Original Article

The quality of life and satisfaction rate of patients with upper limb hyperhidrosis before and after bilateral endoscopic thoracic sympathectomy

ABSTRACT

Background: Hyperhidrosis is a functional disorder identified by excessive sweating. Its incidence is approximately 1% in any population. Bilateral endoscopic thoracic sympathectomy (BETS) intervention is the definitive treatment of choice for palmar and axillary hyperhidrosis.

Aims and Objectives: The purpose of this study is to evaluate and compare the quality of life (QOL) and satisfaction rate of patients with upper limb hyperhidrosis before and after BETS surgery and the influence of compensatory hyperhidrosis (CH) on patients' QOL after surgery.

Settings and Design: This study is a cross-sectional study designed to generate longitudinal data.

Subjects and Methods: This study is a cross-sectional study designed to generate longitudinal data pre- and postbilateral BETS prospectively. This study was conducted in the surgery department of University Hospital in Riyadh, Saudi Arabia. Hundred patients with upper limb hyperhidrosis who underwent BETS from 2014 to 2017 were included. A modified and validated QOL questionnaire for hyperhidrosis was completed by the patients themselves in order to compare the QOL for patients both before and after BETS. Patients' satisfaction and the occurrence of CH were obtained postoperatively.

Statistical Analysis Used: Data were analyzed using the SPSS® statistical package for social studies, version 22.0 (SPSS 22; IBM Corp., New York, NY, USA) for Windows®.

Results: A total of 100 patients completed the questionnaire; 94% of patients had a positive QOL outcome after the surgery. The mean decrease in QOL scores was −42.0 points toward better QOL. The site of sweating had a significant effect on the patients' QOL before and after the surgery (*P* value < 0.001). Moreover, 76% of patients reported a high satisfaction rate.

Conclusion: Primary hyperhidrosis can negatively impair patients' QOL in different domains. BETS showed to be an effective option for improving the QOL of patients and it provided both short- and long-term effectiveness in treating upper limb hyperhidrosis. CH did not interfere with the rate of patient satisfaction or their QOL postoperatively.

Key words: Compensatory hyperhidrosis; endoscopic thoracic sympathectomy; hyperhidrosis; quality of life

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Waseem M. Hajjar, Sami A. Al-Nassar, Heba M. Al-Sharif, Dana M. Al-Olayet, Wejdan S. Al-Otiebi, Alanoud A. Al-Huqayl, Adnan W. Hajjar

Department of Surgery, Thoracic Surgery Division, College of Medicine, King Saud University, King Khalid University Hospital, Riyadh, Saudi Arabia

Address for correspondence: Dr. Waseem M. Hajjar, College of Medicine, King Saud University, King Khalid University Hospital, PO Box 7805, Riyadh 11472, Saudi Arabia. E-mail: washajjar@yahoo.com

Introduction

Hyperhidrosis is a benign functional disorder identified by excessive sweating exceeding the physiological needs to regulate body temperature. Hyperhidrosis is classified into primary and secondary type depending on the cause. Both types negatively impact the patients' quality of life (QOL).[1-5] The incidence of hyperhidrosis is reported as being approximately 1% in any population.[6] Primary hyperhidrosis appears in localized areas of the body. These areas are commonly palms, axillae, plantar aspect of the foot, as well as the craniofacial area.[1-8] Secondary hyperhidrosis can occur in other parts of the body due to several predisposing disorders such as hyperthyroidism, menopause, type II diabetes, etc.[3] The underlying cause of primary hyperhidrosis is still unknown, although histological studies of the sudoriferous glands in the regions where excessive sweating is noted were found to be intact, which suggests that hyperstimulation of the sympathetic nervous system may be a cause for hyperhidrosis.[2-4,9]

Emotional and stressful situations tend to worsen the condition and can, therefore, negatively affect patients' QOL. In fact, recent research seems to suggest that there is a link between hyperhidrosis and certain clinical psychiatric disorders.[1,5,8,10-13]

