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Evaluation of Quality of Life After Bilateral Endoscopic Thoracic Sympathectomy for Primary Hyperhidrosis

Ocena jakości życia po obustronnej torakoskopowej sympatektomii z powodu nadpotliwości pierwotnej

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Abstract

Background. Primary hyperhidrosis is a disorder from which 1% of the society suffers.
Objectives. This present study is aimed to evaluate the effects of endoscopic thoracic sympathectomy on the primary hyperhidrosis.
Material and Methods. Between February 2008 and April 2010, 30 patients with primary hyperhidrosis underwent endoscopic thoracoscopic sympathectomy. Before the operation, 4 (13.3%) cases had sweating on scalp with flushing on the forehead. There was primary palmar hyperhidrosis in 25 (83.3%) cases, facial hyperhidrosis in 17 (56.6%) cases and primary plantar hyperhidrosis in 19 (63.3%) cases. The second and the third thoracic sympathetic ganglia were bilaterally cauterized in 6 (20.0%) of the cases, while 2nd, 3rd and 4th thoracic sympathetic ganglia were bilaterally cauterized in 24 (80.0%) cases.
Results. Quality of life was evaluated by Hyperhidrosis Disease Severity Scale in preoperative and postoperative period. Before the operation, 10 (33.3%) cases expressed that hyperhidrosis was barely tolerable followed by 20 (66.7%) cases expressing that hyperhidrosis was intolerable. After the operation, compensatory sweating was never noticeable in 8 (26.6%) cases, tolerable in 15 (50.0%) cases, barely tolerable in 5 (16.7%) cases, intolerable in 2 (6.6%) cases. In order to assess the quality of life before and after the operation, a scale between 1 (very poor) and 10 (very good) has been implemented. It was found that average before the operation was 7 (2–8), while average after the operation was 8.2 (6–10) ($P < 0.001$).
Conclusions. Endoscopic thoracic sympathectomy is most efficient treatment method of primary hyperhidrosis for enhancing the quality of life (**Adv Clin Exp Med 2010, 19, 5, 619–624**).

Key words: hyperhidrosis, social problems, ganglia, sympathetic, sympathectomy, quality of life.

Streszczenie

Wprowadzenie. Nadpotliwość pierwotna jest zaburzeniem dotyczącym 1% populacji.
Cel pracy. Ocena wpływu torakoskopowej sympatektomii na nadpotliwość pierwotną.
Materiał i metody. Grupę badaną stanowiło 30 pacjentów z nadpotliwością pierwotną, którzy w okresie od lutego 2008 do kwietnia 2010 r. przebyli torakoskopową sympatektomię. Przed zabiegiem chirurgicznym u 4 pacjentów (13,3%) występowało pocenie owłosionej skóry głowy z zaczerwienieniem czoła. Pierwotna nadpotliwość dłoni występowała u 25 osób (83,3%), nadpotliwość twarzy u 17 osób (56,6%), a pierwotna nadpotliwość stóp u 19 (63,3%). W 6 przypadkach (20,0%) były kauteryzowane obustronnie drugi i trzeci współczulny zwój piersiowy, a w 24 przypadkach (80,0%) – obustronnie drugi, trzeci i czwarty współczulny zwój piersiowy.
Wyniki. Do oceny jakości życia w okresie przedoperacyjnym i pooperacyjnym stosowano Hyperhidrosis Disease Severity Scale. Przed zabiegiem chirurgicznym 10 pacjentów (33,3%) oceniało swoją potliwość na: „prawie do zniesienia", a 20 (66,7%) na: „niemożliwą do zniesienia". Po zabiegu chirurgicznym u 8 pacjentów (26,6%) pocenie wyrównawcze nigdy nie było widoczne, a jako możliwe do zniesienia było opisywane przez 15 pacjentów (50,0%), jako prawie możliwe do zniesienia u 5 (16,7%), a niemożliwe do zniesienia u 2 (6,6%). W celu oceny jakości życia przed i po zabiegu chirurgicznym zastosowano skalę od 1 (bardzo zła) do 10 (bardzo dobra). Stwierdzono, że średnia liczba punktów przed operacją wynosiła 7 (2 do 8), a po operacji 8,2 (6 do 10) ($p < 0,001$).

Wnioski. Torakoskopowa sympatektomia jest najskuteczniejszą metodą leczenia pacjentów z nadpotliwością pierwotną w celu poprawy jakości ich życia (**Adv Clin Exp Med 2010, 19, 5, 619–624**).

