Research Article

Palmar Skin Temperature Importance During Transthoracic Endoscopic Sympathectomy For Palmar Hyperhidrosis

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Summary

Background: The primary goal of this study is to identity and analysis age, diagnosis, sympathetic chain levels, complications and results associated with successful endoscopic surgical treatment for hyperhidrosis and also this study was to investigate of palmar temperature changes during the operation and to prove the successful surgical procedures and beneficial of the bilateral sympathectomy during the peroperative case.

Methods: Fifty one patients with severe primary palmar hyperhidrosis received bilateral endoscopic thoracic sympathectomy. Different levels of transection from T4 to T2 were performed step by step until the successful extirpation was implied by the recorded unilateral right palmar temperature intraoperative monitoring. The results of the operations were studied. All patients were followed up and evaluated for symptom resolution, postoperative complication, levels of satisfaction, and severity of compensatory sweating. Effective extirpation ganglia occurred with the intraoperative increasing palmar temperature.

Results: Of a total of 102 lateral procedures, 76 laterals (76%) ended the procedure at the T4 level, 23 laterals (23%) ended the procedure at the T3-T5 level, and 1 lateral (1%) ended the procedure at the T2 level. The postoperative complication was minor, and no Horner's syndrome was detected. The rate of symptom resolution was 100% and no recurrence was found. The satisfaction rate was 92%, and the incidence of mild, moderate, and severe compensatory sweating were 12%, 8%, and 6%, respectively.

Conclusions: Concerning the sympathectomy for palmar hyperhidrosis, there is a possibility that the level of the transection varies and should be adjusted for each individual patient. Intraoperative monitoring of temperature may be a useful tool in establishing a kind of standardized reference for finding the correct target level.

Key words: Hyperhidrosis, sympathetic chain, endoscopic sympathectomy

Palmar Hiperhidrozis İçin Yapılan Transtorasik Endoskopik Sempatektomi Sırasında Palmar Cilt Sıcakliğinin Önemi

Özet

Amaç: Bu çalışmada ki amaç kışilerin yaş, tanı kriteri, sempatik zincir seviyesi, oluşan komplikasyonlar ve sonuçları ile hiperhidrozisde başarılı bir endoskopik sempatektomi arasında yapılan bir karşılaştırmaya birlikte operasyon esnasında kaydedilen palmar ısı değişikliklerinin başarılı bir sempatektomiyi kanıtlaması ve rehber olması açısından önemini vurgulamaktır.

Metod: 51 hasta aşırı primer hiperhidrozis için bilateral endoskopik sempatektomi yapıldı. T2 ve T4 ganglionlarının çıkarmış esnasında sağ eldeki palmar ısı intraopertif monitorize edildi.
Sonuçlar operasyon sonrası değerlendirildi. Tüm hastalar terlemenin yok olması, ameliyat sonrası gelişen komplikasyonlar rahatlammanın derecesi ve aşırı refleks terleme ve efektif ganglion çıkartımında yüksek palmar ısı yönünden değerlendirildi. 

Sonuçlar: Toplam 102 lateral sempatektomi yapıldı bunların; 76 tanesi (%76) T4 ganglion seviyesinde, 23 tanesi (%23) T3-T5 ganglion seviyesinde ve 1 tanesi (%1) T2 ganglion seviyesinde yapılmıştır. Postoperatif komplikasyonlar minör düzeyde olup Horner sendromu görülmemiştir. Sempotların kaybolması hastalarda %100 olmuştur. Memnuniyet derecesi %92 olarak bildirilmiştir. Refleks terleme şiddetine göre %12 yazılı,%8 orta derecede ve %6 şiddetli olmuştur.

Tartışma: Palmar hiperhidrozis için her bir bireyde yapılan çeşitli derecelerdeki ganglionların eksizyonu mümkün olabilmektedir. İntraoperatif monitorize edilen ısı değişmeleri operasyonda doğru bir sempatik ganglionun çıkartılması için yararlı bir yöntemdir.

Anahtar Kelimeler: Hiperhidrozis, sempatik zincir, endoskopik, sempatektomi

INTRODUCTION
Palmar hyperhidrosis is a disease characterized by sweating in the palms beyond the physiological needs of the body, with higher prevalence between the ages of 18 to 54. The disease often significantly affects the patient's quality of life(6). Symptoms affect important aspects of quality of life including physical, psychological and social dimensions. Usually, hyperhidrosis worsens during the warmer seasons and improves during the winter. People who suffer hyperhidrosis can experience excessive sweating on their hands (palmar), on their axillary, on their feet on their face called fascial. Men and women appear to be equally to be affected.

