CASE REPORT

Effectiveness of Endoscopic Lumbar Sympathectomy in Patients with Plantar Hyperhidrosis: First Case Series in Thailand

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Objective: The present study aims to assess the outcome of endoscopic lumbar sympathectomy (ELS) in terms of intra- and postoperative complications after surgery, hospital stay, and side effects among a Thai urban population with plantar hyperhidrosis.

Materials and Methods: This retrospective cohort study was conducted between June and December 2023. Ten patients diagnosed with plantar hyperhidrosis underwent endoscopic thoracic and lumbar sympathectomy. All medical records were collected from Vajira Hospital. Various factors were analyzed to evaluate the outcomes.

Results: The 10 patients were subjected to ELS, and 9 of them simultaneously underwent endoscopic thoracic sympathectomy. There were 6 female and 4 male patients. None of them was smoker. The operative time was 30 minutes for ELS. No intraoperative conversion was observed. For postoperative outcome, 70 percents of patients has symptom of compensatory hyperhidrosis at trunk and thigh. None of them has side effect of retrograde ejaculation or neuralgia or nerve injury. All patients symptom were 100 percent improve after surgery.

Conclusion: ELS is a safe and effective treatment for patients with plantar hyperhidrosis with serious complication.

Keywords: Endoscopic; Sympathectomy; Hyperhidrosis

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Hyperhidrosis is characterized by excessive sweating. Although its etiology is unclear, some theories believe that sympathetic nerve overstimulation causes excessive sweating. This condition usually occurs in the palm and sole with a prevalence of 5% to 16% in the general population[1,2]. Excessive sweat from the palm and sole can disturb the quality of life and give off an unpleasant sweat odor or even skin infection.

Hyperhidrosis can be treated by various ways, starting from the application of aluminum chloride solutions and anticholinergics, iontophoresis, and subdermal injection of botulinum toxin[3,4]. However, these therapies have the disadvantages of short-term effects and high rates of recurrence[5,6]. For the hands, when conservative treatments have failed, endoscopic thoracic sympathectomy (ETS) has become a standard care for primary hyperhidrosis with a satisfactory rating of more than 90% after surgery[7].

Endoscopic lumbar sympathectomy (ELS) is possibly the only effective surgical treatment for plantar hyperhidrosis. However, data regarding the safety and efficacy of ELS for plantar hyperhidrosis worldwide are still lacking. To our knowledge, this work is the first case series reporting the outcomes of ELS in Thailand.

The present study aims to present the safety, efficacy, and operation procedures of ELS in Thailand.

Materials and Methods

All the patients with palmar–plantar hyperhidrosis were diagnosed from patient history and examination. External causes, such as hyperthyroid or diabetes, were investigated to exclude as secondary causes of hyperhidrosis, were excluded from our study. All the patients with primary palmar–plantar hyperhidrosis were referred to the cardiothoracic vascular unit, Department of Surgery to discuss treatment options, including surgery.

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From June to December 2023, 10 patients were diagnosed with primary palmar–plantar hyperhidrosis. Among these patients, nine underwent ETS and ELS, and the remaining one was subjected to ELS only. All the surgeries were performed by the same cardiovascular thoracic, neuro, and urology surgical team.

This retrospective study was conducted on all the patients who underwent ELS for plantar hyperhidrosis in our institute from June to December 2023. This work was approved by the ethical committee at Vajira Hospital, Navamindradhiraj University (Ethical number COA 011/67 E).

Medical records were evaluated. The preoperative data included demographics (such as age and gender), smoking status, and duration of presentation. The operative data included laterality, operative time, anesthetic induction time, estimated blood loss, blood transfusion, intraoperative temperature change, conversion to thoracotomy or intubation, and perioperative complications.

Postoperative data such as symptoms after surgery, numbness, hospital stays, duration of chest tube, postoperative pain, and side effects including compensatory hyperhidrosis were also evaluated.

Nerve monitoring during Endoscopic lumbar sympathectomy (Figure 1).

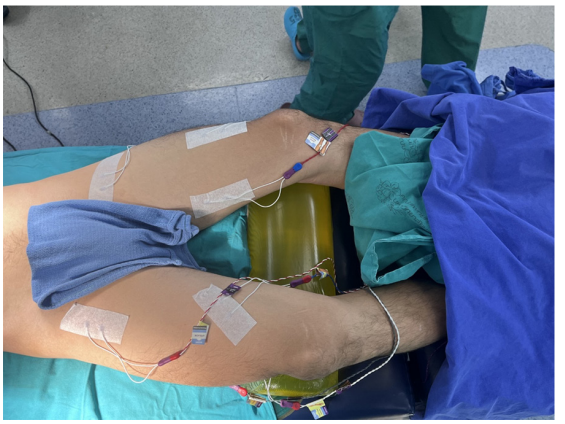

Figure 1. Positioning of nerve monitoring during endoscopic lumbar sympathectomy.

