The 13th International Symposium on Sympathetic Surgery
October 10th & 12th, 2019
Chamber of Commerce, Pisa (Italy)
Final Program

and

Abstract Book

13th International Symposium on Sympathetic Surgery – Pisa (Italy)

October 10th & 12th, 2019

Chamber of Commerce
Piazza Vittorio Emanuele II, n°5
56125 Pisa

Chairman: Mirco Santini
chairman@isssitaly2019.org

www.isssitaly2019.org
Benvenuti a Pisa!
Welcome in Pisa!

It is an honour for me to welcome you in Pisa for the 13th edition of the World Symposium of the International Society of Sympathetic Surgery.

Four years ago in Fukuoka (JP) the Board of ISSS gave me this challenging opportunity to host the Symposium as Chairman, so please let me thank the Past President, President, the Secretary and all the board’s members for the trust they showed me.

The Symposium is, by now, a traditional appointment for all of us interested in the surgery of the autonomous nervous system, to meet every four years to discuss about new researches, physiology, brand new techniques and long-term results in this fascinating art.

I hope that the topics of the final program will stimulate your interest; the invited lecturers, moderators and speakers are the major outstanding experts in their own field. The abstracts accepted cover many hot topics in sympathetic surgery and treatment of severe hyperhidrosis.

The 13th edition of our congress is joint with the XX National Congress of SIET (the Italian Society of Thoracic Endoscopy). A warm thank you to the President of SIET Dr. Gaetano Di Renzo, the Chairman of the XX SIET National Congress, Prof. Franca Melfi and her colleague Dr. Federico Davini, for their kindly support during the organization of the symposium.

A special thanks, again, to Prof. Roberto Crisci, President of the Italian Society of Thoracic Surgery, for having been a great mentor of this joint meeting; I will always be grateful to him for his sponsorship and constant support.

Last, but not least, a warm thank you to my friend, and one of my masters, Prof. Giorgio Cavallesco, thoracic surgeon of the University of Ferrara and Chief of the Surgery 1 Unit of the University Hospital of Ferrara, for his support, patience and friendship.

I indeed hope that all the delegates will be back home with new inspiration and commitment to their everyday job.
I also strongly encourage you to visit Pisa and the beautiful Tuscany area that welcome all of us with the history, art and her traditional and excellent food and wines. A wide choice of tours is available for delegates and their guests.
I wish you a pleasant stay in Italy!
Sincerely,

Mirco Santini
Colophon

Chairman
Mirco Santini (Italy)

Scientific Secretariat
Moshe Hashmonai (Israel)
Georg Bischoff (Austria)
Giorgio Cavallesco (Italy)
Federico Davini (Italy)
Nicola Tamburini (Italy)
Pio Maniscalco (Italy)
Francesco Quarantotto (Italy)

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Surgery 1 Unit
Viale Aldo Moro, 8
44124 Ferrara (Italy)

Azienda USL di Ferrara
Via Cassoli, 30
44121 Ferrara (Italy)
At regular intervals since 1993, international surgeons of the sympathetic system have met to discuss the developments in therapies and surgery. The main aims of these congresses were to provide continuous, high quality education for surgeons and to provide a forum for experts to exchange specialised information on chosen topics.

The general consensus at these meetings was that an organised international group would best meet the demands of the growing number of interested surgeons and scientists. So the ISSS was founded in 2001.

The main objective of the Society is to promote the interchange of knowledge and experience and to advance the science and technique of sympathetic surgery.

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Conflict of Interest Statement
This Symposium is sponsorship free, the organizing expenses are covered by the registration fees only. The organizing secretary have no direct or indirect interest with health care companies.
Program

Oral Presentation:
Presenting author has 10 minutes for his oral presentation. Due to busy schedule the moderators will stop the presenter at the end of his time.

Media:
Slides can be in PowerPoint Office format, Keynote for Apple users. In the room a projector connected to a PC or Mac will be available. Bring your slides on a pen drive.
Video must be checked at Slide center before the sessions.

Translation:
The official language of the Symposium is English only. No translation/translator to other languages will be available.
Wednesday 9th, October 2019

17:00 - 18:30
ISSS Board Meeting
Venue: Viale Room
Chamber of Commerce
Piazza Vittorio Emanuele II, n.5
56125 PISA

Thursday 10th, October 2019

07:30 - 08:00
Registration
Venue: Ricci Auditorium
Chamber of Commerce
Piazza Vittorio Emanuele II, n.5
56125 PISA

08:00 - 08:30
Welcome and Official Opening
G.Bischof (Austria)
M.Santini (Italy)
R.Crisci – SICT next President (Italy)
F.Melfi – SIET Meeting President (Italy)
08:30
Physiology and Research of Autonomic Nervous System
Session
Neuroanatomy and Physiology of the Sympathetic Chain
Discussants:
Yuanrong Tu, Yanguo Liu (China)

08:35
Physiology and Research of Autonomic Nervous System
Master Lecture
Neuroanatomy and Physiology of the Sympathetic Chain
M. Hashmonai (Israel)

09:05
Physiology and Research of Autonomic Nervous System
Invited Speaker Lecture
Segmental or Unilateral Hyperhidrosis
Possible Compensatory Mechanisms Estimated Based on the Mechanism of the similar Efferent Phase of the Physiological Skin Pressure-Sweating Reflex
Prof. Yoko Inukai - University of Aichi (Japan)
09:30
Psychological Aspects of Hyperhidrosis/Blushing
Session
Basic Research in Autonomic Dysfunction

Discussants:
C.Schick (Germany), H.Oda (Japan)

09:35
Psychological Aspects of Hyperhidrosis/Blushing
Depressive, Anxious Symptoms and Personality Characteristics in Patients with Palmar Hyperhidrosis (PH)

Xianjun Min, Yanguo Liu, Yuqing Huang, Jun Wang (China)

09:45
Psychological Aspects of Hyperhidrosis/Blushing
Mind over Body: How Does a Person’s Psyche Affect Their Sweating

H.Melek (Turkey)

09:50
Psychological Aspects of Hyperhidrosis/Blushing
What is the Extent of Sympathetic Blockage Required to Have a Satisfactory Result in Facial Blushing?