Video-assisted thoracic sympathectomy (VATS) is currently the choice procedure for the definitive treatment of primary hyperhidrosis because it is an effective, safe, and minimally invasive method(1). 

MATERIAL AND METHODS
Between 2007 and 2011, 51 (30 female, 21 male) patients underwent one stage bilateral thoracoscopic sympathectomy for treatment of primary palmar hyperhidrosis by the same surgical team. The whole cases were the same anesthetic and surgical protocols were applied. Anaesthesia was induced with 2 mg/kg propofol, 2 µg/kg fentanyl and 0.6 mg/kg rocuronium administered intravenously. After tracheal intubation with double-lumen endotracheal tube, controlled ventilation was initiated without positive-end expiratory pressure. Respiratory rates were adjusted to achieve an end-tidal carbon dioxide level of 30 to 35 mm Hg. Anaesthesia was maintained with a mixture of air (0.5 l/min) and oxygen (0.5 l/min) plus desflurane. In patient who underwent general anesthesia with double-lumen endotracheal intubation supported the medical air for the collapsing the lung.

Starting the operations a small skin incision was made on the mid axillary line at the third intercostal space. The intercostal muscle were dissected bluntly and then the parietal pleura was penetrated with the trocar. A medical gas was insufflated and tension pneumothorax upgrade into the pleural cavity for caused gradual collapse of the lung, allowing the endoscopic visualization. The upper second ribs were used as local landmarks. The whole trunk sympathetic ganglion was identified. Sympatholisis were achieved with monopolar electrocauterization. When the sympatic chain was removed the peroperative phase surgeon's visualization through the endoscope and by an elevation of palmar temperature. Before removing the endoscope, as the collapsed lung was inflated until fully expanded. The same procedures were then repeated on the other side.
For 51 case, a palmar temperature was measured which intraoperatively recorded unilateral right palmar temperature. Telesensor thermometer was used for monitoring palmar temperature into the palms. The one sensor allowed continuous simultaneous monitoring of palmar temperature unilateral sides throughout the whole course of the operation. Prior to induction of anesthesia sensors was attached and taped to the center of each palm. The temperature was kept at about 22°C in the operating room. Palmar temperature values were recorded starting after anesthesia until the end of the operating when the performed unilateral sympathectomy caused only ipsilateral palmar temperature elevation was obtained. Fifty one bilaterally sympathectomies were performed (mean age, 28 years). In the 2 patients with cranio-fascial hyperhidrosis, underwent T2 resection, 25 patients with palmar and axillary hyperhidrosis, underwent T3-T4 resection. 1 patients with isolated axillary hyperhidrosis underwent T3 sympathectomy.T3-T5 resection were 23 patient. No mortality occurred. 

A postoperative chest roentgenograph is obtained in the recovery room to verify the absence of a significant pneumothorax. A temporary intraoperative pediatric chest tube is inserted into the chest during closure of the incisional soft tissues but is removed before tying down the skin closure suture.

RESULTS

No operative mortality was recorded. A raise in hand temperature was documented with the palmar temperature. The whole 51 cases became finished palm sweating after the operation. All of the cases felt their palms had turned dry and hot. A total of 26 patients were compared with their preoperative situations increases of 3 degrees of hands. Other patients ranged from 1-4 degrees of temperatures as indicated in Table 1. The Student's t-test p-value was found to be significant compared with patients compared with their preoperative palmar temperature. (p<0.000). Intercostal neuralgia was the most common postoperative complaint, 48 cases were discharged from the hospital one day later of operation. 3 cases were occurred until the next morning because of chest pain and transient dyspnea had unilateral pneumothorax requiring chest tube insertion and prolonged hospital stay. There were no other complications such as hemothorax or Horner's syndrome. At the follow-up visits, all cases reported cessation of palm sweating.

All cases experienced compensatory sweating on the chest, back, abdomen, buttocks and/or thighs, which, in most cases, was well tolerate post-operative complications included, 3 patients were occured pneumothorax. Three patients experienced hyperesthesias at the incision.

