EVALUATION OF PATIENTS WHO UNDERWENT BILATERAL UNIPORTAL VIDEO-ASSISTED THORACIC SYMPATHECTOMY FOR PRIMARY HYPERHIDROSIS

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ABSTRACT

Introduction: Primary hyperhidrosis (PH) is defined as localized excessive sweating, such as the palmar, plantar or axillary area. Video-assisted thoracic sympathectomy (VTS) is successfully used worldwide in the invasive treatment of PH. Thoracoscopic sympathectomy is a safe and simple procedure compared to other thoracic surgeries.

Methods: We retrospectively evaluated a total of 130 consecutive PH patients who were treated via VTS in our department between June 2008 and June 2018. Fifty-seven (77%) patients were male, 73 (23%) patients were female with a mean age of 26.01±7.4 (18–38 years) years. Age, gender, indication and complication of VTS, surgical procedure, applied treatments, surgical outcomes were reviewed.

Results: The operation indications were palmar and axillary hyperhidrosis in 62 (47.7%) patients, palmary hyperhidrosis in 48 (37%), axillary hyperhidrosis in 14 (10.8%) patients, flushing in 6 (4.6%) patients and Reynauld syndrome in 2 (1.6%) patients. Bilateral VTS was performed at T2 for flushing, T2-T3 for palmar-only hyperhidrosis, T2-T4 for palmar and axillary hyperhidrosis, and T3-T4 for axillary-only hyperhidrosis. In one patient additionally, transaxillary first rib resection was performed for the thoracic outlet syndrome at the same time. One hundred fifteen patients (88.5%) were satisfied, whereas only 15 (11.5%) were dissatisfied with the procedure. The mean operation time, chest tube removal time, length of hospital stay time was 32.24±3.41 (20–50) minutes, 1.1±0.3 (1-3) days, 1.6±0.6 (2-5) days, respectively. The most common complication was compensatory hyperhidrosis (CH) (n:78, 59.6%) which was seen in the waist, the umbilicus, and the back during the mean follow-up period of 38.2±9.2 (range 6-60) months. Recurrence was seen in nine (7%) patients in 6.2±2.4 months after the operation. There was no statistically significant difference in compensatory hyperhidrosis, and recurrence development status with VTS performed ganglion levels (p> 0.05)

Conclusions: Considering possible complication of CH cauterisation technique with uniportal VTS can be successfully and safely performed in the treatment of primary hyperhidrosis.

KEYWORDS: hyperhidrosis, thoracoscopy, sympathectomy

Introduction:

Hyperhidrosis is excessive sweating of abnormal density in certain parts of the body such as hands, feet, armpits and face. Excessive sweating can cause problems and adversely affect people’s private and social life. Nearly half of the patients reported that this situation negatively affected their work life, meeting other people, and emotional relationships [1-2]. Hyperhidrosis can be separated into two groups, primer or secondary.

Primary hyperhidrosis (PH) is defined as localized excessive sweating, such as the palmar, plantar or axillary area. However,
once the secondary causes are excluded, the PH can be diagnosed. The sweat gland structure is standard, but there is an increase in neuronal impulses from the cerebral cortex to the eccrine sweat glands. PH is usually idiopathic; family story has been reported [1].

Secondary hyperhidrosis, which may be generalised or localised, occurs due to a secondary disease. The most common secondary hyperhidrosis causes are systemic diseases (hyperthyroidism, diabetes mellitus, pheochromocytoma, congestive heart failure), infections (tuberculosis, Brucella, malaria) malignancies (Hodgkin’s lymphoma, carcinoid tumour, Pancoast a tumour) peripheral neuropathies, medulla spinalis injuries and menopause [1,3].

Video-assisted thoracic sympathectomy (VTS) is successfully used worldwide in the invasive treatment of PH. Thoracoscopic sympathectomy is a safe and simple procedure compared to other thoracic surgeries. VTS can be performed with sympathetic chain clipping, cauterisation or cutting. There is no proven difference and superiority between these methods regarding stopping excessive sweating [4].

