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ORIGINAL ARTICLE

One stage single port bilateralsympathectomy for palmarhyperhidrosis trans-axillary versus midclavicularapproache

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ABSTRACT

Objective : Primary hyperhidrosis is a disorder characterized by excessive hand sweeting beyond the thermoregulatory needs , among all the different surgical approaches, video-assisted thoracoscopic sympathectomy has been shown as a safe and minimally invasive procedure for palmar and axillary hyper-hidrosis . our study will discuss the successful bilateral midclavicular single port sympathectomy versus bilateral trans axillary single-port video assisted thoracoscopic sympathectomy

METHODS: Patients underwent preoperative, intraoperative, and postoperative follow up . Surgery was performed under general anesthesia and one lung ventilation .In our method all patients of group A through midclavicular approach were placed in the supine position with arms gently abducted underwent endoscopic surgery through 3 cm incision in the areola just below the nipple in male and 3 cm sub mammary incisions infemale in the midclavicular line and the thoracic cavity was approached through the fourth intercostal space. In group B through midaxillary approach the patients were positioned in lateral decubitus position. a single 2-cm long transverse axillary incision was made in the fourth intercostal space.

Results: There was highly statistically significant difference between the two studied groups as regard mean operative time it was 48.2± 9.6 in group A and 60.3± 10.4 in group B . There was no statistically significant difference between the two studied groups as regard post-operative follow up data including post operative pain ,compensatory hyperhydrosis ,or worsening of the condition. There was no statistically significant difference between the two studied groups as regard other post-operative complications including residual pneumothrax segmental collapse horners syndrome residual shoulder pain There was significant difference in ,excellent wound healing and better cosmetic apearence.

Conclusion: Both bilateral trans-axillary and mid clavicular one-staged video-assisted thoracoscopic sympathectomies are effective and safe.bilateral mid clavicular one-staged video-assisted thoracoscopic sympathectomies had less operative time less post-operative complication in the form of less infection, pneumothorax and collapse.

INTRODUCTION

Primary hyperhidrosis is a disorder characterized by excessive hand sweeting beyond the thermoregulatory needs, particularly in response to temperature or emotional stimuli(1). It is a common disease

that affects men and women equally, with a peak incidence in the late second and early third decades of life, and an incidence in the Western world of up to 2.8% of the population. Patients complain of excessive and chronic sweating, independent of their body temperature or the season on the face, hands, soles of the feet, or the axillary region. causing significant medical and psychosocial consequences(2).Conservative treatment with topical or oral agents offers only minimal and temporary relief, and induces a nonspecific injury of the epidermis with abnormal keratinization and hyperkeratotic plugging of the orifices of the sweat gland, requires long-term maintenance therapy to prevent recurrence However, surgical therapy is the most effective approach and recognized as the treatment of choice for patients with primary hyperhidrosis(3). The decision to perform a sympathectomy is made after excluding other underlying pathological conditions, such as malignancy or endocrine disorder, drug-related, neoplastic, and neurological causes(4). Open surgical procedures involving severance or resection of the upper thoracic sympathetic chain (T2,T3 and T4, which are responsible for the sympathetic innervation of the palm) through a posterior, trans axillary or supraclavicular approach were found to be very effective, but they were highly invasive and associated with a high rate of morbidity (5) . To date, among all the different surgical approaches, video-assisted thoracoscopic sympathectomy has been shown as a safe and minimally invasive procedure for palmar and axillary hyper-hidrosis . In addition, it can be performed using single or multiple ports.(6)

our study will discuss the successful bilateral midclavicular single-port video assisted thoracoscopic T2-T4 sympathectomy versus bilateral midaxilary single port sympathectomy.

MATERIALS AND METHOD

Follow up data will be collected and analyzed in zagazig university and king Khalid hospital Najran KSA between December 2017 and April 2021. The study was done according to The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

all patients underwent a careful clinical history, preoperative routine blood examination, spirometry cardiological consulting and chest X-ray to exclude pulmonary affections. Patients with secondary hyperhidrosis were excluded from this study. A written informed consent from all patients was obtained, and study approval from the Ethics Committee was provided.

