KJP The Korean Journal of Pain
| Case Report |
Korean J Pain Vol. 23, No. 1, 2010
pISSN 2005-9159 / eISSN 2093-0569
DOI : 10.3344/kjp.2010.23.1.55

Sympathetic Block for Treating Primary Erythromelalgia

Department of Anesthesiology and Pain Medicine, Kyungpook National University of Hospital, Daegu, Korea

Yoo Jin Bang, MD, Jin Seok Yeo, MD, Si Oh Kim, MD, and Young Hoon Park, MD

Primary erythromelalgia is a rare condition that's characterized by erythema, an increased skin temperature and burning pain in the extremities. The pain is often very severe, and treating erythromelalgia is frustrating and difficult. We report here on the case of a 12-year old girl with primary erythromelalgia in both lower extremities. The pain was refractory to medical treatment, but a bilateral sympathetic block with lidocaine and triamcinolone resulted in relief from the pain. Our experience with this disease demonstrates that sympathetic blocks are effective in improving the symptoms and they may be attempted on erythromelalgia patients who do not respond to other treatments, including medication and epidural blocks. (Korean J Pain 2010; 23: 55-59)

Key Words:
erythromelalgia, sympathetic block.

Erythromelalgia is a combination of three Greek words: erythros (redness), melos (extremities) and algos (pain). Erythromelalgia describes a very rare condition of severe burning pain, redness and elevation in the body temperature in the extremities [1]. In most cases, the pain is not continuous, but rather it is recurrent and lasts for several hours when it occurs. It attacks the lower extremities (88%) more often than it does the upper extremities (26%), yet it can attack both the upper and lower extremities [1,2]. There are many types of treatment for erythromelalgia. There are oral treatments such as neuroleptic drugs and vasodilator. Some kind of drug can be administered by intravenous injection. Sympathetic ganglion block and epidural block are effective invasive procedures to treat this condition [3-6]. Yet of the many reported treatments there seems to be no treatment with consistent effects for all patients, so many combinations of treatment are usually tested on a single patient.

We report here on a child patient who suffered from recurrent pain and we tried treating her with various drug therapies, but with no success. Her pain was satisfactorily controlled after performing a sympathetic ganglion block, so we explore and discuss the case in this report.

CASE REPORT

A 12-year old child with the height of 127 cm and a weight of 25 kg was experiencing severe pain in both her

Received July 30, 2009. Revised August 11, 2009. Accepted September 7, 2009.
Correspondence to: Jin Seok Yeo, MD
Department of Anesthesiology and Pain Medicine, Kyungpook National University of Hospital, 200, Dongduk-ro, Jung-gu, Daegu 700-721, Korea
Tel: +82-53-420-5864, Fax: +82-53-426-2760, E-mail: painfree@gmail.com

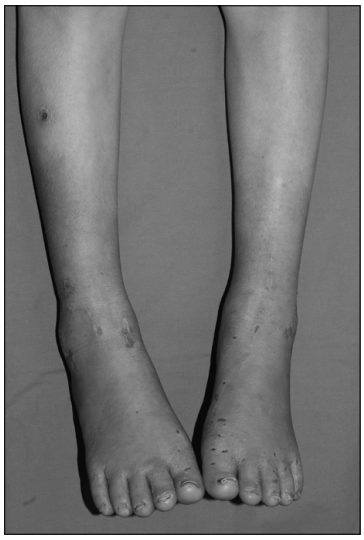

Fig. 1. The patient's feet at the time of visiting pain clinic.