Medical therapy such as botulinum toxin and type A injection is the first line of treatment for patients suffering from mild primary hyperhidrosis.[2,3,5,6] Sweat glands excision and liposuction are surgical treatment options applied to improve hyperhidrosis symptoms. However, endoscopic thoracic sympathectomy (either by clipping or cutting method) has been recognized as the most effective surgical intervention for palmar and axillary hyperhidrosis.[1,3,4,6,7,14] It is indicated in hyperhidrosis patients to eliminate long-term sweating symptoms and has been shown to improve their QOL.[2,7,9]

Compensatory hyperhidrosis (CH) is the most common side effect of bilateral endoscopic thoracic sympathectomy (BETS) in patients suffering from hyperhidrosis reported in "67.4%." It is the major influencing factor on patients' satisfaction rate.[1,2,9,15,16] CH is defined as postoperative excessive sweating encountered most commonly in the trunk region; the underlying mechanism for this condition is still unknown.[17] However, there is an inverse correlation between the patients' satisfaction and severity of CH.[17] One study showed an association between the extent of sympathectomy level and compensatory sweating postoperatively.[18] Sympathectomy performed at two levels increases the severity of CH compared to sympathectomy performed at one level. On the other hand, sympathectomy carried out at two levels reduced the recurrence of the condition to a significantly lower level.[18] In addition, there is no correlation between the recurrence of palmar hyperhidrosis and patients' satisfaction rate.[18] However, a new study showed that CH appears to improve with time during the follow-up period.[19]

The literature reports a relatively high satisfaction rate after BETS has been conducted which ranges between "85% and 95.5%" due to an improvement in the QOL for hyperhidrosis patients compared to the QOL they had before surgery.[2,9,20] One study, however, showed a 30% disappointment rate over time after patients had undergone surgery.[14]

Moreover, a study demonstrated that patients with a "very poor" QOL before surgery had described having a "much better" QOL after surgery.[21] Many postsurgical QOL studies reported that many patients seemed to be experiencing a combination of anxiety, depressive symptoms, and social and mental barriers after surgery.[22,23]

The severity of hyperhidrosis is not the sole factor that can worsen patients' QOL; adaptation to their condition plays a role also. Significantly, some individuals who reported a "very poor" QOL did not exhibit symptoms of severe hyperhidrosis, whereas certain other patients suffering from extreme cases of hyperhidrosis reported that their QOL was merely "acceptable." The main reason for this discrepancy is that they seemed to have adapted better to their current situation.[21]

It is hypothesized that BETS positively affects patient QOL as well as the satisfaction rate of patients suffering from upper limb hyperhidrosis.

Over the years, there have been several publications concerning the effectiveness of endoscopic thoracic sympathectomy and its positive impact on patients' QOL after surgery.

Although several publications have tackled this issue in different countries, as far as we know, there is only limited information on the effectiveness of BETS in improving the QOL and patients' satisfaction both pre- and postsurgery in the Arabian Gulf countries.

This study will also consider the various key contributing factors to hyperhidrosis such as the weather and the type of clothing worn (such as the Abayyah in the case of women and the Thowb in the case of men) that exist in the Arabian Peninsula.

Thus, the main aim of this study is to evaluate the QOL and satisfaction rate of patients' pre- and post-BETS for palmar and axillary hyperhidrosis in Saudi Arabia.

Subjects and Methods

The study was conducted using a cross-sectional design to generate longitudinal data before and after BETS prospectively. The study included 100 patients with upper limb hyperhidrosis who were operated on using BETS intervention within the surgery department of University Hospital in Riyadh, Saudi Arabia during the period of 2014–2017.

All patients who underwent BETS for upper limb hyperhidrosis were included in the study. On the other hand, patients who required redo surgery, patients with craniofacial hyperhidrosis, and patients with secondary hyperhidrosis were excluded from this study.

