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Case Report

A Novel Use of Epidural Continuous Infusion in the Outpatient Setting

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Complex regional pain syndrome (CRPS, type 1 and type 2) describes a variety of disorders characterized by spontaneous or stimulus-induced pain that is disproportional to the inciting event and is accompanied by a myriad of autonomic and motor disturbances in highly variable combinations. Physical therapy, started as early as possible, is the mainstay of treatment, and pharmacological management and interventional techniques can be used to facilitate the participation in rehabilitation programs. Epidural local anesthetic (LA) use has been reported in the inpatient setting for the treatment of CRPS, but outpatient options are limited. Elastomeric pumps are commonly used for peripheral nerve blocks, postoperative pain, and palliative care in outpatient settings, but not described with epidural infusions. We describe a case of a cervical epidural catheter placed under fluoroscopy, utilizing an elastomeric pump in an outpatient setting. The system consists of a 270 mL elastomeric pump which is filled with 0.05% bupivicaine, delivering a constant 10 mL/hour. The system has a clamp that can be used by the patient to start and stop the infusion.

A 23–year-old man presented with right hand/thumb pain of approximately 2 months duration after an injury while cutting meat at work, resulting in an incomplete fracture of the proximal phalanx and injury to the extensor tendons of his thumb, which were repaired by orthopedics, and a thumb spica splint was placed. The patient described the pain as constant and stabbing, scored as a 5 – 6/10 on a numerical rating scale (NRS), and increased with any activities. The pain was associated with intermittent temperature changes, hypersensitivity to cold water, and occasional color changes. Physical examination was remarkable for a well-healed right thumb, mottling skin discoloration over the right thumb and hand, and hypersensitivity and allodynia to light touch and pinprick over the right hand and radial aspect of the wrist. Previous treatments consisted of physical therapy and oxycodone-acetaminophen as needed. A 3-week trial of pregabalin was tried, without improvement. After discussing alternative treatments (stellate ganglion block), the patient elected to try a local anesthetic (LA) infusion through a cervical epidural catheter. The epidural space was accessed at the C7-T1 level via left paramedian approach under fluoroscopy; the catheter was threaded 5 cm, and a 0.05% bupivacaine infusion was started via an elastomeric pump. On post-procedural day 4 the bupivacaine concentration was increased to 0.1% due to insufficient pain relief. The patient had good pain relief on day 8 and discontinued the infusion on day 16. The catheter was removed on day 18.

We report a case of successful treatment of CRPS with an outpatient cervical epidural infusion. This modality has been used successfully for years at Geisinger Medical Center. Our goal is to bring attention to the outpatient use of elastomeric pumps for epidural infusion in the treatment of CRPS. The successful resolution of debilitating symptoms in this patient is encouraging, and the use of elastomeric pumps should be considered for further investigation into its efficacy in patients with CRPS.

Key words: Complex regional pain syndrome (CRPS), cervical epidural, outpatient epidural infusion, tunneled epidural catheter

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Complex regional pain syndrome (CRPS) is a term used to describe a variety of disorders characterized by spontaneous or stimulus-induced pain that is disproportional to the inciting event and accompanied by a myriad of autonomic and motor disturbances in highly variable combinations (1-3). The symptoms can include continuous pain, edema, allodynia, joint stiffness, muscle spasms, skin temperature/coloration changes, and vasomotor dysfunction. It is associated with a particularly poor quality of life and considerable healthcare and societal costs (4).

The diagnosis of CRPS is based on the signs and symptoms derived from the patient's medical history and physical examination. The most successful treatment is a multi-disciplinary approach, where initial pain control allows for physical and psychological interventions. Pharmacological pain management and physical rehabilitation of limb function should be started as early as possible. If, however, there is no improvement of limb function and persistent severe pain, interventional pain management techniques may be considered to facilitate the participation in rehabilitation programs (3,5). Epidural local anesthetic (LA) administration has been used in the inpatient setting for the treatment of CRPS (6,7) and was shown to be highly effective if started within one year after the onset of symptoms (5).

