

Permanent Percutaneous Epidural Stimulation of the Spinal Cord for Post-herpetic Neuralgia

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= Abstract = An 82 year old man who had suffered from intractable post-herpetic neuralgic pain received percutaneous permanent spinal cord stimulator implantation. Pain relief was so remarkable that he could sleep without the interference of frequent acute sharp attacks of pain, and at the same time, he could do his work again, which had been impossible before he received this treatment. We recommend this procedure for several kinds of intractable pain, including peripheral nerve and root lesions, spinal cord lesions and peripheral vascular disease, after careful selection of the patient.

Key Words: *Percutaneous spinal cord stimulation, Post-herpetic neuralgia, Intractable pain*

INTRODUCTION

Dorsal column stimulation was first clinically practically implanted by Shealy and Mortimer (1970), and Nashold and Fredman (1972). While early results showed encouraging pain relief in up to 90 % of cases, satisfactory long-term pain relief fell to 35 % over two years according to several investigators. But nowadays, the long-term results are improved, with the understanding that this system is site-specific in terms of pain location and electrode placement, and with better patient selection (Kumar 1986). Results are further enhanced by the ability to evaluate pain relief by percutaneously implanting the electrodes and then conducting several days of trial stimulation before internalization of the system.

Postherpetic neuralgia is a sequela of acute herpes zoster. Although spontaneous

resolution of herpes zoster may be expected in most patients, a significant number of older patients experience intractable pain. Postherpetic neuralgia is one of the most difficult problems encountered by physicians because no particular modality of treatment has been specific or reliable. Usually it has been believed that deep brain stimulation is effective for this disastrous disease but some have reported good results with spinal cord stimulation.

The following case describes a successful percutaneous epidural spinal cord stimulator implantation after trial stimulation in a very severely suffering postherpetic neuralgia patient at the pain clinic of Seoul National University Hospital, and is the first case of this type in Korea.

CASE REPORT

An 82 year old man who was suffering from post-herpetic neuralgia was referred to our clinic for the management of pain, which was intractable to the conventional modalities of pain management. He had a burning and sharp stabbing pain on the right anterolateral chest wall, from just below the nipple to the 12th rib. Before he was transferred to our clinic,

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he had received some medication including NSAID, epidural local anesthetic injection, and steroid therapy. Finally he received oral and epidural narcotics, which made him irritable and disoriented even though the pain was reduced slightly, and he showed signs of pseudoaddiction. Narcotic administration was decreased gradually until he was using carbamazepine and amitriptyline only per oral route, but pain control was so poor that he could not sleep at all. After visiting our clinic, transcutaneous electrical nerve stimulation (TENS) was tried, which halved his pain during stimulation time, only.

Transient percutaneous epidural spinal cord stimulation was scheduled instead of TENS. The procedure was done under local anesthesia in an operating room where facilities for biplane fluoroscopy were available. The patient was placed prone. At L 2-3 interspace a 16G Tuohy needle was inserted into the epidural space using "loss of resistance" method (Dawkins 1963). The guide wire was inserted first to ease the passage of the stimulating electrode under the fluoroscopy. Then, the guide wire was replaced by the stimulating electrode which must be positioned on the appropriate site for stimulating the exact painful area in the posterior epidural compartment. The position of the stimulating electrode (Neuromed, U. S. A.) was adjusted by gradually withdrawing it to produce paresthesia in the area of the pain (Figure 1 and 2). A temporary electrode was secured to the skin using a #2-0 silk suture at the point of insertion, which was then covered with a sterile dressing. Appropriate electrical connections are then made to the external stimulation device, for use by the patient during the trial. Stimulation was started with 50 Hz for rate and 0.5 ms for pulse width, then adjusted for best frequency and pulse width. The patient was satisfied with the stimulation because pain relief was remarkable (from VAS 9 to VAS 0 during stimulation, and VAS 2-3 without stimulation). After a week long trial of the temporary percutaneous stimulator, the permanent epidural cord stimulator implantation

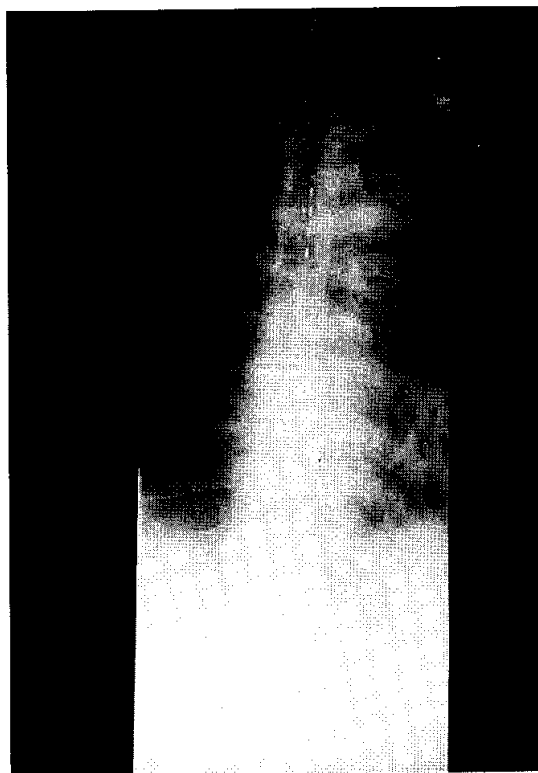


Fig. 1. Posterior-Anterior view of electrode placement for percutaneous spinal cord stimulation

was performed.

