Position-related Brachial Plexopathy after Thoracoscopic Sympathectomy: A Case Report

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Abstract- A 26-year-old man suffered from hyperhidrosis palmaris since childhood. He had received bilateral transaxillary thoracoscopic T3 sympathectomy immediately after the operation weakness in right biceps, brachialradialis, deltoid, supraspinatus, and infraspinatus muscles and parathesia in right C5-6 dermatomes were noted. Serial neurological studies indicated a right brachial plexopathy. We placed the patient in a rehabilitation program from the third day after the surgery and he had a good recovery within 2 months. Video-associated thoracoscopic sympathectomy is an easy, safe, effective and timesaving procedure. Reported complications are few- and our case was related to positioning of the operation.

Key Words: Brachial plexopathy, Thoracoscopic sympathectomy, Hyperhidrosis

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The thoracoscopic sympathectomy has become a new trend in recent years because of its simplicity and time efficiency. Its morbidity is exceedingly low. We presented a case that the surgical position caused brachial plexus injury during thoracoscopic sympathectomy. The pathophysiology and modified surgical position are discussed.

CASE REPORT

The 26-year-old healthy man complained of excessive sweating of bilateral palms since childhood. Under endotracheal intubation anesthesia, he received bilateral transaxillary thoracoscopic T3 sympathectomy in semi-sitting position with his arms externally rotated, abducted and extended over 90 degrees.

To provide a good position for operation, we placed the patient in a semi-sitting position to allow gravity to assist in lung retraction[(1)], and a roll pillow was placed under the back along the midline. The arms were externally rotated and abducted for an adequate exposure to the pectoral axillary region. We used a bandage on the arms to keep them in an operational position. We placed a bandage around the biceps to hold the arms in place because the muscle could be very tight inspite the use of muscle relaxants during general anesthesia (Fig. 1). The total operation time was about one hour and the operation was performed smoothly.

The patient recovered well from general anesthesia, except he complained that he couldn't flex his right upper extremity and numbness over the lateral aspect of his right arm immediately after the anesthesia wore off. Neurological examination showed markedly decreased muscle power (below grade 2, medical research council,

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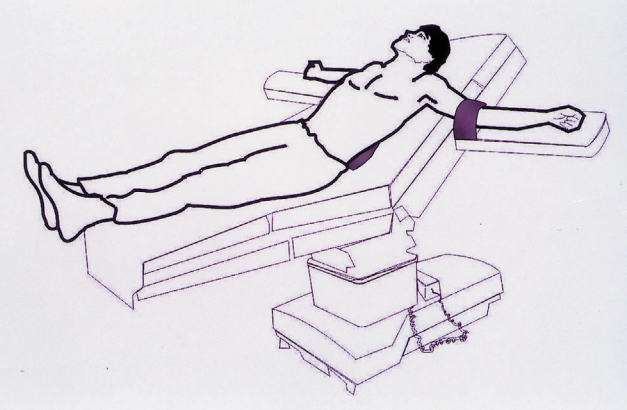

Figure 1. The patient was in semi-sitting position with his arms external rotated, abducted and extended over 90 degrees and fixed arms on the table by bandages. A roll pillow was placed under back along the midline.

MRC) in right biceps, brachialradialis, deltoid, suparspinatus and infraspinatus muscle. Decreased pinprick and light touch was found over right C5-6 dermatomes. In addition, paresthesia over the right thumb and part of the index finger was also found. Suspecting intra-operative brachial plexus injury, we carried out electrophysiological studies and soon placed the patient in rehabilitation program. The electrophysiological data are described below:

1. Post operative 13th day - electromyography (EMG) revealed denervation changes in right brachialradialis, biceps, and supraspinatus. No active denervation change was noted in right C5-6 paraspinalis muscles. Nerve conduction test showed normal compound muscle action potential (CMAP), sensory nerve action potential (SNAP), nerve conduction velocity in bilateral ulnar, right median and left axillary nerves. The only abnormality was a decreased CMAP in right axillary nerve.
2. Post operative 26th day- EMG data showed denervation potentials in the right brachioradialis, biceps, and deltoid. No denervation change was noted in C5-6 paraspinal muscles.
3. Postoperative 19th day- somatosensory evoked potential (SSEP) data showed prolonged latencies of the brachial, neck and cortical components and relative prolonged interpeak latency of N9-N13 from the stimulation of the right median nerve.

The data from electrophysiological studies are compatible with right brachial plexus lesion in the upper trunk level.

