesion, infection, or surgery, by administering drugs to epidural space as close as possible to the lesion.

Chemical adhesiolysis is the main method used in epidural neuroplasty, which involves injection on local anesthetics, steroids, and hypertonic saline. Hypertonic saline, which is used in most procedures, reduces edema through hypertonic osmolar effect on the nerve root adhesion, leading to an analgesic effect (Kim *et al*., 2016). However, hypertonic saline was not used in this case, because intrathecal hypertonic saline was reported to have side effects such as from severe pain to severe ischemic brain disease (Talu *et al*., 2003). Accordingly, intrathecal injection was a major concern in this case due to severe alterations of the epidural space. Furthermore, hyaluronidase and reduced the concentration of local anesthetics were used for safety. Helm *et al*., reported that the addition of hyaluronidase in performing epidural neuroplasty is not only safe but also effective in reducing additional procedures (Racz, 2019). Fronza *et al*., report the anti-inflammatory effect of hyaluronidase which has effect on reduction of edema formation and inhibition of inflammatory mediator production (Fronza *et al*., 2016).

Recently, mechanical adhesiolysis with catheters as well as chemical adhesiolysis by drugs has emerged. A study has shown that using the inflatable balloon neuroplasty catheters to physically strip the adhesion and injecting drugs has shown great effect on pain relief (Oh *et al*., 2020). Accordingly, Rapcan *et al*., stated that performing mechanical and chemical adhesiolysis simultaneously is more effective (Rapčan *et al*,. 2018). However, as Huntoon reports, the cervical area is composed of anatomically vulnerable structure unlike the lumbar spine region, suggesting that procedures in the area can be of a significant risk (Huntoon, 2005). Taken altogether, mechanical epidural neuroplasty is rarely performed in cervical vertebrae and is usually limited to lumbar spine region. Care should be taken to prevent complication when performing a cervical epidural neuroplasty in patients with a cervical postlaminectomy syndrome. Especially in patients with history of spine operation, the epidural space may not be of a normal state, but be of an abnormal state composed of increased adhesive tissue and weakened dura mater that can cause intrathecal drug delivery during injection. Therefore, it is safer to inject fractional doses over a long period of time to deliver medications planned under thorough monitoring as in this case.

CONCLUSION

It is important to find as safe space as possible and give drugs for patients without assured existence of epidural space due to infection and surgery. In this case, we confirm the benefit of the cervical epidural neuroplasty by showing that safe area can be found using steerable catheters. Furthermore, in the case of anatomically vulnerable cervical vertebrae, we cannot help but to emphasize the need for thorough surveillance monitoring and careful injection of drugs.

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