<table>
<thead>
<tr>
<th>Patients</th>
<th>Value of temperature</th>
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<tr>
<td>3</td>
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<tr>
<td>26</td>
<td>3</td>
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<td>17</td>
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<td>5</td>
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DISCUSSION
Primary hyperhidrosis is characterized by increased sympathetic activity at the upper thoracic ganglia T2 and T3 with no apparent underlying cause and is currently the most debilitating form of hyperhidrosis observed in 0.5-1% of the population. Conservative treatment is not always effective and often requires repeated courses of therapy that can be dismantling on the long run.
Thoracoscopic surgery on the thoracic sympathetic nerve chain has emerged in the last two decades to be a superior treatment over nonsurgical options for those afflicted with moderate to severe hyperhidrosis when medical therapies have

Figure 1: Thoracoscopic view upper thoracic sympathetic chain

Figure 2: T2 Ganglion view
been ineffective in providing relief. The current mainstay operation practiced by many thoracic sympathetic surgeons is thoracoscopic sympathectomy, which involves dividing the sympathetic nerve chain without extirpation or resection of the nerve segment. In summary, significant improvement in quality of life can result from surgery for hyperhidrosis. In particular, patients with palmar hyperhidrosis derive the greatest relief from surgery. Although from data such as these it may seem attractive to some to advocate this lower T3 and T4 sympathectomy procedure for other hyperhidrosis patients as well (axillary, palmar, or combination), one should note the reported 3% incidence of lack of relief of palmar symptoms when treating with this lower level sympathectomy(9).

Bilateral endoscopic sympathectomy can be performed by different surgical and anaesthesiological techniques, yet the degree of patient's compliance and satisfaction for such a procedure must be taken into account. Giving the patient the chance of achieving both functional and aesthetic results with minimal risk and discomfort together with an excellent post-operative quality of life is the gold standard(8). Sympathectomy under general anaesthesia and a single-lumen endotracheal intubation is a well-established procedure(3). As previously reported by Garcia(2) and Espania in all cases via video-assisted thorascopic surgery: one or more ganglia between T2 and T5 are usually resected depending on the area affected by hyperhidrosis T2 for craniofacial hyperhidrosis, T3 and T4 for palmar hyperhidrosis and T3 to T5 for combined palmar and axillary hyperhidrosis. They recommend intervention on the T2 ganglia for facial hyperhidrosis and rubor, on the T3 ganglia for palmar hyperhidrosis and on the T3 and T4 ganglia for axillary hyperhidrosis. The simplicity of video-assisted thoracoscopy allowing visualization and reliability of access to the thoracic sympathetic trunk has turned this procedure into excellent alternative for open thoracic sympathectomy.

Compensatory sweating remains the most common, and most disabling complication of video-assisted thoracoscopic sympathectomy; The reported incidence rate of CS after thoracic sympathectomy varies from 24% to 98.6%(3), we had ten cases with compensatory sweating; the efficacy of main trunk cutting or T3 ganglion versus T2 should be studied thoroughly to assess their efficacy in reducing the complication of compensatory sweating. Video-assisted thoracoscopic resection of the sympathetic chain from T2 to T4-5 is safe and effective and leads in almost 100% of cases to the elimination of palmar and axillary and 20% reduced pedal hyperhidrosis. In contrast to the excellent results in patients with palmar-plantar and palmar-axillary hyperhidrosis, In our experience if you protected T2 ganglion looked less reflex compensatory sweating. Severe hyperhidrosis is greatly affects people's lives.

Endoscopic transthoracic sympathectomy is a popular surgical technique to treat severe refractory essential hyperhidrosis because it is a safe, effective, and minimally invasive method. Intraoperative monitoring of palmar temperature is used method for assessing the accuracy as well as adequacy of ablation of the target sympathetic ganglia(7). With continuous monitoring of bilateral palmar temperature during the operative course of sympathectomy, it was possible to depict the alterations of bilateral palmar temperature in response to specific surgical procedures and benificial of the bilateral sympatyhectomy. Following extirpation of the target sympathetic ganglion, elevation of palmar skin temperature is generally regarded as an indication of successfully blockade of sympathetic innervation to the palm, and predicts excellent therapeutic effect(4).
According to our operative experience it may be of importance to those who use intraoperative palmar temperature monitoring as a guide in determining whether or not the correct sympathetic ganglia are ablated for adequate sympathetic denervation of the palms. Given the fact that all the cases demonstrating increasing the palmar temperature pattern were successfully treated and understood to extirpate the sympathetic ganglia.

CONCLUSION

Significant improvement in quality of life can result from surgery for hyperhidrosis. However patients with isolated palmar hyperhidrosis the greatest relief from surgery. Video-assisted thoracoscopic sympathectomy for the treatment of primary palmar hyperhidrosis is effective, with low rates of morbidity and no mortality. Despite the appearance of postoperative changes such as compensatory sweating, patient satisfaction with the procedure is high and their quality of life improves. Continuous intraoperative monitoring of palmar temperature is beneficial, because it has proved a useful guide for operations who perform thoracal sympathectomy, realible information and adequaceey of surgery.

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