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Selective sympathectomy for hyperhidrosis: technique of robotic transthoracic selective postganglionic efferent sympathectomy

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Abstract

Selective postganglionic efferent sympathectomy for hyperhidrosis is associated with excellent relief of hyperhidrosis and a low rate of compensatory hyperhidrosis. However, this technique can be difficult using conventional videoendoscopic techniques. We performed this technique using robotic technology in 55 patients. There was complete relief of hyperhidrosis in 53/55 (96%) patients, partial relief in 2/55 (4%) patients and a compensatory hyperhidrosis rate of 7%.

Keywords: Sympathectomy • Hyperhidrosis • Postganglionic • Technique

INTRODUCTION

The surgical management of hyperhidrosis is controversial. Controversies include the appropriate surgical approach, ganglionectomy vs selective postganglionic efferent sympathectomy (SPES), and the extent of the sympathectomy. Presently, ganglionectomy using video-assisted thoracic surgery is the most common surgical procedure for patients with upper extremity hyperhidrosis. This technique is associated with excellent relief of symptoms. However, compensatory hyperhidrosis (CH) is seen in ∼50–97% of patients who undergo this technique [1–5]. Thoracoscopic attempts at division of rami communicantes have been associated with a lower incidence of complications but a higher recurrence of hyperhidrosis [6]. Historically, Friedel *et al*. [7, 8] have reported relief of hyperhidrosis with an astoundingly low rate of CH (2.5%) using SPES. This procedure is difficult using conventional video-assisted thoracic surgical procedures. The difficulty stems from 2D visualization and limited instrument maneuverability. Robotic surgical systems have the advantage of high-definition magnified 3D visualization and increased instrument maneuverability in a confined space. On the other hand, robotic surgical systems are hampered by the need for a greater number of trocars, separation of trocar sites due to the geometry of the robotic arms, chest tube thoracostomy following surgery and higher costs. To our knowledge, robotic selective sympathectomy has not been previously reported in the literature. In this paper, we describe the technique of robotic SPES.

METHODS

Fifty-five patients underwent robotic SPES. The indication for this operation was hyperhidrosis of the upper extremity refractory to medical management. The contraindication was previous surgery on the thoracic sympathetic chain.

The operation is performed under general anaesthesia. The patient is positioned in the lateral decubitus position with the affected side up. A temperature probe is placed intraoperatively on the ipsilateral hand and the temperature is recorded pre- and post-division of the post-ganglionic rami. A temperature increase of at least 0.8°C is indicative of successful SPES. The operation is performed in two phases.

Phase I: VAT entry

Three 2 cm incisions are used. A line is drawn connecting the tip of the scapula to the costal arch. Incision #1 is placed one-third the distance superiorly from the costal arch in the intercostal space. Incision #2 is located at the anterior axillary line two interspaces superior to incision #1. Incision #3 is located at the anterior axillary line two interspaces superior to incision #2. A 1 cm incision is placed at the anterior axillary line one interspace inferior to incision #1 (Fig. 1). This incision is used intraoperatively for a lung retractor (Endopaddle Retract; Auto Suture, Covidien incorporated, Mansfield, MA, USA) and postoperatively for chest tube placement. The lung retractor is used to retract the lung medially away from the chest wall.

Phase II: SPES

The robot is brought in from over the head of the bed at a 30–45° angle to the longitudinal axis. The camera port is placed in incision #2 (Endoeye videoscope, Olympus America, Inc, Center Valley, PA, USA). With the patient in the right lateral decubitus

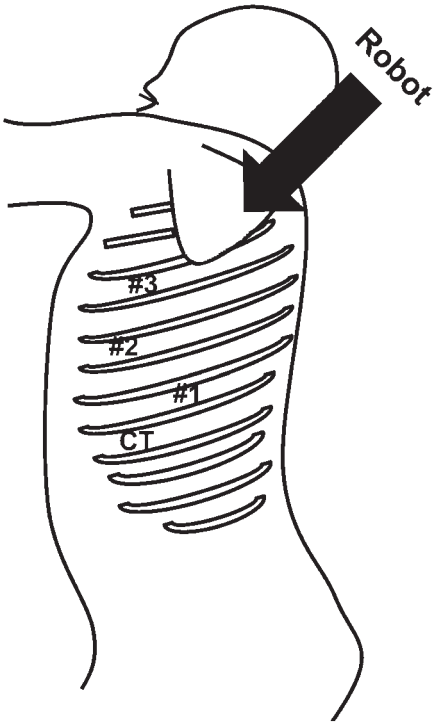

Figure 1: Port placement and robot positioning for robotic transthoracic selective sympathectomy. Numbers 1, 2 and 3 indicate incisions. CT indicates chest tube placement.