Słowa kluczowe: nadpotliwość, problemy społeczne, zwoje współczulne, sympatektomia, jakość życia.

Primary hyperhidrosis (PH) is defined as sweating beyond physiologic needs, and it is a disorder that significantly interferes with a person's social and occupational activities [1]. It results from sympathetic hyper-activation, and can affect the palms, soles, axillae, face, scalp as well as other sites.

One of the most efficient treatment methods on PH is Endoscopic thoracic sympathectomy (ETS), which yields up to 98% of success rate and patient satisfaction [2]. However, compensatory sweating is the most common complication observed in PH patients following the ETS for unknown reasons [3]. The reported frequency of compensatory sweating ranges 50–90% [4, 5].

In order to compare the severity of the disease of patients during the preoperative and postoperative period of any type of PH treatment, scales such as Dermatology Life Quality Index and Hyperhidrosis Disease Severity Scale (HDSS) are present. Among these, HDSS is a disease-specific, quick, reliable, and easily-understood diagnostic tool that provides a qualitative measure of the severity of the patient's condition based on how PH affects daily activities [6].

The aim of our present study was to evaluate postoperative results of ETS in the patients with PH.

Material and Methods

Between February 2008 and April 2010, 30 patients with PH underwent ETS at the Department of Thoracic Surgery, Hospital of Medical Faculty of Dokuz Eylul University. The patients agreed with the operation although they were warned in advance, and written, informed consent was obtained from all patients. All data, including sex, age, past treatment, hyperhidrosis sites, and complications were obtained from clinical records. Clinical follow-up data were obtained by reviewing hospital records, and direct communication with the patients.

The 30 patients comprised 16 (53.3%) men and 14 (46.7%) women. The median age at the time of surgery was 31.7 years, ranging from 19 to 52 years old. Electrocardiogram and chest roentgenogram were performed routinely. All patients had been followed up for at least 3 months (range, 3–24 months; mean, 20 months).

When medical treatments of patients they received during the preoperative period were investigated, it was determined that 11 (36.6%) patients received psychotherapy, 18 (60.0%) of them used dermatological deodorant and cosmetic creams, and 7 (23.3%) of them had local injection of botulinum toxin A treatment, however none of them had an effective and permanent result.

Before the operation, 4 (13.3%) cases had sweating on scalp with flushing on the forehead. There was primary palmar hyperhidrosis in 25 (83.3%) cases, facial hyperhidrosis in 17 (56.6%) cases and primary plantar hyperhidrosis in 19 (63.3%) cases.

All cases were placed in a semiseated position with 90° abduction of both upper extremities, under general anesthesia with a single-lumen endotracheal tube. Two incisions of 1.5 cm were made on 3rd intercostal space intersecting the anterior and posterior axillary line in order to intervene in thorax. After anesthesiologist disconnecting the endotracheal tube from the ventilation tube and deflated the lung, 2 trocars of 5 mm were inserted. The thoracic cavity was monitored through 0° videothoracoscope (Karl Storz GmbH & Co. KG., 2000, Tuttingen, Germany). In this time, low volume ventilation or block of ventilation for 2–3 minutes was taken to collapse the lung and the CO_2 gas insufflation technique was used with careful monitoring of gas flow and hemodynamics. During this period, the anesthesiologist performed pulmonary inflation once the patient's arterial oxygen saturation decreased to 90%. The upper thoracic sympathetic chain was identified. The second and the third thoracic sympathetic ganglia were bilaterally cauterized in 6 (20.0%) of the cases while 2nd, 3rd and 4th thoracic sympathetic ganglia was bilaterally cauterized in 24 (80.0%) cases. Also, potential Kuntz nerve areas were cauterized all of the patients. 24 Fr drain was inserted in the incision on the posterior axillary line and connected to underwater drainage tube, which was removed next day, hence the patients were discharged.

Quality of life was evaluated by HDSS in preoperative and postoperative period (Table 1). In this scale, "How would you rate the severity of your hyperhidrosis?" was asked and the responses from a scale of 1 to 4 were evaluated. A score of 1 or 2 indicates mild or moderate, 3 or 4 indicates severe hyperhidrosis. Post-treatment, as part of a measurement of treatment efficacy and patient satisfaction, the HDSS was administered again. A 1-point improvement in HDSS score has been associated with a 50% reduction in sweat produc-

tion, and a 2-point improvement with an 80% reduction.