A.Giudiceandrea
Psychological Aspects of Hyperhidrosis/Blushing
Discussion
10:10
Indications for Sympathetic Surgery
Session

Moderators:
M.Hashmonai (Israel), M.Santini (Italy)

10:10
Indications for Sympathetic Surgery
Lecture
Overview of Current Indications for Sympathetic Surgery
M.Hashmonai (Israel)

10:35
Indications for Sympathetic Surgery
Endoscopic Thoracic Sympathicotomy for Primary Palmar Hyperhidrosis: a Multicenter Retrospective Study in China
Jianfeng Chen, Yuanrong Tu (China)

10:40
Indications for Sympathetic Surgery
Down-shift Variation of Sympathetic Ganglia is Associated with Drier Hand after Sympathicotomy for Primary Palmar Hyperhidrosis
Yanguo Liu, Yuqing Huang, Fan Yang, Jun Wang (China)

10:50
Indications for Sympathetic Surgery
Discussion
Thursday 10th, October 2019

11:00
Reconstruction Surgery After ET
Session

Discussants:
N.Perin, C.Connery (USA)

11:20
Reconstruction Surgery After ET
Is Intercostal Nerve Reconstruction at R1 Level Better Than at R2 Level for Compensatory Hyperhidrosis Treatment?

H.Melek (Turkey)

11:30
Reconstruction Surgery After ET
Discussion
Thursday 10th, October 2019

11:45
**Unclipping Techniques: True or False?**
**Session**

Discussants
G. Chiesa (Italy), G.Bischof (Austria)

11:50
**Unclipping Techniques: True or False?**
**Lecture**

**Clinical Results of Unclipping After ESB**

G.Bishof (Austria)

12:10
**Unclipping Techniques: True or False?**
**True – Innovations in Sympathectomy for Primary Hyperhidrosis: From Patient Selection to Surgical Approach**

F.Raveglia (Italy)

12:20
**Unclipping Techniques: True or False?**
**False – Bilateral Thoracoscopic Sympathectomy for Primary Hyperhidrosis: Surgical Technique and Our Experience**

D.Gavezzoli (Italy)

12:30 – 13:30
**Lunch Break**
13:30
Lecture
Genetic Basis of Hyperhidrosis?
J. Meyer (Trier University-Germany)

Discussant:
C. Schick (Germany)

14:00
Miscellaneous in ETS
Session

Discussants:
C. Schick (Germany), G. Cavallesco (Italy)

14:00
Miscellaneous in ETS
Analysis of Risk Factors and Prevention Strategies of Sympathetic Chain Injury Due to Thoracic Surgery

Luming Wang, Linhai Zhu, Aizemaiti Rusidanmu, Yiqing Wang, Wang Lv, Jian Hu (China)
14:10
Miscellaneous in ETS
Sympathicotomy for Hyperhidrosis with Non-Intubated Anesthesia
Zubin Yu, Dong Zhou, Jingshi Wang, Jigang Dai (China)

14:20
Miscellaneous in ETS
Non-intubated Laryngeal Mask and Intravenous Anaesthesia in Thoracoscopic Sympathectomy: Comparison of Safety Between Self-Breathing and Involuntary Breathing
Shi Qin Lang (China)
Thursday 10th, October 2019

14:40
Standard Procedures: Clipping, Ablation, Resection Session

Discussants:

R.Crisci (Italy), P.Licht (Denmark)

14:45
Standard Procedures: Clipping, Ablation, Resection
Combined Bilateral ETS And ELS in One Single Session in Patients with Severe Palmo-Plantar Hyperhidrosis

I.Tarfusser (Italy)

14:55
Standard Procedures: Clipping, Ablation, Resection
3-Year Clinical Outcomes Comparing Unilateral and Bilateral Endoscopic Thoracic Sympathectomy for Palmar Hyperhidrosis

H.Oda (Japan)

15:05
Standard Procedures: Clipping, Ablation, Resection
Thoracoscopic Sympathicotomy for Palmar and Plantar Hyperhidrosis: A Comparison Between Two Approaches

Chenglin Yang, Xin Yu, Wenyi Liu, Zifan Li, Huiwen Bai, Hao Wu, Da Wu, Juwei Mu (China)
15:15
Standard Procedures: Clipping, Ablation, Resection
Discussion
15:30
Strategies in Compensatory Sweating
Session
Moderator:
J.Garcia-Morato (Argentina)

15:30
Strategies in Compensatory Sweating
Avoid Compensatory Hyperhidrosis After Sympathetic Surgery for Craniofacial Hyperhidrosis
Moon Duk Hwan (Republic of Korea)

15:40
Strategies in Compensatory Sweating
Analysis of Complications and Patients’ Satisfaction Following Bilateral Sympathectomy R5-R8 for the Treatment of Severe Compensatory Hyperhidrosis
César FM Vasconcelos (Brazil)

15:50
Strategies in Compensatory Sweating
A New Sympathicotomy Method for Primary Hyperhidrosis to Overcome Compensatory Hyperhidrosis
Kim Jae Jun (Republic of Korea)

