RESULTS OF THORACOSCOPIC THORACIC SYMPATHECTOMY WITH TWO THORACOPORTS RUNNING TITLE: TWO-PORTS THORACIC SYMPATHECTOMY

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Recent studies have suggested that thoracoscopic sympathectomy is a simple, fast, minimally invasive and safe procedure in the treatment of palmar hyperhydrosis with decreased rates of complication, lesser postoperative pain and scar and shorter postoperative hospital stay than conventional sympathectomy. In this study it was intended to investigate the possible benefits of thoracoscopic sympathectomy performed with two thoracoports in a military cohort.

A total of 245 thoracoscopic thoracodorsal sympathectomy with two thoracoports were carried out in 126 patients with palmar hyperhydrosis. All patients were male with a mean age of 22.4 years (range: 20-29). Two thoracoports of 10-mm diameter were inserted at the posterior axillary and midaxillary lines. The sympathetic chain together with the second and third (T2 and T3) ganglions were resected and the nerve of Kuntz cauterized.

No mortalities were observed in our cases. Conversion to a thoracotomy was not required in any patient. Mean actual operating time was 17.4 minutes and mean amount of postoperative bleeding 110 milliliters. Postoperative complications included submassive bleeding in one patient and pulmonary air leak in another. Also, Horner's syndrome developed in two patients. Symptoms related to palmar hyperhydrosis disappeared completely in all patients except two. We followed the patients for a mean duration of 13.2 months. Compensatory hyperhydrosis developed in seven and unilateral recurrence in one patient during follow-up.

Our results seem to confirm the conclusion of several previous studies that found the two-port sympathectomy technique to be a fast, safe and efficacious procedure in the treatment of palmar hyperhidrosis.

Key words: VATS sympathectomy, thoracoscopic sympathectomy, palmar hyperhidrosis

Primary hyperhidrosis is a disorder characterized by excessive sweat production in the palms and often in the axillae and soles as well (1). It is caused by inappropriate functioning of the sudomotor sympathetic nerves, which is manifested, as hypersensitivity to sudorific stimuli. No histologic abnormalities have been found in sweat glands or sympathetic chain ganglions. Unlike that occurring in response to normal thermal stimuli, hyperhydrotic patients exhibit excessive sweating in their palms, soles or axillae when under emotional tension (2). While the triggers are primarily emotional, they may also relate to heat or exercise (1). Hyperhydrosis can cause maceration of the skin and result in severe emotional, social, and even occupational handicaps for many patients (1,3). Diagnosis of hyperhydrosis requires an accurate history, which usually reveals that the symptoms are usually long-standing, with an exacerbation around puberty, and generally persist for a lifetime, unaccompanied by any other disability. Objective methods of diagnosis such as a starch-iodine test and thermograpy are available, but for most clinicians reporting of the typical symptoms is sufficient (2). Medical treatment modalities include topical aluminum chloride, iontophoresis, systemic or topical anticholinergic therapies and biofeedback. Excision of axillary sweat glands also has been performed (1). Surgical sympathectomy is the definitive form of treatment and should be considered for all patients with significant primary hyperhydrosis (1). In this context it is important to remember that palmar hyperhidrosis is a benign disease and a surgical procedure aimed toward its remedy has to be very safe and carry little or no mortality risk.

Thoracic sympathectomy has been known for years to be the most effective treatment for upper limb hyperhidrosis when medical therapy and iontophoresis have failed. More recently, with the development of minimally invasive video-assisted thoracic surgery (VATS), endoscopic thoracic sympathectomy has become the treatment of choice (4).

In this study we prospectively investigated the clinical characteristics and outcomes of 126 patients who underwent thoracoscopic sympathectomy with two thoracoports in our department between January 1999 and August 2001.

