Endoscopic Thoracic Sympathectomy: A Comparative Study of Resection And Electro-diathermy Ablation in the Treatment of Primary Palmar Hyperhidrosis, Taif Experience

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ABSTRACT

Background and aim of the work: Palmar Hyperhidrosis is an excessive and unpleasant sweating and it is under control of the thoracic sympathetic chain. At present, endoscopic upper thoracic Sympatheteromy (ETS) offers a safe and durable solution of the condition. The operation includes excision, electro diathermy ablation or application of surgical clips on the thoracic sympathetic ganglia T2 and T3. The present study was done to compare the results achieved by excision and electro-diathermy ablation.

Patients and methods: This prospective randomized study was conducted in King Abdul Aziz Specialist Hospital and Al-Hada Armed Forces Hospital, Taif- Saudi Arabia, from January 2007 to August 2010 and included sixteen patients with primary palmar hyperhidrosis. They were randomized into 2 groups; each of 8 patients. In one group; the sympathetic chains with T2 and T3 ganglia were excised on both sides and in the other group, the sympathetic chains and ganglia were ablated bilaterally using electro-coagulation diathermy hook.

Results: There were 10 women and six men. The mean age of the ablation group was 23.6 ± 7.6 years and in the resection group it was 22.5 ± 8.4 years. The mean operating time for bilateral Sympathectomy in the resection group was 74 ± 18.6 minutes; whilst in the thermal ablation group it was 32 ± 7.8 minutes. The mean postoperative hospital stay in the excision group was 48 ± 12 hours and in the ablation group, it was 24 ± 6 hours. No deaths occurred and all patients are discharged with dry hands. The mean follow up was 24 ± 18 months. Intraoperative intercostal venous bleeding occurred in 18.75% of sympathectomies in the excision group but not in the ablation group. Neuralgic pain of the chest wall developed in 31.25% of sympathectomies of the ablation group. Horner's syndrome developed in 6.25% per cent of the sympathectomies in both groups. Compensatory hyperhidrosis of trunk and thighs occurred in 37.5% of both groups. Recurrence developed in 6.25% of ablation group but no recurrence in the excision group.

Conclusion: The rate of recurrence after endoscopic thoracic sympathectomy for treatment of primary palmar hyperhydrosis, if ablation is used, may be higher than resection, however; it is practically accepted as the procedure is easier, has shorter operating time with less liability to develop neuralgic pain and intercostal venous bleeding.

Keywords: Endoscopic Thoracic Sympathectomy, Electro-diathermy Ablation, resection, Taif, Primary Palmar Hyperhidrosis

INTRODUCTION

Primary hyperhidrosis has an estimated prevalence of nearly 3–4% and it may affect hands, face, axillae and feet, causing significant medical and psychosocial problems (1, 2). Surgical therapy is the most effective approach and recognized as the treatment of choice for patients with primary hyperhidrosis as non surgical treatments alleviate symptoms only transiently (1). In the past, upper thoracic sympathectomy required a supraclavicular approach with possibility of injury of cervical structures or bilateral thoracotomies and therefore it was rarely offered, however; at present the endoscopic approach becomes the preferred treatment of primary palmar hyperhydrosis once the secondary causes have been rolled out (1-3). It is considered now the procedure of choice as it is easy and safe in addition; the complications which are normally associated with the conventional approach can be avoided by the endoscopic one because of the superior view achieved with the video-telescope system (4). There is a controversy between the need for resection of the sympathetic trunk versus other procedures such as electro-coagulation, cryo-coagulation, destruction by radio-frequency, the use of harmonic scalpel, laser ablation or sympathetic trunk interruption by titanium clips(5-6). In the present study the outcome of endoscopic thoracic sympathectomy performed by resection and thermal ablation techniques are compared.

PATIENTS AND METHODS:The study was conducted in King Abdul Aziz Specialist Hospital and Al-Hada Armed Forces Hospital after approval of the ethical committees and written consents were taken from the patients. The study included 16 patients with primary palmar hyperhydrosis. Thirty two endoscopic thoracic sympathectomies from January 2007 to August 2010 were performed. All patients suffered from palmar hyperhydrosis that affected their daily activities and all secondary causes were excluded. Thorough preoperative investigations were done for all patients which included chest X-rays and pulmonary function tests. The 16 patients were randomized into 2 groups; each group included 8 patients (5 women and 3 men). In one group the sympathectomies were performed by resection technique and the electro-diathermy ablation was used in the other group.

Statistical analysis: The analyses were performed using SPSS version 15 and when distribution did not satisfy the parametric assumptions, non-parametric tests were used. P-value of less than 0.05 was considered to be significant.

Operative technique: We used (with modification) the technique described by Cina et al. (6). General endotracheal anesthesia with double lumen intubation was used and the patient is placed in supine position to be at the edge of the table for the side to be operated upon and both arms were abducted with attention to avoid injuries of the brachial plexuses by compression or stretch. Verres needle is introduced in the fifth intercostals space in the mid-axillary line with insufflations of 0.7-1 liter of carbon dioxide to the pleural cavity to allow collapse of the ipsilateral lung. This is followed by clamping the appropriate side of the endotracheal tube. After insertion of a ten mm trocar replacing the Verres needle, carbon dioxide insufflation is maintained with pressure of 10 mmHg. Using a 10 mm video-telescope the pleural

cavity is inspected and the sympathetic chain can be easily identified lying along the necks of the ribs in the extra-pleural space.

