Thoracoscopic Sympathectomy in the Management of Vasomotor Disturbances and Complex Regional Pain Syndrome of the Hand

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Abstract

Complex regional pain syndrome, vasospastic disorders, and hyperhidrosis are chronic and debilitating upper extremity problems. Twenty-nine consecutive patients treated with thoracoscopic sympathectomy are presented. Diagnoses included complex regional pain syndrome, hyperhidrosis, Buerger’s disease, Raynaud’s disease, and peripheral vascular disease.

All patients with hyperhidrosis had complete symptom resolution. Patients with Buerger’s and Raynaud’s disease had excellent/good results. Six patients with complex regional pain syndrome had excellent or good relief; the remaining six patients had varying degrees of recurrence. A statistically significant association was noted between duration of complex regional pain syndrome prior to sympathectomy and outcome.

Thoracoscopic sympathectomy is an effective treatment for hyperhidrosis and vasospastic disorders. Although the results for complex regional pain syndrome are not uniformly excellent, this technique offers promise in the treatment of this difficult problem.

Thoracoscopic sympathectomy has gained popularity over the past 15 years as a minimally invasive treatment of many sympathetic mediated conditions such as complex regional pain syndrome, primary palmar hyperhidrosis, and vasospastic disorders of the upper extremity (eg, Raynaud’s disease and Buerger’s disease).1-15

In comparing thoracoscopic versus open sympathectomy, some early reports indicate less morbidity and higher patient satisfaction with the open technique.16 However, recent data suggest thoracoscopic sympathectomy, although achieving similar results, offers advantages over the traditional open technique, including decreased hospital stay, limited dissection and exposure, and decreased morbidity.3,17 According to some authors, thoracoscopic sympathectomy has become the treatment of choice in managing conditions such as primary palmar hyperhidrosis.8,18

Indications for thoracoscopic sympathectomy generally are reserved for patients with the above disorders who have failed all conservative medical therapies. The technique offers higher patient satisfaction and decreased morbidity compared to open sympathectomy. Stellate ganglion blocks are indicated prior to thoracoscopic sympathectomy and serve as a good predictor of surgical success.18 Many authors include stellate ganglion blocks in vasospastic and complex pain syndromes in the work-up of these patients.6,16 More often than not, sympathectomy is the last line of treatment in patients with these chronic problems.

This article presents the authors’ experience with thoracoscopic sympathectomy in the management of upper extremity disorders.

MATERIALS AND METHODS

Patient Population

Twenty-nine consecutive patients (25 females and 9 males) who underwent thoracoscopic sympathectomy between 1997 and 2000 were retrospectively reviewed. Average patient age was 34 years (range: 17-66 years). Average follow-up was 18 months (range: 6-39...
months). Twelve patients were diagnosed with complex regional pain syndrome, 11 with hyperhidrosis palmaris, 3 with Buerger’s disease, 2 with Raynaud’s disease, and 1 patient had peripheral vascular disease. All cases of hyperhidrosis, Buerger’s disease, and Raynaud’s disease were bilateral. Among the patients with chronic regional pain syndrome, 6 were affected on the left upper extremity and 6 on the right.

All patients failed medical management. Patients with hyperhidrosis underwent treatments including iontophoresis, drysol formaldehyde, beta-blockers, botulinum toxin injections, and gloves. Several patients with hyperhidrosis underwent stellate ganglion blocks. Only patients with persistent symptoms that interfered with their quality of life and ability to perform work underwent treatment.

All patients with complex regional pain syndrome were on chronic medications (including narcotics) at presentation. To varying degrees, they underwent modifications and additions to their treatment regimens with medications including muscle relaxants, nerve stimulating agents, tricyclic antidepressants, and selective serotonin reuptake inhibitors. All patients underwent hand therapy. Stellate ganglion blocks were performed in all 12 patients with complex regional pain syndrome with temporary pain resolution.

