RESULTS OF SURGICAL TREATMENT

OF HYPERHIDROSIS BY SYMPATHECTOMY

An Essay

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بسم الله الرحمن الرحيم

INTRODUCTION

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Sweating has an important physiological function concerned with both temperature and fluid balance. Hyperhidrosis is uncommon condition it may be a feature of general medical diseases such as thyrotoxicosis and fevers. It may also be due to damage of the centre of peripheral sympathetic nerves.

Localised hyperhidrosis tends to occur on the palms, the soles, the axillae and to a lesser extent the face. The diagnosis of this primary hyperhidrosis not a difficult one to make. It is a common embarrassing and even disabling condition. If it does not respond to simple conservative therapy, the surgeon should not hesitate to advise sympathectomy for hyperhidrosis of the upper or lower limbs or some simple local operation on the affected skin areas for localised excessive axillary sweating (Ellis - H 1980).

Three main approaches have been described for the upper dorsal sympethectomy the supraclavicalar described by Telford (1935). The axillary approach discribed by Atkins in 1949, and a posterior approach which has long since been abandoned. The lateral approach finds, favour with some surgeons because it leaves a scar which under normal circumstance is invisible

the most commonly used approach however is the supra-clavicular one(Smiddy F., 1981) . Sympathetic denervation was initially employed for vasospastic disorders involving the upper extremities but by the 1940s lumber sympathectomy had be come the mainstay of the surgical treatment of arteriosclerotic occlusive disease of the lower extremities. However with the progressive development of direct arterial reconstructive techniques the importance of sympathectomy as a primary form of surgical management of peripheral arterial occlusive disease steadily waned. Thus today the best if not most common indication for sympathectomy is a non-vascular one namely causalgic pain and to control extreme cases of essential hyperhidrosis .(Rutherford B, 1980).
Primary or idiopathic hyperhidrosis is a sweating in amount greater than that required for insensible loss or physiological needs is best treated surgically(Rutherford B, 1980).

Hyperhidrosis generally appears in childhood and persists for the rest of the patient life affects in particular the palms, soles and axillae. Hyperhidrosis of the palms is the condition that causes the most psychological trauma from a social point of view. Cases with sever psychological disturbance are common and are caused by the difficulties that the patients experience in establishing social and profesional activities.

(Bogokowsky et al., 1983).

In this essay we will try to add a spot light on the role of sympathectomy in cases of primary or idiopathic hyperhidrosis and the best ways used in surgical treatment and its results.

The anatomy of the sympathetic chain has been described in details to demonstrate its importance in this operation to avoid many complications that can occur after sympathectomy.

The different methods of sympothectomy explained in details and its complications during and after the operation.

The results of different approaches of sympathectomy are analysed to reach the method of choice for the surgical treatment of hyperhidrosis.

Many different reports from different sources are added to explain the effects of the several approaches of sympathectomy