In the resection group, another two 5 mm trocars were inserted in the anterior and the posterior axillary lines of the third intercostal space. In the ablation group, only one further 5 mm trocar was inserted in the anterior axillary line of the third space.

In resection group, the chain on the second rib was exposed by incising the parietal pleura on the second and third ribs using a five mm endoscopic diathermy hook. The chain was freed, lifted with the hook and divided above the second thoracic ganglion with endoscopic scissors. Using a five mm endoscopic grasper, the distal cut end of the chain was picked up by and the chain with its ganglia were dissected from the chest wall to be resected by scissors or hook just below the third ganglion. Dissection close to the chain is essential to avoid injury of the intercostal veins lying superficial to it.

In the ablation group, The chain with the second and third ganglia are thermally ablated using the diathermy hook after identifying and rolling it against the neck of the ribs beneath the parietal pleura.

To ablate Kuntz nerve fibers if present, cauterization was done (in both groups) at the upper border of the second rib for a 5 cm lateral to the chain.

At the end of the operation in both groups, a 12 F Nelaton's plastic catheter was inserted through a 5 mm port and the other wounds are closed. The tube was removed after immersing its end under saline in a container and the lung is inflated till all the insufflated carbon dioxide is expelled from the pleural cavity to be followed by closure of the wound.

The procedure was repeated on the other side. Chest x-rays was routinely done postoperatively to confirm lung re-expansion.

RESULTS: Table 1 summarizes the patients criteria. There were 10 women and six men. The mean age of the ablation group was 23.6 ± 7.6 years and in the resection group it was 22.5 ± 8.4 years.The mean operating time for bilateral sympathectomy in the resection group was 74 ± 18.6 minutes; whilst in the thermal ablation groups it was 32 ± 7.8 minutes. The mean postoperative hospital stay was in the excision group 48 ± 12 hours and in the

ablation group 24±6 hours. There was no conversion to open procedure.

Intraoperative intercostal venous bleeding occurred in 3 patients in one side only (18.75%) of the sympathectomies in the excision group but not in the ablation group, however: the bleeding was controlled by diathermy coagulation. Central chest pain experienced normal ECG) was (with immediately after recovery from the general anesthesia in nearly all patients of both groups and parentral analgesia was required to relieve it. However; most patients were discharged free of pain. Neuralgic pain with paraesthetic sensations at the chest wall developed in one patient of ablation group at one side only (6.25% of sympathectomies of this group) whilst in the resection group pain persisted at both sides in 2 patients and at one side in one patient (31.25% of sympathectomies of this group). Pain disappeared within 2-3 months after surgery in the patient of ablation group and in 2 patients of the resection group. In one patient the pain required to be managed by pain specialist for 6 months to be controlled. In 2 patients of the resection group mild unilateral hemothorax was detected in the second postoperative week and treated by thoracocentesis. Transient manifestations of Horner's syndrome were developed unilaterally in one patient (6.25%) of each group and disappeared within 2 months. Mild compensatory sweating of trunk and thighs occurred in 3/8 patients (37.5%) of both groups. All patients were discharged with dry hands at time of discharge and remained dry in the resection group, but recurrence at one side occurred in one patient (6.25%) of the ablation group. The mean follow up was 24±18 months.

DISCUSSION: Hyperhidrosis which is relatively frequent disorderis not a life threatening disease. but represents an extremely uncomfortable situation causing deep social and psychological problems (1, 2, 7). There are several ways to treat excessive sweating as; antiperspirants, anticholinergics, psychotherapy, botulinum toxin injections and surgery (1). The traditional supra-clavicular procedure is not preferred because of its disturbing complications Horner's as syndrome; in addition, there may be injury of phrenic nerve and brachial plexus (1-3, 8, 9). In the trans-axillary approach, the injury of the

cervical structures is avoided, but still we have the problems of thoracotomy (1, 6). However; endoscopic thoracic sympathectomy (ETS) offers a safe alternative with simple, precise and reliable access to the sympathetic chain and can be performed by excision of sympathetic chain and T2 and T3 ganglia or ablation by electro-cautery, harmonic scalpel, radiofrequency, laser or interruption of the trunk by titanium clips (1-17).

Cinà *et al.*(6) reported that resection obtained immediate success rate of 99.7 % while ablation achieved dry hands in 95.2 % and in another studies (1,2,4,8) similar results of immediate success are recorded. In the present study the immediate success rate was 100% after resection or ablation, however, this higher success rate may be related to the smaller number of patients also to the care given to cauterize at the upper border of second rib for 5 cm lateral to the sympathetic chain, this step is recommended by many surgeons to ablate additional sympathetic fibers and/or accessory nerve of Kuntz if found, which increased the rate of immediate success up to 100% as shown in some studies (13, 14).