Patients who underwent BETS at the same surgical setting from 2014 to 2017 were included in this study also. Moreover, the sympathetic chain is divided or clipped just below T2–T3 level. However, the choice of the surgical technique has been left to the patient decision and preference as many studies showed no deference in the surgical outcome.[3,4,6,14]

After Institutional Review Board approval for the study proposal was obtained, the data pertaining to this study were collected by giving the patients a QOL questionnaire that could be self-completed before surgery; this QOL questionnaire has been validated already previously. Postoperatively after 3 months, the patients via the phone answered the same questionnaire. Informed consent was obtained from each participant before filling in the questionnaire, and each individual patient's name, file number, and bio-information were treated with confidentiality. Initially, the patients' telephone numbers were collected by referring to medical records at KKUH. Next, the patients completed the QOL questionnaire for hyperhidrosis both pre- and post-BETS procedure. De Campos in 2003 designed this questionnaire;[1] however, a written approval from him was obtained to use it in our study, but some modifications to the functional and emotional domains were applied in order to achieve a questionnaire that was more appropriate to our cultural setting.[8] This scale was chosen because it was previously assessed by De Campos to be reliable, valid, and appropriate in assessing the degree of change in the QOL before and after surgery.

[1] M.D., Professor, University of Sao Paulo Medical School, Division of Thoracic Surgery.

The first section of the questionnaire addressed patients' demographics including gender, age, occupation, and marital status. Then, the affected sites and severity of hyperhidrosis before surgery was performed were obtained by asking the patients about the various locations where excessive sweating was experienced, for example, the palms, the axilla, or other areas.

The questionnaire included four domains to measure overall the QOL both pre- and postsurgery; these were, namely, the functional/social domain, the personal domain, the emotional domain, and the special circumstance domain. Each domain was divided into several conditions, which could be measured on a scale from 1 to 5 before and after surgery. The scale before surgery represents the following: 1 = excellent, 2 = very good, 3 = good, 4 = bad, and 5 = very bad. The scale after surgery represented the following: 1 = much better, 2 = a little better, 3 = the same, 4 = a little worse, and 5 = much worse. The total score was calculated for the four domains before and after surgery separately. The effect of treatment or the degree of changes in patient's QOL before and after the surgery was measured by a scoring system, where patients scoring lower or closer to 20 were deemed to have a good QOL and patients scoring higher or closer to 100 were deemed to have a poor QOL.[8] In addition to the overall QOL, the satisfaction rate of the patient after undergoing surgery was recorded as being one of the following: "satisfied," "neutral," or "dissatisfied."

The occurrence of CH postoperatively was measured by asking the patients if they noticed sweating in any new areas of their bodies after the surgery. Responses were "yes" for having CH and "no" for no incidence of CH.

Statistical analysis: Data were analyzed using the SPSS® statistical package for social studies, version 22.0 (SPSS 22; IBM Corp., New York, NY, USA) for Windows®. Continuous variables were expressed as the mean ± standard deviation and categorical variables were expressed as percentages. A *t*-test was used for continuous variables and a Chi-square test was used for categorical variables. A P value < 0.05 was considered to be statistically significant.

Results

The study involved 100 hyperhidrosis patients who underwent thoracic sympathectomy. Two patients met the exclusion criteria (one patient had secondary hyperhidrosis due to hyperthyroidism, and the other one had undergone a redo surgery). A total of 100 patients, that is, 77 males (77%) and 23 females (23%), filled the questionnaires pre- and postoperation [Table 1].

Based on the patients' responses, their general QOL prior to surgery was notably poor; 49% of respondents reported that their QOL was bad, 34% reported that it was very bad, 14% claimed that their QOL was good, and only 3% described their QOL as being very good. As far as postsurgery responses were concerned, 67% of the patients reported that their QOL was much better, 13% rated it as a little better, 14% noted no change, and 6% of the patients rated their QOL as being a little worse than before (*P* value < 0.001) [Table 2].

When we questioned regarding the recurrence of sweating in new areas after the surgery (CH), 92% of the patients replied in the affirmative and 53% reported that they were frequently experiencing it in the back region. The next group of respondents (34%) reported suffering from CH in the chest, 30% of respondents claimed to be suffering from CH in the abdomen, 18% in the feet, 13% in the thighs, whilst 10% had experienced a recurrence of symptoms in the same area as before the surgery.