Patients with vasospastic disorders similarly underwent all conservative therapies prior to considering sympathectomy. Conservative treatments such as activity modification (eg, smoking cessation, avoidance of cold environments, etc.), biofeedback, pharmacologic treatments (eg, calcium channel blockers, beta-blockers, tricyclic antidepressants, selective serotonin reuptake inhibitors, etc) were used, when applicable, for each patient. All patients also underwent stellate ganglion blocks, with some or complete relief, prior to sympathectomy.

One patient with peripheral vascular disease was diagnosed with Buerger’s disease. Despite advanced age and diabetes, he responded to stellate ganglion blockade, and therefore following failed conservative therapy, underwent thoracoscopic sympathectomy.

**Surgical Technique**

Although variations exist, the surgery is similar in most reported techniques. Following general anesthesia, patients undergo selective intubation followed by lateral decubitus positioning with the unaffected side down. In cases where bilateral sympathectomies were performed, immediately following the completion of one side, the contralateral side was prepped and draped in identical fashion.

The following instruments are necessary for the procedure: 1) a 5- to 10-mm rigid endoscope with a 0°, 30°, and 60° angled lens with a video monitor attachment; 2) 5- to 10-mm diameter blunt-tipped scissors with an electrocautery attachment; 3) a 5- to 10-mm curved grasper; and 4) a 5-mm suction/irrigator.

Following a 1-cm incision and blunt dissection, the endoscope is inserted along the sixth and seventh intercostal space in the mid-axillary line. Two instrument ports are placed under direct visualization, one near the tip of the scapula and the other in the third or fourth intercostal space along the mid-axillary line (Figure 1). The ipsilateral lung is mechanically deflated and the chest wall expanded. Ribs and vertebral bodies 1-4 are identified. The sympathetic ganglia are located immediately dorsal to the vertebral body and the chain appears as a slightly pinkish-white structure running along the posterior head of the ribs (Figure 2). The overlying pleura is dissected and the chain is revealed (Figure 3). The rami communicantes of the second through fourth sympathetic ganglia are incised, and the sympathetic chain between T2 and T4 is excised (Figure 4).

Bleeding is controlled with a cautery. The wound is irrigated and suctioned. A small (16-18 french) chest tube is inserted through one of the thoracoscope portals. The lung is reinflated and the wounds are closed in two layers, a deep layer with 0 Vicryl followed by 3-0 or 4-0 nylon skin closure. The chest tube is secured, and the wounds are dressed. If indicated, the patient is turned and the procedure is performed on the contralateral side.

Postoperatively, a chest radiograph is obtained to rule out pneumothorax. The chest tube is discontinued when no air leaks exist and documented output is minimal. Patients usually are discharged on postoperative day 1.

**RESULTS**

All patients treated for hyperhidrosis had complete resolution of their sweaty palms. Similarly, all five patients treated
for Buerger’s and Raynaud’s disease experienced excellent pain and symptom relief. All of these cases were deemed successful outcomes.

Among the 12 patients treated for complex regional pain syndrome, the results were variable. Six had moderate, good, or excellent pain relief with marked improvement in their quality of life. The remaining 6 patients had mild, minimal, or no symptom relief and required chronic narcotics and placement of a spinal cord stimulator in 1 patient. One patient with peripheral vascular disease and suspected concomitant Buerger’s disease failed therapy and required amputations of his thumb, long, and ring fingers.

Perioperative complications included Horner’s syndrome in one patient, which ultimately resolved within six months of sympathectomy. Another patient required repeat exploration following sympathectomy for excessive chest tube output without long-term sequelae. Two patients treated for hyperhidrosis had compensatory mild hyperhidrosis; one case was transient and the other was well-tolerated, without complaint, by the patient. One case of recurrent upper extremity arterial insufficiency was noted, which was successfully resolved with local radial artery sympathectomy. Although somewhat unclear, this is most likely attributed to recurrent sympathetic effect. Another patient had transient burning and forearm pain following sympathectomy, which gradually resolved. Lymphedema was noted in one patient, which was successfully treated with temporary compression stocking. One patient experienced shoulder stiffness postoperatively, which resolved with physical therapy.

