

## Lumbar Sympathetic Radiofrequency Neurotomy in Plantar Hyperhidrosis

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**Objective :** Surgical treatment of focal plantar hyperhidrosis is often unsatisfactory compared to palmar hyperhidrosis. The purpose of this study is to evaluate the effect of lumbar sympathetic radiofrequency neurotomy on plantar hyperhidrosis.

**Methods :** From February 2004 to December 2005, 10 patients (mean age 24.3 male 1, female 9) with the clinical diagnosis of plantar hyperhidrosis were treated by bilateral lumbar sympathetic radiofrequency neurotomy of L3 and L4. Patients' symptom relief, satisfactory rate and side effects related to the procedure were analyzed.

**Results :** Radiofrequency neurotomy was effective in the treatment of focal plantar hyperhidrosis showing excellent (more than 75% improved) outcome in 70% of the patients and good (more than 50% improved) in 30%. Complications related to the surgical procedure, such as sensory dysesthesia and compensatory hyperhidrosis were not detected in any case.

**Conclusion :** The use of radiofrequency neurotomy to ablate the lumbar sympathetic ganglion is a safe and effective treatment option for patients with plantar hyperhidrosis.

**KEY WORDS :** Plantar hyperhidrosis · Lumbar sympathetic radiofrequency neurotomy.

### Introduction

Essential hyperhidrosis requiring surgical treatment is an abnormal condition with excessive sweating for the regulation of body temperature in specific parts including the palm, sole, axilla and face. It induces emotional and social distress in the patients. With the introduction of 2mm-diameter endoscopes, palmar hyperhidrosis is treated surgically without burdening the patient reducing operation time and hospital stay and could even minimize postoperative complications, allow for immediate subsidence of hyperhidrosis symptoms<sup>5)</sup>. As a treatment for plantar hyperhidrosis, lumbar sympathectomy may be considered<sup>1,4)</sup>.

However, treatment of focal plantar hyperhidrosis by endoscopic sympathectomy is relatively difficult and less effective. For lumbar sympathectomy, percutaneous procedures are preferred to classical methods that resect sympathetic ganglion, neurolysis (alcohol, phenol).

The application of RF is limited because of the location of lumbar sympathetic ganglion being diverse. Nevertheless, its advantages are that the size of lesion can be controlled read-

ily and complications are infrequent<sup>2)</sup>. Lumbar sympathectomy in a focal plantar hyperhidrosis was performed in a patients by applying RF neurotomy(RFN) with good results. The cases are reported here together with a review of the literature.

### Materials and Methods

Ten patients who had serious difficulties carrying out social life due to bilateral plantar hyperhidrosis, underwent RFN on L3, L4 sympathetic ganglion from February 2004 to December 2005 were analyzed. The study population was 1 male and 9 females. Their mean age was  $24.3 \pm 10.2$  years. The mean follow-up duration after surgery was 6 months (3~10 months). Three patients also showed palmar hyperhidrosis but their main symptom was plantar hyperhidrosis. All patients had no history of sympathectomy or other neurolytic agents.

#### Operative technique

The patient was placed in lateral position and both arms

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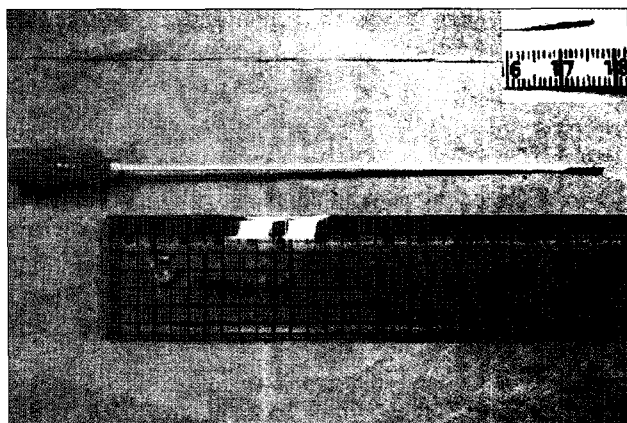


Fig. 1. 20 gauge, 145mm, 10mm curved active tip.

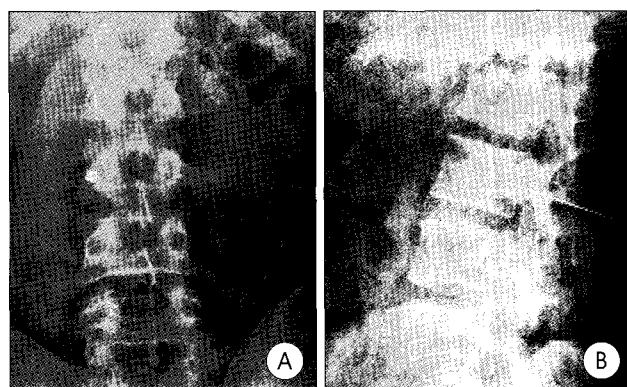


Fig. 2. A : Anteroposterior fluoroscopic view shows the bipolar radiofrequency cannula positions for the 3rd lumbar sympathectomy. Cannula tips are about 3mm medial to the lateral border of the vertebral body. B : Lateral fluoroscopic view shows the bipolar radiofrequency cannula positions for the 3rd lumbar sympathectomy. Cannula tips lie the anterior border of the vertebral body.