Table 1: Baseline characteristics before surgery

	n
Gender	
Male	77
Female	23
Age	
≤18	4
19-35	84
36-50	11
≥50	1
Nationality	
Saudi	94
Non-Saudi	6
Occupation	
Employed	68
Not employed	8
Student	24
Marital status	
Married	32
Not married	68
Affected areas	
Hands	88
Axilla	44
Face	28
Feet	24
Redo surgery	
Yes	1 (excluded)
No	100
History of hyperthyroidism	
Yes	1 (excluded)
No	100

Table 2: Quality of life before and after the surgery for the overall domain

Before the surgery		After the surgery		*P*
QOL	***n***	**QOL**	***n***	
Excellent	0	Much better	67	<0.001*
Very good	3	A little better	13	
Good	14	The same	14	
Bad	49	A little worse	6	
Very bad	34	Much worse	0	

*Significant *P* (*P*<0.05). QOL: Quality of life

After applying the QOL questionnaire and studying the many different domains, it integrates. The results showed that both the functional/social domain and the special circumstances domain where the majority of the patients experienced the most troublesome QOL with 46% of the patients reported a bad QOL in each of these two domains. Significantly, however, after surgery had taken place, a pronounced improvement in symptoms was witnessed across all the domains. This improvement took place, predominantly, in both the personal and emotional domains: up to 62% of patients expressed an increased sense of well-being in the personal domain, while 53% felt similarly in the emotional domain (*P* value < 0.001) [Table 3].

Looking at the severity of the disease preoperatively, up to 58% of the patients expressed that their sweating was intolerable and always interfered with their daily activities, whilst postoperatively, 84% of the patients expressed that their sweating was now "never noticeable" and never interfered with their daily activities.(*P* value < 0.001) [Table 4].

In terms of satisfaction after surgery, 76% of patients reported feeling satisfied, whilst 14% were neutral and 10% were dissatisfied with the procedure.

Moreover, in terms of the relation between the QOL and satisfaction after surgery, it was very highly significant as the *P* value < 0.001 [Table 5].

Discussion

Hyperhidrosis patients usually decide to undergo BETS to improve their QOL in different domains. For this reasons, surgeons aim to conduct a surgical procedure that is effective, safe, and one that provides both short- and long-term results. The effectiveness of BETS was evaluated in order to assess the overall improvement in patient QOL, as well as their satisfaction rate after surgery and the rate of occurrence of CH as a complication.

Almost all previously published studies in the literature have established the effectiveness of BETS (either by cutting or

Table 3: Quality of life before and after the surgery for the subdomain

Subdomain	Before the surgery		After the surgery		*P*
	QOL	*n*	QOL	*n*	
Functional/Social domain	Excellent	1	Much better	41	<0.001*
	Very good	9	A little better	49	
	Good	12	The same	7	
	Bad	46	A little worse	3	
	Very bad	32	Much worse	0	
Personal domain	Excellent	0	Much better	62	<0.001*
	Very good	9	A little better	22	
	Good	24	The same	10	
	Bad	42	A little worse	5	
	Very bad	25	Much worse	1	
Emotional domain	Excellent	4	Much better	53	<0.001*
	Very good	12	A little better	24	
	Good	33	The same	20	
	Bad	38	A little worse	2	
	Very bad	13	Much worse	1	
Special circumstances domain	Excellent	0	Much better	17	<0.001*
	Very good	4	A little better	53	
	Good	10	The same	17	
	Bad	40	A little worse	12	
	Very bad	46	Much worse	1	

*Significant *P* (*P*<0.05). QOL: Quality of life

clipping method) in treating primary hyperhidrosis specifically palmar and axillary hyperhidrosis, and the beneficial results of BETS are now internationally renowned.[1-10] The novelty of our study compared to previous studies centers around the factors that aggravate hyperhidrosis in Saudi environment, in particular the very hot weather and the nature of clothing that Saudi women wear.

In our report, we measured patient QOL prior to surgery and we found that hyperhidrosis can significantly decrease an individual's QOL and interfere with their daily activities. It affects mostly the functional, social, and emotional domains of life. A gross KM study has shown that the poor QOL associated with hyperhidrosis can lead to chronic stress and depressive symptoms.[11] In our study, we demonstrated the positive results enjoyed by patients who underwent BETS, which were statistically significant ($P < 0.001$) and remarkable compared to the QOL they had sustained preoperatively. Wolosker's study (2010) has concluded that patient QOL before surgery is one of the predictive factors for increased satisfaction and improvement in the QOL amongst patients undergoing BETS.[21] In our study, we discovered a similar result; patients who reported that their QOL was "very poor" before surgery showed the highest improvement in their day-to-day life and were most satisfied postoperatively.

