

Original Research Article

Transthoracic endoscopic sympathectomy for upper limb hyperhidrosis

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ABSTRACT

Background: Hyperhidrosis is a disabling troublesome characterized by excessive perspiration that produces a social and professional deficit for patients. Thorascopic sympathectomy represents the best approach for this disorder. There are several methods for treatment of extensive hyperhidrosis which includes: Antiperspirant, anticholinergic, ionophoresis, psychotherapy, botulinum toxins injection and surgery. Endoscopic Thorascopic Sympathectomy (ETS) which is most safety, which require excision and electrocoagulation by cautery or ultrasonic shear which is used in this study, and by Clips application on the thoracic sympathetic ganglia between T2 to T4 or T5. ETS is minimally invasive procedure that increased the interest in this modality of treatment.

Methods: This prospective study include 78 cases admitted to IBN Sina Hospital, Sana'a, Yemen during the period of November 2013 and August 2017, 66 were male (84.6%) and, 12(15.4) are female. The procedure based on Endoscopic Thorascopic Sympathectomy.

Results: Seventy-eight patients underwent bilateral thorascopic, palmer hydrosis in 55 (70.5%) patients, 14 (17.9%) combined axillary, palmar and planter and 9 (11.6%) combined with planter and axillary hyperhidrosis. Complications included partial right pneumothorax requiring chest drain one case (1.28%), chronic wound pain five to seven months two cases (2.56%) and compensatory sweating twenty -three cases (29.5%). There was one (1.25%) exploratory rethoracoscopy for bleeding at the end of the procedure which was the third intercostal artery at the vertebra-costal junction and controlled by ultrasonic shear cauterization. No cases of Horner's syndrome were identified. There was no mortality.

Conclusions: Thorascopic sympathectomy is a safe and effective procedure for treatment of hyperhidrosis. Hospital stay is very short, lower post-operative rates of complication or infection and early wound healing. Patient more satisfied with the immediate treatment effects on the preoperative symptoms of hyperhidrosis.

Keywords: Axilla, Hyperhidrosis, Thoracosopy, Sympathectomy

INTRODUCTION

Hyperhidrosis is a neural sympathetic control abnormality of the exocrine sweat glands, which causes excessive and disturbing sweating. The thoracic sympathetic chain is engaged in the neural control of sweating in hyperhidrosis of the upper limbs. It lies in front of the neck of the thoracic ribs and under the

parietal pleura. Preganglionic sympathetic fibres (white rami) junction with cells ganglionic of the sympathetic chain, usually at the same level of the lateral horn of the spinal cord where they originate. Occasionally, these preganglionic fibres travel along the sympathetic chain downward or more commonly upward before joining a ganglionic cell at a different level. The postganglionic fibres (grey rami) join a peripheral nerve or distribute around a segmental artery to reach the effector cell. The

nerve endings, which control the function of the glands involved in hyperhidrosis, differ from other sympathetic fibres in that they use acetylcholine as the neurotransmitter, which is why anticholinergic drugs are sometimes used in the treatment of this condition. Symptoms involve remarkable aspects of the life quality, including psychological, physical and social dimensions. Sweating in excessive amount more than usual starts in childhood or adolescence and remained all of life. Impatient, bothering and anxiety lead to aggravate sweating. In addition, Sweating can cause by high temperatures and emotional stress or it may a raised without any clear reasons. Patient who suffer hyperhidrosis can undergoes excessive sweating on their palmar, axillary, plantar, facial or on their trunk. Many individuals suffer from a gathering of the above. Primary hyperhidrosis is an extremely dysregulation of sweat and may be sever occupational psychological and social burden to many people. In study prevalence of hyperhidrosis in the United States 4.8%, representing as hyperhidrosis approximately 15.3 million people. That's almost twice as many people as previously believed.¹ Treatment by medicine is sometimes depressing, and the transient response is more common, but treatment by Surgery is the most effective and based on retardation of transmission of impulses from sympathetic ganglia to the exocrine sweat glands. Thorascopic sympathectomy was first described in 1942 by Hughes J, and stay uncommon until the introduction of video endoscopic techniques in the 1980 s.² Since then it has turn in to excellent method of treatment of primary hyperhidrosis of the palms, axillae, and face and more recently for facial blushing. Compensatory sweating is the most common side effect and approved to be due to a thermoregulatory mechanism. The reported frequencies vary considerably, with incompatible views to its severity and predisposition. Prevalence of hyperhidrosis in the United States is 2.8% (7.8 million individuals).³ Hyperhidrosis affected Men and women in the same degree. In many years, axillary hyperhidrosis was treated in surgical ways with subcutaneous curettage or excision of the skin containing these exocrine glands. In other ways, this surgical process has a significant rate failure and is associated with ugly scarring and the risk of limited arm movement.^{4,5} A new surgical techniques for excising axillary exocrine and apocrine sweat glands, such as minimally invasive suction curettage, may have improved outcomes and decreased morbidity, however larger and longer term studies are needed.^{4,6}

