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Advantages of limited thoracoscopic sympathectomy

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Abstract

Background: Thoracoscopic resection of the first through the fourth thoracic sympathetic ganglion for palmary and axillary hyperhidrosis and Raynaud's syndrome is associated with a high initial success rate. However, the reported incidence of compensatory hyperhidrosis of the trunk and legs and Horner's syndrome are high. This study assesses the results of thoracoscopic sympathectomy limited to transection of the interganglionic trunk or resection of one or two thoracic ganglia.

Methods: Twenty-eight thoracoscopic sympathectomies were done for dystrophy of the hand ($n = 9$), palmar and axillary hyperhidrosis ($n = 6$), and Raynaud's syndrome ($n = 4$). The extent of sympathectomy varied from interganglionic division between the second and third ganglion ($n = 12$), to resection of the third ganglion ($n = 12$), to resection of the second and third ganglion ($n = 4$).

Results: Sympathectomy resulted initially in relief of symptoms in all cases. Horner's syndrome did not occur.

Conclusions: After a median follow-up of 11 months, two of nine patients with dystrophy judged the result of operation as good. All patients with hyperhidrosis and Raynaud's syndrome judged the result of sympathectomy as good. Compensatory hyperhidrosis was experienced by two patients with dystrophy of the hand who had removal of the second and third sympathetic ganglion.

Key words: Sympathectomy — Thoracoscopy — Hyperhidrosis — Raynaud — Dystrophy

The thoracoscopic approach to the sympathetic chain appears to be superior to the traditional supraclavicular, transaxillary, or posterior approaches because thoracoscopy provides an excellent exposure of the sympathetic chain and is associated with minimal postoperative pain, resulting in rapid recovery of the patient. These advantages have resulted in an increased interest, in the patient and the surgeon, in thoracoscopic sympathectomy. Several authors have reported thoracoscopic sympathectomy to be safe, feasible, and effective [3, 11]. However, the incidence of Horner's syndrome after thoracoscopic sympathectomy varies from 0 to 9.7% [2, 4]. Compensatory hyperhidrosis of the face, trunk, or legs is experienced by 48–68% of the patients after surgical sympathectomy [3, 5, 9, 14]. In the studies which reported these rates, the second, third, fourth, and sometimes the lower part of the stellate ganglion were removed. It has been suggested that the incidence of compensatory sweating is correlated to the extent of sympathectomy [8]. In addition, discussion exists on the necessity of resection of three or four thoracic ganglia to produce warm and dry upper limbs. These considerations are the basis for our study, which assesses the efficacy of limited thoracoscopic sympathectomy in patients with palmar and axillary hyperhidrosis, Raynaud's syndrome, or dystrophy of the hand.

Materials and methods

A retrospective analysis was done of all patients who had thoracoscopic sympathectomies from May 1993 to October 1995 at the University Hospital Dijkzigt. All patients who were selected for thoracic sympathectomy had a thoracoscopic procedure. Patients with dystrophic disorders of the hand had preoperative percutaneous infiltration of the stellate ganglion with Marcaine to confirm relief of symptoms on sympathetic blockage. Preoperative radiographic studies of the chest were not done routinely. Thoracoscopic sympathectomy was done under general anesthesia with the patient in a lateral decubitus position. To allow the lung to fall down, the operation table was placed in anti-Trendelenburg position. A double lumen endobronchial tube was inserted to allow deflation of one lung. Access to the pleural cavity was established through a 1-cm stab incision in the midaxillary line in the fourth intercostal space. After the muscles and parietal pleura had been opened with a curved clamp, a rigid 10-mm trocar was inserted. Carbon dioxide was insufflated to a maximum pressure of 8 mmHg to facilitate compression of the lung. After sufficient compression of the lung, carbon dioxide insufflation was discontinued. A 5-mm trocar was inserted through the posterior axillary line in the fifth intercostal space. A second 5-mm trocar was placed in some patients when retraction of the lung or sympathetic chain was required. Apical pleural adhesions were cut with endoscopic scissors. After visualization of the sympathetic chain, the second rib was identified. The first rib was usually covered by fatty tissue. Palpation with an endoscopic dissecting clamp and localization of the brachiocephalic vessels proved helpful to localize the first rib. To dissect the sympathetic chain, the parietal pleura was opened with a diathermic

