

## Efficacy of Continuous Brachial Plexus Block for Intractable Cancer Pain in a Terminal Patient

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### Abstract

We report a case of terminal cancer in which continuous peripheral nerve block provided effective relief for cancer-related pain that was difficult to control with pharmacotherapy. A 70-year-old woman with thyroid cancer, paraplegia due to multiple bone metastases, and cauliflower-like proliferation of skin metastasis on the left upper arm was receiving inpatient palliative care. Intractable pain during treatment of the tumor and when changing body position due to metastatic tumor and pathological fracture of the left humerus was difficult to control with pharmacotherapy. Continuous interscalene brachial plexus block was therefore performed, resulting in effective pain relief over the subsequent 38 days before death. Ultrasound-guided continuous peripheral nerve block can be performed at the bedside in patients in poor general condition who cannot tolerate neuraxial block, and should be considered in cases of terminal cancer patient suffering from intractable pain despite pharmacotherapy.

### Key words:

Intractable cancer pain; Pain management; Peripheral nerve block; Brachial plexus block.

### Introduction

The World Health Organization (WHO) recommends pharmacotherapy as the standard treatment for cancer pain, and this approach has provided effective pain relief for many cancer patients. However, pharmacotherapy has to be discontinued in 10-30% of cases due to insufficient analgesia or drug-related side effects [1]. Nerve blocks can be effective for intractable cancer pain.

Using local anesthetic or neurolytic treatment to provide pain relief by suppressing or blocking nociceptive transmission from the periphery to the central nervous system, nerve blocks can deliver instant analgesic effect while avoiding the side effects associated with pharmacotherapy. Nerve blocks also reduce analgesic drug requirements by providing pain relief. However, the indications are limited, with nerve blocks typically contraindicated in cases of bleeding tendency, coagulation disorder, or focus of infection along the insertion route. All nerve blocks are invasive and may affect quality of life (QOL) and activities of daily living (ADL).

No randomized controlled trials have been conducted to date regarding the efficacy of different types of peripheral nerve block for cancer pain [2]. Although peripheral nerve blocks have conventionally been performed for perioperative pain relief, in recent years it has become possible to more safely and accurately perform ultrasound-guided single block and catheter placement at the bedside, making nerve block potentially useful as pain relief for terminal cancer patients in poor general condition. Informed consent regarding the presentation of this paper was obtained from the family of the patient.

### Case Report

A 70-year-old woman with performance status (PS) 4 had paraplegia due to thoracic vertebral metastasis after thyroid cancer surgery and intramedullary nailing for impending bone fracture due to left humeral metastasis. She was admitted to the palliative care ward in our hospital for symptom relief due to cauliflower-like proliferation of skin metastasis with ulceration on the left lateral upper arm and exacerbated pain and exudate (Figure 1).



**Figure 1:** Cauliflower-like proliferation of skin metastasis on the left upper arm.

Following admission, the pain increased as the cauliflower-like area enlarged. Before treating the metastatic tumor, acetaminophen (800 mg/day) was prescribed in addition to the loxoprofen (180 mg/day) that she had been taking since before admission. Pain control was unsatisfactory and oxycodone hydrochloride hydrate (immediate-release oxycodone powder; 2.5 mg) was administered as needed, but

the patient subsequently exhibited incoherent behavior. Discontinuation of opioid therapy improved symptoms, but pain continued to increase as the ulcerated lesion increased in size. In consideration of achieving a balance between controlling both pain and psychiatric symptoms, the delirium was considered to pose no risk and treatment with oxycodone hydrochloride controlled-release tablets (10 mg/day) was initiated. Although this approach enabled effective pain management for the majority of the time when the patient was lying still, delirium symptoms occasionally recurred and did not improve even after switching from regular oxycodone to transdermal fentanyl patches (0.3 mg/day). Despite treatment with Mohs paste, the volume of metastatic tumor exudate did not decrease and daily bandage changes were required. Subsequently, pain began to increase when changing body position and plain radiography revealed pathological fracture in the left upper arm distal to the intramedullary nail. She did not complain of pain while lying still, but pain during metastatic tumor treatment and when changing body position remained difficult to control even with pre-treatment opioid rescue (immediate-release oxycodone powder 2.5 mg, 2–3 times/day). Laboratory values were as follows: white blood cells, 15,760/ $\mu$ l; hemoglobin, 7.0 g/dl; albumin, 1.5 g/dl; platelets, 438,000/ $\mu$ l; C-reactive protein, 25.34 mg/dl; prothrombin time-international normalized ratio, 1.17; and activated partial thromboplastin time, 42.4 s.