Most common used technical surgery for treatment of upper extremity hyperhidrosis involves the interruption of the upper thoracic sympathetic chain (usually from the second to fourth thoracic ganglia). A lot of studies have shown endoscopic transthoracic sympathectomy (ETS) to be effective, but the potential for adverse effects, specially the development of compensatory hyperhidrosis, the use of ETS as first line therapy was precluded.⁷⁻¹¹ Thoracic sympathetic clipping is an alternative to permanent severing of the sympathetic

nerve.¹²⁻¹⁵ Support the efficacy of the procedure for hyperhidrosis by the results of a prospective study of 727 patients treated with thorascopic sympathetic clipping for hyperhidrosis or facial flushing and sight that some patients had postoperative compensatory sweating advantage from reversal of the procedure via clip removal.¹⁴

METHODS

Present prospective study includes 78 cases admitted to our Hospital, Sanaa, Yemen, during the period of November 2013 and August 2017.

The aim of this study is to evaluate the efficacy of bilateral Thorascopic sympathectomy by ultrasonic dividing the rather than resecting the sympathetic chain in alleviating symptoms and improving quality of life in patients with hyperhidrosis and evaluate the occurrence, severity of compensatory sweating after surgery

Sixty-six were male and 12 were female. Most of them were normal body weight or thin 73 (93.5%) with body mass index (BMI) between 18-20 and average length 160 cm (164-175 cm length) their age range between 17 and 28 years old. Excessive uncomfortable palmar sweating was the main presentation in 55 (70.5%) cases, axillary, planter and palmar 14 (17.9%) cases. Axillary and planter 9 (11.5%) cases (Figure 8).

Surgical technique for endoscopic sympathectomy techniques



Figure 1: Position of the patient for right thorascopic sympathectomy.

Under general anaesthesia we perform bilateral ETS using double lumen endotracheal tube. carbon dioxide pumping is used to help encourage lung collapse. Semi-Fowler's position (30 degree) is preferred with the patient's arms abducted and a twist behind the shoulders and scapula to improve reach to the upper sympathetic chain. Just one 7mm or 10mm port with an operative thoracoscopy was needed for manipulation. Otherwise, one telescope port and one operating port was reset if an

operating thoracoscopy was not available (Figure 1). The sympathetic chain was easily identified lower the parietal pleura, running vertically through the necks of the ribs in the upper costo-vertebral region.



Figure 2: The right thoroscopic sympathectomy involving T2, T3, T4, T5.

Authors performed bilateral synchronous sympathectomy starting on the right side. An L-shaped hook cautery alternating cutting coagulation was used to section the sympathetic chain, it is easier and faster than trying to remove a segment of the chain (Figures 2).



Figure 3: Tube immersion in saline during lung inflation.



Figure 4: Closure of the ports without chest tube.



Figure 5: Left thoroscopic sympathectomy.



Figure 6: Patient showing dry planter surface of right foot.



Figure 7: Patient showing dry hand.

Care was taken specially to make sure that complete surgical removing of ganglia and severance of the sympathetic chain is controlled. Mostly the dissection was continued by ultrasonic dividing the pleura for 5cm lateral to the chain. If a perverse nerve bundle of Kuntz

was identified, it too is severed. The transect ends of the sympathetic chain are separated as far as possible and cauterized by ultrasonic shear (ethicon endisurgery, INC, Cincinnati, OH, USA) prevent regrowth of the nerve and symptoms recurrence. For patients with hyperhidrosis, level T2 and T3 or T2 - T5 was divided, depending on the severity of the lower extremity symptoms. syndrome appear from injury to Satellite ganglion so care should be taken not to divide the sympathetic chain above the level of the second rib lead to damage Satellite ganglion. Before closing the skin, a mini chest tube was left in the chest and the subcutaneous tissue was closed with 3-0 Vicryl. The patient's lung was expanded with positive pressure ventilation, while the external end of the chest tube was immersed in kidney dish full of saline showed no more air bubble it was removed from the chest quickly to avoid residual air in the pleural cavity see (Figure 3), and after that a final subcuticular suture was placed see (Figure 4). The procedure was repeated on the left side see (Figure 5). A radiograph for chest was immediately must be done after the operation to ensure complete lung expansion. The operation is usually performed, and the patient stay in hospital for 24-48 hours, after that all patients was discharged (Figure 6-7).

RESULTS

There were no death occurrences and no need to convert the ETS procedure into open surgery.

