
CLINICAL SCIENCE

SUSTAINED BENEFIT LASTING ONE YEAR FROM T4 INSTEAD OF T3-T4 SYMPATHECTOMY FOR ISOLATED AXILLARY HYPERHIDROSIS

Marco Antonio S. Munia, Nelson Wolosker, Paulo Kaufmann, José Ribas Milanes de Campos, Pedro Puech-Leão

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Munia MAS, Wolosker N, Kaufmann P, Milanez de Campos JR, Puech-Leão P. Sustained benefit lasting one year from T4 instead of T3-T4 sympathectomy for isolated axillary hyperhidrosis. Clinics. 2008;63:771-4.

INTRODUCTION: Level T4 video-assisted thoracoscopic sympathectomy proved superior to T3-T4 treatment for controlling axillary hyperhidrosis at the initial and six-month follow-ups of these patients.

OBJECTIVE: To compare the results of two levels of sympathectomy (T3-T4 vs. T4) for treating axillary sudoresis over one year of follow-up.

METHODS: Sixty-four patients with axillary hyperhidrosis were randomized to denervation of T3-T4 or T4 alone and followed prospectively. All patients were examined preoperatively and were followed postoperatively for one year. Axillary hyperhidrosis treatment was evaluated, along with the presence, location, and severity of compensatory hyperhidrosis and self-reported quality of life.

RESULTS: According to patient reports after one year, all cases of axillary hyperhidrosis were successfully treated by surgery. There were no instances of treatment failure. After six months, compensatory hyperhidrosis was present in 27 patients of the T3-T4 group (87.1%) and in 16 patients of the T4 group (48.5%). After one year, all T3-T4 patients experienced some degree of compensatory hyperhidrosis, compared to only 14 patients in the T4 group (42.4%). In addition, compensatory hyperhidrosis was less severe in the T4 patients ($p < 0.01$). Quality of life was poor before surgery, and it improved in both groups at six months and one year of follow-up ($p = 0.002$). There were no cases of mortality, no significant postoperative complications, and no need for conversion to thoracotomy in either group.

CONCLUSION: Both techniques were effective for treating axillary hyperhidrosis, but the T4 group showed milder compensatory hyperhidrosis and greater patient satisfaction at the one-year follow-up.

KEYWORDS: Hyperhidrosis; Axillary; Compensatory hyperhidrosis; Sudoresis; Sympathectomy.

INTRODUCTION

Axillary hyperhidrosis is an important disease that may cause serious emotional and work-related problems. Local treatment and psychotherapy show low effectiveness. Injections of botulinum toxin offer good but temporary results lasting fewer than six months, and excision/resection

of the eccrine sweat glands is less effective and allows for a higher recurrence rate than sympathectomy.¹⁻⁵

Video-assisted thoracic sympathectomy (VATS) is a recognized procedure for the definitive treatment of palmar hyperhidrosis, but its efficacy in treating axillary hyperhidrosis remains controversial. No randomized, prospective studies of axillary hyperhidrosis treatment have been published that compare different levels of thermoablation of the sympathetic chain in VATS.

Therefore, we carried out a randomized, prospective study to compare the results of VATS at two resection levels, T3-T4 versus T4. Efficacy of axillary hyperhidrosis treatment, presence and severity of compensatory hyperhidrosis, and patient satisfaction were evaluated over one year

Hospital das Clínicas, Faculdade de Medicina, Universidade de São Paulo - São Paulo/SP, Brazil
 Email: ma.munia@uol.com.br
 Tel.: 55 11 3078.4104

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after the surgery using an interview and a quality-of-life questionnaire.

METHODS

After randomization, 64 patients with pure axillary hyperhidrosis, ranging in age from 17 to 46 years, were submitted to VATS. All patients received information regarding risks and chances of compensatory hyperhidrosis. Criteria for inclusion in the study were a complaint of axillary hyperhidrosis and the intention to undergo surgery. Criteria for exclusion were the existence of prior thoracic surgery; the existence of diseases such as cardiac diseases, pulmonary infections, neoplasia, or pleural or lung diseases that could increase surgical risk; or a body mass index (BMI) greater than 25.^{6,7}

All patients were submitted to surgery under general anesthesia with selective intubation and pulmonary ventilation. Two incisions were made in each hemithorax: the first at the fourth intercostal space on the anterior axillary line, and the second at the third intercostal space on the mid-axillary line.^{8,9}

After identification of each sympathetic chain, patients randomized into the T3-T4 group underwent sympathectomy on the bodies of the third, fourth, and fifth ribs, followed by thermoablation of the segments isolated between them. Patients randomized into the T4 group underwent resection of the chain (sympathectomy) at the fourth and fifth ribs, with thermoablation of the segment between them. After the sympathectomy, the lung was re-expanded under direct viewing and air was simultaneously aspirated from the pleural space using a small catheter (16 Fr). The same procedure was carried out on the contralateral chain. There was no routine use of a chest drain. A chest x-ray was performed following the operation in order to assess lung expansion.