The permanent implantation procedure was the same as described above until the fixation of the stimulating electrode to the deep fascia. A subcutaneous pocket is created to house the receiver in the anterolateral abdominal wall. The receiver extension leads are brought through the subcutaneous tunnel to connect to the stimulating leads. After the best pulse width and frequency had been determined, the patient was discharged with instructions on how to operate the stimulator. Follow-up checks for 6 months revealed no change in pain relief in this patient.

DISCUSSION

The application of surface electrodes to



Fig. 2. Lateral view of electrode placement for percutaneous spinal cord stimulation

the dorsal columns of the spinal cord has been used in the treatment of intractable pain. The rationale for dorsal column stimulation (DCS) has been the 'Gate theory' of pain proposed by Melzack and Wall (1965). Stimulation of large diameter myelinated peripheral cutaneous fibers or of their extensions into the dorsal columns will inhibit some of the activity produced in dorsal horns by stimulation of small myelinated or unmyelinated fibers (Zumpano and Saunders 1976).

Originally, stimulation was achieved by the surgical implantation of electrodes close to the dorsal columns during laminectomy. But these days, the spinal cord may also be stimulated by percutaneously inserting electrodes into the epidural space. The effects of percutaneous spinal cord stimulation may be evaluated over an extended period of time aiming the tip for a pos-

ition where stimulation could produce paresthesia over the painful area without having committed the patient to an extensive operation. If stimulation does not produce satisfactory pain relief, the system can be removed easily. If pain relief does occur, it may be left in place permanently. We have performed percutaneous implantations only for a few patients including this one.

Percutaneous epidural stimulation gives a good response in peripheral nerve and root lesions, spinal cord lesions and peripheral vascular disease, in particular the most satisfactory relief occurred in patients who had initial satisfactory pain relief with TENS (Shearly *et al.* 1970; Krainick and Thoden 1982; Kumar 1986; Meglio M and Ciono 1989).

Meglio *et al.* (1981) reported that it is important to stress the findings in their post-herpetic pain patients, 60% of whom benefitted from spinal cord stimulation. The stability of the result achieved was remarkable, therefore they recommend the use of SCS as the first choice in the treatment of post-herpetic pain.

The main complications are related to electrode displacement, fracturing, or fibrosis at the stimulating tip. To prevent electrode displacement, the patient should be instructed not to bend his back during the 1st month after implantation. Fibrosis at the stimulating tip has occurred occasionally. The patients gradually experienced a dampening of the stimulation-induced paresthesia and progressive inability of the stimulation to provide pain relief. In either fracturing or fibrosis, replacement of the electrode invariably resulted in re-establishment of the pain relief. We have performed 15 cases of trial stimulations and 3 cases of permanent implantation by percutaneous route. And in our cases, we have had only one complication of electrode fracturing during retrieval of the electrode, which was managed by changing the electrode.

Postoperatively, we routinely begin the electrode selection process with the twelve two-electrode combinations available from a four-electrode array.

Usually, this percutaneous system operates well for 3 to 7 years. After this period, fibrosis occurring around the electrode prevents effective stimulation. Therefore, we have to replace the electrode or seek an other method of pain relief. Even though our patient has kept this instrument for 6 months without any complication or reduction of the effect, we will have to wait longer until we can evaluate the duration of this clinical tool.

In conclusion, dorsal column stimulation represents a useful technique in a select group of patients for whom there is no other treatment option. Both the physician involved and the patient should realize that there is a possibility of a technical complication. Almost always, patient selection is a key factor in this method. The followings are the recommended basic criteria for patient selection before performing this new promising treatment modality(Kumar 1986).

1. Pain is due to a known benign organic cause.
2. All conventional methods to achieve pain control have failed.
3. Patients have no major abnormal personality traits. Depression, anxiety, lack of sleep are considered normal responses to chronic pain and do not constitute a contraindication provided they respond satisfactorily to psychological management.
4. Drug dependency has been gradually eliminated and inappropriate drug use terminated before the implant.
5. Most patients have initial satisfactory pain relief with TENS, but can not continue due to allergic skin reactions, cumbersomeness

of the apparatus or drop in its effectiveness.

6. A trial of percutaneous epidural stimulation is effective in producing appreciable pain relief.

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