16:00
Strategies in Compensatory Sweating
Discussion
16:15
ETS: What’s New?
Session

Discussants:

M. Hashmonai (Israel), P. Licht (Denmark)

16:20
ETS: What’s New?
Implementation of a Symptom Management Education Module for Patients With Palmar Hyperhidrosis

H. Givans, N. Perin (USA)

16:30
ETS: What’s New?
The Safety and Feasibility of Intraoperative Near-Infrared Fluorescence Imaging with Indocyanine Green in Thoracoscopic Sympathectomy for Primary Palmar Hyperhidrosis

Guotian Pei, Yanguo Liu, Yuqing Huang, Jun Wang (China)

16:40
ETS: What’s New?
Analysis of the Curative Effect of Selective Thoracic Sympathectomy for Primary Palmar Hyperhidrosis by Single-Hole Thoracoscopy

Hao Wu, Qing Li, Quan Xu, Sui Yin, Liru Chen, Lei Peng, Yeji Hu (China)
16:50
ETS: What’s New?
Video-Assisted Mediastinoscopy Thoracic Sympathectomy in Treatment of Palmar Hyperhidrosis Combined With Pleural Adhesions
Weiquan Gu, Jie Yang, Shengli Yang, Jun Ye, Fei Wang, Ye Xiao, Lingjun Luo, Xiaowen Zhang, Ning Zhao (China)

17:00
ETS: What’s New?
A New Ultra-Minimally Invasive Splanchnic Nerve Dissection for the Treatment of Upper Abdominal Pain in Advanced Pancreatic Cancer
Han Kaibao, Yang Qingjie, Sun Xiaoyan, Wang Liangbin (China)

17:10
ETS: What’s New?
Discussion

17:30
Closing Remarks
Chairman
Mirco Santini
Saturday 12th, October 2019

08:30
Abstracts Sessions
Venue: Green Room

Moderators:
P. Maniscalco (Italy), M. Santini (Italy)

08:40
Abstracts Sessions
Hyperhidrosis, Endoscopic Thoracic Sympathectomy, and Cardiovascular Outcomes: A Korean Health Insurance Review and Assessment Service Database Cohort Study

Moon Duk Hwan (Republic of Korea)

08:50
Abstracts Sessions
Endoscopic Thoracic Sympathectomy as a Therapeutic Alternative for Hyperidrosis: Two Clinical Cases

M. Roffinella (Italy)

09:00
Abstracts Sessions
Efficacy of CO2 Insufflation During Bilateral Thoracoscopic Sympathectomy

M. Sanzi (Italy)
09:10
Abstracts Sessions
Endoscopic Simpatectomy: Quality of Life After Long Term Follow Up
N.Tamburini (Italy)

09:20
Abstracts Sessions
Near Infrared Fluorescence Imaging of Sympathetic Ganglion After Indocyanine Green Application: Initial Experience
W.Schreiner (Germany)

09:30
Abstracts Sessions
Harlequin-Syndrome Following Sympathicus Clipping: a Rare Condition
W.Schreiner (Germany)

09:40
Abstracts Sessions
Discussion

10:00
Closing Remarks
Chairman
Mirco Santini
10:15 – 11:00
ISSS Plenary Meeting
General Information

VENUE
CHAMBER OF COMMERCE (PISA, ITALY)
Piazza Vittorio Emanuele II, 5 – Pisa 56125

FEES
ISSS SYMPOSIUM REGULAR FEE 200 €
RESIDENT AND TRAINEES FREE
SIET MEMBERS 50 €

ON SITE REGISTRATION WILL BE POSSIBLE BUT ONLINE IS STRONGLY RECOMMENDED.

ISSS support a greener world.

The 13th World Symposium of ISSS will be a paper-free event. The final program, abstract book, Certificate of attending will be only in e-format downloadable from the official website of the symposium in advance or during the work.

During the days of the meeting we strongly advice to use your tablet, smartphone or laptop to take notes, exchange business cards or review the final program. Thank you for your collaboration.
Less paper we use more trees will be saved for our planet.

ORGANIZING SECRETARIAT
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TRAVEL INFORMATION
Pisa Airport
Railway
Pisa Railway station

Florence Railway Station
https://www.firenzesantamarianovella.it/en/

Tourist Information
https://www.discovertuscany.com/pisa/

CURRENCY
The currency in Italy is Euro €. Most of the commercial activities accept credit cards (VISA, MC, AMEX, DINERS etc.) plastic or electronic.

ATM (Bancomat) are available at Bank agencies booth accessible H24
A valid Photo ID or Passport is warmly recommended during your stay.

Weather in October is normally warm but rain or sudden showers may be expected. Bring a mid season wardrobe.

Taxis are available in Pisa
http://www.cotapi.it/en/
The fare for a ride from Pisa Airport to the Center of the City is normally between 9 and 12 €.

