

Epidural Spinal Cord Stimulation for Treatment of Outpatients with Intractable Pain

— Report of Three Cases —

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We devised a new needle for epidural spinal cord stimulation (ESCS) and have used it in outpatients with intractable pain. We now report three typical cases and introduce the procedure of ESCS with the new needle.

ESCS was reported to be effective in various kinds of pain¹⁻⁷, peripheral vascular⁸⁻¹² and spastic muscular diseases¹³⁻¹⁵.

The conventional method involves the insertion of a threadlike stainless steel wire through a catheter into the epidural space. It is a difficult technique. The tip of the wire has to be inserted into the epidural space using a 17-gauge Tuohy needle. This conventional technique is so time-consuming that it can not be used in outpatients; of course, the indwelling electrical stimulating device can not be used in these patients.

We therefore devised a new needle for ESCS and have successfully used it in the outpatients with various kinds of intractable pain.

The needle is shown in figure 1. The surface of the outer needle (22-gauge, 7 cm) of the paired needles used for performing epidural block procedures was insulated with a teflon coating except at the tip. The head

of the outer needle was connected using a clip to the negative pole of the electrical stimulator.

The patient is placed in the lateral position with knees drawn up to the stomach, and neck is flexed and the head rests on a pillow. The site of the puncture depends on the segments to be blocked. The needle is placed into the epidural space with the loss of resistance method using saline. 5 ml of normal saline, which is a good conductor of electricity, is injected into the epidural space. The stylet is replaced in the needle. The negative pole of the electrical stimulator is then connected to the clip of the outer needle and the positive electrode is placed on an arbitrarily selected area of the body (fig. 2). The patient rests in the same position during electrical stimulation at a frequency of 2 Hz, applied for a duration of 20 min, 1-3 times per week, at such a strength that the patient can feel mild twitching in the muscle without complaining of any unpleasant sensation. The needle is withdrawn after the stimulation.

The patient is asked to grade the intensity of their pain on a scale of 0 to 10 before the treatment is begun. A pain score of 0 represents "no pain, at all" and 10 represents "pretreatment pain".

Case Reports

A 69 year-old man complained to lum-

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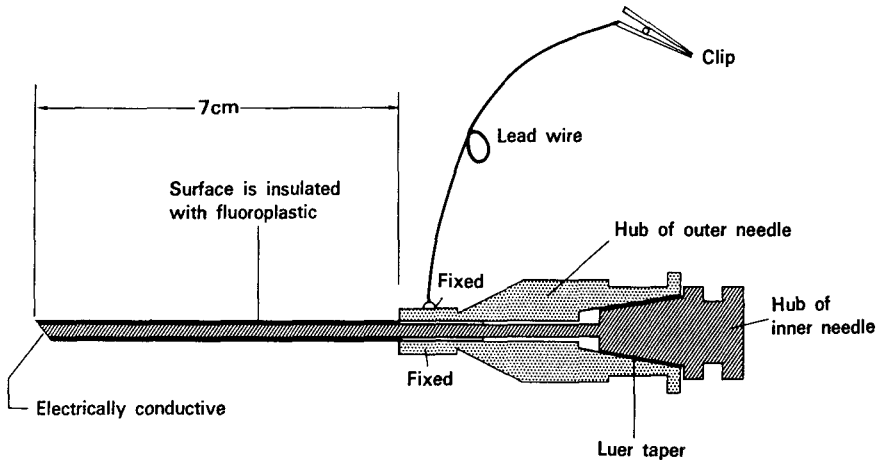


Fig. 1. Epidural electrical stimulation needle

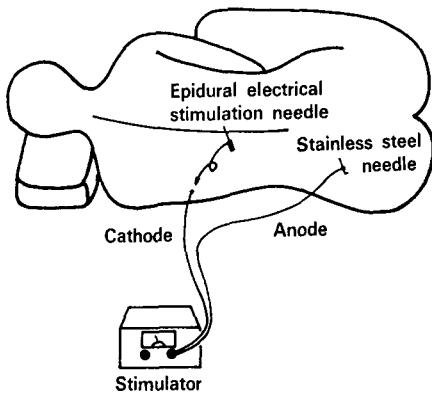


Fig. 2. Epidural spinal cord stimulation for outpatient

bago, pain in the right leg and intermittent claudication. He had hypertension, myocardial infarction and diabetes mellitus. The lumbago started ten years earlier and was treated with drugs and traction in another hospital, but nothing relieved the pain. He was admitted to hospital and a diagnosis of prolapsed intervertebral disc was made. He was discharged after two months treatment which had alleviated the pain. He was re-admitted three years later and was treated with repeated epidural local anesthetics for two months. The next year, the pain returned and he was considered for surgery. Several incidents of myocardial ischemia occurred and surgery was postponed.

He was transferred elsewhere for surgery but myocardial infarction occurred on the day before surgery, so it was again delayed. Acupuncture gave no significant relief of pain. He came to our clinic in February, 1986.

We performed ESCS from the first medical examination because he had already received epidural block (fig. 3). The first ESCS relieved the pain. Three days after the first ESCS, pain score changed from 10 to 8. The patient wanted to have repeated treatment and it was performed two or three times per week. The pain was gradually relieved. He now receives ESCS once every three weeks and the result is regarded as excellent.