In the second questionnaire, the respondents were asked both of the effects of PH in the preoperative period on their quality of life and the effects of compensatory sweating in the postoperative period from a scale of 1 (very poor) to 10 (very good).

The statistical analysis was performed with the SPSS software, version 11.5 (SPSS, Inc., Chicago, IL). Clinical data were expressed as the median ± the standard Error of Mean (Minimum-maximum). Wilcoxon signed-rank test was used, and *P* value less than 0.05 was considered as statistically significant.

Table 1. Hyperhidrosis Disease Severity Scale [6]

Tabela 1. Skala Hyperhidrosis Disease Severity [6]

Phase (Stopień)	"How would you rate the severity of your hyperhidrosis?" „Jak oceniasz uciążliwość nadpotliwości u siebie?"
1	My sweating is never noticeable and never interferes with my daily activities.
2	My sweating is tolerable but sometimes interferes with my daily activities.
3	My sweating is barely tolerable and frequently interferes with my daily activities.
4	My sweating is intolerable and always interferes with my daily activities.

Results

ETS was performed in 30 patients. After the operation, all of the patients had immediate dryness on affected sites and cessation of primer hyperhidrosis. There was no mortality or life-threatening complication. Only 2 cases (6.6%) were reoperated via axillary mini thoracotomy as the sweating difference was relevant between the right and left hands in the postoperative period. Overall hospital stays after operation was 2 ± 0.3 days.

According to HDSS results before the operation; 10 (33.3%) cases expressed that sweating is barely tolerable and frequently interferes with the daily activities, followed by 20 (66.7%) cases expressed that sweating is intolerable and always interferes with the daily activities. Upon examining the questionnaire results, hyperhidrosis was treated in 100% of cases and in the post-operative period 23 (76.6%) of the cases expressed that sweating was either insensible or tolerable, followed by 7 (23.4%) cases expressing that it was barely tolerable or intolerable.

Following the discharge, none of the patients continued to suffer from sweating on the upper limb or face. Compensatory sweating was observed on the back of 18 (60.0%) cases, on the abdomen of 15 (50.0%) cases, on the legs of 11 (36.6%) cases, on groins of 5 (16.6%) cases and while eating (gustatory sweating) in 8 (26.6%) cases. According to the post-operative HDSS results, compensatory sweating was never noticeable in 8 (26.6%) cases, tolerable in 15 (50.0%) cases, barely tolerable in 5 (16.6%) cases, intolerable in 2 (6.6%) cases.

Upon examining the variation of the severity of sweating in the light of primary hyperhidrosis of cases with compensatory sweating findings, it was observed that severity of sweating remained unchanged in 3 (10.0%) cases, followed by a 50% decrease in 12 (40.0%) cases, 80% decrease in 10 (33.3%) cases and above 80% decrease in 5 (16.6%) cases, which indicates that only 10% of the cases complain about the severity of sweating and unchanged quality of life. Improvement up to 50% and above was ensured in quality of life of 27 (90.0%) cases.

There was primary hyperhidrosis at the lower extremities in 19 (63.3%) cases. After the procedure, sweating on lower extremities continued only in 4 (21.1%) cases and it was not noticeable in 15 (78.9%) cases.

In order to assess the quality of life before and after the operation, a scale between 1 (very poor) and 10 (very good) has been implemented. It was found that average before the operation was 7 (2–8), while average after the operation was 8.2 (6–10) ($P < 0.001$, standard deviation: –3.81).

No recurrence was observed in the follow-up period on the affected site of PH.

When assessing the compensatory sweating and the quality of life, no statistically significant difference was found between the genders ($P > 0.05$).

Discussion

This study underlines three points: a) PH that causes considerable social and emotional handicaps can be successfully treated with the one-stage bilateral ETS method, b) while compensatory sweating is seen in the back and abdomen more frequently following ETS, it is a frequently seen complication that can occur in any part of the body and it has a negative effect on the patient's satisfaction, c) based on the emergence of high patient satisfaction, PH patients whose conservative and medical treatment methods fail, should be encouraged to have ETS, after sufficiently informing them regarding possible complications.