Public transportation in PISA
http://www.aboutpisa.info/transportation-in-pisa.html
Faculty

G. Bischof (Austria)
G. Cavallesco (Italy)
G. Chiesa (Italy)
C. Connery (USA)
R. Crisci (Italy)
J. Garcia-Morato (Argentina)
M. Hashmonai (Israel)
Y. Inukai (Japan)
Y. Liu (China)
P. Maniscalco (Italy)
J. Meyer (Germany)
H. Oda (Japan)
N. Perin (USA)
M. Santini (Italy)
C. Schick (Germany)
Y. Tu (China)

Presenting Authors

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D. Gavezzioli (Italy)
L. Wang (China)
Z. Yu (China)
Q. Shi (China)
I. Tarfusser (Italy)
I. Oda (Japan)
C. Yang (China)
D.H. Moon (Republic of Korea)
R. Tavares (Brasil)
J.J. Kim (Republic of South Korea)
H. Givans (USA)
G. Pei (China)
H. Wu (China)
W. Gu (China)
K. Han (China)
M. Roffinella (Italy)
M. Sanzi (Italy)
Abstracts Book
SEGMENTAL OR UNILATERAL HYPERHIDROSIS: POSSIBLE COMPENSATORY MECHANISMS ESTIMATED BASED ON THE MECHANISM OF THE SIMILAR EFFERENT PHASE OF THE PHYSIOLOGICAL SKIN PRESSURE-SWEATING REFLEX

Yoko Inukai

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Segmental (Fig. 1) or unilateral (Fig. 2) hyperhidrosis are forms of sweating disorder. In some cases of these disorder, they are accompanied by anhidrosis/hypohidrosis in other areas. This pathogenesis may be compensatory; it is likely caused by underlying lesions in the areas with anhidrosis/hypohidrosis, but the precise mechanism remains unclear. Hyperhidrosis often occurs on contralateral to the same dermatomes with anhidrosis/hypohidrosis, and ipsilateral rostral and caudal dermatomes adjacent to those of anhidrosis/hypohidrosis. The similar efferent phase of the physiological “skin pressure-sweating reflex” might be associated with these mechanisms. This reflex is primarily due to inhibition of ipsilateral sweating by unilateral skin pressure; secondarily sweating is increased on the contralateral same dermatome and ipsilateral adjacent different dermatomes. [Study 1] Microneurography indicates that unilateral skin pressure reduces the amplitude of sudomotor nerve activities ipsilaterally and increases it contralaterally. [Study 2] Studies using the ventilated capsule method during heating show that pressure on the skin of bilateral back during lying supine sweating decreases on upper body and increases on lower body. Central sudomotor sympathetic outflow in response to body temperature is simultaneously hyperactivated, indicating that sweating is enhanced in compensation to maintain a constant total sweating rate. In conclusion, segmental or unilateral hyperhidrosis in segments not directly affected may be compensatory.
DEPRESSIVE, ANXIOUS SYMPTOMS AND PERSONALITY CHARACTERISTICS IN PATIENTS WITH PALMAR HYPERHIDROSIS (PH)

Xianjun Min, Yan guo Liu, Yuqing Huang, Jun Wang (Beijing Haidian Hospital)

Objective: To investigate symptoms of depression and anxiety, and personality characteristics in patients with PH. Analyze the role of these emotional factors in patients. Methods: Personality Diagnostic Questionnaire 4 (PDQ4) was used to investigate the characteristics of personality among 505 patients with PH. Self-rating depression scale (SDS) and self-rating anxiety scale (SAS) were used to evaluate symptoms of depression and anxiety. Improvement of hand sweating, side effects like compensatory sweating or pain score, and satisfaction rate were recorded. Result: The study revealed that overall, 31.89% patients with PH had depressive symptom and 16.03% had anxious symptom. Surgical operation did not change the mental symptoms, however, the scores of depression and anxiety were significantly lower in patients with PH after operation (p=0.0013, p<0.001). Postoperative pain score was associated with preoperative anxiety (p=0.0177). 21.78% of the patients had some form of diffident type of personality disorder compared to normal people, which has not been associated with gender and age. Most involved patients were ‘very satisfied’ with this result except for eight patients (2.21%) who were dissatisfied, and the degree of satisfaction was related to personality disorder (p=0.0271). Conclusion: Patients with PH are more likely to have mild or moderate mental disorders and unique personality characteristics. Operation may change the status of the mental disorder above, and furthermore, preoperative anxiety may increase the degree of postoperative pain. The personality characteristics of patients are related to the degree of satisfaction.
“Mind over Body: How Does a Person’s Psyche Affect Their Sweating”

Tolga Evrim Sevinç, Gizem Gedikoğlu, Hüseyin Melek, Ahmet Sami Bayram, Cengiz Gebitekin

Uludag University, Faculty of Medicine, Department of Thoracic Surgery, Bursa, Turkey

Introduction: Compensatory Hyperhidrosis (CH) is a common postoperative complication among patients with primary hyperhidrosis (PH), and its etiology is still unclear. The results of recent studies showed that the level of psychoticism in patients is related to CH. Thus, preoperative evaluation of all patients’ psychological states with PH is recommended. The aim of this study is to compare the personality characteristics of individuals who experienced severe CH with those that had minimal complications.

Methods: Fifty-three patients with CH who underwent sympathectomy for PH were included in the study. Two groups were formed according to the severity of CH (group 1: mild CH, group 2: severe CH). The relationship between psychological states and compensatory sweating were assessed using The Eysenck Personality Questionnaire-Abbreviated Form which measures an individual’s neuroticism, extraversion and psychoticism, and lie. All the statistical analyses were performed using IBM SPSS Statistics software.

Results: Thirty patients were male, while 23 were female. The mean age of the patients was 27.0 ± 6.3 years. 21 patients had mild CH and 32 patients had severe CH. The mean scores of neuroticism, extraversion, psychoticism, and lie in all groups, respectively, were 2.019 ± 1.73 (p= 0.20), 4.28 ± 1.78 (p= 0.46), 1.17 ± 1.17 (p= 0.46), and 4.6 ± 1.4 (p= 0.085).