A test series of four twitches was performed at the common peroneal nerve, with a response rate of >80% required before electromyography (EMG) monitoring. The alarm criteria for significant lumbar plexus injury in the present cohort were sustained activity for >2 seconds from the free-run EMG monitoring of the lumbar plexus. Continuously sustained EMG activity for >2 seconds; focal, semirhythmic tonic discharges; and acute signal decrease in the lumbar plexus were considered as significant alert signals.

Endoscopic lumbar sympathectomy technique (Figure 2).

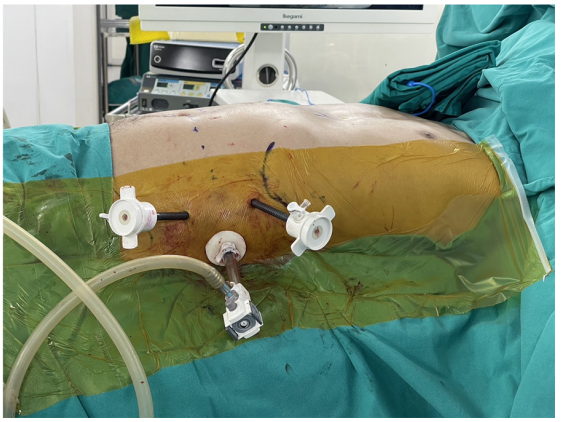

Figure 2. Demonstration position of endoscopic port placement for endoscopic lumbar sympathectomy.

All operations were performed under general endotracheal anesthesia. The patient was placed in a supine position. After routine draping, an approximately 3 cm-long skin incision was made 2 cm away from the medial and superior spot of anterior superior iliac spine on both sides. After skin incision, the external oblique muscle, internal oblique muscle, and transveralis abdominis were dissected consecutively with splitting using hemostat. The transversalis abdominis was separated from the peritoneum. The retroperitoneal space was opened with blunt finger dissection. The absence of peritoneal opening was ensured during this procedure. A round-shaped balloon device (Kii Dissecting Ballon Access System) was inserted through the incision site and then ballooned up to 500 cc to dilate the retroperitoneal space under camera guidance. A 10 mm blunt tip balloon trocar was inserted into dilated space and ballooned with 20 cc of air. CO_2 gas was insufflated to induce pneumoretroperitoneum up to 15 mmHg. A camera device was inserted to the first trocar. Two additional ports were employed: the second port (5 mm) was inserted at the anterior axillary line just below rib cartilage, and the third port (5 mm) was placed at the anterior axillary line just above iliac crest at the same level. After the retroperitoneal space was exposed, Gerota's fascia was dissected. On the right side, the sympathetic chain lying posterior to the inferior vena cava was retracted superiorly. On the left side, the sympathetic chain lies posterior and lateral to the infrarenal aorta. The sympathetic nerve was identified in the medial aspect of the psoas muscle (Figure 3). The upper and lower 2 cm margins of the sympathetic nerve were clipped using

Figure 3. Lumbar sympathetic ganglion was clipped at L3-L4 region.

a titanium clip (Endo Cliptm III Autosuturetm). The muscle layer and subcutaneous tissue were closed layer by layer. All cases were confirmed through the identification of L3–4 level from the C-arm view after clipping both sides.

For the patients with palmar hyperhidrosis who consented for simultaneous ETS, thoracic sympathectomy was performed in a semi upright position after ELS. Two incisions were made: a 5 mm one for thoracoscopy and another 5 mm for the hook. R4-5 sympathectomy and R3 ganglion ablation were performed for the patients with palmar hyperhidrosis. The transection to lateral side of rib was extended to eliminate the nerve of Kuntz and transect a sympathetic chain. Afterward, a 16-Fr nasogastric tube was place in the pleural cavity and the lung was inflated to check for air leaks. The chest tube was removed after ensuring the lack of air leakage. Postoperative routine chest and abdomen radiography was performed in all the patients.

Postoperative care after sympathectomy

All the patients who received ETS and ELS were allowed to recover at the recovery unit in the operative theater and returned to the general ward if no complications occur. Chest and abdomen x-ray were filmed to check for clip and pneumothorax after the surgery. The patients were discharged after chest x-ray was confirmed normal on the next day after surgery.

Postoperative outcome evaluation after surgery

Postoperative skin temperature was intraoperatively measured immediately after sympathectomy. The quality of life were evaluated on the day after surgery and 2 weeks, 6 weeks, and every 6 months thereafter in the our clinic using scale of happiness (1-100).

Statistical analysis

Statistical analysis was performed using STATA v. 16.0 software (StataCorp, College Stata, TX, USA). Categorical variables are presented as frequencies and percentages, and continuous variables are presented as median and interquartile range (P25 to P75).

Results

Ten patients with palmar–plantar hyperhidrosis underwent ELS. Only one of them required ELS alone due to a history of ETS before this surgery. The baseline characteristics are shown in Table 1. The median age of patients was 28.5 years old (IQR 25 to 35). Female was the predominant sex. None of the patients had any underlying disease.