MATERIALS AND METHODS

We performed 245 thoracoscopic thoracodorsal sympathectomy with two thoracoports in 126 patients with palmar hyperhidrosis in our Department of Thoracic Surgery at the Chest Hospital of Gulhane Military Medicine Academy between January 1999 and August 2001. In 119 patients the procedure was performed bilaterally in separate sessions. It was carried out solely on the right or left side in 6 and 1 patients, respectively. All patients were males with a mean age of 22.4 years (range: 20-29). Among our study group, there were 112 enlisted men, 5 officers, 7 noncommissioned officers, and 2 civilian people (relatives of officers). The indication for surgery was palmar hyperhydrosis in all. There was additional facial hyperhydrosis in four patients and axillary hyperhydrosis in three. The patients had experienced disabling palmar hyperhydrosis since adolescence and most had received medical therapy with topical agents without much relief. The majority also reported that excess sweating of their palms adversely affected their skills and work in military services and significantly impaired their social condition in civilian life.

Routine preoperative studies were made in every patient. T2 and T3 sympathectomy was performed in all subjects and a T4 sympathectomy was added in those with axillary hyperhidrosis.

Two-Port Thoracoscopic Sympathectomy: Surgical Technique

All interventions were carried out under general anesthesia. Patients were placed in the lateral decubitus position and tilted anteriorly by about 15 degrees. A finger temperature probe to record the increase in peripheral cutaneous temperature following sympathectomy was utilized in the later 137 operations. Following deflation of the ipsilateral lung, a small skin incision was made to insert a 10-mm thoracoport through the posterior axillary line over the superior border of the fourth rib into the thorax. Following exploration, a second small incision was made into the third or fourth intercostal space at the midaxillary line to insert the second 10-mm thoracoport. We used a 0-degree thoracoscope through the first thoracoport and a jaws clamp and an endoscissor through the second. After the pleura and sympathetic chain were held with the jaws clamp, the pleura was opened and the T2 and T3 ganglions were dissected from their surrounding tissue (Figure 1). The sympathetic chain together with the T2 and T3 ganglions were excised from upside up T2 ganglion to upside up T4 ganglion with the endo-scissor (Figure 2). Finally, because the accessory fibers such as the nerve of Kuntz (accessory nerve fiber which runs parallel and lateral to the main trunk) were divided, we horizontally scored the bodies of the second and third ribs with an electrocautery from the costovertebral angle laterally for 3 cm. We inserted a chest tube through the midaxillary port incision and had the patients extubated while in the operation room. All patients were monitorized in the postoperative unit until removal of the chest tube. Pathological confirmations of the resected materials were obtained in every case. Throughout the study period, total operation time, postoperative unit stay, hospital stay, complications, and early and late recurrences were recorded for every patient.

RESULTS

No fatality occurred in our study population. Nor did we encounter any major intraoperative complication necessitating open surgery. There were pleural adhesions at in 9 patients, which could be eliminated with the endo-scissor or electrocautery. Intercostal arterial injury in 3 patients and intercostal vein injury in 2 patients occurred during operation and the resultant bleeding could be controlled with cauterization in all. Postoperative complications were submassive bleeding in one patient, which amounted to 570 ml within 2 days and a pulmonary parenchymal air leak in another that persisted for 3 days. Both complications spontaneously resolved. Horner's syndrome developed in 2 patients postoperatively. No infectious or neurological complication occurred in our study population. Mean actual operating time from skin incision to skin suturing was 17.4 minutes (range: 14-25). Mean amount of postoperative bleeding was 110 ml. (range: 50-570 ml.). The chest tubes were removed in the first postoperative day in all patients except three. Mean postoperative unit stay was 1.1 days (range: 1-4) and mean hospitalization stay was 2.3 days (range: 2-5). Postoperative analgesia was provided in the form of a single parenteral dose of tenoksikam (Tilcotil® Roche, Istanbul, Turkey) administered routinely on the operation day and oral analgesics