Material and Method:
We retrospectively evaluated a total of 130 consecutive PH patients who were treated via VTS in our department between June 2008 and June 2018. Fifty-seven (77%) patients were male, 73 (23%) patients were female with a mean age of 26.01±7.4(18-38 years) years. Age, gender, indication-complication of VTS, surgical procedure, applied treatments, surgical outcomes were reviewed. All of the patients included in the study were diagnosed with PH. They had at least two of the following criteria defined by Hornberger et al.[5]: 1- bilateral and symmetrical sweating 2- At least one sweating episode per week, 3- Impairs daily life 4- Age of onset less than 25 years 5- positive family story, 6- Cessation of focal sweating during sleep.

Patients were excluded from the study: under 18 years of age, who not agree to participate in the study, who did not accept surgical treatment, who have secondary hyperhidrosis Video-assisted thoracic sympathectomy was performed under general anaesthesia with double lumen intubation patients were placed in the lateral decubitus and slightly, a forward position with the arm at 90% abduction and elevation. The patient was turned onto the other side after one side was All patients underwent bilateral VTS with one 5 mm thoracoport and L shaped 10 mm 0-degree rigid operating thoracoscope (Karl-Storz GmbH & Co., Tuttlingen, Germany). Approximately 2 cm incision performed from the mid-axillary line on the third intercostal space and the sympathetic chain was sympathectomy (cauterized) using a thoracoscopic suction-cautery through the thoracoscope hole (Figure 1 A,B).

In four (3.2%) patients, because of minor apical adhesions, a second thoracoport was placed. The adhesions were merely separated with hook cautery to reveal a sympathetic chain. T2-T4 and T3-T5 sympathetic ganglia and if any Kuntz’s nerves were ablated by cauterisation under the parietal pleura (Figure 1 C, D).

At the end of the procedure, 24 F thoracic drain was inserted, and the incision was closed. All the patients were extubated in the operating room and were followed by monitoring during the first 8 hours in their service room. Chest physiotherapy was applied in the early postoperative period. Portable chest X-ray was performed after surgery immediately. Chest the tube removed the day after the operation if no air leak and patients were discharged on the first postoperative day. Outpatient controls performed postoperative follow-up. All patients were routinely followed up annually by telephone questionnaire for patients’ degree of sweating, possible CH, overall satisfaction, and complications.

The procedures followed were by the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 and 2008.

Data Analysis:
Statistical analysis was performed using the Statistically Package for the Social Science program (SPSS, 20.0) Data were expressed as mean±SD. Frequencies and percentages were used for the certain measures. Newman Keuls multiple comparison tests for subgroup comparison, independent t-test for comparison of binary groups, chi-square test for comparison of qualitative data were used. The results were evaluated as p <0.05.

Results:
Demographic features, clinical characteristics and surgical outcomes of 130 patients who were performed VTS for PH was summarised in Table 1.

The operation indications were palmar and axillary hyperhidrosis in 62 (47.7%) patients, palmary hyperhidrosis in 48 (37%) patients (Figure 2), axillary hyperhidrosis in 14 (10.8%) patients (Figure 3), flushing in 6 (4.6%) patients and Reynaud syndrome in 2 (1.6%) patients. Bilateral VTS was performed for all patients at T2-3 for flushing, Reynaud syndrome and palmar-only hyperhidrosis, T2-T5 for palmar and axillary hyperhidrosis, and T3-T5 for axillary-only hyperhidrosis. In one patient additionally, transaxillary first rib resection was performed for the thoracic outlet syndrome at the same time. One hundred fifteen patients (88.5%) were satisfied, whereas only 15 (11.5%) were dissatisfied with a surgical procedure. The mean operation time, chest tube removal time, length of hospital stay time was

Figure 1: A: The image of L shaped 10 mm rigid operating thoracoscope and thoracoscopic suction-cautery through the thoracoscope’s hole; B: VTS operation view, cauterization of the sympathetic chain uniportally with thoracoscopic suction-cautery through the thoracoscope hole.; C: The thoracoscopic view of T1-T4 sympathetic ganglia; D: The view of T2-T4 sympathetic ganglia and nerve ablation by cauterization under the parietal pleura
Table 1 Demographic and clinical characteristics and surgical outcomes of 130 cases who were performed VTS