feet, as well as skin ulcers, redness, swelling and flashes of heat when she was admitted into our hospital's Department of Dermatology (Fig. 1). At around the age 3 she began experiencing symptoms of redness, heatness and pain in both feet. The symptoms were alleviated when her feet were put in cold water. But when she walked or when her feet were exposed to heat, her symptoms became worse than before. Her symptoms aggravated 4 months previous to admission, and for 2 weeks prior hospital admission, she had to immerse her feet in cold water for 10 minutes at every hour during the day. The pain was so severe that she could not sleep properly, and she had to immerse her feet in cold water several times in the night. Her feet became swollen with small wounds, so she used the traditional healing method of repetitively immersing her feet in loess-water, but her symptoms had rapidly worsened. For the family's medical history, her mother, maternal aunt, maternal grandmother and maternal female cousin had the same disease, so a matrilineal heredity pattern could be seen. The Department of Dermatology suspected the patient to have erythromelalgia accompanied by cellulitis and contact dermatitis, so many tests and treatment were done. The blood test results showed an ESR of 73 mm/hr and an elevated platelet level of 598,000/μl, an AST of 51 U/L and an ALT of 48 U/L. There were no other symptoms indicating secondary erythromelalgia. On day 1 of admission, cephalosporin 1 g twice a day was administered. To control the pain, NSAIDs were administered by intramuscular injection when necessary. Aspirin 500 mg 3 times a day, acetaminophen 300 mg 3 times a day, prednisolone 10 mg twice a day and gabapentin 100 mg 3 times a day were administered. On day 2 of admission, the patient's skin lesions seemed to improve, but the pain was still not alleviated. So on day 3, amitriptyline 10 mg was orally administered before she slept. On day 4, fluoxetin was administered at 10 mg a day. Her pain was still not mitigated, but now her feet had to be immersed in cold water at a higher frequency of every 30 minutes instead of every hour. On day 6, due to her continuous pain, she was referred to the Department of Pain. She complained of pain at level 5 on the visual analogue scale. The skin lesions on both feet were almost all cured, but the feet were still swollen and red. The feet were very cold when there was no pain but when there was pain we can feel heatness on her feet. The child could not wear shoes because of the pain. She began using a wheelchair for transportation because walking worsened the pain. To control the pain, a caudal epidural block was performed with a 23 G needle and using 0.3% lidocain 7 ml and triamcinolone 10 mg. The procedure still did not alleviate the pain. But the patient's skin lesions on her feet were almost all cured, so her parents had her discharged for personal reasons. She still continued taking antihistamine, gabapentin and fluoxetin after leaving the hospital. Nine days after her discharge, she visited a pain clinic, where her VAS score was still at level 5. However, she immersed her feet every 30 minute or a hour interval during the day and still immersed her feet in the night as well. So we decided to perform a sympathetic ganglion block on right L3. The patient was placed in the prone position. Under C-arm fluoroscope guidance, we injected lidocaine in skin 4 cm away from the L3 spinous process for local anesthesia and 25 G spinal needle was inserted until the anterolateral aspect of the L3 vertebral body was touched and then contrast media was injected. The contrast media diffused from L2 to L3, and then 1% lidocaine 6 cc and triamcinolone 10 mg were administered (Fig. 2). After the procedure, the patient's feet temperature went from 27°C to 30°C and her pain also increased, so her feet had to be immediately placed in water. When she visited the pain clinic one week later, her VAS score went down to level 3. In the night in every 2-3 hours, she woke up from the pain in her feet and had to immerse her feet in cold water for 10 minutes. The patient visited the hospital on foot and she was able to attend school again after the sympathetic

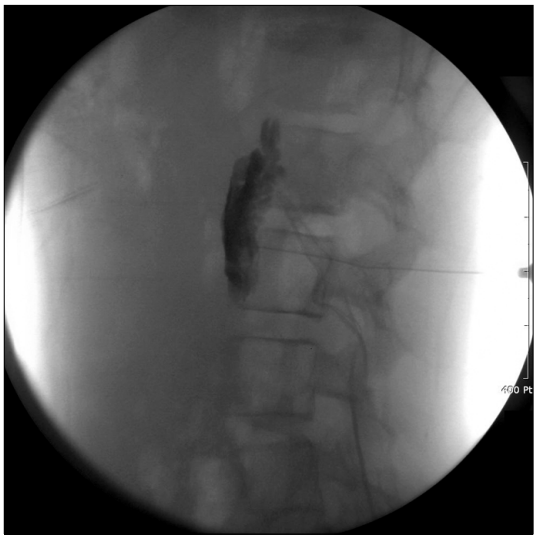

Fig. 2. Lateral view of X-ray show spreading of mixture over L3 vertebral region in sympathetic ganglion block.

ganglion block. However, the red-swelling in her feet remained. So a sympathetic ganglion block was performed again on left L3 with 1% lidocaine 6 cc and triamcinolone 10 mg. Even after the second sympathetic ganglion block, the child-patient's pain score was elevated level 4 on the VAS score. After one weeks of the procedure, her VAS score was still at level 3 but the frequency of pain was reduced. During the day, she had to immerse her feet in cold water every 2-3 hours a day. In the night, she woke up 2-3 times to immerse her feet. The feet's swelling, redness and sensation of burning were reduced. Four weeks after the procedure, she had to put her feet in cold water every 2-3 hours in a day and one time in the night but each time her feet were put in cold water, her feet did not become red or become hot as they used to. It is thought that she continued to put her feet in cold water during the day as well as when waking up at night because she was accustom to the habit, and this habit had been formed for a long time.