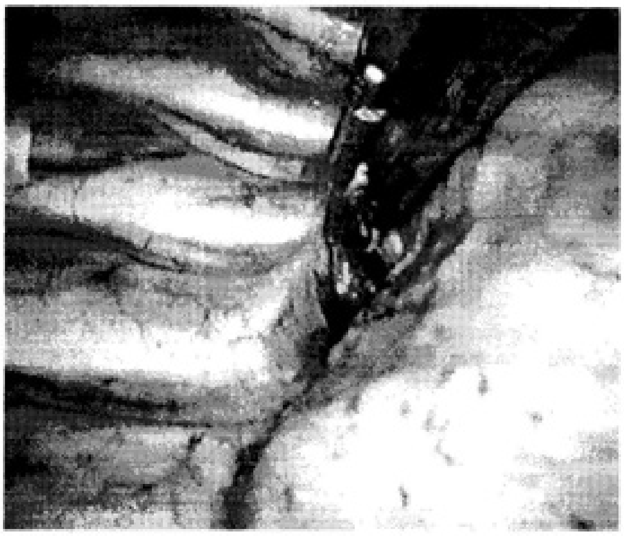

Figure 1. After the pleura and sympathetic chain were held with jaws clamp, the pleura was incised.

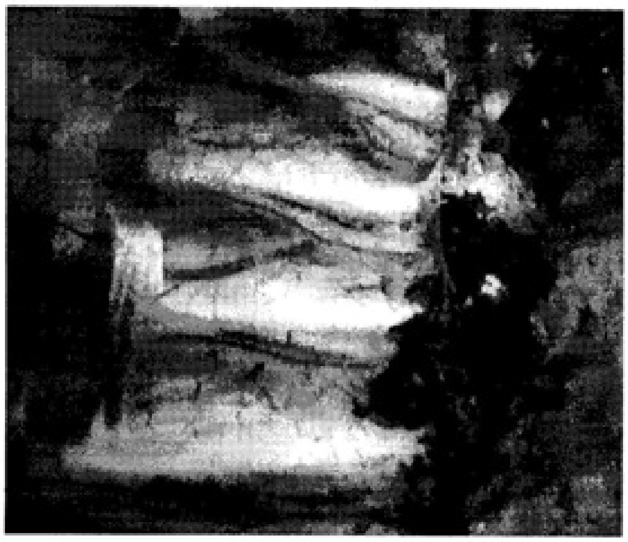

Figure 2. The sympathetic chain (marked by an asterisk -*) resected with an endo-scissor.

continued for a mean duration of 2.2 days postoperatively (range: 1-5).

The symptoms of palmar hyperhydrosis disappeared completely in all patients except in two in whom accurate cauterization of the Kuntz nerve could not be achieved. These two patients had been operated before the use of a finger temperature probe became routine. We followed the patients for a mean of 13.2 months (range: 9-26). We observed compensatory hyperhidrosis to develop at the trunk in 7 patients, but this was seemingly well tolerated by them. One unilateral recurrence causing moderate disturbance was noted in one patient after 9 months who declined a second operation.

DISCUSSION

Palmar hyperhydrosis has the potential to lead to various psychological and social problems. Wet palms give a false impression of uncertainic and nervousness in a person. Social isolation may occur. In addition, it is a serious physical handicap. The wet grip causes things to continually slip out of the hands, and it is particularly troublesome to work with paper (5). Most of our patients were enlisted men. These persons with palmar hyperhydrosis usually experience substantial difficulties with procedures related to military training and their works. All patients in our study reported having psychological and/or social problems because of palmar hyperhidrosis.

The first surgical treatment of hyperhydrosis was reported by Kotzareff in 1920. The second, third and fourth thoracic sympathetic ganglions were resected by Leriche in 1937. Hyndman in 1942, and Love and Jurgin in 1964 reported that resection of only the second sympathetic ganglion was adequate for relief for palmar hyperhydrosis, since all sympathetic nerves supplying the upper limbs pass through the second sympathetic ganglion (2). The thoracoscopic approach to this procedure was first described in 1951 by Kux who revolutionized the surgical treatment of this condition (6). It was not until the 1980s that thoracoscopic sympathectomy became popular (7). Recently VATS sympathectomy for palmar hyperhidrosis has been suggested as a relatively simple, faster and safer procedure associated with a decreased complication rate, lessened postoperative pain and scar, and shorter postoperative hospital stay in comparison to the standard intervention performed via a conventional thoracotomy (2,7,8). Despite its less invasive nature, VATS interventions have had comparable efficacy. Landreneau and co-workers have reported on their VATS experience stating that their patients had less shoulder dysfunction and less pulmonary dysfunction than those undergoing standard thoracotomy (9). VATS sympathectomy is a more sophisticated technique than open thoracic sympathectomy. When endoscopic treatment is compared to open sympathectomy, excellent visualization of the ganglions and adequate magnification allow precise ablation of the ganglions with a lower risk of Horner's syndrome (10).