Different approaches; psychotherapy**,** oral anticholinergics, local application of deodorant-cosmetic creams, topical aluminum chloride, local injection of botulinum toxin A, excision or suction

of apocrine glands, iontophoresis, oriental medicine such as herbal medication and acupuncture have been used in treatment of PH. In our clinic, during routine procedures, we pay close attention to PH patients who are planned to have ETS, making sure that their complaints have been present for at least 2 years and that they did not benefit from various treatment methods they have been using. Patients included in this study were selected based on the same criteria, and they were evaluated along with psychiatry and dermatology clinics, during the preoperative period. We believe that this multidisciplinary approach may enable us to determine if PH patients can be treated using psychiatric or dermatologic methods.

PH occurs in otherwise healthy people which a bothersome experience that is likely to affect the quality of life adversely. Existing nonsurgical therapeutic options are far from ideal [2]. Definitive cure can be obtained by sympathetic denervation. Tetteh et al indicated that, bilateral ETS is the golden standard with a success rate up to 100% in treating patients that are defined as Phase 3 or 4 in HDSS [7]. While ETS is an easily applicable, short surgical procedure that is minimally invasive, although rare, it can lead to irritating complications such as pulmonary parenchymal injury, haemothorax, pneumothorax, prolonged air leakage, incisional site or chest pain, wound infection, dry hands, transient facial anhidrosis and Horner's syndrome. In this study, we did not come across any complications such as these in any patient. However, in 2 cases (6.6%), sweating difference was relevant between the right and left hands in the postoperative period, and reoperation via axillary mini thoracotomy was performed due to the insufficient cauterization of the Kuntz nerve. Since the determination of Kuntz nerve during the operation is very difficult, in order to destroy Kuntz nerve fibers completely, the area around the thoracic sympathetic ganglia which cauterized during the first operation was cauterized with a range of 2 cm along the rib. Following ETS, in both of these cases, sweating disappeared in the right hand and continued with the same severity in the left hand, however, it disappeared after reoperation. These 2 cases belonged to patients who were treated within the first year. Based on our experience gained in time, recently, in cases such as inadequate sympathectomy in the primary surgery or recurrences, we do not prefer thoracotomy, and still conduct thoracoscopic procedure. We believe that successful results can be obtained from ETS performed for the second time, without encountering any difficulties.

On the ETS, the level of division or resection of the ganglion differed according to the patient's symptoms. Although it was stated to be appropriate to extract the 2nd and 3rd thoracic sympathetic ganglia on palmar and facial hyperhidrosis and 3rd and 4th thoracic sympathetic ganglia on axillary hyperhidrosis, the physio-anatomy was not revealed accurately, also considering that it was specific to individual, we preferred to perform a transection of the 2nd and 3rd thoracic sympathetic ganglia in 6 (20.0%), and 2nd, 3rd and 4th thoracic sympathetic ganglia in 24 (80.0%) cases with cautery. Lin-Telaranta classification that can be used in PH cases for different procedures with different indications enables complication rates to decrease, in addition to providing the opportunity to predict side effects. Here, various sympathetic disorders are divided into three main categories. In Group 1 cases with sweating restricted within the head that like conflicted type social phobia and blushing, in Group 2 cases with sweating on the head and face with or without blushing, in Group 3 cases with sweating in the hands and underarms are present. In Group 1, 2nd thoracic sympathetic ganglia, in Group 2, 3rd thoracic sympathetic ganglia, and in Group 3, 4th thoracic sympathetic ganglia blockage were recommended as surgical procedures by the authors [8].

In this study, our goal was to prevent possible pneumothorax and oxygenation problems of patients we operated on, during the postoperative period, by placing small diameter chest tubes to both sides. However, lately in our clinic, we do not perform tube thoracostomy in any of our ETS occurrences with the exception of significant lung parenchyma injury cases that might occur during trocar placement or surgical procedures. Instead of this, at the end of the operation, a suction catheter is placed into the pleural cavity using one of the trocar entry locations and the end of the catheter is inserted into a liquid filled container. Thus, intrapleural air is evacuated using pulmonary inflation. By using this method, air evacuation is completed in a few minutes, suction catheter is removed quickly and the incision is closed with absorbable suture. In cases where we used this method, we did not come across any residual pneumothorax that required intervention during the postoperative period.