**DISCUSSION**

Thoracoscopic sympathectomy is a minimally invasive, cost-effective treatment for multiple sympathetic-mediated conditions that affect the upper extremities including hyperhidrosis palmaris, vasospastic disorders, and complex regional pain syndrome. Endoscopic approaches to the thoracic sympathetic chain offer significant advantages over the more traditional open approaches, while providing comparable results. As a result, more patients may be considered for these treatments because of the improved benefit-to-risk ratio.

Currently, most authors agree that thoracoscopic sympathectomy is the treatment of choice in hyperhidrosis palmaris management. Noppen et al reported a 98% success rate in 100 patients treated for hyperhidrosis. Johnson et al reviewed 48 patients and reported complete symptom relief in 47 and partial relief in 1. Similarly, the current review of 11 patients with hyperhidrosis reports complete symptom relief following sympathectomy.

The most common complication following thoracoscopic sympathectomy for palmaris hyperhidrosis is compensatory sweating. Johnson et al reported a 22% incidence of compensatory sweating in 48 patients. Despite the variable reported incidence of this complication, patients who are affected generally have no complaints and the condition is well tolerated.

Vasospastic diseases, such as Raynaud’s and Buerger’s, are debilitating and often result in severe pain and ischemia to the digits. Conservative therapies include avoidance of cold, smoking cessation, and pharmacologic therapies (eg, calcium channel blockers and alpha adrenergic agents). Patients may respond favorably to stellate blocks and, therefore, may be candidates for thoracoscopic sympathectomy; however, because of the systemic nature of their condition, some authors argue that recurrence is likely. Despite these concerns, several investigators reported excellent results for management of vasospastic conditions.

Di Lorenzo et al described long-term excellent results in six patients with vasospastic disorders treated with thoracoscopic sympathectomy. Similarly, Ishibashi et al reported excellent
results with sympathectomy for gangrenous or ulcerated digits secondary to Buerger’s disease. The current study resulted in excellent symptom resolution in five patients with vasospastic conditions. Average patient follow-up, to date, is 28 months. Although the number of patients is small, the results are encouraging.

Complex regional pain syndrome often is debilitating and difficult to treat.25-28 Previously referred to as reflex sympathetic dystrophy and causalgia, these conditions are now classified as complex regional pain syndrome I (reflex sympathetic dystrophy) and II (causalgia).26 Frequently secondary to trauma, the diagnosis is based on pain, autonomic dysfunction, edema, dystrophy, and atrophy.27 Treatment options include physical therapy, pharmacologic therapies (eg, beta blockers, calcium channel blockers, selective serotonin reuptake inhibitors, tricyclic antidepressants, adrenergic agents, and corticosteroids), biofeedback, acupuncture, transcutaneous nerve stimulation, and sympathectomy.28 Some authors stress improved results with early treatment,26-28 Gellman25 reported improved results in patients who respond to stellate ganglion blocks. AbuRahma et al28 also suggested that patients who have not progressed to atrophic changes will most likely improve with sympathectomy.

In a review of 11 patients who underwent thoracoscopic sympathectomy for complex regional pain syndrome, Johnson et al29 reported symptom relief in 7 patients and recurrence in 4. Six patients had significant pain relief with good or excellent results in the current study. Among the 6 patients whose symptoms did not resolve, all remained on chronic narcotics and 2 patients underwent spinal cord stimulator placement.

The current study suggests that patients with a shorter duration of complex regional pain syndrome prior to sympathectomy tend to have improved results. With univariate analysis using Student t-test, a statistically significant association was noted among successful treatment and time interval between complex regional pain syndrome onset and treatment (P = 0.039). The successfully treated group had an average interval of 19.5 months from onset of complex regional pain syndrome and sympathectomy, whereas the unsuccessful treatment group had an average interval of 29.5 months.

Although this study is composed of a small number of patients with average follow-up of 17 months, the results are consistent with previous reports.27,28 No significant association was noted between treatment result and gender, age, or affected extremity.

REFERENCES