Operative technique :

The same manipulation technique was used in all cases. Surgery was performed under general anesthesia and one lung ventilation using a double-lumen endotracheal tube Patients were divided into 2 groups, group A underwent our midclavicular approach and group B underwent sympathectomy through mid-axillary approach each . In group A all patients were placed in the supine position with arms gently abducted a small roll was placed transversely behind the scapulae to slightly elevate the axilla from the operating table. The neck, bilateral shoulders, axilla, chest, and upper abdomen were prepped and draped. A fingertip pulse oximeter probe was used to record the changing pattern of the plethysmographic curve on the operated side. first group underwent trans areolar endoscopic surgery through 3 cm incision in the areola just below the nipple in male and 3 cm sub mammary incisions infemale in the midclavicular line and the thoracic cavity was approached through the fourth intercostal space. In group A the same body position was used to perform the procedure on the other side. Three millimeter, 30° thoracoscope and 10 mm endoscopic port was introduced into the thoracic cavity after lung exclusion on the operative side of surgery.

The sympathetic chain was identified counting the ribs from the first rib. By opening the mediastinal pleura, the sympathetic chain was exposed and T2–T4 chains were identified perfectly after identifying the stellate ganglia well which covered by pad of fat. Dissection was performed by electrocautery from the second to the fourth ganglia and the resected chain was removed. Then, the thoracoscope and

endoscopic instruments were removed a temporary 24-Ch chest tube was inserted into the thoracic cavity through the surgical incision and connected to underwater seal. The same procedure is performed on the other side without changing the position of the patient, and both intrathoracic catheter were removed on negative suction with chest x ray was done for all patients in the recovery room.

In group B the patients were positioned overone side of chest (lateral decubitus position)and the arm flexed and fixed over the head to expose the axilla. The operating side was approached after deflation of the same lung of the same side by one lung ventilation, a single 2-cm long transverse axillary incision was made in the fourth intercostal space mid axillary line, posterior to the pectoralis muscle. A 10-mm trocar was inserted in the fourth intercostals space, the dorsal sympathetic chain was identified running along the neck of the ribs close to the costovertebral junctions. The firstand second rib were identified under direct vision the stellate ganglia was identified well, and the sympathetic chain was transected (segments T2-T4) with diathermy The surgical procedure was completed by visualization of thoracic cavity for any possible bleeding after that reinsufflation of the collapsed lung under direct vision, insertion of an 24-F thoracic catheter through the same incision, and closure of the wound then the patient was repositioned on the other side and the procedure was repeated, and both intrathoracic catheter were removed with negative suction, lidocaine was injected around the wound during closure with follow up chest x ray was done for each patient in the recovery room . In group B the patients were positioned overone side of chest (lateral decubitus position)and the arm flexed and fixed over the head to expose the axilla. The operating side was approached after deflation of the same lung of the same side by one lung ventilation, a single 2-cm long transverse axillary incision was made in the fourth intercostal space mid axillary line, posterior to the pectoralis muscle. A 10-mm trocar was inserted in the fourth intercostals space, the dorsal sympathetic chain was identified running along the neck of the ribs close to the costovertebral junctions. The firstand second rib were identified under direct vision the stellate ganglia was identified well, and the sympathetic chain was transected (segments T2-T4) with diathermy The surgical procedure was completed by visualization of thoracic cavity for any possible bleeding after that reinsufflation of the collapsed lung under direct vision, insertion of an 24-F thoracic catheter through the same incision, and closure of the wound then the patient was repositioned on the other side and the procedure was repeated, and both intrathoracic catheter were removed with negative suction, lidocaine was injected around the wound during closure with follow up chest x ray was done for each patient in the recovery room .

RESULTS

Data collected throughout history, basic clinical examination, laboratory investigations and outcome measures coded, entered and analyzed using Microsoft Excel software. Data were then imported into Statistical Package for the Social Sciences (SPSS version 20.0) (Statistical Package for the Social Sciences) software for analysis. According to the type of data qualitative represent as number and percentage , quantitative continues group represent by mean ± SD the following

tests were used to test differences for significance:

- Chi square Test ($\chi 2$): was used to study comparison and association between two qualitative variables.

-Fisher's Exact: correction for chi-square when more than 20% of the cells have expected count less than 5.

- t-Test: was used for comparison between two groups having quantitative variables with normal distribution (for parametric data).

- A P-value of < 0.05 was considered statistically significant & <0.001 for high significant result for two tailed tests.