Table 1. Demographic data for plantar hyperhidrosis patient.

Descriptive data	n=10
Age, median (P25 - P75)	28.5 (25 to 35)
Sex, n (%)	
Male	4 (40%)
Female	6 (60%)
Non-smoker, n (%)	100 (100%)
Approach, n (%)	
Endoscopic lumbar sympathectomy	1 (10%)
Endoscopic thoracic and lumbar sympathectomy	9 (90%)
conversion to thoracotomy or laparotomy	0 (0%)
Operation time, median min (P25 - P75)	30 (30 to 60)
Estimate blood, median ml (P25 - P75)	5 (5 to 10)
Blood transfusion, n (%)	0 (0%)
Complication, n (yes %)	0 (0%)
Hospital stay, median (P25 – P75)	2 (2 to 2)
Compensatory hyperhidrosis, n (yes %)	7 (70%)

From the operative data, we could identify all the lumbar sympathetic chains on both sides. Operative time ranged 30 to 60 minutes, with blood loss of only 5 milliliters. No conversion to open surgery or any chest tube after the surgery was recorded. No intra and postoperative complications such as neuralgia, retrograde ejaculation, numbness, or ureter injury were observed. For the outcome after surgery, the patients with plantar hyperhidrosis reported 100% foot dryness and 100% satisfaction. However, 70% of the patients had compensatory hyperhidrosis at the back and trunk area after the surgery. All of the symptoms were mild with no effect on their quality of life.

Discussion

Hyperhidrosis is defined as excessive sweating from focal parts of the body. Face, palm, axillar parts, and sole are commonly involved. Primary hyperhidrosis is common and usually affects the autonomous sympathetic pathway. Meanwhile, secondary hyperhidrosis is usually caused by

underlying diseases, such as hyperthyroid or medical use[8,9]. Symptoms usually manifest during childhood to adolescence and interfere with the quality of life.

Several treatment options are available for hyperhidrosis, such as the topical use of aluminum chloride solution, medication as anticholinergic drug, and iontophoresis. However, the symptoms improve only as long as these treatments are continuously applied. Another option is the intradermal injection of botulinum toxin. However, the effect is limited to only few months, especially for the sole due to the difficulty in applying anesthetic cream. ELS is the only permanent cure for plantar hyperhidrosis.

Several studies reported about the long-term effects of ELS. Lima and colleagues[10] reported a 98% improvement in symptom after ELS. Rieger's cohort study on patients with plantar hyperhidrosis who underwent ELS reported a 97% success rate[7,11]. Meanwhile, our study recorded 100% satisfaction among the patients who underwent ELS.

The main complication after ELS is postoperative sympathectomy neuralgia at the lower limbs. Its incidence varies from 3% to 42%, and it disappears after full recovery. The genitofemoral nerve and lateral femoral cutaneous nerve are damaged the most during lumbar sympathectomy. This symptom features acute pain that persists for 2 to 6 weeks after operation[2-4,11]. The characteristic of pain is burning, tingling, numbness, or stabbing pain at the proximal anterolateral and posterior thigh. This complication is caused by direct injuries to these nerves. In this cohort, all the patients were operated under intraoperative neurophysiological EMG monitoring. When the instruments come in direct contact with the lumbar plexus during dissection, the signal will alarm the surgeon. None of the patients had postoperative sympathectomy neuralgia. Therefore, intraoperative neurophysiological EMG monitoring is useful during the early learning curve period to protect lumbar plexus injuries during dissection.

The next complication from ELS is retrograde ejaculation. This complication of lumbar sympathectomy occurs in 6% to 54% of male patients and mainly after the bilateral resection of the upmost lumbar ganglia[5-7]. This complication appears to be permanent for 0.8% to 54% of men who underwent bilateral lumbar sympathectomy[12]. The sweat glands of the feet are supplied by the postganglionic sympathetic fibers running through the spinal nerves from L4 to S3. These sympathetic fibers always arise from the upper border of the L3, and the first lumbar ganglion is situated cephalad to the upper border of the L3. Preserving at least one of the upper lumbar ganglions is important to minimize this complication[12-15]. In this cohort, none of the patients had retrograde ejaculation after surgery. This phenomenon can be attributed to the resection of the bilateral lumbar ganglia at level L3/4 in all the patients.

Our study has several limitations. One is the small number of enrolled patients, and the other is the short-term postoperative follow-up. However, we plan to do a larger cohort studies and long-tern follow-up.

Conclusion

ELS is a safe and effective treatment for plantar hyperhidrosis.

What is already known on this topic?

Plantar hyperhidrosis treatment varies from conservative to surgery. However, effect of surgical treatment has been known that only treatment to cure this disease permanently

What this study adds?

To our knowledge, we believe that study is claimed to be a first study to report an outcome plantar hyperhidrosis surgery of Thailand. This study is also favorable results.

Conflicts of Interest

The authors declare no conflict of interest.

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