Conclusion: There was no significant relationship between the scores of neuroticism, extraversion, psychoticism, or lie with the severity of CH. Further studies are necessary in order to prove that a person’s psychological state can affect the development of CH.
Endoscopic thoracic sympathicotomy for primary palmar hyperhidrosis: a multicenter retrospective study in China

Jianfeng Chen MD PhD, Yuanrong Tu MD

Department of Thoracic Surgery, First Affiliated Hospital of Fujian Medical University, No 20 Chazhong Road, Fuzhou 350005, People’s Republic of China

Background: This study aims to evaluate the clinical efficacy and safety of endoscopic thoracic sympathicotomy (ETS) and to explore strategies to reduce the incidence of transfer hyperhidrosis (TH).

Methods: From January 2003 to July 2016, 10275 primary palmar hyperhidrosis (PPH) patients in 15 institutions underwent ETS. We carried out a retrospective analysis of clinical data of Group A, with non-retained R2 (R2, R2–3, or R2–4 ablation) and Group B, with retained R2 (single R3 or R4 ablation).

Results: All procedures were successfully performed. Both hands of all patients became warm and dry immediately after surgery. Pneumothorax was found in 146 patients. Thirty nine patients had intraoperative bleeding. Follow-up was carried out from 6 months to 13 years. A total of 531 patients (5.2%) were lost to follow-up. The effective rate for PPH was 100%. Palmar hyperhidrosis recurred in 73 patients (0.7%). TH appeared in 7678 patients (78.8%). For Groups A and B the incidence of TH was 80.4% and 78.5%, respectively ($P > .05$). However, The incidence of Grade III+IV TH in Group B (1.6%) was significantly lower than that in Group A (4.8%), ($P < .001$).

Conclusion: ETS is a minimally invasive, safe and effective therapeutic method for PPH. Although the overall incidence of TH is high, the incidence of Grade III–IV TH can be significantly reduced by reserving R2, lowering the level of thoracic sympathicotomy, and single severing of R3 or R4.
**Down-shift Variation of Sympathetic Ganglia is Associated with Drier Hand after Sympathicotomy for Primary Palmar Hyperhidrosis**

Yanguo Liu, MD1*, Yuqing Huang, MD 2*, Fan Yang, MD 1*, Jun Wang, MD 1

1: Department of Thoracic Surgery, Peking University People’s Hospital, Beijing100044, China

2: Department of Thoracic Surgery, Beijing Haidian Hospital, Beijing100080, China

**Background:** R4 sympathicotomy is one of the standard treatments for primary palmar hyperhidrosis, but the outcomes are variable. Anatomical variation of sympathetic ganglia is supposed to be a cause for this phenomenon. Since the sympathetic ganglia could be visualized via near-infrared (NIR) fluorescent thoracoscopy, we utilize this novel technique to identify the variation and investigate its relationship with surgical outcomes.

**Methods:** This is a prospective multi-center cohort study. All enrolled patients received intravenous indocyanine green infusion at doses of 5mg/kg 24-hours preoperatively. Anatomical variation of T3 sympathetic ganglia was observed via fluorescent thoracoscopy. R4 sympathicotomy was performed regardless of variation. Patients were followed up at one month postoperatively.

**Results:** 178 sympathetic chains in 89 patients were analyzed. The T3 ganglion was normal in 146 sides, shifted downward in 32 sides and none shifted upward. The therapeutic effect of hands of normal side was ‘overly dry’ in 4.8%, ‘comfortable dry’ in 31.5%, ‘mild moist’ in 58.2% and ‘wet’ in 5.5%. Of variation side, it was 12.5%, 43.7%, 43.7% and 0, respectively. The difference was statistically significant \(P=0.0161\). Dry hands (including overly dry and comfortable dry) rate in variation side was higher than that in normal side (56.2% vs 36.3%, \(P=0.037\)). The incidence of compensatory hyperhidrosis among patients with different variation had no significant difference.

**Conclusions:** NIR fluorescent thoracoscopy provides accurate identification of ganglia variations during thoracic sympathetic surgery. Down-shift variation of the T3 ganglion is associated with drier hands post conventional R4 sympathicotomy.
“Is intercostal nerve reconstruction at R1 level better than at R2 level for compensatory hyperhidrosis treatment?”

Gamze Çetinkaya, Hüseyin Melek, Tolga Evrim Sevinç, Ahmet Sami Bayram and Cengiz Gebitekin

Department of Thoracic Surgery, Uludağ University, School of Medicine, Bursa, Turkey

Objectives: Compensatory hyperhidrosis (CH) is the most common and feared side effect of sympathectomy because patients' quality of life (QOL) is greatly impaired. Our previous study revealed that intercostal nerve reconstruction (Gebitekin Technique-GT) improves QOL and related disorders in the overwhelming majority of patients with CH. In this study; we compared the results of GT at the first intercostal nerve (R1) level with those at the second intercostal nerve (R2) level for the treatment of CH.

Methods: Between January 2014 and November 2017, 32 CH patients underwent GT. Patients’ satisfaction and demographic parameters were self-assessed before and six months following surgery using the World Health Organization QOL (WHOQOL-BREF) and our own clinic’s questionnaires. Patients were divided into two groups. Group 1- Patients where R1 was used for reconstruction. Group 2-Patients where R2 was used for reconstruction. The QOL before and after GT between the two groups were compared.

Results: 32 patients were included in the study (group 1=15, group 2=17). There were 23 (71.87%) male and 9 (28.12%) female with a mean age of 32.09±6.77 years. Complications were observed in 12.5% of patients. 24 (75%) patients reported a greatly reduced of CH after GT. Failure in response to treatment occurred in 1 (6.7%) patients in group 1 and 7 (41.2%) in group 2 (p=0.041). None of the patients had recurrence of primary hyperhidrosis. All patients answered the QOL. In both groups, the percentage change of the sub-areas of QOL was statistically significantly higher in group 1 (p<0.05).

