Sudeck's Atrophy, Hyperhydrosis and other Hypersympathetic Syndromes, what is the Recent Proper Surgical Management?

Abulazaym A.A.[1*] and Horria H.[2]

[1]Neurosurgery Department, Faculty of medicine, Cairo University, Cairo, Egypt.
[2]General surgery Department, Faculty of medicine, Mansoura University, Mansoura, Egypt.
abaaaza51@yahoo.com*

Abstract: Twenty eight patients with upper limb Sudeck's atrophy (minor causalgia), hyperhydrosis (palmar and axillary) and causalgia were submitted to endoscopic transthoracic sympathectomy as a definitive treatment. There were 9 patients with Sudeck's atrophy, 16 patients with upper limb hyperhydrosis and 3 patients with major causalgia. The procedure was successful in curing 26 patients (92.86%) and gave mild improvement in two patients (7.14%) whom belonged to the Sudeck's atrophy (minor causalgic) group because of the advanced dystrophic changes in their limbs. The commonest side effects were compensatory sweating. The procedure is effective, very simple, and required only two nights stay, and is recommended as a method of choice for the surgical treatment of hypersympathetic syndromes of the upper limbs as Sudeck's atrophy, hyperhydrosis and major causalgia.
[Abulazaym A.A. and Horria H. **Sudeck's Atrophy, Hyperhydrosis and other Hypersympathetic Syndromes, what is the Recent Proper Surgical Management**. Journal of American Science 2010;6(12):1169-1174]. (ISSN: 1545-1003). http://www.americanscience.org.

Keywords: Sudeck's Atrophy, Hyperhydrosis and other Hypersympathetic Syndromes, what is the Recent Proper Surgical Management

1. Introduction:

Our modern civilization is plagued with chronic sympathetic hyperactivity secondary to chronic tension. Painful conditions such as myocardial ischemia (which is also prevailing), soft tissue trauma, bone and joints trauma or even trivial painful conditions frequently induce in those predisposed patients what is classically known as Sudeck's atrophy. Sudeck in a comprehensive series of papers beginning in 1900 described in detail the characteristics of this ambiguous chronic painful condition characterized by the predominance of muscular, bone and joint manifestations including osteoporosis. The difficult issue in this syndrome is that the chronic embarrassing pain and the gradual dystrophic changes are resistant to usual measures and medicines and thus these patients constitute a protracted problematic group. Many descriptive terms as hand-shoulder syndrome, post traumatic painful osteoporosis, acute bone atrophy, pseudo-rheumatism..etc are within a list of 26 German, 20 English and 6 French terms under which these disorders are termed; denoting their ambiguity and prevalence especially in communities of chronic tensions and frustrations as in the west communities. However, either minor causalgia or reflex sympathetic dystrophy is the term that is recently slowly dominating. These latter recent names are referring to the common denominator in the clinical picture, as also in the classic causalgia, which is the relief of the chronic heavily agonizing pain and other manifestations by effective sympathetic block. Hyperhydrosis is a more common interrelated syndrome that reflects hypersymathetic activity and affects mostly a younger age group and also responds to sympathetic block. We present in this paper our experience in a minimally invasive operation, the endoscopic trans-thoracic sympathectomy that we found effective, easy and short timed. We also stress that the endoscope is a valuable surgical indispensable armament that is very beneficial and minimally invasive and every surgeon can easily and should master it. A barrier of fear may hinder the trans-thoracic approach in surgeons and neurosurgeons, however as happened to us after few operations we found in our selves the courage and the feel at home feeling. It goes without saying that as in the second step of any operative intervention, we must (after the proper anatomical opening) do exploration and safeguard the relevant vascular, nervous and organ structures.

2. Patients and Methods

28 patients (11 men and 17 women) underwent endoscopic transthoracic sympathectomy for upper limb causalgia or hyperhidrosis. As hyperhidrosis is more common, 16 patients (12 women and 4 men) underwent 30 endoscopic transthorathic sympathectomies for upper limb and axillary hyperhidrosis. The mean age was 24.2 years (range 17-32 years). The chief complaint in all patients was excessive sweating. In 3 patients (18.75%) it was confined to the hands; in 2 patients (12.5%) it was confined to the axillae, and in 8

patients (50%) it was affecting both areas. There were 2 patients with recurrent palmar and one axillary hyperhidrosis.