<table>
<thead>
<tr>
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<th>130 (100)</th>
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<tbody>
<tr>
<td><strong>Sex, n (%)</strong></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>57 (44)</td>
</tr>
<tr>
<td>Female</td>
<td>73 (56)</td>
</tr>
<tr>
<td><strong>Age, mean±SD (range, years)</strong></td>
<td>26.01±7.4 (18–38)</td>
</tr>
<tr>
<td><strong>Mean operation time, mean±SD (range, min)</strong></td>
<td>32.24±3.41 (20–50) minutes</td>
</tr>
<tr>
<td><strong>Mean tube removal time, mean±SD (range, min)</strong></td>
<td>1.1±0.3 (1-3) days</td>
</tr>
<tr>
<td><strong>Mean length of hospital time, mean±SD (range, min)</strong></td>
<td>1.6±0.6 (2-5) days</td>
</tr>
<tr>
<td><strong>Operation Indications, n (%)</strong></td>
<td>130 (100)</td>
</tr>
<tr>
<td>Primary Hyperhidrosis</td>
<td>122 (93.8)</td>
</tr>
<tr>
<td>Flushing</td>
<td>6 (4.6)</td>
</tr>
<tr>
<td>Reynauld syndrome</td>
<td>2 (1.6)</td>
</tr>
<tr>
<td><strong>Complications and side effects n (%)</strong></td>
<td>92 (70.8)</td>
</tr>
<tr>
<td>Compensatory hyperhidrosis</td>
<td>78 (59.6)</td>
</tr>
<tr>
<td>Chronic pain</td>
<td>8 (6.4)</td>
</tr>
<tr>
<td>Pneumothorax</td>
<td>4 (3.2)</td>
</tr>
<tr>
<td>Hemohorax</td>
<td>2 (1.6)</td>
</tr>
<tr>
<td><strong>Recurrence, n (%)</strong></td>
<td>9 (7)</td>
</tr>
<tr>
<td>Palmary</td>
<td>5 (3.8)</td>
</tr>
<tr>
<td>Axillary</td>
<td>4 (3.2)</td>
</tr>
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</table>

32.24±3.41 (20–50) minutes, 1.1±0.3 (1-3) days, 1.6±0.6 (2-5) days, respectively. The mean a patient’s cost for the healthcare system was calculated as 102.32±12.6 USD. There was no need for conversion to open surgery and was not seen the intraoperative complication. The most common complication was Compensatory Hyperhidrosis (CH) (n:78, 59.6%) which was seen on the waist, the umbilicus, and the back. Oral 4 mg oxybutynin per day was started for patients with excessive CH (n:8) whereas tolerable ones (n:70) were followed. The other complications were chronic pain required oral medication (n:8, 6.4%), pneumothorax required drainage (n:4, 3.2%) and hemothorax required drainage (n:2, 1.6%). The mean follows up period was 38.2±9.2 (range 6-60) months. Recurrence was seen in nine (7%) patients in 6.2±2.4 months after the operation [Palmary in 5 (3.8%), Axillary in 4 (3.2%)] For recurrent patients, re-operation was recommended. Only one of them was accepted, and this patient was re-operated successfully. Intraoperative or postoperative mortality was not observed. There was no statistically significant difference in compensatory hyperhidrosis, and recurrence development status with VTS performed ganglion levels (p>0.05) (Table 2).

**Discussion:**

Hyperhidrosis, which impairs the quality of life of the person and leads to various psycho-social problems is thought to effects 2.8% of the population in the United States [6]. The prevalence of hyperhidrosis’s ranges between 0.6% and 5.5% for the different populations. While PH is mostly seen during puberty period and after then, its frequency decreases with age [7]. There are no prevalence studies for Turkey in the literature.

Etiologically, the disease can be divided into primary and secondary hyperhidrosis. Although the exact cause of PH is unknown, it is estimated that the sympathetic nervous system is the result of overworking. It is known that the familial transition near the half of the cases but the genetic transition is unproven. PH clinically presents as the excessive bilateral sweat of face, palms, armpits, feet. Gustatory sweating (Frey’s syndrome) is also a form of PH. Secondary hyperhidrosis can be generalised or localised and develops due to an underlying disease such as obesity, menopause, malignancy, diabetes mellitus or hyperthyroidism [8]. All of the 130 patients included in the study were diagnosed with PH. However, in our series, clinical manifestation of PH was composed of facial flushing and extremity sweating except than gustatory sweating. Patients with secondary hyperhidrosis were excluded from the study.