EMBRYOLOGY AND ANATOMY OF SYMPATHETIC CHAIN :-

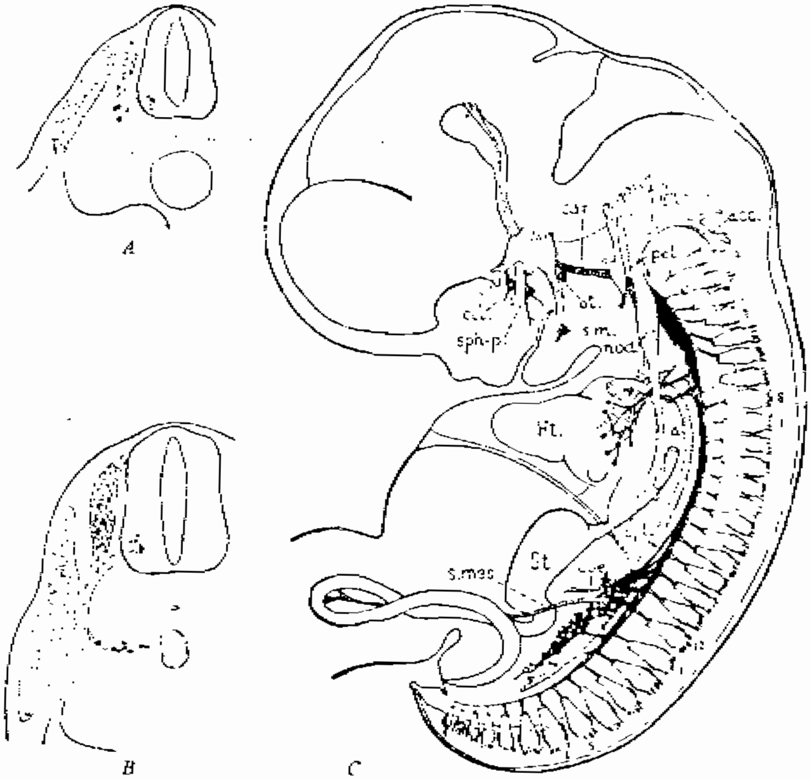
Development of sympathetic chain :-

The ganglion cells of the sympathetic system are derived from the neural crest through the medium of the primitive spinal ganglia. Certain of the cells in the ventral parts of theseganglia migrate towards the sides of the aorta where they subsequently form the ganglia of the sympathetic trunk. Others migrate still further and eventually form the subsidiary sympathetic ganglia. Thereafter the chain grows head wards and tailwards until the whole trunk laid down. The view has been advanced that the sympathetic ganglion cells are at least in part-derived from cells which migrate from the basal lamina along the anterior nerve roots (William & Worwick, 1980) . The exact source of origin of the ganglion cells is not wholly agreed upon, but the best evidence favors the neural crest rather than the neural tube. In the fifth week some of the crest cells are migrating down the dorsal roots of the spinal nerves. Leaving the nerve trunk,they take position in paired masses dorsolateral to the aorta. Growth quickly merges them into continuous longitudinal strands, whose segmentalenlargements represent primordial autonomic ganglia, each containing an aggregation of neuroblasts. These soon differentiate into multipolar ganglion cells, encapsulated by satellite cells also of crest origin.

There are three groups of ganglia based on the distance of cell migration. The first set to appear is forming in embryos of 6 mm. in the vicinity of the aorta throughout most of the extent of the trunk. The prospective ganglion cells consolidates into well demarcated, segmental masses during the seventh week, whereupon the paired ganglia become linked chain-fashion by longitudinal nerve cords. The resulting ganglionated cords are the sympathetic trunks which extend along the vertebral column, on each side. In the neck region such primary ganglia develop in the lower cervical segments only growth cranied then carries the trunks to higher cervical level. Others cells migrate further away and form collateral ganglia arranged about the aorta, such as the coeliac and mesentric ganglia. They are conspicuous about a week after the trunk ganglia appear. At about this time still other cells migrate to organs that they will innervate and form terminal ganglia located near or within these organs such ganglia are found in the head, heart, lung and pelvic viscera, and in the myenteric and submucous plexues of the digestive tube.

The cranial terminal ganglia related to the brain at no time segmental. They appear slightly later than those of the trunk and are derived chiefly from cells that migrate from the primitive semilunar ganglion , although the geniculate and petrosal ganglia also contribute. The cells of the remaining terminal ganglia advance along the vagus except those of the gastro-intestinal region which come from collateral ganglia.

The ganglia of the sympathetic trunk and the collateral ganglia belong to the thoraco-lumbar autonomic or sympathetic system the terminal ganglia belong to the cranio-sacral autonomic or parasympathetic system. Both of fibres types acquire myelin sheath and in the thoraco lumbar region constitute the white communicating rami, on the other hand all axons extending from the autonomic ganglion are unmyelinated and efferent in function. Some of them grow back into the spinal nerves by way of separate gray communicating rami and are then distributed through these nerve to hairs blood vessels and sweat glands. (Arey L., 1974).



Development of the human autonomic system (after Streeter). *A, B* Schematic sections through the lumbar and thoracic levels of a 7 mm. embryo (× 40); *C*. Autonomic system of a 16 mm. human embryo (× 7); the gangliated trunk is heavily shaded.

cil., Ciliary ganglion; *cœ.*, cœliac artery and plexus; *Ht.*, heart and cardiac plexus; *ot.*, otic ganglion; *pet.*, petrosal ganglion; *s-m.*, submandibular ganglion; *sph-p.*, spheno-palatine ganglion. In *A* and *B*, spinal ganglion cells are represented by dotted circles, autonomic cells by black ovals, and sheath cells by white rings.