The chief complaint of the major causalgic group (3 patients; all men) was the classic severe agonizing burning pain in the palm; while the chief complaint of the minor causalgic [sympathetic dystrophy] group (9 patients; 5 males and 4 females) was predominantly milder dull burning pain in the palms and distal forearms that was worse on motion and emotional excitement and associated with gradual atonic muscle atrophy and dystrophic skin changes as a series of events following the precipitating factor (myocardial infarction, angina pectoris, joints and bones trauma, soft tissue trauma, phlebitis with phlebothrombosis).

Routine laboratory and radiological screening tests were carried out preoperatively. Under general anaesthesia a 0.5 cm incision was made in the anterior axillary line over the third rib space. The Verres needle was inserted. The lung was slowly deflated by instilling one liter of CO2 into the intraplural space. The upper sympathetic chain was easily visualized lying over the necks of the ribs from the second to the six ganglia. The diathermy probe was inserted through a similar incision in the fourth space. The sympathetic chain overlying the lower part of the first, second and third ribs was treated with diathermy down to the periostium. The intercostal space left untouched. The nerve of Kuntz (a branch parallel and lateral to the main trunk) was coagulated if present. The fourth thorathic segment was coagulated in patients with axillary hyperhidrosis. In one patient with failure of a previous open surgery and recrrence of hyperhidrosis there were some pleural adhesions which were treated by the electrocautery probe. Before closure of the wound, the lung was expanded by positive endexpiratory pressure combined with suction through a small tube. A post operative chest X- ray was performed in the recovery room. The procedure took about 15-20 minutes. Patients

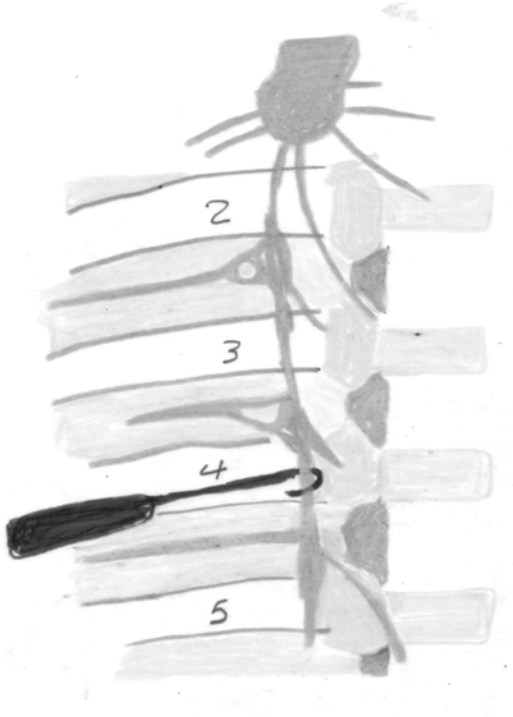

Fig. 1 The schematic drawing showing T_4 sympathectomy was performed by simple diathermic severance of the sympathetic trunk were discharged after two days (range 1-5 days) after surgery. In cases of hyperhldrosis, the contralateral sympathectomy was undertaken 6 weeks later. Patients were followed up for an average of four months (range 2-11 months) to assess the operative results and the occurrence of any complication.

3. Results:

Sixteen patients underwent endoscopic transthoracic electrocautery for hyperhidrosis of the upper limb, 14 patients underwent bilateral and 2 patients underwent unilateral surgery. There were 12 females and 4 males of mean age 24.2 years (range 17-32 years). The hands alone were affected in 3 patients (18.75%), the axillae alone in 2 patients (12.5%), and both areas in 8 patients (50%) (Table 1). There were 2 patients with recurrent palmar hyperhidrosis after the cervical approach, one with bilateral and one with unilateral recurrence. There

was another patient with recurrent unilateral axillary hyperhidrosis after open surgery. All the patients were completely relieved of sweating of the hands and axillae on returning from the operating theatre. As regard the causalgic (sympathalgic) group, the total number were 12 patients; 3 with major causalgia (all males) and 9 with minor causalgia (5 males and 4 females); all with failure of conservative treatment (including repeated sympathetic blocks done in different pain centers) to provide adequate sustained relief. The major causalgic subgroup patients presented with persistence of the typical major causalgic pain. The diagnosis could often be made from across the room based on the appearance of extreme distress shown by a patient cradling the affected limb without touching it to protect it from being touched or even to avoid a breeze inciting a paroxism of pain. The median nerve alone or with other nerves of the upper limb was involved in 2 cases and the brachial plexus in another case. The mean age was 26.7 (range 19-42). In the minor causalgic dystrophic subgroup; the extremely varied clinical presentation, often associated with features not typical of sympathetic hyperactivity with the predominence of muscular and joint symptoms as well as the usual presence of psychogenic features have led to protracted futile therapy in most patients. This eventuated in advanced dystrophic changes that were built up slowly and gradually. The mean age was 39 years (range 21-66 years).