Conclusions: Gebitekin Technique at either the R1 or R2 level provides an effective CH treatment. However, using the first intercostal nerve is associated with better decrease in sweating and improve quality of life. For this reason, the first intercostal nerve can be used as a standard treatment for GT.
INNOVATIONS IN SYMPHATECTOMY FOR PRIMARY HYPERHIDROSIS: FROM PATIENT SELECTION TO SURGICAL APPROACH

Federico Raveglia¹, Alessandro Rizzi¹, Marcello Costa Angeli², Marco Scarci², Alessandro Baisi¹

¹Thoracic Surgery, ASST Santi Paolo e Carlo, Università degli Studi di Milano, Italia
²Thoracic Surgery, Ospedale San Gerardo, Monza, Italia

Background: it is common opinion that sympatetic nerve interruption is the most effective and lasting treatment for primitive hyperhidrosis, despite risk of disturbing compensatory hyperhidrosis (CH) onset. In addition, the more interruption level is high, the more risk is increased since that should preserve the negative afferent tone to hypothalamus itself. Despite this general rule, many of the series published in the last decade described various denervation target level and technique (transection or clipping) reporting contrasting and not comparable results. We present our experience as a contribution in defining the correct approach.

Methods: we retrospectively analyzed data from patients which underwent to thoracoscopic sympatetic chain interruption from 2001 to 2018. Since enrollment and surgical approach developed along the years, patients were collected in 4 groups. Main outcome was hyperhidrosis improvement, secondary outcomes were compensatory sweating onset, grade of satisfaction, complications and recurrences.

Results: 2,725 patients, mean age 28 years, underwent sympatectomy for primary hyperhidrosis: 1) 2001-2003, non-selective nerve resection at the upper edge of the 3° rib independently from patient’s distribution of sweating 2) 2004-2005, selective interruption by clipping at the upper edge of predetermined ribs based on patient’s distribution of sweating 3) 2004-2012, same technique but patients were selected for hyperhidrosis location (table 1) and severity using a NAS questionary (figure 1) 4) 2013-2018 selective nerve interruption by clipping at the lower pole of each ganglia corresponding with skin area affected by hyperhidrosis. Sweating improvement and satisfaction grade progressively improved; disturbing compensatory sweating decreased from 72% to 3%.

Conclusion: selective ganglia clipping according to the distribution of sweating pattern reported in our table is effective in hyperhidrosis improvement and CH management. However, optimal patient satisfaction is reached when careful preoperative selection and surgical strategy are both tailored to balance advantages and side effects according to patient’s wish.
BILATERAL THORACOSCOPIC SYMPATHECTOMY FOR PRIMARY HYPERHIDROSIS: SURGICAL TECHNIQUE AND OUR EXPERIENCE

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INTRODUCTION
The aim of this study is to illustrate, in detail, the surgical technique of bilateral sympathectomy performed by VATS in our Center in the last twenty years. The main focuses of this project are the costs, the postoperative results and the complications. The level of satisfaction of the patients was also evaluated using a specific questionnaire.

MATERIALS AND METHODS
In our Center, the definitive treatment of primary axillary and palmar hyperhidrosis is performed by bilateral T2-T4 VATS sympathectomy for over twenty years. The surgical procedure is executed under general anesthesia, with single-lumen endotracheal intubation without the use of CO2, using three aesthetic accesses of 5 mm in axillary cavity. The radical removal of selected ganglion is performed based on the location of the predominant disorder. At the end of the procedure a 10 Fr thoracic drainage is placed in the chest cavity. The drainage is removed immediately before the extubation, after forced lung expansion.
This surgical technique was applied systematically from 2000 to 2018 to 863 patients. A telephone questionnaire was administered to evaluate the patient satisfaction.

RESULTS
In our series the surgical technique has proved to be simple, effective, fast, with an average operating times of 40 minutes and low cost, with an hospital stay of two days. The morbidity rate was 2% without mortality.
The satisfaction questionnaire has proven greater satisfaction in terms of improving quality of life in patients with severe palmar hyperhidrosis.

CONCLUSIONS
Our technique is effective in terms of results, complications, operative times and hospitalization. The overall satisfaction of patients appears to be closely linked to the careful selection in terms of localization and severity of hyperhidrosis.
ANALYSIS OF RISK FACTORS AND PREVENTION STRATEGIES OF SYMPATHETIC CHAIN INJURY DUE TO THORACIC SURGERY