position, the right robotic arm is placed in incision #1 and the left robotic arm is placed in incision #3. The robotic endograsper is placed in the left arm and the robotic hook cautery is placed in the right arm. The sympathetic chain and its surrounding anatomy are identified. Ribs 2, 3 and 4 are marked with electrocautery. The pleura immediately overlying the sympathetic chain is dissected from the second to the fourth rib (Supplementary Video 1). The post-ganglionic rami from T2 to T4 are identified and divided 2 cm laterally in all patients (Fig. 2). If present, accessory fibres and the nerve of Kuntz are divided (Supplementary Video 2). Upon completion of the procedure, the robot arms are removed from the patient and a 16 French chest tube is placed in the 1 cm incision. Incisions are closed and selective thoracic sympathectomy is repeated in a similar fashion on the contralateral side. After completion, the patient is extubated in the operating room. Chest tubes are removed prior to discharge after chest X-ray shows no untoward findings.

RESULTS

All patients had simultaneous bilateral robotic thoracic highly selective sympathectomy. There were 25 males and 30 females. Mean age was 31.4 ± 10.5 years. Preoperatively, all patients (55/55, 100%) had intolerable hyperhidrosis of the upper extremities that affected their daily activities (Hyperhidrosis Disease Severity Score D). Indications for sympathectomy were palmar hyperhidrosis in 36/55 (65%) patients, axillary hyperhidrosis in 7/55 (13%) patients and combined axillary and palmar hyperhidrosis in 12/55 (22%) patients.

Mean operative time was 84.3 ± 40.1 (bilateral) minutes. There was no conversion to thoracotomy.

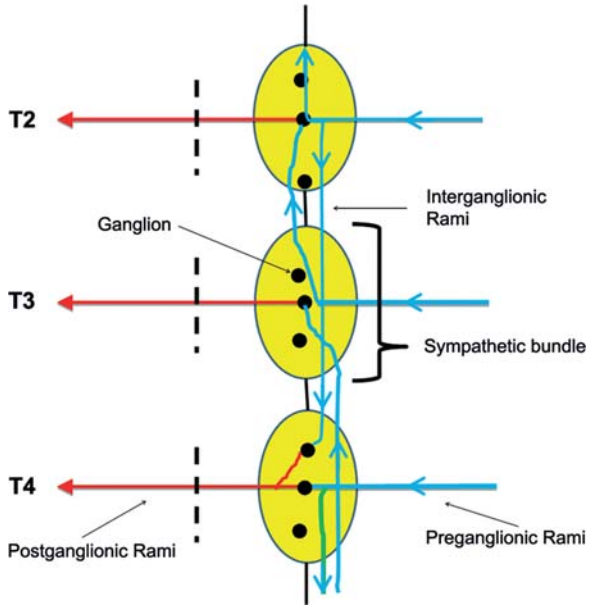

Figure 2: Diagram of the sympathetic chain from T2 to T4 demonstrating selective postganglionic sympathectomy. The dotted line indicates the line of transection. Preganglionic fibres (blue) arise from the spinal cord and synapse via a ganglion within the sympathetic chain to postganglionic fibers (red). A mixture of ganglia and interganglionic nerve fibres comprise the sympathetic bundle.

Median increase in the temperature of the ipsilateral hand was 0.8°C after division of the efferent postganglionic fibres.

Complications included transient unilateral Horner's syndrome seen in 1/55 (1.8%) patients, unilateral dysesthesia of the right hand in 1/55 (1.8%) patients, transient unilateral isolated ptosis in 1/55 (1.8%) patients and bradycardia in 2/55 (3.6%) patients. There was no permanent Horner's syndrome.

Median hospital stay was 1 day (1–4 days). There was no mortality.

At a mean follow-up of 21 ± 12 months, 53/55 (96%) patients had complete resolution of their initial hyperhidrosis symptoms. In 2/55 (4%) patients, there was partial resolution of their initial hyperhidrosis symptoms. CH was seen in 4/55 (7%) patients.

SUPPLEMENTARY MATERIAL

Supplementary material (Videos 1 and 2) is available at *EJCTS* online.

Conflict of interest: none declared.

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