There was no mortality and no serious morbidity. Horner's syndrome occurred in one patient with unilateral recurrent palmar hyperhidrosis, and was resolved in 6 weeks. Pneumothorax requiring a chest drain occurred in two patients. Some transient signs of pleural irritation (3 patients) and intercostal neuralgia (4 patients) were reported. The mean duration of hospital stay was two days (range 1-5 days). In the follow up period of three months, (range 3-12 months), compensatory sweating occured in 14 patients (50%) and gustatory sweating in 10 patients (35.7 1%). This compensatory and gustatory sweating were considered much less embarrassing than the original complaint. Despite the above mentioned side effects, 15 of 16 patients (93.75%) with hyperhidrosis, all patients with major causalgia and 5 patients with minor causalgia (5.55%) were very much improved in the follow up period and considered the result of endoscopic surgery highly satisfactory (Table 2). The remaining patient with hyperhidrosis (6.25%) and two patients with minor causalgia (2.22%) were moderately improved and were only satisfied. Two patients with minor causalgia (22.2%) had other residual symptoms associated with limitation of movement, stiffness of joints and other trophic changes. These were usually related to the delay between the onset and the diagnosis, which averaged 7 months. However both patients experienced gradual and moderate improvement. In a total number of 28 patients with hyperhidrosis or causalgia of the upper limb, transthoracic endoscopic sympathectomy gave excellent results in 89.28% of cases (25 cases) and mild to moderate improvement in 10.72% (3 cases).

Table (1): area affected by hyperhydrosis in 28 patients.

area	No. of patients	percent
Hands only	3	18.75
Axilla only	2	12.5
Both areas	8	50
Recurrent hands	2	12.5
Recurrent axilla	1	6.25

Table (2): subjective assessment of the results of endoscopic surgery by 28 patients.

	Improvement	Immediate postoperative	At follow up
Hyperhidrosis	Very much improved Moderately improved	15 (93.75%) 1(6.25)	15(93.75%) 1(6.25%)
Major causalgia	Very much improved Moderately improved	3(100%)	3(100%)
Minor causalgia	Very much improved Moderately improved Slightly improved	5(55.55%) 2(22.2%)	5(55.55%) 2(22.2%)

4. Discussion:

Twenty eight patients with upper limb hyperhidrosis (palmar and axillary) or causalgia (major and minor) were submitted to endoscopic transthoracic sympathectomy as a definitive treatment. There were 16 patients with upper limb hyperhidrosis (including three patients with recurrence after open surgery), and 12 patients with upper limb causalgia (3 with major causalgia and 9 with minor causalgia). The procedure was successful

in curing 25 patients (89.28%) and gave moderate improvement in 3 patients (10.72%); two of them belonged to the minor causalgic group because of the advanced dystrophic changes in their limbs. The commonest side effects were compensatory sweating. There was a high level of patient satisfaction. Horner's syndrome occurred in one patient. The procedure is effective, simple, and required only two nights stay, and is recommended as a method of choice for the surgical treatment of upper limb hyperhidrosis or causalgia.

HYPERHIDROSIS is defined as sweating above and beyond the physiological needs. It can be very distressing and the source of intense embarrassment (Symptoms usually appear at puberty with an incidence of 0.6-1.0%). Hyperhidrosis is usually localised to the palm, axillae and feet, but the face, back, groin and legs may also be affected [1]. Sympathectomy remains the cornerstone of surgical management.