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Objective: To explore the high risk factors of sympathetic chain injury during thoracic surgery, related symptoms and prevention measures after injury. Methods: The patients who underwent thoracic surgery from June 2015 to June 2018 were collected. The sympathetic chain injury and general clinical pathological data were collected to observe the clinical relevance of patients with sympathetic nerve injury. Patients with sympathetic neuropathy or lesions involving sympathetic nerves or patients undergoing therapeutic sympathectomy were excluded. The study included 11260 patients, including 9030 lung cancer patients, 625 benign lung tumors, 527 esophageal cancers, 96 benign esophageal lesions, and 982 mediastinal tumors. Results: A total of 203 patients had different degrees of sympathetic chain injury, including 96 patients with thoracotomy, 107 patients with minimally invasive surgery, 28 patients with posterior mediastinal lesions, 20 patients with posterior chest wall lesions, and 25 patients with extensive chest adhesions. Systematic lymph node dissection was performed in 196 cases. Sympathetic chain injury and chest lesions involved posterior mediastinal, lesions involving the posterior chest wall, extensive chest adhesions, and systemic lymph node sampling were significantly associated. Sympathetic nerve chain injury patients mainly showed adiapneustia on the side of the disease, adiapneustia on the upper extremities of the diseased side, Horner syndrome, persistent dizziness, orthostatic hypotension, relief of hypertension, bradycardia. During the follow-up period, 178 patients had significant relief of sympathetic nerve injury, and 25 patients had persistent symptoms and no significant relief. Conclusion: The incidence of iatrogenic injury of sympathetic chain during chest surgery is low but inevitable, and most of them are temporary. Clinicians should fully grasp the knowledge of sympathetic anatomy and mutation, and be familiar with sympathetic anatomy, to avoid anatomical permanent damage of sympathetic nerves, especially special patient groups with mental sub-health status, and to achieve postoperative recovery of the disease and physical and mental health.
Objective: To evaluate the feasibility of applying laryngeal mask neap tidal volume rapid frequency intermittent positive pressure ventilation in anesthesia of thoracoscopic hyperhidrosis surgery. Methods: from May 2017 to May 2018, 86 patients with hyperhidrosis, who underwent endoscopic thoracic sympathectomy (ETS) in our hospital were selected and randomly divided into treatment group and control group. 43 patients in the control group received general anaesthesia with single-lumen intubation, while the other 43 patients in the treatment group received intermittent positive pressure ventilation with a faster rate of neap volume in the laryngeal mask. The anesthetic duration, intraoperative and postoperative adverse reactions and anesthetic dosage of the two groups were compared. Results: The duration of anesthesia and the intraoperative and postoperative adverse reactions of patients in the treatment group were significantly lower than those in the control group, and the dosage of anesthetic drugs, such as propofol and sufentanil, was significantly lower than that in the control group. There was a significant difference in the comparisons between the two groups ($P < 0.05$), with statistical significance. Conclusion: The laryngeal mask neap volume rapid frequency intermittent positive pressure ventilation is widely used in the anesthesia of thoracoscopic palmar hyperhidrosis surgery, which plays an important role in reducing the incidence of intraoperative and postoperative adverse reactions and the dosage of anesthetic drugs, and is worthy of clinical application.
NON-INTUBATED LARYNGEAL MASK AND INTRAVENOUS ANESTHESIA IN THORACOSCOPIC SYMPATHECTOMY: COMPARISON OF SAFETY BETWEEN SELF-BREATHING AND INVOLUNTARY BREATHING

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Objective: Laryngeal mask combined with intravenous anesthesia can be used for thoracoscopic sympathectomy. However, the disappearance of some patients’ self-breathing during anesthesia leads to our investigation on the positive effect of thoracoscopic sympathectomy.

Methods: This is a retrospective propensity score matching study (1:1) which analyses perioperative outcomes between involuntary breathing group (experimental group) and self-breathing group (control group), and compares confounding factors in operation. We monitored HR, BP, SP0₂, PETCO₂ separately after anesthesia intubation (T0), at the beginning (T1), 10 minutes after (T2), 20 minutes after (T3), and the end (T4) of the surgery. Complications, the times of operation, anesthesia, and the removal of laryngeal mask after surgery, comfort of the surgeon, and discharge time are recorded.

Results: 48 matched subjects were selected. Operations are all completed without bleeding, conversion to open surgery, or serious complications. All patients were discharged on surgery day. Intraoperative HR, BP are in the normal range while PETCO₂ of T1-T4 is higher than T0 (P > 0.05). No significant difference between both groups during operation and anesthesia. Operator’s comfort of the experimental group is higher than the control group (P < 0.05). Control group’s removal time of the laryngeal mask is longer (P > 0.05).

Conclusion: Thoracoscopy sympathectomy for involuntary breathing laryngeal venous anesthesia seems reliable especially due to the close relationship between nerves and vessels.
INTRODUCTION

Essential palmar hyperhidrosis (HH) is regularly associated with plantar HH. It has been reported that endoscopic transthoracic sympathectomy (ETS) may also reduce footsweat in over 50% of the patients. Unfortunately, in most patients this effect is not permanent and plantar HH tends to reappear and return to previous levels within months. Induced by a first patient who demanded a combined procedure, the approach was subsequently offered to a small selection of patients with debilitating palmo-plantar hyperhidrosis (PPHH) who had not responded to conventional treatment.

MATERIAL AND METHODS

Between 2017 and 2019, 14 patients (8 F, 6 M), age range 14 to 53 (mean 33.9 years), underwent combined bilateral retroperitoneoscopic and thoracoscopic sympathectomy. 2 patients had undergone previous ETS procedures and suffered significant recurrence of palmar HH.

The procedure was carried out in the following sequence:

1. lumbar retroperitoneoscopic block of the sympathetic chain using 3-4 clips applied interganglionically at the level of L3-4, first in the right flank, then on the left side.
2. 2-port thoracoscopic sympathectomy T3 (ganglion oriented cut + ablation), first left, then right. Two patients opted for the clamping method. No chest drain was set.

Follow-up was carried out with a questionnaire 5-29 months postoperatively.

RESULTS

Total operating time ranged from 85-160 minutes, mean 111.4 minutes. As expected, the ELS fraction was more time-consuming (55-95 minutes, mean 74.6 minutes) than the ETS procedure (30-65 minutes, mean 37.2 minutes). 2 patients had local pleural adhesions after previous surgery, requiring time-consuming lysis. No complications were encountered. Need for analgesics in the first postoperative hours was comparable to single procedures. Total hospitalization was 24 hours for all patients.