Compensatory sweating is one of the most common postoperative complications after ETS. This phenomenon is a greater amount of sweating elsewhere in the body. It is a disorder of imbalanced regulation of sweating, and the exact mechanism of this complication is not clear [3]. Studies conducted to see whether sympathectomy level and compensatory sweating is correlated, resulted in completely different facts. There are studies suggesting that compensatory sweating in-

creases in parallel with the increase in the height of the resected chain, whereas there are studies claiming the opposite and other studies indicating that there is no relation with the extent of the number of resected ganglia [9–11]. However, the most widely recognized theory supported by other clinical studies shows that sympathetic system fails to function in the post-operative period. Lin et al concluded that, damaged nerve reflex arch between the sympathetic truncus and hypothalamus resulted in compensatory sweating [8]. In our study, compensatory sweating with different severity occurred immediately or at day 1 after ETS. The most common sites are the back and the abdomen. However, compensatory sweating was insignificant or at tolerable levels in majority of the cases; most patients stated that the termination of sweating in the primarily affected areas was more important than anything else. At the end of the follow-up period, compensatory sweating was determined to have almost completely disappeared in 26 (86.6%) of the cases. These results we obtained are consistent with literature. Chiou et al. [9] conducted bilateral endoscopic T2 sympathectomy on 91 consecutive patients and they observed compensatory sweating in 88 (97%) of the cases within the first year. In 94% of these patients, spontaneous improvement was observed within 9 months. The authors indicate compensatory sweating to be the most common reason for moderate satisfaction or disappointment with the surgery. They also limited the sectioned level to the T2/T3 ganglion and its connection, which did not reduce the occurrence of compensatory sweating [9]. Nevertheless, in another study, Yang et al have investigated how to reduce compensatory sweating and drew attention to the fact that preservation of T2 ganglion and sympathetic segment above can lead to a major reduction of particularly embarrassing and disabling compensatory sweating. In conclusion, they discovered that lowering the thoracic sympathetic transection level further can significantly reduce both incidence and severity of compensatory sweating [3]. Similarly, Neumayer et al also obtained results that compensatory sweating is effectively reduced by the limited method of clipping T4, and patient's satisfaction and improvement in quality of life is remarkable [5]. Licht et al examined 100 consecutive patients who underwent thoracoscopic sympathectomy for axillary hyperhidrosis and determined that compensatory sweating was present in 90% of cases and 61% of these were very severe. As a result, they report that patients with primary axillary hyperhidrosis are more prone to experience compensatory sweating [12].

As a result of this study, the quality of life was found to have improved in 90.0% of cases due to the healing of the area that was primarily affected, and the complications and side effects being tolerable and temporary in most cases. This rate obtained is encouraging and it is consistent with other data in the literature. In their study, Chiou et al state that 87% of patients were satisfied [9]. In another study, Drott et al indicated that 98% of the patients were satisfied at the end of follow-up period [2].

In recent years, among the alternative surgical methods used for PH, microinvasive endoscopic approaches are more frequently used. In their study, Sung et al state that thoracic sympathectomy can be conducted safely and effectively with the use of 2 mm ultra-thin needle endoscopic instruments, which provide sufficient lighting and visualization of the operation area. Furthermore, the authors report excellent cosmetic effects and state that problems such as incisional site pain and large operative wound due to the use of 5 or 10 mm endoscopic instruments are not present when 2 mm instruments are used [10]. In addition to this, during the recent years, ETS applications have become less invasive where a single incision or clip application on sympathetic chain have been used for blocking instead of cautery, leading to shorter operation time and reduced postoperative complications [5].

There were some limitations on this study. In our study, short-term results from a limited number of cases were evaluated. Additionally, this study does not include a control group or groups that have other treatment modalities and/or surgical procedures. We believe that the positive results obtained from our study can gain even more significance by more comprehensive studies with greater number of cases that compare different treatment methods and show long-term follow-up results.

The authors concluded that:

– ETS is a simple, efficient, safe surgical procedure that provides patient comfort during the postoperative period, reducing the length of hospital stay, it also has lower operative morbidity and higher postoperative satisfaction rates.

– ETS is an indispensable method for PH treatment as it yields nearly full rate of immediate and permanent success and improves quality of life above 50%.

– HDSS is a fast and simple method that enables assessment of quality of life for PH, in addition it can be used to compare the levels of primary hyperhidrosis and compensatory sweating.

– All patients must be informed about compensatory sweating before surgery because of it can cause discomfort and affect overall success.

– No significant difference between the gender-satisfaction facts of compensatory sweating was observed statistically.

– World Health Organization (WHO) defines health in terms of body and mind. Accordingly, PH should be recognized as a disease rather than cosmetics problem.

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