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hook. The sympathetic chain was always divided with scissors without diathermia to prevent diathermic injury of the stellate ganglion or the intercostal nerves. The extent of the resection of sympathetic tissue was determined by the disease the patient was operated for. In patients with dystrophic disorders, the second and third thoracic sympathetic ganglia were resected during the initial phase of our study. With progression of our study, interganglionic division of the sympathetic chain between the second and third ganglion was done because two patients developed compensatory hyperhydrosis after resection of the second and third thoracic ganglion. In patients with palmar and axillary hyperhidrosis, the third ganglion was resected. For Raynaud's syndrome, interganglionic division was done inbetween the second and third ganglion. All procedures were completed by insertion of a small-diameter chest tube through one of the trocars. The chest tube was connected to a water seal with 10-cm water suction. The chest tube was removed on the 1st postoperative day after radiography of the chest confirmed the absence of a pneumothorax.

Follow-up studies were done by interviewing the patients. The patients were asked to qualify the operative result as good, moderate, or poor. Compensatory, gustatory (facial sweating triggered by spicy foods), and phantom hyperhidrosis (subjective feeling of impending hyperhidrosis in the palms without actual sweating) and other possible complications were recorded.

Results

Nineteen consecutive patients (13 females, 6 males) who had thoracoscopic sympathectomies were included in this study. The median age of the patients was 31 years (range 16–51 years). Nine patients had dystrophic disorders of the hand. In this category, two patients had posttraumatic pain syndromes, three patients had cold and painful hands with documented stenosis or occlusion of the ulnar or radial artery, and four patients had painful or cold hands without evident etiology. Six patients had palmar and axillary hyperhidrosis and another four patients had Raynaud's syndrome.

In the group of patients with dystrophy, four patients had removal of the second and third sympathetic ganglion and the other four patients had interganglionic division of the sympathetic chain between the second and third ganglion. All bilateral procedures were done in one session. In one patient with dystrophy, the sympathetic chain could not be exposed because of extensive pleural adhesions, probably due to repeated attempts to ablate the sympathetic ganglia percutaneously. The thoracoscopy was not converted to an open procedure in this patient. This patient has so far declined another attempt at surgical sympathectomy.

In six patients with palmar and axillary hyperhidrosis the third sympathetic ganglion was resected on both sides. In four patients with Raynaud's disease the sympathetic trunk was divided between the second and third thoracic sympathetic ganglion bilaterally. All bilateral sympathectomies were done in one session. Conversion to an open sympathectomy did not occur in any of the patients. The operative duration of unilateral thoracoscopic sympathectomy varied from 20 to 65 min with a median duration of 40 min. Blood loss was minimal in all cases.

Postoperatively, thoracoscopic sympathectomy was followed in all 18 patients who had a thoracic sympathectomy by relief of symptoms. In two patients with hyperhydrosis, palmar hyperhydrosis disappeared gradually within several days after thoracoscopic sympathectomy. Neither Horner's syndrome nor pneumo nor hematothorax was seen. One patient had subcutaneous emphysema which resolved within 2 days. Another patient had a pulmonary infiltrate which responded well to antibiotic treatment. Intercostal neuralgia was recorded in one patient and lasted 2 months. Six patients complained of retrosternal and dorsal thoracic pain which subsided after a couple of days. Average hospital stay was 4.4 days (range 3–7 days).

Median follow-up was 10 months (range 1–24 months). At follow-up, only two of the eight patients with dystrophy qualified the result of the sympathectomy as good. One patient with dystrophy assessed the operative result as moderate and five patients had a complete relapse of their symptoms. Recurrence of symptoms occurred after 1, 3, 4, 9, and 12 months in these patients. All patients with hyperhidrosis or Raynaud's syndrome experience good relief of their symptoms at follow-up.