There are also some beneficial non-surgical treatment modalities for PH, such as topical antiperspirant creams, antidepressants, iontophoresis and botulinum toxin injection. However, the effect of a majority of them is temporary, and the results are not gratifying compared to surgery [6-8]. The patients in our study were usually examined in dermatology or internal medicine clinics. The non-surgical treatment methods were used, but the results were not satisfactory.

Bilateral VTS is a gold standard surgical method today for PH with low morbidity-mortality, complication rates, perfect cosmetic results, minimal postoperative pain, and short hospitalisation time. There are various methods such as cutting, burning or cutting by electrocautery or clipping of sympathetic nerves-ganglions. Bilateral VATS is an effective and safe choice of treat-
Table 2: Comparison of difference in compensatory hyperhidrosis and recurrence development status with Video-assisted thoracic sympathectomy performed ganglion levels

<table>
<thead>
<tr>
<th>Variable</th>
<th>T2-T5 sympathectomy for palmary and axillary hyperhidrosis (n:62)</th>
<th>T2-T3 sympathectomy for palmar hyperhidrosis (n:48)</th>
<th>T3-T5 sympathectomy for axillary hyperhidrosis (n:14)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compensatory hyperhidrosis</td>
<td>39</td>
<td>32</td>
<td>7</td>
<td>1.270</td>
</tr>
<tr>
<td>Recurrence</td>
<td>4</td>
<td>5</td>
<td>-</td>
<td>0.362</td>
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Figure 2: The image of a patient with palmary primary hyperhidrosis.

Failure for primary hyperhidrosis with low morbidity-mortality rates, better cosmetic results, minimal postoperative pain, and short hospitalisation period. The techniques can use similar high success rates (around 90%) [7,8]. We preferred burning with electrocautery of sympathetic chain and found 88.5% of the patients satisfied in our study. Clipping may be a reversible method for some side effects such as CH according to some articles [9]. However, Loscertales et al. [10] report that the clipping method is irreversible ten days after the procedure for CH.

Possible side effects and complications of VTS are CH, excessive dryness, gustatory sweating, pneumothorax, hemothorax, subcutaneous emphysema, bradycardia, chest infection. CH is the most frequent side effect, its aetiology is unknown, and treatment is difficult. Different levels of sympathectomy to reduce the degree and occurrence of CH is still controversially [11]. We found CH as a most common side effect as consistent with previous studies. We started medical treatment in severe cases of CH. Other complications were chronic pain, pneumothorax and hemothorax.

Failures of the process can be due to incomplete surgery or nerve regeneration after months-years from operation [12]. Recurrence was seen in nine (7%) patients in our study. We think that possible recurrence mechanism depends on nerve regeneration because of recurrences found in 6.2±2.4 months after the operation.

It has been reported that the procedure can be performed awake or non-intubated with the help of loco-regional anaesthesia and sedation and so fast-track recovery and discharge can be achieved [13]. Although we have successfully used awake VATS procedure for many other indications, we have not yet achieved success for VATS sympathectomy. One of the patients in our study bilateral awake VATS sympathectomy was tried, but due to excessive cough reflex, hyperpnea and patient incompatibility, general anaesthesia and intubation had to be passed.

Our study has some limitations. First, it is a retrospective study including consecutive patients and, So, the study opens to selection bias. Second, a limited number of cases to make a comparison. However, the strength of our study is that we performed a standard bilateral uniportal video-assisted thoracic sympathectomy which rarely used in the literature and evaluated from many perspectives related to primary hyperhidrosis and the procedure.
Conclusions:

Although there are some other palliative therapy methods, bilateral VTS sympathectomy is still an only curative treatment for PH. Considering possible complication of compensatory hyperhidrosis cauterisation technique with uniportal VTS can be successfully and safely performed in the treatment of PH.

Competing Interests

The authors declare no conflict of interest.

References