DISCUSSION

Erythromelalgia is a rare disease that occurs in 3 out of every 5,000 patients who are referred to pain clinics [3]. Erythromelagia can be divided into the primary and secondary cases depending on the cause. Primary erythromelalgia is common in middle-aged males. But third of the cases of the patients are under 30 years of age and it can occurs amongst children and adolescents [6]. The disease has an autosomal dominant inheritance pattern. Patients with this disease have mutations in the SCN9A gene, which encodes the voltage gated sodium channels and these are primarily expressed within the nociceptive dorsal root ganglia and sympathetic ganglia, so patients with erythromelalgia have a low threshold to pain stimulation [7-9]. Secondary erythromelalgia can be accompanied by myeloproliferative disease such as polycythemia vera, essential thromocytosis, leukemia and autoimmune disease such as systemic lupus erythematosus and diabetes [3]. The average age of secondary erythromelalgia occurrence is 59, so secondary erythromelalgia in children or teenagers is rare. The prevalence rate of secondary erythromelalgia between males to females is equal [6]. In the case presented here, there were no signs or symptoms of secondary erythromelalgia. On examining the family's medical history and considering the child-patient's young age, her case was diagnosed as primary erythromelalgia. The symptoms and signs for erythromelalgia are as follows: localized redness, swelling, burning pain and an increased skin temperature in either the upper or lower extremities on both the right and left. The disease is caused or worsened when weight is put on the attacked area or the area's temperature is raised. When the attacked area is exposed to the cold or it is elevated or given rest, the condition is alleviated [3,10]. The patient in our case had these signs and symptoms. With the repetitious immersing of her feet, she developed immersion foot and a secondary ulcer and infection, which caused her condition to rapidly worsen.

Davis et al. [11] performed a retrospective study on 87 erythromelalgia patients to determine its natural course. Localized lesions broke out in 21.8% of the cases where the patient immersed the attacked area, infection occurred in 16.1% of the cases, ulcer in 12.6% and gangrene in 1.1% and the attacked area has to be severed in severe cases. Because the disease affects the patient's quality of life, 50% of the patients cannot take long walks, 12.5% have to leave work, 3% have to use a wheelchair and 2.1% are bed-ridden. Around the time before our patient was admitted to the hospital, she had to immerse her feet in the middle of class. This affected her school studies, so she could not attend school for a while. She could not participate in out-door activities with other children. So doctor must actively try to alleviate the patient's pain with various

treatments in order for the patients to continue their normal life-activities.

There is still no treatment that has shown standardized effects. Because the disease is very rare, research has been done on only a small number of patients and there are only theories as to the pathology because the proven pathology has not yet been brought to light. Cohen [3] advocated educating patients with this disease on the causes that worsen the symptoms so that the patients can avoid exasperating environments and on how to safely care for attacked area. Medical treatment includes aspirin, gabapentin, serotonin reuptake inhibitor, amitriptyline, prostaglandin and calcium channel blocker. But in most cases, their efficacies have not been proven or they are only limited [3,9,10,12]. If symptoms are not alleviated with oral medication, then venous administration of nitroprusside, lidocaine and prostaglandin has been reported to mitigate these patients' symptoms [10]. In our patient's case, taking aspirin, gabapentin, fluoxetin and amitriptyline did not relieve the symptoms.

The invasive procedures for erythromelalgia include epidural block, sympathetic ganglion block, spinal cord stimulator insertion and brachial plexus block [3,13]. D'Angelo et al. [6] reported improvement of the patient's condition after inserting a lumbar epidural catheter and injecting the patient with local anesthetics and opioid. In our patient's case, we used steroid when we performed a caudal epidural block and a sympathetic ganglion block. Because steroid has anti-inflammatory effect by blocking production and release of the inflammatory mediator and it has the electrophysiological effect of changing the neuromuscular junction and neuron conduction. Also the corticosteroid may exert an "anesthetic" like action by blocking nociceptive C-fiber conduction and this is independent of corticosteroid's anti-inflammatory properties [14]. The effect of steroid is proportional to the distance from where they are injected to the area of nerve lesions, and these nerve lesions in the case of genetic erythromelalgia are caused by the changes in the voltage gated sodium channels in the nociceptive dorsal root ganglion and the sympathetic ganglia. So we injected steroids near the sympathetic ganglia and the dorsal root ganglion in the area of the lesions to see the results. The effects of sympathetic ganglion blocks have been reported to vary depending on different authors. For an erythoromelalgia patient suffering from severe pain in the lower extremities, Seishima et al. [15] prescribed many oral medications and performed an epidural block, but the pain was not relieved. So they performed a sympathetic ganglion block. Hereinafter, the patient did not experience pain for 9 months. Shiga et al. [16] performed a thoracic sympathectomy on a erythromelalgia patient who suffered from severe pain in both hands and the pain was relieved immediately. Although a sympathetic block alleviates symptoms in some patients, in other cases it worsens their condition. In some reports, a sympathectomy has been suggested only in patients for whom a diagnostic sympathetic block was effective [17]. Other reports have presented cases where the patient's symptoms worsened after receiving a unilateral sympathectomy. This was because the sympathetic ganglion block raised the thermoregulatory blood flow and reduced the nutritive blood flow including oxygen, and so a sympathetic ganglion block is not indicated for erythromelalgia [3]. Yet if other treatments fail to alleviate the pain, a sympathetic ganglion block may be tried. The exact mechanism of a sympathetic ganglion block in an erythromelalgia patient is not clear but several therories are suggested. First, vasoconstriction starts before the reactive vasodilation that's similar to Raynaud's phenomenon occurs [18]. Second, small afferent nerves are attacked by the disease and this causes neuropathic pain [19]. Third, the platelets are activated and they coagulate, blocking the arteries [6]. Sympathetic ganglion block has effect on neuropathic pain and can relieve vasoconstriction and increase blood flow, so the pain can be improved. In our patient's case, the caudal block did not mitigate the symptoms, so we tried a lumbar sympathetic block twice. Her condition improved and she has remained so for 6 months of follow-up.