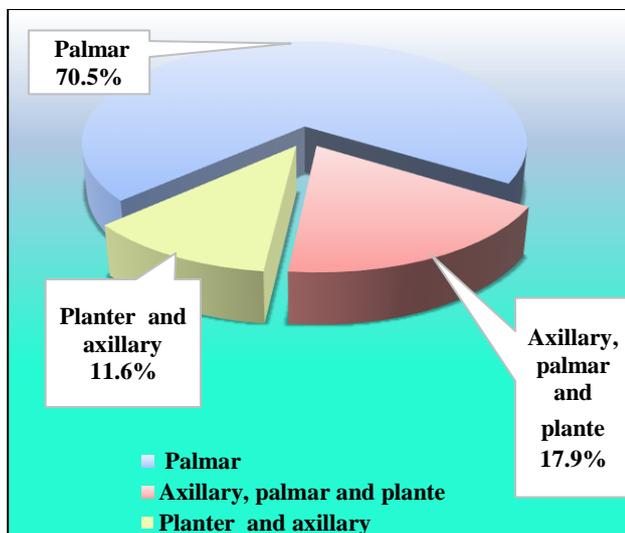


Figure 8: Frequency of compensatory hyperhidrosis sites.

Authors have performed bilateral TS in 55 (70.5%) patients with palmar, 14 (17.9%) with axillary, palmar and planter and 9 (11.6%) with planter and axillary hyperhidrosis (Figure 8).

Sixty-six were male and 12 female patients with a median age of 21 years (range from 17to 28 years). The mean of hospital stay was 1 day (range 1-2). Postoperative complications like Horner’s syndrome was not recorded

in any case, heamothorax in one case (1.28%) readmitted to the operation theater and through Thorascopic approach the bleeder which was the third intercostal artery near to the paravertebral space was controlled by ultrasonic shear. All patients (100%) were satisfied with the immediate treatment effects on the preoperative symptoms of hyperhidrosis. Postoperatively twenty-three (29.49%) of patients had mild compensatory sweating in areas of the trunk, back, inner thigh, or foot and 3 patients (3.8%) developed significant compensatory sweating, but only one of them (1.28%) complained of intolerable symptoms, forty eight (61.54%) non-compensatory sweating, one case had pneumothorax in one case (1.28%) and two 2.56% cases had wound pain (Figure 9).

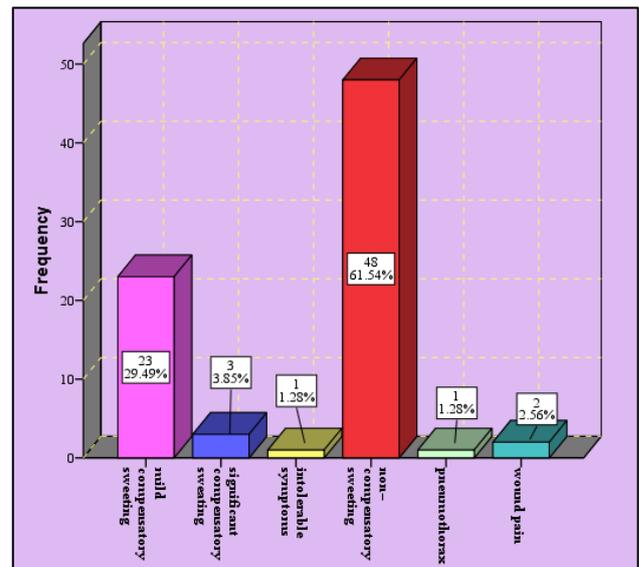


Figure 9: Frequency of postoperative complication.

DISCUSSION

Primary hyperhidrosis is an extremely disabling condition with an estimated prevalence of 1% in the western world.¹⁶ It can be defined as sweating in excess of the body's homeostatic requirements. Palms of the hands, the axillae, or the face mostly affected by hydrolysis and may be a severe professional, psychological, and social burden to many patients.

The therapeutic options for the management of hyperhidrosis have traditionally been non-operative. These include topical antiperspirants, anti-cholinergic drugs, iontophoresis and more recently botulinum toxin injections. These methods seldom give sufficient relief, their effects are transient, compliance rates are low, and they are not without associated side effects. Thorascopic sympathectomy is, however, a safe and effective method of managing these patients with significant improvement in quality of life.¹⁷ A variety of different surgical approaches have been used with time with varying results.¹⁸ The term ‘sympathectomy’ is often used synonymously with ‘sympaticotomy’, the former

historically referring to the extirpation or destruction of the sympathetic ganglia and chain, and the latter referring to the division of the sympathetic chain. In present study, authors performed just cauterization and dividing the chain, as it allowed fewer incisions, less external and internal tissue trauma, while producing equivalent clinical results, but like most previous reports, we refer to the procedure as sympathectomy.