Our patients were divided into two groups, group A patients underwent midclavicular approach included 23 patients 13males , 10

females with mean age+_ 25 years . Group B underwent midaxillary approach included 17 patients 8 males and 9 females with mean age +_ 27 years , they underwent lateral position with mid axillary line approach. there was no statistically significant difference between the two studied groups as regard sex (p>0.05)(Most of both groups were males) or demographic data . This table shows that there was highly statistically significant difference between the two studied groups as regard mean operative time (p<0.001). Non on both groups need to converse to thoracotomy. There was no statistically significant difference between the two studied groups as regard need for second port (p>0.05).

Post-operative follows up:

35% complained of pain of moderate degree according to pain score most of them were in group B, and they received oral analgesia for OPD follow up .

Compensatory hyperhidrosis occurred in 27% of patients, mild degree , were 17% of patients and moderate degree represented in 10% ., the intensity of sweeting in patient with compensatory hyperhidrosis decreased after 3 months of OPD follow up in 36% while 45% of them developed excessive sweeting.

This table shows that there was no statistically significant difference between the two studied groups as regard post-operative follow up data (p>0.05)

53% of patients had fully expanded lung,while 15% of patients had mild residual apical pneumothorax, they were managed conservatively and discharge on second day of surgery, while 32 % of patients had moderate degree of pneumothorax with segmental collapse of the lung in which ICDs were kept on negative suction and follow up x ray

This table shows that there was highly statistically significant difference between the two studied groups as regard excellent cosmetic (p<0.001). Non on both groups had Horner's syndrome nor died. There was no statistically significant difference between the two studied groups as regard other post-operative complications (p>0.05).

Table 1: Operative data among the studied gatherings:

Variable	Gathering A N=23		Gathering B N=17		t-test	P-value
Operative time (min): ***Mean ±SD*** ***Range***	48.2±9.6 30-65		60.3±10.4 40-80		3.8	**0.000*** **(HS)**
Variable	**N**	**%**	**N**	**%**	**χ 2**	**P-value**
Need to conversion to thoracotomy: ***Non***	23	100	17	100	----	1
Need for secondport: ***No*** ***Yes***	21 2	91.3 8.7	16 1	94.1 5.9	Fisher	0.738

HS: Highly significant

This table shows that there was highly statistically significant difference between the two studied groups as regard mean operative time

Table 2: Post-operative follow up data among the studied gatherings:

Variable	Gathering A N=23		Gathering B N=17		χ 2	P-value
	N	%	N	%		
Data:						
Post-operative pain	6	26	8	47		
Rebound post-operative hyperhidrosis	5	22	6	35		
Rebound 3	1	4.3	2	11	0.25	0.993
months post-operative	2	8.6	3	17		
No post-operative improvement						
Worsen condition	1		2	11		

Post-operative follows up:
35% complained of pain of moderate degree ,
Compensatory hyperhidrosis occurred in 27% of patients,

Table 3:

Variable	Gathering A N=23		Gathering B N=17		χ 2	P-value
	N	%	N	%		
Residual pneumothorax:	2	8.6	3	17.6	fisher	0.376
Segmental collapse:	6	26	5	29	0.11	0.736
Horner's syndrome:						
Non	0	0	0	0	-----	1
Mortality:	0	0	0	0	-----	1
Shoulder girdle:						
Residual pain	0	0	0	0	-----	1
Wound healing:						
Excellent	23	100	17	100	-----	1
Excellent cosmetic:						**0.000***
Better single incision	23	100	0	0	fisher	**(HS)**

This table shows that there was highly statistically significant difference between the two studied groups as regard excellent cosmetic

Discussion

40 patients had palmer hyperhidrosis managed by minimally invasive video-assisted thoracoscope surgery with one port access through 10-mm port with full equipment and instruments. Double-lumen endobronchial tube for anesthesia was used for all patients in both groups guided by fibro-optic bronchoscope aiming to ensure proper position of double lumen tube for total lung collapse in the operative side without need of CO2 inflation.

Uniport VATS provides better visualization, magnification of sympathetic chain with identification of the first rib, stellate ganglia, the fibers of Kunz and other accessory fibers parallel to the sympathetic chain, this increased the safety of the division and avoid injuries to the vital structures. (7)

multiple ports always associated with prolonged operative time, post-operative pain, more possibility to infection with prolonged hospital stay and multiple scars with discomfort (8)

Our patients were divided into two groups:

group A patients had supine decubitus position with elevation of the shoulder and sterilization of chest wall with one port access to the chest through the areola by incision of 3cm just below the nipple in male and sub mammary crease in female in the midclavicular line after elevation of the breast

with fixing it by plaster, this position was comfortable for both surgeon and anesthetist with good exposure to whole chest wall without the need of changing the position of the patient during surgery and without interruption for the anesthetist and decrease the risk of contamination.(4).