Due to the intractable pain, a continuous brachial plexus block approach was selected for pain relief. Using an 18-gauge epidural needle and epidural catheter, ultrasound-guided left brachial plexus block was performed at the bedside using an interscalene approach (needle insertion depth, 3 cm; subcutaneous catheter insertion and fixation depth, 8 cm). We provided transparent dressing seal for catheter puncture site. A mechanical pump provided patient-controlled analgesia with a drug solution of 0.2% levobupivacaine at the following settings: continuous infusion rate, 4 ml/h, bolus volume, 3 ml; and lock-out time, 30 min. After the block had been performed, the patient was able to move the fingers on her left hand without pain. No leakage of drug solution from the catheter insertion site or decrease in arterial oxygen saturation was seen. Nerve block administration provided effective pain management and opioid therapy was discontinued. No improvements were observed in delirium symptoms, but pain symptoms during metastatic tumor treatment and when changing body position were alleviated between block administration and patient death, 38 days later. Effective pain management also enabled the family to spend time peacefully with the patient. No clear symptoms of infection developed around the catheter insertion site before death.

## Discussion

According to the WHO Cancer Pain Relief Guidelines, pharmacotherapy represents the standard treatment for cancer pain. The introduction of this method of pain relief has enabled control of cancer-related pain in numerous patients. However, pharmacotherapy does not provide sufficient analgesic effect or cannot be successfully implemented due to side effects in 10–30% of patients with cancer pain [1]. Pain treatment for such patients is an important issue for palliative care professionals. Interventional treatment methods are indicated in cases of cancer pain that are unresponsive to drugs. As the mechanism of analgesic effect provided by nerve blocks differs from that provided by pharmacotherapy, pain relief may be achieved in cases that are unresponsive to drugs, and without the side effects associated with

pharmacotherapy, such as nausea, vomiting, constipation, and disturbance of consciousness. The analgesic effect with nerve blocks is also instantaneous. Nerve blocks can deliver pain relief because many cases of cancer pain are caused by nociceptive transmission from the peripheral nerves. However, the indications for nerve blocks are limited by the site and cause of pain, the general condition of the patient, and the presence of infection or tumors in the vicinity of the block site.

As was the case in the present patient, sudden pain associated with changing body position or treatment for metastatic tumor is often difficult to manage with rescue drugs and is a good indication for nerve block. According to the WHO Cancer Pain Relief Guidelines, increasing doses of opioids are recommended until analgesic effect is achieved or serious side effects that are difficult to control arise. However, some patients experience neuropsychiatric symptoms such as myoclonus or disturbance of consciousness without pain relief. Nerve blocks are indicated in such cases. In the present patient, delirium due to initial opioid use was suspected despite the low dosage. As a result, nerve block was performed without increasing the opioid dose. While the delirium prevented accurate self-evaluation of the pain, objective evaluation from family members and staff indicated that effective pain relief during treatment and when changing body position was achieved.

Peripheral nerve blocks act to relieve somatic pain by blocking neurotransmission from the relevant dominant nerve territory, and are frequently performed for perioperative pain relief. When performed for cancer pain, these blocks can deliver dramatic analgesic effect. However, motor paralysis and diminished sensation may arise in the relevant area, leading to decreased QOL and ADL. However, this method is useful for treating pain associated with metastatic bone tumors, pathological fractures, and changing body position that is difficult to manage with pharmacotherapy. We believe it needs to cut off the strong nociceptive impulse from peripheral lesion to central nervous system by nerve block. It has a potent analgesic effect more than increasing dose of opioids to reduce intractable pain. Compared to epidural block or intrathecal block, peripheral nerve blocks have the advantage of more localized action, no complications such as hypotension or urinary retention, and low risk of infection or bleeding disorders. Furthermore, in recent years, improved image quality with ultrasound diagnostic equipment has enabled ultrasound-guided nerve block to be more safely and accurately performed at the bedside.

No controlled studies have been conducted regarding the efficacy of peripheral nerve block for cancer pain and only case reports or case series reports have been published regarding brachial plexus block, but effective pain control has been shown in both types of study [3–7]. Although the present patient was in poor general condition with terminal cancer, ultrasound-guided continuous interscalene block performed at the bedside enabled effective management of intractable pain related to a metastatic skin cancer on the brachium until the patient died. The analgesic effect of the block was good and pain during treatment and when changing body position was sufficiently reduced. Opioid therapy was discontinued after performing the block. However, the delirium did not improve and these symptoms were presumed to represent end-stage delirium. With regard to infection, although inflammation and catheter bacterial colonization are reportedly common [8,9], clinically significant infections appear rare [10]. The longer the catheter is in place, the greater the risk of infection. However, no clear infection symptoms were observed during

the 38 days in which the catheter was in place. If the patient required prolong block, we could prepare home care with the catheter in situ.

## Conclusion

The present report has described the use of continuous interscalene brachial plexus block to provide effective relief until death from cancer pain that was difficult to control with opioids in a patient with terminal cancer. Peripheral nerve block can be performed at the bedside in patients with poor general condition who cannot tolerate neuraxial block and should be considered in cases of terminal cancer patient suffering from intractable pain despite pharmacotherapy.

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