

## Clinical reports

# Continuous lateral dorsal cutaneous nerve block by a portable disposable pump

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### Introduction

Sympathetic nerve block either by sympathetic ganglion block or epidural block is a common procedure to treat ischemic pain caused by blood flow disturbances [1–3]. However, these procedures are not applicable in certain conditions. We used a portable disposable pump to perform a sustained blockade on the lateral dorsal cutaneous nerve of the foot in a patient who suffered from multiple myeloma and had ischemic pain in the fifth toe. The results suggest that this approach is a useful alternative to produce satisfactory analgesia.

### Case report

We treated a 55-year-old man complaining of pain at rest in the fifth toe of the right lower limb. A diagnosis of multiple myeloma had been made at the age of 46. At the same age, the fourth and fifth left toes were surgically amputated because of peripheral circulatory failure caused by cryoglobulins. At the age of 48, the patient had perforation of the colon as a result of intestinal circulatory failure, necessitating the resection of the right half of the colon.

Recently, the patient experienced a recurrence of digestive tract hemorrhage and was admitted to our hospital. After admission, pain appeared in the fifth right

toe. The patient was then referred to our pain clinic for consultation.

Hematological testing revealed marked anemia and leukocytopenia with a red blood cell count of  $1.83 \times 10^6$  cells· $\mu\text{l}^{-1}$ , hemoglobin level of 5.9 g·dl<sup>-1</sup>, hematocrit of 18.9%, and a white blood cell count of  $1.9 \times 10^3$  cells· $\mu\text{l}^{-1}$ , with the presence of serum M protein.

The patient was found to have an ulcer formation from the internodal joints of the fourth and fifth right toes to the toe tips, and complained of resting pain in the fifth toe in particular.

The patient was medicated with a prostaglandin E<sub>1</sub> (PGE<sub>1</sub>) preparation 10  $\mu\text{g}\cdot\text{day}^{-1}$ , an antiplatelet agent (cilostazol) 200 mg·day<sup>-1</sup> and given blood transfusion to improve blood flow. For pain management, the patient received an intravenous injection of a salicylic acid preparation 350 mg one to two times daily. With the digestive tract hemorrhage subsiding and blood pressure stabilizing, we performed a right lumbar sympathetic ganglion blockade using 5 ml of pure alcohol. This blockade decreased his pain.

On the 4th day after the blockade, hemorrhage in the digestive tract reappeared. Pain increased simultaneously with blood transfusion and the discontinuation of the vasodilators. A continuous epidural block had been scheduled for analgesia, but the total amount of bleeding was 1000 ml per day, which necessitated the use of dopamine to maintain blood pressure and eventually forced us to give up the block. Then we decided to block the lateral dorsal cutaneous nerve of the foot at the area of the back side of the fifth metatarsal bone using 2 ml of 1% lidocaine. This treatment produced marked pain relief. Therefore, we inserted a 27-G butterfly needle into the same site and connected the needle to a portable disposable pump (SFA-0501W, Nipro, Osaka, Japan; 0.3 ml·hr<sup>-1</sup>) filled with 50 ml of 0.5% lidocaine (Fig. 1). Since adequate analgesia was feasible for 24 h after connection to the pump, the butterfly needle was replaced with a 24-G intravenous

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**Fig. 1.** Insertion of a 27-G butterfly needle into the back side of the fifth metatarsal bone connected to a portable disposable pump

indwelling catheter to avoid tissue damage by the needle. On the 3rd day of the blockade, the digestive tract hemorrhage was effectively controlled by the administration of hemostatic agents but pain in the fourth toe increased. This blockade was terminated after 6 days, and a continuous epidural block was done. By continuous epidural block, the blood flow of the lower extremities was improved and analgesia was sustained.

## Discussion

Multiple myeloma is responsible for the peripheral circulatory failure caused by cryoglobulins, and sometimes involves digestive tract hemorrhage due to intestinal circulatory disturbance, as in the present case [4]. Pain triggered by peripheral circulatory failure can be eliminated by blocking the sympathetic nerve either by a sympathetic ganglion blockade or epidural blockade. Appropriate sympathetic nerve block at an early stage is important because failure to block the sympathetic nerve can lead to thrombosis as a result of vasospasm [5].

In the present case, pain was temporarily relieved by a lumbar sympathetic ganglion blockade, but was aggravated by circulatory insufficiency caused by the digestive tract hemorrhage. An epidural block seemed appropriate until it was contraindicated due to massive hemorrhage. Thus, we selected blockade of the peripheral nerves in the pain-affected region. Since superficial sensation in the fifth toe is governed by the lateral dorsal cutaneous nerve, a branch of the sural nerve, elimination of pain can be achieved by blocking this nerve. Although analgesia can relieve hypertonicity in the local sympathetic nerves, sustained analgesia requires repeated blockade.

A portable disposable pump is a safe and economical infusor for various types of analgesia [6–8]. By using this infusor, we achieved sustained analgesia without having repeated injection needle into the body of the patient. The pump used in the present study infuses at a rate of  $0.3 \text{ ml}\cdot\text{hr}^{-1}$ . In addition, we selected 0.5% lidocaine as a blocking agent, which would not have caused any local anesthetic poisoning if it were inadvertently injected into a blood vessel.

In the present case, analgesia was achieved over a 6-day period without complications using this continuous lateral dorsal cutaneous nerve block. Long-term blockade, however, is sometimes associated with displacement of the catheter or infection at the site of insertion.

In summary, we reported successful pain management in a patient with ischemic pain in the fifth toe. Sympathetic nerve blockade was contra-indicated due to massive hemorrhage of the digestive tract. Continuous lateral dorsal cutaneous nerve block using a portable disposable pump is an effective means to produce analgesia.

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