Cases of causalgia of the upper limb are extremely embarrassing and renders the patient almost completely useless and miserable. Major causalgia is a clinical syndrome associated with a lesion of a peripheral nerve that contains sensory fibers and is characterized by burning pain in the affected extremity, usually in the hand or foot. It occurs as a complication in about 3% of major nerve injuries. It is most often associated with incomplete lesions of the median nerve in the upper limb and the sciatic nerve (the tibial part) in the lower limb. These two nerves account for about 60% of the cases; the rest of the cases involved primarily the nerves of the upper extemity [7]. Despite the recognition that the sympathetic nervous system is involved, the specific pathophysiology is unknown. Various theories as to the cause of causalgia have been proposed, including short - circuiting effects at the area of the injury, permitting irritation of sensory afferent fibers by the efferent sympathetic impulses, periarteritis in volving the vessels about the injured neural segments, and abnormal feedback into the internuncial centers of the spinal cord. The syndrome is one of excruciating burning pain often described as having a superimposed throbbing, aching, bursting pressure, knife like stabbing, twisting, or crushing component. In many instances (about one third); pain begins immediately after injury; it usually begins sometime during the first week. The pain is usually located in an area corresponding to the cutaneous distribution of the nerve but is not necessarily limited to this area. Another characteristic of the pain, one usually necessary for a positive diagnosis, is accentuation by stimuli to such emotions as surprise and anger and by other disturbances in the patient's environment. To touch, feel, or even hear the name of a slick object such as a paper or a sheet will cause severe increase in pain in some patients. In many instances light touch, heat, or minor movements of the trunk and extremity will increase existing pain. Some patients insist the pain seems less severe on cool, damp days or at night. After having seen a patient with severe causalgia one is not likely to forget the picture of a pain- racked patient guarding the affected extremity with extreme care. The skin of the affected part may show evidence of vasodilatation early after injury, and this may or may not be replaced later by vasoconstriction. Thus the skin of the affected part may be dark red, dry glossy, and atrophied or cold, mottled, and moist. The skin may be devoid of hair or, on the contrary, may have an abnormal growth of hair, hyperhidrosis is common. Accurate evaluation of the completeness of the nerve lesion is commonly impossible because of the extreme pain caused by handling the affected limb. When causalgia is severe, the diagnosis is usually clear and is easily confirmed by procaine block of the second and third sympathetic ganglia. Rarely will other neurologic conditions be confused with true causalgia [7].

Both major and minor causalgia seem to constitute a closely related conditions; Horowitz [17] had already concluded that (the post traumatic pain syndromes seem to be identical in type with minor causalgia), Bonica [7] has taken the logical view that effective treatment by sympathetic denervation justifies classifying the entire group under one rubric. Omar et al., [21] & Buker et al. [8] have reported successful treatment of early minor causalgic states (reflex sympathetic dystrophy) by a long series of sympathetic ganglion blocks with local anesthetics (occasionally and especially in the early stages of the disease, a series of several sympathetic blocks with procain will relieve the pain or make it tolerable); failure of this conservative measures is the indication of surgery.

Sympathectomy remains the cornerstone of surgical management to hyperhidrosis and causalgias (major and minor), various operative approaches have been described, each with its advocates; the cervical or supraclavicular approach (Tel- ford, 1935)[6], the posterior approach [2], the transaxillary approach [4], and the transthoracic endoscopic sympathectomy[3]. This study was an experience in endoscopic transthoracic electrocautery of the sympathetic chain for the treatment of upper limb hyperhidrosis or causalgia.

Endoscpic transthoracic sympathectomy is a minimally invasive procedure with several advantages over the open surgery. It provides excellent visualization of the sympathetic chain. The simplified technique described in this series of 28 patients was successful in treating around 90%

(89.28%) of the patients with upper limb hyperhidrosis or causalgia; the rest of the patients obtained moderate to mild improvement. It was not followed by any major complication, there was no wound infection and the two scars of 0.5 cm. length are almost invisible. The operative time varies, but the average for the unilateral procedure was 20 minutes. Gothberg et a! [16] reported a 25 minutes for a bilateral procedure; while Edmondson et al. who reported an average time of 45 minutes for bilateral procedure. The hospital stay average 2 days in this study which compares good with that reported by other workers.

Postoperative Homer's syndrome is largely a complication of the open approaches, but the danger of creating a Homer's syndrome (6.25%) and of pneumothorax (12.5%) was less than that reported by Edmondson et al. They reported percentages of 14% and 16% for these two complications respectively. Compansatory sweating represents a thermoregulatory response and is usually over the trunk and upper thighs in 13 patients (46.42%) in our sires, which is near the incidence reported by Adar [1]. Gustatory sweating occurred in 9 patients (32.14%) which was nearly similar to that reported by Edmondson et al. [13]. In general compensatory and gustatoy sweating were not very embarrassing to the patients.

In summary,

Endoscopic transthoracic electrocautery of the sympathetic chain for the treatment of upper limb causalgias and hyperhidrosiss is a safe, simple, fast and cosmetically acceptable procedure. It is considered the treatment of choice for these conditions.

