

Needlescopic video-assisted thoracic surgery for reversal of thoracic sympathectomy

Randolph H.L. Wong*, Calvin S.H. Ng, Jasper K.W. Wong and Susanna Tsang

Division of Cardiothoracic Surgery, Department of Surgery, Prince of Wales Hospital, Shatin, Hong Kong, China

* Corresponding author. Division of Cardiothoracic Surgery, Department of Surgery, Prince of Wales Hospital, The Chinese University of Hong Kong, Shatin, Hong Kong, SAR, China. Tel: +852-26322629; fax: +852-26478273; e-mail: wonhl1@surgery.cuhk.edu.hk (R.H.L. Wong).

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Abstract

Thoracic sympathectomy is a commonly performed surgical procedure for the treatment of palmar hyperhidrosis. However, one major complication of such a procedure is compensatory truncal hyperhidrosis. We describe an extreme case of compensatory truncal hyperhidrosis and anhidrosis over the head and neck region which led to a heatstroke. Bilateral reoperative needlescopic video-assisted thoracic surgery was performed for the reversal of thoracic sympathectomy with an interposition intercostal nerve graft. The patient's truncal hyperhidrosis resolved gradually over 1 month following the reversal procedure.

Keywords: Compensatory hyperhidrosis • Palmar hyperhidrosis • Sympathectomy • Video-assisted thoracic surgery

INTRODUCTION

Thoracic sympathectomy especially via the needlescopic video-assisted thoracic surgery (n-VATS) approach is one of the most commonly performed functional surgeries to treat palmar hyperhidrosis. However, the exact mechanism leading to the development of compensatory truncal hyperhidrosis remains elusive. We described a patient who had improved symptoms of truncal hyperhidrosis after a successful bilateral n-VATS reversal of thoracic sympathectomy trunk at the level of T2–4 using a harvested interposition intercostal nerve graft.

CASE REPORT

A 42-year old fireman with long-standing palmar hyperhidrosis underwent bilateral three-port n-VATS sympathectomy in February 2003 by sympathetic trunk resection at T2–4 levels. Although his palmar hyperhidrosis resolved immediately after the operation, he shortly developed anhidrosis over his head and neck regions, and severe truncal hyperhidrosis which began to cause significant disturbances to his daily activities. He complained of the constant soaking of his clothes from truncal sweating, even at room temperatures of 24°C while he was doing normal daily activities, which caused him more social embarrassment than the initial sweating of his hands caused by his existing condition. A 2-week course of oxybutynin was prescribed with no significant improvement. Six months after the initial operation, he had an episode of heatstroke while performing outdoor duties which required running for around 5 km. The temperature on the day was between 30–32°C, and the relative humidity was between 75 and 85%. At that time, he complained of light-headedness, 'feeling' that heat could not dissipate from

his head and neck region and muscle cramp in his legs. He was transferred to a hospital and was found to have a body temperature of 40°C and shock. His presentation was similar to a previous report by Sihoe *et al.* [1] on a patient with post-sympathectomy heatstroke. He was subsequently successfully treated with fluid and electrolyte resuscitation and supportive care.

After a thorough discussion with the patient, reversal of sympathectomy was performed via the n-VATS approach. Our n-VATS operative set up has been described previously [2]. Under general anaesthesia, double-lumen intubation and one lung ventilation, previous 3 mm port-sites were enlarged to 5 mm. The anterior port site is located at the fourth intercostal space 1 cm lateral to the lateral border of the pectoralis major. The camera port is located at the seventh intercostal space at the mid-axillary line while the posterior port is located at the posterior-axillary line at the fourth intercostal space. Through the anterior and posterior ports with the aid of a 5-mm endoscopic grasping forcep and a diathermy scissor, the parietal pleural overlying previously transected sympathectomy trunk was identified and dissected to expose the caudal and cranial free ends of the sympathetic trunk. We trimmed 1–2 mm of the free ends of the sympathetic trunk (Fig. 1a and b). The parietal pleura overlying the fourth intercostal nerve was dissected with the aid of a diathermy hook. A segment of the fourth intercostal nerve measuring around 7–8 cm was harvested as a free graft (Fig. 1c). It was placed to join the two free ends of the sympathetic trunk and the position was subsequently secured by a fibrin sealant (Fig. 1d). All the nerve endings were trimmed with a uncauterized scissor to avoid thermal injury. The procedure was repeated on the contra-lateral side. The patient had an uneventful recovery and was discharged home on post-operative day 3. At 1 month following the reversal procedure, his truncal hyperhidrosis improved from a subjective severity scoring