Patients were followed for one year after intervention. At 12 months after the index procedure, systematic reexaminations were performed on all patients. The observers recording the findings were blinded to patients' treatments. The following were assessed:

1. Presence or absence of axillary hyperhidrosis reported by the patient and confirmed by the examiner.
2. Presence or absence of compensatory hyperhidrosis, along with its location and severity, as reported by the patient and confirmed by the examiner. The severity of the sudoresis was graded at one of three levels: mild, moderate, or severe. Patients who noticed no difference in the location or intensity of their body sweat were deemed unaffected by compensatory hyperhidrosis. Mild compensatory sweating was considered present when patients reported minor modifications in the location and severity of their perspiration, such as visible sweating, but did not express

significant concern about it. Moderate compensatory hyperhidrosis was considered present when patients reported visible and embarrassing sweating or occasionally disabling situations caused by sweating.

Finally, severe compensatory hyperhidrosis was considered present when patients reported interference in their social and professional activities, such as the need for successive clothing changes caused by sweating of the same intensity as their previous axillary hyperhidrosis, but at other primary locations. It was defined as severe when it was visible, embarrassing, and led to at least one change of clothes during the day.

3. The patients' satisfaction with the final outcome of the procedure (including both the treatment and any complications) was subjectively evaluated using a multiple-choice subjective rating scale (four options): 1, deficient (dissatisfied); 2, fair; 3, very good; 4, excellent.

STATISTICAL ANALYSIS

For categorical variables, depending on the sample, the χ^2 or Fisher's exact tests were used for verifying associations between the type of surgery and possible results and complications. These statistical tests were used at each follow-up assessment to compare types of surgery with the variables of interest (axillary hyperhidrosis, incidence and severity of compensatory hyperhidrosis, and patient satisfaction). The associations between patients' ages, degrees of satisfaction, and ganglion resection level (T3-T4 or T4) were investigated using the Mann-Whitney U test. Significance for all tests was defined at 5%.

RESULTS

The mean age and gender distributions in the two groups were similar (Table 1). The incidence and severity of compensatory hyperhidrosis are presented in Table 2. No recurrence of axillary hyperhidrosis was reported at the 12-month follow-up in either of the groups.

The incidence of compensatory hyperhidrosis was lower in the T4 group, at one month, six months, and 12 months of follow-up. Compensatory hyperhidrosis was less severe in the T4 group, and this group showed no cases of severe compensatory hyperhidrosis by the final follow-up at 12 months.

Table 1 - Clinical characteristics of the patient sample

	<i>T3-T4 group</i>	<i>T4 group</i>	<i>p value</i>
Mean age	25.06	26.67	
Men/Women	10/21	4/29	0.051

Table 2 – Incidence and severity of compensatory hyperhidrosis in the two patient groups following surgery

Group	6 months			1 year		
	Absent	Mild	Moderate/ Severe	Absent	Mild	Moderate/ Severe
T3-T4	4	16	11	2	18	11
T4	17	14	2	19	13	1
	p < 0.001*			p < 0.001*		

*Based on the chi-squared test.

Table 3 - Patient satisfaction rates

Group	6 months		1 year	
	Mean Rank	Sum of Ranks	Mean Rank	Sum of Ranks
T3-T4	26.79	830.50	26.73	828.50
T4	37.86	1249.50	37.92	1251.50
	p < 0.002*		0.002*	

*Based on the Mann-Whitney test, using asymptotic two-tailed significance.

The incidence and severity of compensatory hyperhidrosis in patients who underwent T3-T4 resection remained constant over the 12 months of follow-up, whereas both the incidence and severity of compensatory hyperhidrosis decreased in the T4 group from six to 12 months ($p > 0.05$). There was no difference in the location of compensatory hyperhidrosis between the two groups: the most affected regions were the abdomen, back, and legs. The groups also reported no difference in the situations that triggered the compensatory hyperhidrosis: the majority of patients in both groups (21 in the T3-T4 group, 12 in the T4) attributed it to heat and intense physical activity.