Corresponding author
Abulazaym A.A.
Neurosurgery department, Faculty of medicine, Cairo University, Cairo, Egypt.
abaaaza51@yahoo.com

5. References:

1. ADAR R., KURCHIN A., ZWEIG A., and MOZES M.: Palmar hyperhidrosis and its surgical treatment. Ann. Surg. 186: 34-41, 1977.
2. ADSON A.W. and BROWN G.E.: Extreme hyperhidrosis of the hands and the feet treated by sympathetic ganglionectomy. Mayo Clinic. Proc. 7: 394, 1949.
3. Alric P, Branchereau P, Berthet JP, Leèger P, Mary H, Mary-Aneè C. Video-assisted thoracoscopic sympathectomy for palmar hyperhidrosis: results in 102 cases. Ann Vasc Surg 2002;16:708-713.
4. ATKINS H.H.: Preaxillary approach to the stellate and the upper thoracic sympathetic ganglia. Lancet., 11, 1949.
5. KUX E.: Thorakoskopische Engriffe am Nervebsystem. Stuttgart: Georgthieme Verlag, 1945.
6. TELFORD E.D.: The technique of sympathectomy Br. J. Surg. 23: 448-50, 1935.
7. BONICA, J.J.: Causalgia and other reflex sympathetic dystrophies. Advances in pain research and therapy, Vol. 13, New York, Raven. Press., pp. 141-166, 1979.
8. BUKER, R.H., COX, WA., SCULLY, T.J., SEITER, G. and PAULING, F.W.: Causalgia and transthorathic sympathectomy. Am. J. Surg., 124: 724727, 1972.
9. BYRNE J., WALSH T.N. and HEDERMAN W.P.: Endoscopic transthoracic electrocautery of the sympathetic chain for palmer and axillary hyperhidrosis. Br. J. Surg. 77L 1046-1049, 1990.
10. Doolabh N, Horswell S, Williams M, Huber L, Prince S, Meyer DM, Mack MJ. Thoracoscopic sympathectomy for hyperhidrosis: indications and results. Ann Thorac Surg 2004; 77:410-414.
11. DOUPE, J., CULLEN, C.H. and CHANCE, G.Q.: Post-traumatic pain and the causalgic syndrome. J. Neurol. Neurosurg. Psychiatry, 7: 33-48, 1944.
12. Dumont P, Denoyer A, Robin P. Long-term results of thoracoscopic sympathectomy for hyperhidrosis. Ann Thorac Surg 2004;78:1801-1807
13. EDMONDSON, R.A., BANERJEE A. and RENNIE, J.A.: Endoscopic transthoracic sympathectomy in the treatment of hyperhidrosis. Ann. Surg. 215-293, 1992.
14. ERDMIR, H., GELMAN, S. and GALBRAITH, J.G.: Prediction of the needed level of sympathectomy for posttraumatic reflex sympathetic dystrophy. Surg. Neurol., 17: 353-354, 1982.
15. .Georghiou GP, Berman M, Bobovnikov V, Vidne BA, Sautre M. Minimally invasive thoracoscopic sympathectomy for palmar hyperhidrosis via a transaxillary single-port approach. Interactive Cardiovasc Thorac Surg 2004;3:437-441
16. GOTHBERG G., CLAES. G. and DROTT C.: Electrocautery of the upper thoracic sympathetic chain: a simplified technique. Br. J. Surg. 8: 862, 1993.
17. HOROWITZ, S.H.: latrogenic causalgia, Classification, clinical findings, and legal ramifications. Arch. Neurol., 41: 821-824, 1984.
18. Krasna MJ, Ferguson MD. Thoracoscopic sympathectomy. General Thoracic Expert's

Techniques. Baltimore: CTSNET Experts' Techniques, 2002.
19. MALONE, P.S., DUIGNAN, J.P. and HE DERMAN, W.P.: Transthoracic electrocoagulation (T.T.E.C.) A new and simple approach to upper limb sympathectomy. Irish Med., J., 75: 20-21, 1982.
20. .Ojimba TA, Cameron EP. Drawbacks of endoscopic thoracic sympathectomy. Br J Surg 2004;91:264-269.
21. OMAR, G. and THOMAS, S.: Treatment of causalgia. Review of cases at Brook General Hospital. Tex. Med., 67: 93-96, 1971.
22. SCHWARTZMAN, R.J. and MAC LELLAN, T.L.: Reflex sympathetic dystrophy. Arch. Neurol., 44: 555-561, 1987.
23. SUNDERLAND, S.: Nerves and nerve in juries, Baltimore, The Williams and Wilkings Co., 1968.
24. WALKER, P.M. and JOHNSTON, K.W.: Predicting the success of a sympathectomy: A prospective study using discriminant function and multiple regression analysis. Surgery, 87: 216-221, 1980.

10/29/2010