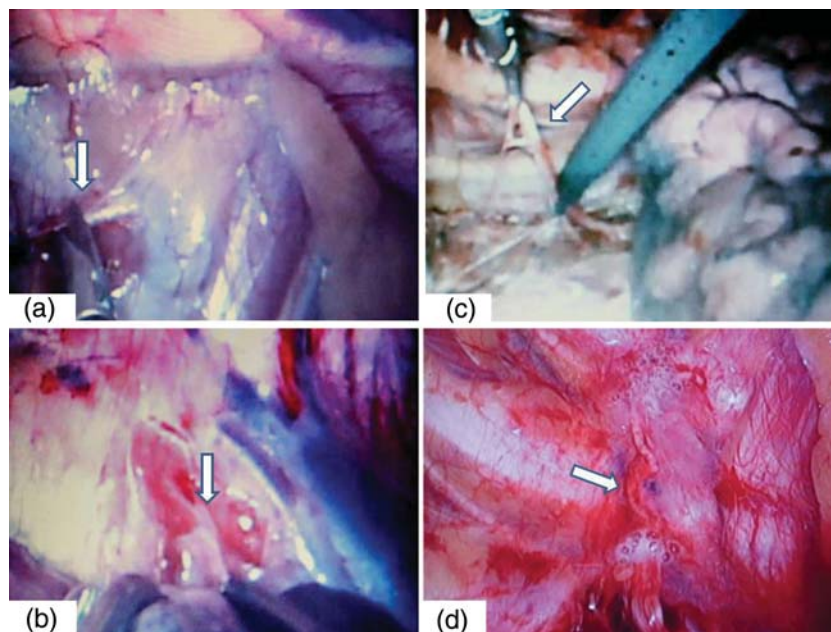


Figure 1: (a) The trimmed end of the second thoracic sympathectomy trunk (white arrow). (b) The trimmed end of the fourth thoracic sympathetic trunk (white arrow). (c) With 5 mm instruments, the fourth intercostal nerve was grasped by the endoscopic grasping forceps while the diathermy hook dissected off surrounding attachments. White arrow points to the fourth intercostal nerve. (d) The free nerve graft was positioned to join the trimmed ends of the second and the fourth sympathetic trunks and fixed with a fibrin sealant.

of 9 out of 10 to 4 out of 10. He also noted the reappearance of sweating over his hands, forearms, the posterior part of his chest wall to the shoulder level and his forehead but not to the extent of hyperhidrosis. He is able to run 10 km at noon with an average outdoor temperature of 30–33°C without problem at the third post-operative month and has passed the physical examination required by the fire department. After settling his minor chest wall pain, he was finally able to resume duty as a fireman 4 months after the reversal operation.

DISCUSSION

Palmar hyperhidrosis can cause a significant embarrassment, functional disability and social handicap. Surgical sympathectomy, via n-VATS, is one of the most commonly performed procedures for palmar hyperhidrosis with reported symptomatic improvement in more than 95% of patients undergoing the procedure [3]. However, thoracic sympathectomy may result in undesirable consequences, including compensatory truncal hyperhidrosis, gustatory sweating, intercostal neuralgia and Horner's syndrome. Among these, some reported compensatory truncal hyperhidrosis as the most frequent complaint after the procedure, ranging from 35 to 89% of different severity [4]. It is potentially more disabling than palmar hyperhidrosis and could profoundly impair a patient's quality of life and their satisfaction regarding the operation. Rodríguez *et al.* [5] reported 6% of their patients regretted having undergone the operation due to severe compensatory hyperhidrosis. In our reported case, the patient is a fireman who experienced severe compensatory truncal hyperhidrosis and even developed heatstroke causing a significant professional dysfunction which led to him regretting having had the sympathectomy.

Although the thoracic sympathetic clipping technique is hoping to offer a potentially reversal when there is compensatory truncal hyperhidrosis, a recent consensus statement by the

Society of Thoracic Surgeons recommended that the clipping method should be considered irreversible as the clipped nerve might not be able to recover after the removal of clips [6].

Somatic-somatic nerve grafting is a long-recognized treatment for peripheral nerve damage [7]. However, it is a less commonly performed procedure for a somatic-autonomic nerve transfer. One of the few reported clinical applications was for the treatment of neurogenic bladder after spinal cord injury [8]. It involved establishing an artificial somatic-central nervous system-autonomic reflex arc by anastomosing the somatic nerve graft with an autonomic efferent nerve to restore the end organ function.

In 2009, Haam *et al.* reported their case series on the VATS reversal of sympathectomy in 19 patients using an intercostal nerve graft. In their study, 9 patients experienced an improvement in their compensatory hyperhidrosis and 3 of them had markedly improved symptoms [9]. We believe that our n-VATS approach is feasible to achieve similar results as demonstrated in our patient.

In our reported case, we harvested a segment of the fourth intercostal nerve as a free nerve graft and fixed it with the fibrin glue. There is growing evidence suggesting the fibrin glue is important for the initial phase of peripheral nerve regenerative by promoting Schwann cell intrusion [10]. Further studies looking into the role on the fibrin glue usage is warranted to elucidate the underlying physiology.

CONCLUSION

Reversal of thoracic sympathectomy with an intercostal nerve graft via n-VATS is technically feasible and can lead to the symptomatic improvement of compensatory truncal hyperhidrosis. However, further clinical and functional physiological studies are needed to elucidate the underlying mechanism.

Conflict of interest: none declared.

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