Thoracoscopic thoracodorsal sympathectomies are generally performed by three trocars of 5 to 10 mm in diameter. Gossot et al in 1997 reported that a "selective" sympathectomy was possible by dividing the rami communicantes of T2 to T4 ganglions (4). Hsia et al in 1999 performed limited thoracoscopic sympathectomy by a single trocar (11). In their series the sympathetic chain was divided from medial to lateral by electrocautery, but the chain or ganglions were not removed. In 2000, four different studies reported on needlescopic VATS approach (2,6,10,12). In this technique, three ports and instruments 2-mm caliber were used to cauterize the sympathetic chain. The sympathetic ganglions were not resected, but the integrity of sympathetic chain was breached. Gossot et al also stated that selective sympathectomy was associated with a higher incidence of recurrence than a conventional resection (4). In our series, we performed thoracoscopic sympathectomy with two 10-mm thoracoports. T2 and T3 ganglions of the sympathetic chain were removed followed by the cauterization of the nerve of Kuntz. Most patients reported satisfaction with the treatment and the reduction in the number of incisions leading to a cosmetically good result. The success rate of thoracic sympathectomy has been reported to be between 94-98% in various series (2,7,10). We attribute the very high success rate of 99.2% in this series during our initial implementation of the two-port technique to the use of a digital temperature probe in the later 137 operations, which allowed us to monitor the efficacy of the intervention by recording the increase in peripheral cutaneous temperature. In some patients in whom the third sympathetic ganglion is connected to the first one through the nerve of Kuntz, failure to interrupt the latter may result in treatment failure (2). We routinely ablated the T2 and T3 ganglions along with the sympathetic chain and destroyed the accessory fibers by endo-cauterization. Lee et al quoted the initial satisfaction rate as high as 98% in most reports, but that dropped to 66% due to development of post-sympathectomy compensatory sweating during long-term follow-up (2). The mean follow-up of our study was 13.2 months (range: 9-26). We detected truncal compensatory hyperhidrosis in 7 patients, and a unilateral recurrence of palmar hyperhidrosis in one. It is possible that a longer follow-up would have revealed higher rates of these. Because the severity of the compensatory sweating was proportional to the number of ganglions removed, we resected only two ganglions in the patients with palmar hyperhidrosis.

Postoperative Horner's syndrome is a rare event, but has occurred in almost every series (7). It can be total or partial (i.e., with or without pupillary miosis). Horner's syndrome is caused by direct or indirect damage to the first sympathetic ganglion, usually by means of electrical current diffusion or excessive traction on the ganglion during dissection. The reported rates of Horner's syndrome ranges from 0% to more than 3% (7). Most authors agree that the endoscopic approach reduces the rate of Horner's syndrome owing to better visualization. In our study transient Horner's syndrome developed in two patients. This means a rate less than 1%, which is lower than that associated with open procedures. As a historical baseline, Horner's syndrome complicated 5.3% (6 in 112 patients) of sympathectomies performed via axillary thoracotomy in our department from 1991 through 1996. Postoperative rhinitis is another complication of T1 ganglion resections (7). This did not occur in any of our patients.

CONCLUSION

Our results obtained in this series of two-port thoracoscopic thoracodorsal sympathectomy point to a generally excellent outcome, but longer follow-up periods are necessary to more accurately define the efficacy of the technique as well as rates of late recurrence. Our results seem to confirm the conclusion of several previous studies that found the two-port sympathectomy technique to be a fast, safe and efficacious procedure in the treatment of palmar hyperhidrosis. Most patients seemed satisfied with the treatment and the procedure was cosmetically favorable owing to reduction of the number of incisions needed.

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