The results of Thorascopic sympathectomy over the last decade have continued to improve with a combination of better understanding of pathophysiology and also the recent advances in video-assisted endoscopic sympathectomy. However, there have been few long-term series. Reubendra et al, Study demonstrates that sympathectomy does provide long-term benefit (>3 years up till now) with no recurrence.¹⁹ However, it is not without its complications, the most important being compensatory sweating, in the region of (67-85%).^{20,21} As compared to our study compensatory sweating found in 26 patient (33.3%). Is it therefore reasonable to remove one disorder to create another? Hederman WP, stated that patients who have sweating severe enough to cause significant occupational or social difficulties, and who have been cured by sympathectomy, are among the most grateful that surgeons will encounter in the course of their work.²² This can be seen in previous published reports on the significant improvement in the quality of life of these patients.²³

In a cohort of 281 people undergoing ETS for hyperhidrosis, the rate of Horner's syndrome was 1% and no patient developed gustatory sweating.²⁴ In other study 458 patients undergoing ETS reported by Moya and colleagues, major perioperative complications with conversion to thoracotomy occurred in 0.4%, pneumothorax in 2%, subcutaneous emphysema in 1%, pleural bleeding in 0.2%, hemothorax in 0.1% and atelectasis in 0.1%.²⁵ As compared to our study in Cina et al, study, excessive dryness of the hands occurred in 0.4%, Horner's syndrome in 0.3% and gustatory hyperhidrosis in 1.1% of patients.²⁴

Rates of compensatory hyperhidrosis in our study were low, occurring in one out of 22 patients (5%). This patient increased sweating in the lumbar region since surgery, but her overall scores reflected marked improvement and the patient expressed satisfaction with the procedure. Other studies have reported higher rates of compensatory hyperhidrosis, between 17% and 100%.^{18,21} Some authors suggest that a more extensive of sympathectomy (to the level of T4 or T5) is associated with increased compensatory hyperhidrosis.^{26,27} Leseche et al, using multivariate analysis in a cohort of 134 patients undergoing ETS for hyperhidrosis reported an incidence of compensatory sweating of 71%.²⁸ This was described as minor in 53% and severe in 19%. They found that the extent of sympathectomy was not associated with the occurrence of this complication. In their cohort, however, only 15% of patients had a sympathectomy extending to T3, 48% received a

sympathectomy extending to T4 and 37% to T5. In 1,274 patients undergoing ETS reported by Reisfeld R, some degree of compensatory sweating was reported in almost all patients, but was usually mild.²⁷ In this cohort, 2% of patients requested reversal of their procedure. Postoperative complications like Horner's syndrome was not recorded in any case, hemothorax in one case (1.28%) readmitted to the operation theatre and through Thorascopic approach the bleeder which was the third intercostal artery near to the paravertebral space was controlled by ultrasonic shear. All patients (100%) were satisfied with the immediate treatment effects on the preoperative symptoms of hyperhidrosis.

In Cina et al, study, of the 22 patients who underwent surgery, one patient (5%) developed a postoperative pneumothorax requiring placement of a Heimlich valve. There were no other local or wound complications. No patient developed Horner's syndrome or any other neurologic complication. One patient (5%) reported compensatory increase in sweating in the lower lumbar area.²⁴ As compared to our study Complications included partial right pneumothorax requiring chest drain one case (1.28%), chronic wound pain five to seven months two cases (2.56%) and compensatory sweating twenty -three cases (29.5%). There was one (1.25%) exploratory rethoracoscopy for bleeding at the end of the procedure which was the third intercostal artery at the vertebral-castal junction and controlled by ultrasonic shear cauterization. No cases of Horner's syndrome were identified. There was no mortality. The variability of reported incidence of compensatory sweating could reflect the heterogeneity of the population, different surgical procedures being performed, or perhaps a consequence of different definitions of compensatory sweating.²⁶ Factors such as geographic location, working environment, humidity and temperature together with heterogeneity of the population can also affect the incidence of compensatory sweating. It has been speculated that compensatory sweating may be a thermoregulatory mechanism to compensate for the loss of secretory tissue, and for that reason, it is related to both the surgical procedure and to the extent of resection division of the sympathetic chain.

Resection as opposed to division of the sympathetic chain has been shown to correlate with the severity of compensatory sweating because of the extensive areas of skin anhidrosis, which may be a prerequisite to this complication but with similar results between the two procedures.^{14,29} When considering the extent of sympathectomy, there are many views; authors believe that limiting the extent of sympathectomy may reduce the compensatory sweating, some others believe that even a limited sympathectomy resulted in compensatory sweating in all patients; and finally some others believe that the extent of sympathectomy does not influence the occurrence of compensatory sweating.^{18,30-33}

CONCLUSION

Thorascopic division of the sympathetic chain as opposed to resection is safe and effective when performed by trained surgeons and anesthesiologists, with excellent results for appropriate indications. There is clearly an improvement in the quality of life in the majority of patients. However, the patients need to be fully informed of the complications, especially compensatory sweating, which can be severe in a significant minority of cases.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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