Fig. 1.

ANATOMY OF THE SYMPATHETIC CHAIN :-

The sympathetic nervous system which is the larger division of the autonomic, include the two ganglionated sympathetic trunks,their branches, plexuses and subsidiary ganglia. It has a much wider distribution than the parasympathetic system, for it innervate all the sweat gland of the skin, the arrector muscles of the hair, the muscular wall of many blood vessels, the heart, lung and abdomino-pelvic viscera.

Efferent Sympathetic Pathways :-

The preganglionic fibres carry the axons of nerve cells in the lateral column of the grey matter of all the thoracic and upper two or three lumbar segments of the spinal cord where they form the intermediomedial and intermedio-lateral cell groups.

These fibres are myelinated and have diameters of 1.5 to 40 μm. they emerge from the spinal cord through the ventral roots of the corresponding spinal nerves and pass into the spinal nerve trunks and the commencement of their venteral rami, which they leave in the white rami communicantes to join either the corresponding ganglia on the sympathetic trunks or their intergang-lionic parts,since this out flow is confined to the thoracolumbar region,typical white rami communicantes are also restricted to the fourteen spinal nerves noted above.

However the possibility of a limited out flow of preganglionic fibres in other spinal nerves has been suggested. It is certain that nerve cells of the same type as those in the lateral grey column also exist at other levels above and below the thoracolumbar out flow (Mitchell,1953) and that small numbers of their fibres issue in corrosponding ventral roots. Dorsal spinal nerves roots may also contain vasodilotar fibres.

Having reached the sympathetic trunk the preg-anglionic fibres may behave in a number of different ways.

a) They may end in the corresponding ganglion by arboriz-ing with the dendrites of ganglion cells.
b) Theymay pass through the corresponding ganglion and either ascend to a ganglion at a higher level or descend to one at a lower level before terminat-ing in 2 similar manner; it is believed that preg-

anglionic fibres do not divide into ascending or descending branches on entering the sympathetic trunk. A single preganglionic fibres may through its collateral and terminal branches, synapse with nerve cells in several of the ganglia which it traverse; other preganglionic fibres distribute branches to one ganglion only.

c) They may pass through the corresponding ganglion and may ascend or descend without being intrrupted and then emerge in one of the medially directed branches of the sympathetic trunk to enter a plexus of the ganglion cells there in. Occasionally the interruption of preganglionic fibres occurs in ganglia situated proximal to the sympathetic trunk these are known as intermediate ganglia and are most numerous on the grey rami communicantes in the cervical and lower lumbar regions (Boud & Munro: 1940).

They may be of microscopic size and are sometimes situaed in the ventral roots or trunks of the spinal nerves. Branches from more than one preganglionic fibres may synapse with a single postgonglionic neuron.

he sympathetic ganglia:-

Include collections of cells of the sympathetic runk, nerve ganglia in the autonomic plexuses and the nter - mediate ganglia. Originally the ganglia on the he sympathetic trunks corrospond numerically to the anglia on the dorsal roots of the spinal nerves. But usion of adjoining ganglia has occured and in man there re rarely more than twenty two or twenty three and there ay be fewer discrete ganglia. The subsidiary ganglia in he great autonomic nerve plexuses (e.g. coeliac gangl-on, superior mesentric ganglion ... etc) are deravative, f the ganglia of the sympathetic trunks.

The axons of the principal ganglion cells are sually fine non myelinated fibres and constitute the ost ganglionic fibres. They are distributed to the ffectororgan in a variety of ways. Postganglionic fib-es arising from a ganglion on the sympathetic trunk may:

a) Pass back to the corresponding spinal nerve through a grey communicans this usually joins the spinal nerve trunks just proximal to the white ramus comm-unicans. Its fibres aredistributed through the ventral and dorsal rami of the spinal nerves and their branches to the