Compensatory, gustatory and phantom hyperhidrosis were not observed after interganglionic division of the sympathetic chain between the second and third ganglion or resection of the third sympathetic ganglion. Two patients had compensatory hyperhidrosis of the face and the trunk after resection of the second and third sympathetic ganglion. Compensatory hyperhidrosis was one sided and located opposite the side of sympathectomy in these patients.

Discussion

Discussion exists on the extent of resection of sympathetic tissue required to render warm and dry upper limbs. The majority of surgeons remove the second, third, fourth, and sometimes the lower part of the stellate ganglion [2, 7, 9, 15]. However, it is questionable whether such an extensive resection is necessary. Limiting the extent of sympathectomy is supposed to reduce operative time, intraoperative bleeding, and the incidence of Horner's syndrome. Based on the recommendations by Wittmoser, our policy is to divide the interganglionic sympathetic chain between the second and third ganglion for disorders of the hand [17]. For palmar and axillary hyperhidrosis, we remove the third sympathetic ganglion because the axilla is supplied mainly by segmental sudomotor fibers from the third ganglion. Our version of sympathectomy appears to be efficient for hyperhidrosis and Raynaud's syndrome. However, at follow-up, the results of limited sympathectomy in patients with dystrophic disorders of the hand were disappointing. Surprisingly, all patients with dystrophy experienced initial relief but noticed recurrence of symptoms, sometimes as soon as 1 month after the sympathectomy. Several explanations for recurrence have been given: regeneration of the sympathetic fibers, impossibility to produce total sympathectomy of the hands, sensitization of the sectioned postganglionic fibers, and the existence of accessory ganglia and independent sympathetic pathways [6, 13, 16]. Ahn et al. reported resection of the lower third of the stellate ganglion through the fourth ganglion to be successful in nine patients with reflex sympathetic dystrophy for a median follow-up of 6 months [2]. In a series of 17 patients with reflex sympathetic dystrophy of the hand, open sympathectomy of the stellate ganglion down to and including the third sympathetic ganglion was followed by excellent or good results in 91% of the patients after an average follow-up of 14 months [12]. Obviously, all patients developed a Horner's syndrome postoperatively. The success rate of limited thoracic sym-

pathectomy in the present study was 25%. Therefore, it appears that dystrophic disorders of the hand require an extensive thoracic sympathectomy.

Resection of the lower third of the stellate ganglion or the first thoracic sympathetic ganglion can easily cause Horner's syndrome. However, Horner's syndrome has also been reported after resection of the second or third ganglion [1, 10]. The majority of these cases were temporary and were attributed to an ascending current arising from diathermic transection of the sympathetic chain. This can be prevented by cutting the sympathetic chain with scissors [4]. In our experience, coagulating the sympathetic chain is unnecessary because bleeding is negligible after transection of the sympathetic chain.

The major side effect of sympathectomy is compensatory sweating, which is reported to occur in 48–68% [3, 5, 9, 13]. It is supposed to be the result of a compensatory mechanism and related to the extent of sympathectomy. Hederman noticed a reduction of the incidence of compensatory sweating when the sympathectomy was limited to the second and third ganglion [8]. In this study, compensatory sweating was noticed in two out of four patients after removal of the second and third sympathetic ganglion. None of the 14 patients who had excision of the third sympathetic ganglion or division of the sympathetic trunk between the second and third sympathetic ganglion complained of compensatory hyperhidrosis. This observation supports the hypothesis that the incidence of compensatory sweating is related to the extent of sympathectomy.

In conclusion, limited thoracoscopic sympathectomy appears an effective treatment for patients with palmar and axillary hyperhidrosis and for patients with Raynaud's syndrome. Compensatory hyperhidrosis and Horner's syndrome are uncommon after limited thoracoscopic sympathectomy. In patient's with dystrophic disorders of the hand, the success rate of limited thoracoscopic sympathectomy is low.

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