Group B patients had lateral decubitus position with one port access through 4th intercostal space in the midaxillary line.

All ports access in both groups trans axillary. through the areola and sub mammary incisions had an excellent approach with good exploration to both thoracic cavities, the sympathetic chain, and vital intrathoracic structures (5). with high significant difference between two groups as regard to operation time which was highly significant prolonged in group B in comparing to group A.

The site of first rib which not seen by VATS was identified by the pad of fat so the stellate ganglia of sympathetic chain below the first rib could be avoided (11) and cutting of the sympathetic chain started by hook and diathermy at the level of lower border of second rib with 3 cm horizontal incision around the sympathetic chain to ensure cutting of sympathetic collaterals and the excision of sympathetic chain will extend to the lower border of the fourth rib. (9)

After VATS sympathectomy hypotension and hypoxia were devolved in 17% of patients as the tone of the blood vessels was released so vasodilation of peripheral blood vessels was expected and hence close observation of oxygen saturation and blood pressure by anesthetists was managed and no patients needed prolonged ventilation or inotropic support (7).

The need of second port access in 3rd intercostal space of anterior axillary line was recorded in15% of patients for dissection of lung adhesions, and hemostasis, no patients converted to open thoracotomy.

Negative suction was connected to the temporary small sized intrathoracic tube (24 French size) with positive pressure by anesthetist during skin closure to avoid any residual air inside the pleural cavity and the catheter was removed in recovery room after chest x ray and before shifting to the ward.

Residual postoperative pneumothorax is a common complication after VATS surgery in general and not specific to sympathectomy (5-6) in our study we had residual pneumothorax in 15% patients, were managed conservatively with mask oxygen and follow up chest x ray while 32% of patients ICD were needed and kept on negative suction and removed after fully expanded lung in the second day of surgery , the same incidence of complications related to VATS sympathectomy either persistent pneumothorax or the need of second ports for hemostasis were recorded in different studies with same plan of management(3-4-5)

All our patients had dramatic improvement of the palmer hyperhidrosis with dryness of both hands, early ambulation, and recovery within few hours postoperatively.

According to pain score no patients suffered from severe pain after surgery and 35% of patients had moderate degree of pain which controlled by oral analgesia on discharge, lidocaine injection around the wound was used during closure of skin which decreased the intensity and duration of post-operative pain (8) .

Debate still exists about the levels of sympathectomy and transection of sympathetic chain either to the level of T3 or T4, as the resection at the level of T3 is highly effective with excellent success (99–100%) and low incidence of severe compensatory hyperhidrosis of 1.3– 12% but carrying high incidence of recurrence 29% (10-12) making the lower level of transection to T4 is preferable (12)

All our patients under went VATS sympathectomy to sympathetic chain from T2 to T4 and extension of the resection to T5 was avoided to decrease the incidence and severity of compensatory hyperhidrosis (10), and the resection of sympathetic chain at the level of T3 was avoided to decrease the incidence of recurrence (2),in our study the result of T2–T4 ganglia excision by VATS with collaterals was effective without recurrence of palmer hyperhidrosis

Compensatory hyperhidrosis occurred in 27% ofpatients, the most affected locations were the back, anterior chest wall, abdomen,

Without significant difference in both groups, after 3 months of OPD follow up of patients with compensatory hyperhidrosis , 36% of them improved while 45% developed excessive sweeting, this result was in line with other studies ,and it was significantly decreased when compared by trans axillary or supraclavicular thoracotomies (12)

OPD follow up after 3 months of surgery, no neuralgic complications, all wounds of both groups healed with no discomfort, no pain but the healing of wounds in group A were more cosmetically accepted with more patient satisfaction, there was no mortalities recorded in our study.

CONCLUSION

The result of our study concludes that the single-port VATS sympathectomy for palmer hyperhidrosis in supine decubitus position through areolar incision in male and sub mammary incision in female is safe, more cosmetic, reliable and feasible method for management of palmer hyperhidrosis, and associated with less intraoperative time, low morbidity and a short hospital stay.

VATS sympathectomy through large sized single port (10 mm) with one lung ventilation making the procedure reliable ,easy , quick and less complications.

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