were abducted in 90°. The skin was sterilized by a conventional method and drapping was performed. During surgery, electrocardiogram, serum oxygen concentration and blood pressure of patients were monitored. By a C-arm fluoroscopy (Siemens, GE, USA), while observing the antero-posterior view (A-P view) of the L-spine, the L3 body was assessed, The site 8cm away from the spinous process in the right side was considered as a entry point. Local anesthesia of the skin was performed with 1% lidocaine and a catheter (20G, 145mm, 10mm curved active tip) was inserted (Fig. 1). Advancing it while assessing that the catheter did not contact the lumbar vertebral body, the needle tip was located in the internal side of the vertebral body by 3mm, and on lateral view, at the posterior site of the anterior border by 5mm (Fig. 2). A radiofrequency generator (PMG-230, Baylis, Canada) was connected to the catheter, and under the stimulation of 50Hz, 1V, absence of the contraction of the legs and the inguinal area were confirmed. Through the catheter, 1.5ml of 2% lidocaine was injected. After 5 minutes, RF was performed and left side was performed as same manner. The fourth lumbar

vertebra was performed by the identical method. RF was performed twice, at 80°C for 90 seconds, with a resistance value of about 120~160Ω. After resting 1 hour in the recovery room and confirming the absence of special complications, the patient was discharged.

## Results

The satisfaction degree of patients at six months later were as follows : excellent (more than 75% improved) in 7 patients (70%) and good (more than 50% improved) in 3 patients (30%). One patient complained of mild right leg weakness, but he completely recovered at postoperative 7 days without any serious problem. Complications related to the surgical procedure, such as sensory dysesthesia, deafferentation pain and compensatory hyperhidrosis were not detected in any case.

## Discussion

In lumbar sympathectomy for the treatment of plantar hyperhidrosis, the percutaneous surgical procedures such as chemical sympathectomy or procedures applying radiofrequency have been preferred to classical surgical procedures. Lumbar sympathetic ganglions are located in the anterior side of the lumbar vertebra, and their location, shape and size are diverse in each individual. There are 5 pairs of ganglions each in the right and left side from the 12 thoracic sympathetic ganglion to the fourth lumbar sympathetic ganglion. In many cases, there are 4 pairs due to the fusion of the first and the second lumbar sympathetic ganglion, concentrated in the area between the second and the fourth lumbar vertebra. The sympathetic nerves innervating the legs pass through the second and the third lumbar vertebra in most cases, thus blocking was performed on the second, third and fourth lumbar vertebra, and if the soles were included, the blocking was done in the third and fourth lumbar vertebra<sup>6)</sup>. In the cases of the patients in our study population, they complained of excessive sweating in the sole. Therefore, RF was performed on the third and fourth lumbar vertebra. The procedures applying alcohol, phenol, or other neurolytic agents can not control the size of lesion and, the incidence of neuritis is high. Dysesthesia and deafferentation pain may develop. Neurolytic agents may be injected to the subarachnoid space. On the other hand, applying radiofrequency neurotomy, the advantages are that the size of lesion can be readily controlled. It does not destruct adjacent tissues and thus scar tissues are not developed. Hence, it can be applied repeatedly. In contrast, the shortcoming of radiofrequency neurotomy is that in comparison to drugs using neurolytic agents, the blocking

area is limited to the vicinity of the needle tip. Since the lumbar sympathetic ganglion has the pyramidal shape located vertically from the top to the bottom, it is difficult to destruct it completely by one RF lesion. Precise resection is also difficult due to the diverse antero-posterior location. However, recently, due to the improvement of radiofrequency generators, accessory instrument, and the development of curved tip electrodes, the success rate has been raised<sup>3)</sup>. Prior to the generation of lesions by applying radiofrequency, the absence of the pain in the legs and inguinal areas in response to the stimulation of 2Hz, 3V was confirmed. This was to prevent the injury of the spinal nerve or the genitofemoral nerve. In our study, special complications were not developed after RF lesioning. Sayson et al.<sup>7)</sup> have reported that in lumbar sympathectomy the blocking between the second lumbar vertebra and the fourth lumbar vertebra, genitofemoral nerve injury was developed more frequently. Therefore, as in our cases, performing RF on the fourth lumbar vertebra, the possibility of the injury of the genitofemoral nerve is high. Hence, it has to be performed more cautiously on that level<sup>7)</sup>. Although good result was obtained, our study may need larger number of cases and long term follow-up.

## Conclusion

In the treatment of plantar hyperhidrosis, the radiofrequency neurotomy for lumbar sympathetic ganglion is effective and safe in decreasing or ceasing the sweating.

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