In conclusion, many different treatments can be used to manage the pain of erythromelalgia. A sympathetic block may be an effective for those cases that are refractory to non-invasive treatment.

REFERENCES

1. Rauck RL, Naveira F, Speight KL, Smith BP. Refractory idiopathic erythromelalgia. Anesth Analg 1996; 82: 1097-101.
2. Galimberti D, Pontón A, Rubio L, Torre A, Angles V, Soriano E, et al. A case of primary erythromelalgia. J Eur Acad Dermatol Venereol 2009; 23: 1338-9.
3. Cohen JS. Erythromelalgia: new theories and new therapies.

J Am Acad Dermatol 2000; 43: 841-7.
4. Park SK, Han KR, Lee YS, Hyun HS, Kim C. Epidural block of bupivacaine and mexiletine for erythromelalgia. Korean J Anesthesiol 2001; 41: 792-5.
5. Stricker LJ, Green CR. Resolution of refractory symptoms of secondary erythermalgia with intermittent epidural bupivacaine. Reg Anesth Pain Med 2001; 26: 488-90.
6. D'Angelo R, Cohen IT, Brandom BW. Continuous epidural infusion of bupivacaine and fentanyl for erythromelalgia in an adolescent. Anesth Analg 1992; 74: 142-4.
7. Waxman SG, Dib-Hajj SD. Erythromelalgia: a hereditary pain syndrome enters the molecular era. Ann Neurol 2005; 57: 785-8.
8. Dib-Hajj SD, Rush AM, Cummins TR, Hisama FM, Novella S, Tyrrell L, et al. Gain-of-function mutation in Nav1.7 in familial erythromelalgia induces bursting of sensory neurons. Brain 2005; 128: 1847-54.
9. Natkunarajah J, Atherton D, Elmslie F, Mansour S, Mortimer P. Treatment with carbamazepine and gabapentin of a patient with primary erythermalgia (erythromelalgia) identified to have a mutation in the SCN9A gene, encoding a voltage-gated sodium channel. Clin Exp Dermatol 2009; 34: E640-2.
10. Nathan A, Rose JB, Guite JW, Hehir D, Milovcich K. Primary erythromelalgia in a child responding to intravenous lidocaine and oral mexiletine treatment. Pediatrics 2005; 115: E504-7.
11. Davis MD, O'Fallon WM, Rogers RS 3rd, Rooke TW. Natural history of erythromelalgia: presentation and outcome in 168 patients. Arch Dermatol 2000; 136: 330-6.
12. Rudikoff D, Jaffe IA. Erythromelalgia: response to serotonin reuptake inhibitors. J Am Acad Dermatol 1997; 37: 281-3.
13. Harrison CM, Goddard JM, Rittey CD. The use of regional anaesthetic blockade in a child with recurrent erythromelalgia. Arch Dis Child 2003; 88: 65-6.
14. Weinstein SM, Herring SA. Lumbar epidural steroid injections. Spine J 2003; 3(3 Suppl): 37-44.
15. Seishima M, Kanoh H, Izumi T, Niwa M, Matsuzaki Y, Takasu A, et al. A refractory case of secondary erythermalgia successfully treated with lumbar sympathetic ganglion block. Br J Dermatol 2000; 143: 868-72.
16. Shiga T, Sakamoto A, Koizumi K, Ogawa R. Endoscopic thoracic sympathectomy for primary erythromelalgia in the upper extremities. Anesth Analg 1999; 88: 865-6.
17. Belch JL. Temperature-associated vascular disorder-Raynaud's phonomenon and erythromelagia. In: A textbook of vascular medicine. Edited by Lowe GD, Tooke JE. London, Oxford University Press. 1996, pp 339-52.
18. Littleford RC, Khan F, Belch JJ. Skin perfusion in patients with erythromelalgia. Eur J Clin Invest 1999; 29: 588-93.
19. Orstavik K, Mørk C, Kvernebo K, Jørum E. Pain in primary erythromelalgia-a neuropathic component? Pain 2004; 110: 531-8.