Another patient is a 58 year-old woman who had lumbago, pain in the right leg and disturbance of gait. She had hypertension. She had a foraminotomy for spinal canal stenosis elsewhere which relieved her pain. Three months after surgery pain in the back and right leg returned and she was re-admitted. Epidural and nerve root blocks caused no relief. We performed ESCS from the first medical examination because she had already received epidural block (fig. 4). The first ESCS relieved the pain. Four days after ESCS pain score decreased from 10 to 8 and the pain was relieved gradually. Forty five sessions of ESCS produced complete pain relief.

The third patient is a 44 year-old man

Fig. 3. The course of treatment of case 1. The patient received a total of 152 sessions of ESCS. He is regarded as having an excellent result.

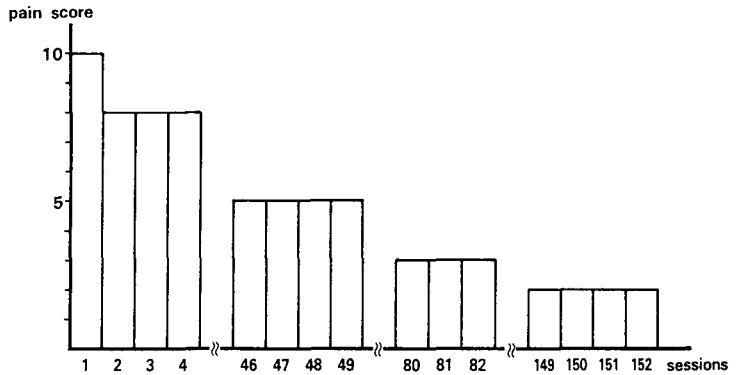


Fig. 4. The course of treatment of case 2. The patient received a total of 45 sessions of ESCS. Pain was completely relieved.

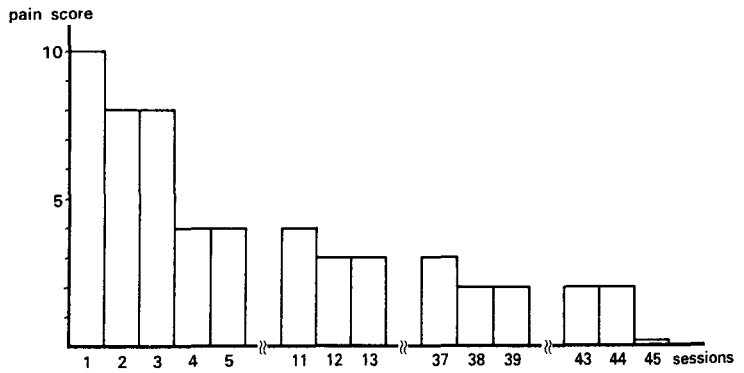
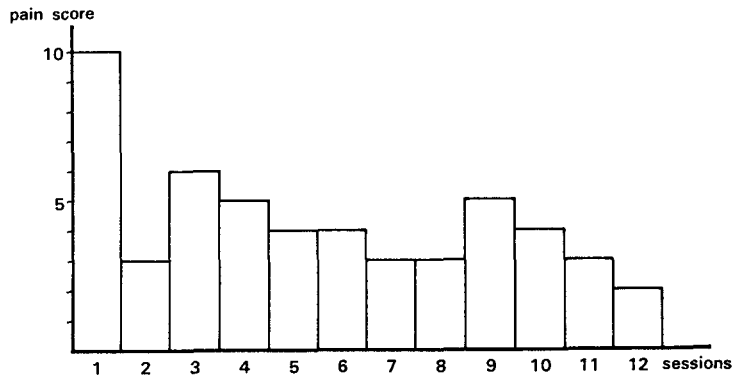


Fig. 5. The course of treatment of case 3. The patient received a total of 12 sessions of ESCS. Pain was completely relieved.



who had pain in surgical wound. Left varicoectomy of the testis caused him severe pain in the left inguinal region. Epidural blocks for six months brought slight relief. He had surgery for a left renal calculus, and immediately after surgery he noticed severe pain in the left flank and inguinal regions. He was referred to our outpatient clinic (fig. 5). The first ESCS relieved the pain. Twelve days after the first ESCS pain score was

reduced from 10 to 3, and the pain was relieved thoroughly in a total 12 sessions.

Discussion

We usually administer drug therapy, physical therapy, acupuncture or nerve blocks with local anesthetics to outpatients in the pain clinic. This method is used in outpatients with intractable pain, all of whom were completely unresponsive to any other

treatment. This method is technically easier and there is a lower rate of dura puncture, bleeding or nerve injury than with the conventional approach. The patient can return home immediately after ESCS because no local anesthetic is injected into the epidural space. We have seen no complications. This method can be used to confirm the effectiveness of ESCS before the implantation of a stimulating device.

We postulate the mechanism of ESCS as follows. ESCS activates the descending inhibitory system of the pain pathway and produces release of endorphins in the central nervous system. Peripherally, ESCS diminishes sympathetic activity with resultant vasodilation, which may induce secondary pain relief. Hilton et al.¹⁶ demonstrated vasodilation in muscles following dorsal root stimulation, and we have reported the increase of muscle blood flow in the hind leg of mongrel dogs after lumbar ESCS¹⁷.

ESCS is used successfully in outpatients with various kinds of intractable pain.

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