Thoracoscopic Sympathectomy for Palmar Hyperhidrosis in Children and Adolescents

Thesis submitted
for Partial Fulfillment of M.D Degree in General Surgery
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(قَـــالُوا سُـــبْحَانَكَ لا
عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا
إِنَّـــكَ أَنْـــتَ الْعَلِـــيمُ
الْحَكِيمُ)

صـــدق الله العظـــيم

(البقرة:32)

Dedication

To the soul of my father. To my mother and wife for their help and patience during preparation of this work.
work.

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PPH	Primary Palmar Hyperhidrosis
ETS	Endoscopic Thoracic Sympathectomy
VATS	Video Assisted Thoracoscopic Sympathectomy
ICN	Inter Costal Nerve
SG	Stellate Ganglion
PET	Positron Emission Tomography
EEG	Electro Encephalography
CS	Compensatory Sweating

INTRODUCTION

Everyone sweats. It is an essential physiologic process. Sweating is one of the body's ways of cooling off when it starts to overheat. If anyone is keeping active, then he can understand how much sweat is normal. The term hyperhidrosis is used to describe the condition of excessive sweating (1).

Hyperhidrosis patients can produce between four and five times the normal levels of sweat. Those who have studied the disorder have estimated that there are millions of people around the world that are currently dealing with the disruptive and embarrassing symptoms of this excessive sweating condition. In other words, roughly 3% of people in the total world population may currently be dealing with excessive sweating or hyperhidrosis. Many who have hyperhidrosis do not even get it diagnosed-a fact that hinders further knowledge of the condition. For those who don't get their excessive sweating diagnosed it will mean little to no relief of the symptoms. Unfortunately, these people do not get excessive sweating treatment. It should be understood that hyperhidrosis can be a very serious condition and that excessive sweating treatment is possible (1).

Due to its nature, it should be clear how hyperhidrosis can disturb the life and embarrass the sufferer. The quality of one's life including social interactions, relationships, and career can be affected; it can also have serious psychological and emotional consequences. Thus, many people who have hyperhidrosis may experience depression and low self-esteem (2).

Hyperhidrosis can cause excessive sweating from the armpits, feet, face, palms, and other parts of the body. If one or more areas is prone to\ this overflow of perspiration it may be qualified by terms like axillary (armpits),

palmar (hands), plantar (feet), facial (face), or general which means that all areas of the body suffer from excessive sweating (3).

Doctors who have studied the condition are still unsure about the root causes of hyperhidrosis but they have suggested that certain neurological and metabolic catalysts may be involved in most cases of excessive sweating, even when the person if otherwise in good physical health. Additionally, temperature changes and shifts in emotions can cause excessive sweating, but this is by no means a sure cause because some hyperhidrosis sufferers will sweat constantly no matter their emotional state or the temperature (3).

Palmar hyperhidrosis is a somatic disorder characterized by excessive perspiration in the hand. It is caused by hyperfunctioning of the eccrine sweat glands, which are frequently triggered by emotion. Non-surgical treatment options (iontophoresis, botulinum toxin injection, etc.) will not yield lasting effects. Endoscopic thoracic sympathetic surgery (ETS) using video-assisted thoracoscope is being established as a safe and effective treatment. Its success rate is greater than 95% in most series (2).

Video-assisted thoracoscopic sympathectomy (VATS) is currently a worldwide accepted treatment of primary palmar hyperhidrosis (PPH). In the literature, different methods including resection (sympathectomy), transection (sym-pathicotomy) or clipping methods are being used (2).

AIM OF THE WORK

The aim of this work is to evaluate the role of thoracoscopic sympathectomy in the treatment of primary palmar hyperhidrosis in children and adolescents.

DEFINITIONS

Sweat is a clear, odourless solution secreted by sweat glands. It is hypotonic, meaning that it has a lower concentration of electrolytes than the cells of the sweat glands. The body has millions of sweat glands which lie within the deep layers of the **skin** and connect via ducts to the epidermis (outer layer of skin) before opening out onto the skin surface (4).

Sweating is the primary mechanism by which the human body regulates its temperature. It occurs during day time and sleeping. Sweat glands secrete sweat in response primarily to heat stimuli, nervous stimuli, emotional and gustatory (food) stimuli. Emotional sweating in the palms and soles ceases during sleep, whereas thermal sweating occurs even during sleep (4).

Primary or idiopathic hyperhidrosis refers to a condition in which the eccrine sweat glands produce sweat beyond that required for physiologic needs. Typical stimuli include anxiety, heat and taste; however, hyperhidrosis often occurs without triggers. This sweating is localized to specific parts of the body; particularly the hands, axillae and feet, and often results in sweat literally dripping off the patient (5).

HISTORICAL REVIEW

Sympathectomy developed in the mid-19th century, when it was learned that the autonomic nervous system runs to almost every organ, gland and muscle system in the body. It was proved that these nerves play a role in how the body regulates many different body functions in response to changes in the environment, exercise and emotion.

Thoracic sympathectomy is a procedure designed to interrupt the adrenergic effect of the central nervous system on the upper extremity. The predominant effects of sympathectomy are reduction of vasomotor tone and lowering of peripheral vascular resistance. Surgical removal of the upper thoracic sympathetic chain has demonstrated its clinical effectiveness in the management of a variety of autonomic-mediated disorders of the upper extremity. These disorders include causalgia, reflex sympathetic dystrophy, nonreconstructible arterial insufficiency, hyperhidrosis, cold sensitivity after cold injury, refractory Buerger's disease, and Raynaud's phenomenon. Relief of autonomic-mediated pain syndromes and reduction in perspiration are significant clinical effects of sympathectomy. The birth and development of endoscopy with the introduction of the cystoscope by Bozzini in 1806 was the important development that subsequently led to the application of diagnostic and therapeutic endoscopic procedures. Thoracoscopy was introduced by Jacobaeus, a Swedish internist, in 1910. He later described pleural operations through the thoracoscope. The procedure was essentially limited to diagnostic purposes until improvements in anesthetic techniques and single-lung ventilation provided a stimulus to expand the scope of diagnostic procedures and encourage the therapeutic application of thoracoscopic surgery(6).

The first sympathectomy was performed by Alexander in 1889. Since the sympathetic nervous system was well known to affect many body systems, the surgery was performed in attempts to treat many conditions, including idiocy, goitre, epilepsy, glaucoma, and angina pectoris. Thoracic sympathectomy has been indicated for hyperhidrosis (excessive sweating) since 1920, when Kotzareff showed it would cause anhidrosis (total loss of ability to sweat) from the nipple line upwards (10).

Sympathectomy itself is relatively easy to perform; however, accessing the nerve tissue in the chest cavity by conventional surgical methods was difficult, painful, and done via several different approaches. The posterior approach was developed in 1908, and required resection (sawing off) of ribs. A supraclavicular (above the collar-bone) approach was developed in 1935, which was less painful than the posterior, but was more prone to damaging important nerves and blood vessels (12).

Because of these difficulties, and because of disabling sequelae associated with sympathetic denervation, conventional or "open" sympathectomy was never a very popular procedure, although it continued to be practiced for hyperhidrosis, Raynaud's disease, and various psychiatric disorders (12).

A transthoracic approach to the sympathetic chain was first described shortly thereafter by Goetz and Marr in 1944. A variety of effective surgical techniques for thoracic sympathectomy evolved later on: cervical(supraclavicular), dorsal (posterior), anterior, transthoracic extrapleural, transthoracic transpleural, transaxillary, thoracoscopic (video-assisted) (13).