The reports of patient satisfaction are presented in Table 3. Patients of the T4 group reported higher satisfaction than those of the T3-T4 group ($p < 0.05$). It should be emphasized that, after one year, none of the patients in the T4 group were dissatisfied, but five patients in the T3-T4 group were dissatisfied.

DISCUSSION

Despite current local and systemic therapeutic modalities, axillary hyperhidrosis is still a frequent condition that affects a great number of patients, leading to disturbances in social and professional life.^{2,3,6,10}

Previous studies have shown that VATS is an effective treatment for axillary hyperhidrosis, with a success rate of 89%.^{11,12} As a result of technical advances and a procedural change such that resection is carried out at a lower ganglion level (fourth ganglia), the technique now has a success rate of

94%.¹³ In the present study, we observed that both T3-T4 and T4 resections were effective in all cases at both one month and 12 months of follow-up. We attribute this success rate to the extreme care taken in identifying patients who would benefit the most from surgical treatment, and accepting them for treatment only after they had received an adequate explanation of all the risks and of the possibility of compensatory hyperhidrosis and still expressed a desire to undergo surgery. This approach meant that only the patients best suited to the procedure and its aftermath were admitted for treatment.

One problem found in several case series is the degree of recurrent axillary hyperhidrosis, which has been reported to range from 15%¹⁵ to 65%.^{16,17} In our study, we did not observe any recurrence in either group at six or 12 months follow-up. This lack of recurrence is probably due to the absence of technical failure among the operated patients.¹⁸

The compensatory hyperhidrosis observed in this study was distributed in the body in the same way as described in the medical literature, i.e. in the abdomen, back, feet, and gluteal region. In most cases, it is tolerable and does not lead to social disturbances or occupational disability since the patients have been previously informed about this possibility. Patients are inconvenienced only when their symptoms are severe or when they do not receive adequate preoperative information. It is very important that patients always be warned about this possible complication before surgery, because of the irreversibility of the method and the likelihood of compensatory hyperhidrosis.

The key to these good outcomes observed in this study are the resection of the T4 ganglion and information given to patients.¹⁹ T5 resection is not necessary.^{11,19} For T4 ganglion resection, a complete operation on T4 is necessary, involving sympathectomy from the upper margin of the fourth rib to the lower margin of the fifth rib, followed by thermoablation of the chain.²⁰ Patient satisfaction at six months follow-up was greater in this group than in the T3-T4 group.^{18,21,22} The high satisfaction in the T4 group increased even more at 12 months follow-up.

Compensatory hyperhidrosis is the most frequent complication of VATS, and it occurs when an ample resection of the sympathetic chain is performed, at a frequency of up to 89% of cases.²¹⁻²⁴ In our series, in which resections were carried out at lower levels, we found that 93.5% of the patients in the T3-T4 group and 57.6% in the T4 group experienced this complication after one year; 35.5% of the T3-T4 patients showed moderate or intense compensatory hyperhidrosis, whereas only one patient (12.5%) in the T4 group showed moderate compensatory hyperhidrosis. In addition, the T4 group showed no cases of intense compensatory hyperhidrosis. With respect to mild compensatory hyperhidrosis, we observed that between the six-month and one-year follow-up of the T3-

T4 group, there was an increase in mild cases (from 16 to 18) and a decrease in the more serious cases, although the changes were not statistically significant. In contrast, the T4 group showed a decrease in the number of mild cases (from 14 to 13) since many patients started to feel that they were free from these effects.

We did not use any objective measurement of sudoresis because these methods produce only data at a specific point in time. There are no methods capable of measuring hyperhidrosis over an entire day.

Despite the presence of compensatory hyperhidrosis, all the patients of our series reported that the procedure had improved their quality of life. The satisfaction was high in both groups, with no statistical difference between the groups at either one-month or six-month follow-ups.

Long-term follow-up of these two groups may show whether these results persist. In the event of late recurrence of symptoms among patients in the T4 group, reoperation could be carried out in order to extend the sympathectomy to the T3 ganglion.²⁵⁻²⁷

CONCLUSION

We conclude that resection of the T4 ganglion is preferable to resection of the T3 and T4 ganglia together. Despite their equal efficacy for reducing axillary hyperhidrosis, T4 resection leads to a lower rate of compensatory hyperhidrosis.

Compensatory hyperhidrosis in the T4 group tended to decrease over time, which was reflected in the statistically significant improvement in long-term personal satisfaction.²⁸

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