The most reported side effect of BETS in our study was CH. CH is defined as excessive sweating in new areas, which were not problematic before the surgery; yet, the mechanism of CH is still unknown.[17] In our study, most of the patients who developed CH as a complication continue to suffer from it as a chronic complication. It is commonly encountered in the back, abdomen, thigh, and groin areas.[17] The incidence of compensatory sweating is rated between 67% and 89% in published studies.[20] Our study also showed a high prevalence of CH (92%) in our sample. This could be due to the fact that the extent of sympathectomy performed on our patients took place at both levels T2 and T3. A similar result in Japan observed by Hiroshi (2014) demonstrated that sympathectomy performed at levels T2 and T3 decreased the rate of recurrence of palmar and axillary hyperhidrosis but was associated with an increased rate of CH, which would support the findings in our study.[18] Our data analysis also revealed that despite the high frequency of CH, it did not negatively affect the degree of satisfaction or QOL of patients postoperatively.

Specifically, then, patients suffering from palmar hyperhidrosis were found to be amongst the most satisfied out of all those who were surveyed with an improved QOL (that fell within the maximum range) even in the presence of CH. A similar study conducted by Bryant (2014) reiterated our observation.[15] There was, however, one study that found CH could badly influence the degree of satisfaction, which we did not encounter in our sample population.[18] To this day, there is no proven way to predict the appearance or severity of CH. However, a 5-year follow-up study found that CH usually diminishes significantly over a 1–2-year period after surgery.[17]

We encountered 76 patients (76%) who were found to be "satisfied" with their surgery, 14 patients (14%) with a neutral feeling toward BETS intervention, and 10 patients (10%) who were "dissatisfied" with BETS. Moreover, in terms of the relation between the QOL and satisfaction after surgery, it was very highly significant as the *P* value < 0.001 [Table 5].

To the best of our knowledge, this is the first study conducted in the Arabian Gulf countries that compared patient QOL both pre- and postoperatively in order to prove the effectiveness of BETS in treating upper limb hyperhidrosis. The disadvantage of the current study that may have influenced the study's results is the small sample size.

We recommend studying CH in further detail, focusing on the severity and site of occurrence as well as the duration of CH. Any further studies, however, should be performed

Table 4: Hyperhidrosis severity pre- and postbilateral endoscopic thoracic sympathectomy

Severity of hyperhidrosis	Before surgery (*n*)	After surgery (*n*)	*P*
My sweating is never noticeable and never interferes with my daily activities	8	84	<0.001*
My sweating is tolerable but sometimes interferes with my daily activities	12	15	0.534
My sweating is barely tolerable and frequently interferes with my daily activities	22	1	<0.001*
My sweating is intolerable and always interferes with my daily activities	58	0	<0.001*

*Significant *P* (*P*<0.05)

Table 5: Relation between quality of life and satisfaction after surgery

QOL	Satisfaction after surgery			*P*
	Satisfied	Neutral	Not satisfied	
Much better	12 (100.00)	0 (0.00)	0 (0.00)	<0.001*
A little belter	58 (86.57)	7 (10.45)	2 (2.99)	
The same	6 (42.86)	5 (35.71)	3 (21.43)	
A little worse	0 (0.00)	1 (16.67)	5 (83.33)	

*Significant *P* (*P*<0.05). QOL: Quality of life

using a larger sample size across many regions in KSA to help confirm the efficiency of BETS.

Conclusion

In conclusion, BETS performed at two levels is the best and most efficient option to improve the QOL of patients across all domains in upper limb hyperhidrosis, as our results seem to have demonstrated a maximum increase in patient QOL postoperatively.

In addition, the presence of CH did not interfere with the patients' level of satisfaction or with their QOL postoperatively.

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Conflicts of interest

There are no conflicts of interest.

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