Elastomeric pumps are commonly used for peripheral nerve blocks, postoperative pain, and palliative care in the outpatient setting (8) and frequently used at Geisinger Medical Center for a variety of conditions for chronic pain. Our goal is to bring attention to the use of elastomeric pumps for continuous epidural infusion of LA in the outpatient setting.

In our institution, IRB approval is not required for case reports that include one patient.

Case Report

A 23-year-old man presented with right hand/thumb pain of approximately 2 months duration. The patent cut his right hand/thumb while cutting meat at work, resulting in an incomplete fracture of the proximal phalanx and injury to the extensor tendon of his thumb, which was repaired by orthopedics, and a thumb spica splint was placed. The patient described the pain as constant and stabbing, scored as a 5 – 6/10 on a numerical rating scale (NRS), and increased with any activities. The pain was associated with intermittent temperature changes, hypersensitivity to cold water, and occasional color changes. Previous treatment consisted of physical therapy, which aggravated the pain, and occasional oxycodone-acetaminophen as needed, with good relief.

Physical examination was remarkable for a well-healed right thumb, right hand glove, and thumb spica splint, mottling skin discoloration over the right thumb and hand, and hypersensitivity and allodynia to light touch and pinprick over the right hand and radial aspect of the wrist. No edema of the thumb, cyanosis, or ulcerations was noted. An x-ray showed good alignment of near complete fracture of right first metacarpal.

After the diagnosis of CRPS was made, a 3-week trial of pregabalin was tried, without any improvement in the patient's symptoms. After discussing alternative treatments (stellate ganglion block), the patient elected to try a LA infusion through a cervical epidural catheter.

Procedure Description

The patient's back was prepped and draped in the usual sterile fashion. At the C7-T1 intervertebral space, the skin and deep tissue were infiltrated with 1% lidocaine using a 25-gauge (G) needle. An 18 G Tuohy needle was advanced via the interlaminar left paramedian approach with the loss of resistance technique. There was no evidence of cerebrospinal fluid, blood aspiration, or persistent paresthesia. Then, 5 mL of 1% lidocaine was injected into the epidural space. Subsequently, an epidural catheter was inserted to a depth of 5 cm. The catheter was placed in a tunnel created to the left with a 22 G spinal needle and a 14 G venous catheter, was pulled out through the skin and anchored with 3-0 silk sutures.

DISCUSSION

We report a case of successful treatment of CRPS with epidural infusion. This therapy utilizes an epidural catheter placed under fluoroscopy in the epidural space at the appropriate dermatome level, which is then secured. The system consists of a 270 mL elastomeric pump filled with a bupivacaine and saline solution, delivering a constant 10 mL/hour, which cannot be changed and is kept constant by a regula-

tory valve, regardless of the volume remaining in the pump. The system has a clamp that can be used by the patient to start and stop the infusion. The patient is instructed to continue the infusion until numbness of the extremity is achieved and the pain is resolved. The goal is to achieve pain relief within 3 hours and then the pump is clamped for at least one hour to maximize the time between clinic visits for pump refills. If the patient is unable to achieve paresthesia and pain relief in less than 3 hours, then the concentration of the LA is increased until the desired effect is achieved. The maximal bupivacaine concentration should be calculated in a manner as to not exceed the recommended dose of 0.4 mg/kg/hr. The technique described has been used for patients with other pain conditions including lower extremity and thoracic pain, in which it is placed in the lumbar and thoracic epidural spaces, respectively. Contraindications to the technique include systemic infection, infection at the site, presence of a coagulopathy, and also in patients that are unable to maintain close follow-up.

CONCLUSION

Epidural LA infusions have been used in the inpatient setting. Our goal is to bring the attention to the use of an elastomeric pump for epidural infusion in the outpatient setting for the treatment of CRPS. The successful resolution of debilitating symptoms in this patient is encouraging, and the use of an elastomeric pump should be considered for further investigation into its efficacy in patients with CRPS.

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