The operating time for bilateral sympathectomy by resection recorded in the literature (1, 5, 6, 12, and 14), ranges from 40 -95 minutes (mean around 65 minutes) and for ablation method the range is 24 - 35 minutes (mean around 30 minutes). In the present study, our results are similar and the mean operating time for resection was 74±18.6 minutes and that for ablation was 32 ± 7.8 minutes. The results of this study and the reported in the literature show the significant difference in operating time between both techniques.

Intercostal vein bleeding was recorded by many investigators to range between 2-10 % in resection technique and from 0-1% if ablation is used (6, 10-12). To minimize the rate of this complication, it is recommended to dissect close to the chain, to avoid injury of the intercostal veins which are found more superficial (6). However, in spite of taking this point in consideration in this study, the rate of intercostal venous bleeding was 18.75% in resection group; this high figure is partially related to the small number of patients. No one had this complication in the ablation group.

Neuralgia and/or paraesthesia at the chest wall were reported in several studies in the range of 30% of patients, when resection was performed, however; the pain was described to be severe in less than 1%, mild neuralgia is recorded also in 4% of ablation technique and in most of patients the symptoms disappear after maximum 3 months and only persist more than 3 months in less than 0.25% (1, 2, 6, 10-14). In the present study neuralgia was recorded in 31.25% of sympathectomies performed by resection and in 6.25% ablation group, however; the pain disappeared after 2-3 months in all patients, but persisted for 6 months in one patient of the resection group and required treatment by pain specialist.

Hemothorax was detected radiologically in the present study at the second postoperative week in 12.5% of sympathectomies performed by resection, but not in ablation group, however it was minimal and treated by thoracocentesis. Dumont, (13) recorded hemothorax in about 1% and chylothorax in 0.13%. No chylothorax was detected in the present study and the relatively higher incidence of hemothorax in this study may be related to the small series of patients.

No brachial plexus injury was detected in the present study and it did not exceed 0.25 per cent in other studies (6, 12& 13).

Horner's syndrome was developed in 6.25% of sympathectomies of this study in both resection and ablation group, but, complete recovery occurred within 2 months. Cinà *et al.*(6), recorded Horner's syndrome in less than 1% of sympathectomies performed by ablation and about 2% if resection is used. Some authors recorded higher incidence in ablation group than in resection group and related that to the thermal injury transmitted to the stellate ganglion (13, 15).

Lyra et al. (16) recorded compensatory sweating in 40% of patients in sympathectomies performed by either. resection or ablation and it could be tolerated by most of patients and only in less than 1% of patients it was severe and unbearable. Compensatory hyperhidrosis has been recorded to be the most common post operative complication with an incidence between 20-60% and there is no significant difference between resection and ablation (6-14, 17). In the present study compensatory sweating occurred in 37.5% of patients of both

ablation and resection groups and it was mild and accepted by the patients.

Prasad et al (1), recorded recurrence after resection in 0.2% and in 5% of ablation and similar results were recorded in other studies (6, 8, 10-14). In the present study, with mean follow up of 24 months, the recurrence in the resection group was 0 % and in the ablation group was 6.25%, these results are nearly similar to the those of the previousstudies. In conclusion, the rate of recurrence after endoscopic thoracic sympathectomy for treatment of primary palmar hyperhydrosis, if ablation is used, may be higher than resection, however; it is practically accepted as the procedure is easier, has shorter operating time with less liability to develop neuralgic pain and intercostal venous bleeding.

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 Table (1): Patients' criteria and outcome of endoscopic thoracic sympathectomy according to the method used

| | Resection | Ablation | P value |
|---|----------------------|----------------------|----------|
| Number of patients | 8 | 8 | NS |
| Number of sympathectomies | 16 | 16 | NS |
| Sex: Male Female | 3(37.5%) 5(62.5%) | 3(37.5%) 5(62.5%) | NS NS |
| Mean age (years) | 22.5±8.4 | 23.6±7.6 | NS |
| Mean operating time for bilateral sympathectomy (minutes) | 74±18.6 | 32±7.8 | P <0.05 |
| Mean postoperative hospital stay (hours) | 48±12 | 24±6 | P<0.05 |
| Number of deaths | 0(0%) | 0(0%) | NS |
| Dry hand at time of discharge | 16(100%) | 16(100%) | NS |
| Intercostal vein bleeding (side) | 3(18.75%) | 0(0%) | P<0.05 |
| Hemothorax (side) | 2(12,5%) | 0(0%) | P<0.05 |
| Chylothorax (side) | 0(0) | 0(0) | NS |
| Neuralgia/parasthesia (side) | 5(31.25%) | 1(6.25%) | P<0.05 |
| Horner's Syndrome (side) | 1(6.25%) | 1(6.25%) | NS |
| Compensatory sweating (patient) | 3 (37/5%) | 3(37.5%) | NS |
| Recurrence (side) | 0(0%) | 1(6.25%) | NS |

P value >0.05 is considered non significant (NS)