Rehabilitation program was initiated from the third postoperative day and included electrical stimulation to prevent muscle atrophy, passive range of motion over the right shoulder and muscle strengthening exercise. The numbness started to improve 1 week later. Marked improvement in muscle strength was obtained 1.5 months later. Fully recovery was noted 2 months after the rehabilitation.

DISCUSSION

Hyperhidrosis palmaris is an annoying disorder. Excessive palmar sweating is a common phenomenon among oriental people. The symptom is considered to be an occupational embarrassment by some and social handicap by others. Mild cases may be treated with local drying agents or anti-cholinergic drug. However, such therapy is inadequate in severe cases.

The most effective and permanent therapy for severe hyperhidrosis is surgical sympathectomy. There are several different procedures for sympathectomy. Surgical methods include transaxillar, supraclavicular, upper dorsal approach, and transthoracic endoscopic surgery. Kux described the first thoracoscopic sympathectomy for hyperhidrosis palmaris in 1951. In recent years, video-associated thoracoscopic procedure has provided a good intrathoracic approach with a minimally invasive procedure. The endoscopic sympathectomy has become the new trend in recent years because of its simplicity and time efficiency[1-4]. The morbidity associated with thoracoscopic sympathectomy is exceedingly low. A transient or permanent Horner's Syndrome may occur as a result of injury of the Tl root[5,6]. Significant hemothorax is unusual. Pneumothorax is usually mild[5,6], and chest tube is rarely required. Other rare complications include chylothorax due to injured thorathic duct[7], wound infection, Raynoud's phenomenon, subcutaneous emphysema[5,6], intercostal neuralgia, and cardiac arrest due to ventricular fibrillation[8]. The patient's position is a crucial element of this procedure. We considered that the

brachial plexus injury in our case was due to excessive external rotation, abduction and extension of the right shoulder. Postoperative brachial plexus injury has been documented in the literature for more than 100 years. Early on, compression was thought to be associated with the plexus compression between the clavicle and some other structure such as the first rib, the transverse process of the fifth and sixth cervical vertebrae, or the head of the humerus[9,10]. Most recent studies have shown that traction is the major cause of injury with compression possibly playing a secondary role[11]. Both stretching and compression of the nerve ultimately lead to ischemia of the vasa nervorum and subsequent injury to the nerve[12,13]. Several factors have been associated with intraoperative brachial plexus injury, including primary disease, anatomical variation, positioning of the patient, surgical factors and physological factors[14]. In brachial plexus injury, patients may experience weakness, sometimes accompanied by paresthesia but rarely by pain[15]. Ben-David has mentioned that brachial plexus injury after non-cardiac surgery, is often characterized by motor deficit in the upper and middle roots with an average full recovery time of 20 weeks[14]. Characteristically, recovery usually begins within 2 to 3 weeks of the onset and is complete after several months[11]. In our case, a similar clinical change was observed. Classic postoperative brachial plexus injury has occurred in different positions, but more often when there was an abduction of arms, 90 degree or greater, and restraining of the arms on an arm board in abduction, extension, and external rotation[9]. This position may cause downward traction of the upper trunk of brachial plexus with downward traction at the region of pectoralis muscle insertion[11]. Minor brachial plexus injury without root avulsion has good prognosis[10,12,14-17]. Hashmonai M, et al[18] and Lange JF[19] have also reported direct brachial plexus injury during thoracoscopic sympathectomy. From this case, we caution patient's position during transthoracic sympathectomy to avoid over abduction, external rotation and extension of the arm. We suggest to flex both shoulder and elbow joints during the operation (Fig. 2).

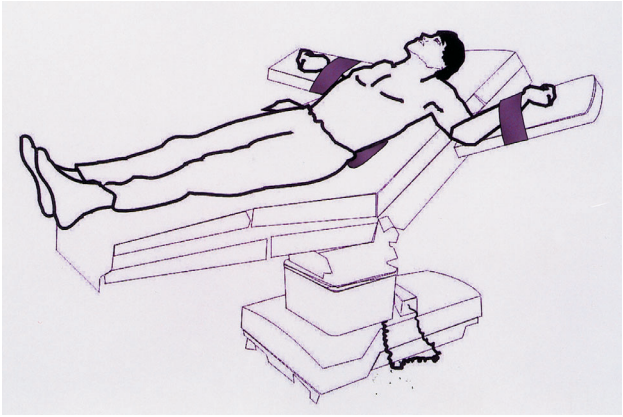

Figure 2. We modified the operation posture by flexing both the shoulder and elbow joint to avoid over abduction, external rotation and extension.

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