At follow-up (5-29 months, mean 19) 37.5% declared themselves completely satisfied, 62.5% satisfied with acceptable side-effects. No patient expressed dissatisfaction or regretted the procedure. Compensatory sweating (CS) was present in all, ranging from mild to moderate. 2 patients reported occasionally pronounced CS in hot conditions, responding well to oxybutynine.

Average quality of life score improved from 1.1 (preoperatively) to 8.5 (at follow-up) on a 0-10 scale. All would certainly (87.5%) or probably (12.5%) redo the operation if having to decide again.

CONCLUSIONS

Combining ETS (T3) and ELS appears to be a suitable option for patients with severe to extreme PPHH, without adding significantly to postoperative discomfort and side-effects, while saving the patient multiple anesthesias, costs and time off-work.
INTRODUCTION: Our preliminary study in the 12th ISSS showed that unilateral endoscopic thoracic sympathectomy (ETS) for palmar hyperhidrosis (PH) could provide higher level of patient satisfaction because of less incidence of compensatory sweating (CS) in comparison with bilateral ETS. OBJECTIVES: The aim of this study is to analyze the resolution of symptoms, recurrence rate, severity of CS and patient satisfaction with a 3-year follow-up of unilateral or bilateral ETS for PH. MATERIALS AND METHODS: From January to December in 2016, 140 patients with PH underwent unilateral extended R4 (R4 + G3 partial ablation) ETS for the dominant hand and 288 patients with PH underwent bilateral extended R4 ETS. For these patients, a questionnaire survey was performed from late June to early July in 2019. Ninety two patients in unilateral ETS group and 110 patients in bilateral ETS group were available in this survey and the response rate was 65.7% and 38.2%, respectively. RESULTS: In unilateral group, PH of the dominant hand in 97 patients (97.8%) was cured and 2 patients (2.2%) relapsed. Absolute dryness was achieved in 56 patients (60.9%), almost dryness in 29 patients (31.5%) and slightly wetness in 5 patients (5.4%). Moreover, PH of the opposite hand was also alleviated to almost dryness in 33 patients (35.9%) after unilateral ETS probably due to the improvement of psychological stress of daily life, such as shaking hands and using a pen. During follow-up periods, 26 patients (28.3%) had been performed secondary extended R4 ETS for the opposite hand and 15 patients (16.3%) desired to have the opposite operation in the near future. After all, 51 patients (55.4%) did not necessitate the surgery for the opposite hand. CS was observed in less than 50% of patients in unilateral group; 43 patients (46.7%) had minor CS, 2 patients (2.2%) had moderate CS and none had severe CS. Nine of 26 patients (34.6%) who had had secondary operation for the opposite hand resulted in the increment of CS but none had severe CS. Overall, 60 patients (65.2%) in unilateral ETS group were very much satisfied, 25 patients (27.2%) were satisfied, 5 patients (5.4%) were slightly satisfied and two patients (2.2%) were dissatisfied due to recurrence. In bilateral group, complete dry hands obtained in 58 patients (52.7%), almost dry hands in 43 patients (39.1%), slightly wet hands in 5 patients (4.5%) and 4 patients recurred (3.6%). Approximately 80% of patients in bilateral group had CS; 44 patients (40.0%) had minor CS, 37 patients (33.6%) had moderate CS and 4 patients (3.6%) had severe CS. Overall, 42 patients (38.2%) in bilateral group were very much satisfied, 52 patients (47.3%) were satisfied, 8 patients (7.3%) were slightly satisfied and 8 patients (7.3%) were dissatisfied due to recurrence and/or severe CS, however none regretted. CONCLUSIONS: With a 3-year follow-up, unilateral ETS had less incidence of severe CS and provided a considerable higher level of patient satisfaction in comparison with bilateral ETS. Following unilateral ETS, the patients are able to select the treatments for the opposite hand after having experienced CS in hot summer.
Thoracoscopic Sympathicotomy for Palmar and Plantar Hyperhidrosis: A Comparison Between Two Approaches

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**Background:** More than 50% palmar hyperhidrosis (PAL) patients also have plantar hyperhidrosis simultaneously. We compared the long-term results of R3 and R3+ R4 sympathicotomy for the treatment of the palmar and plantar hyperhidrosis patients.

**Methods:** We compared the preoperative baseline data and clinical data of 220 patients who underwent R3 or R3 + R4 sympathicotomy. Patients were divided into R3 and R3 + R4 group. All of them were questioned after 1 year by phone or outpatient review. The follow-up focused on the improvement of hyperhidrosis, recurrence, overall satisfaction and compensatory hydrosis (CH). Then propensity matching analysis was performed.

**Results:** Compared with R3 group, the R3+R4 group showed a higher percentage of palmar (98.75% vs 93.33%, P=0.007) and plantar (65.63% vs 45.00%, P=0.008) relief. Propensity matching produced 60 matched pairs, there was also a significant difference in palmar(P=0.012) and plantar(P=0.028) hyperhidrosis relief. Overall satisfaction (P=0.293) and CH (P=0.698) were comparable. **Conclusion:** Compared with R3 sympathicotomy, R3+R4 sympathicotomy can achieve a higher rate of improving palmar and plantar hyperhidrosis without increasing the incidence of CH. R3+R4 sympathicotomy is a feasible and reliable method for the treatment of palmar and plantar hyperhidrosis.
Avoid compensatory hyperhidrosis after sympathetic surgery for craniofacial hyperhidrosis

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OBJECTIVES: Endoscopic thoracic sympathectomy (ETS) has not been widely adopted for treating craniofacial hyperhidrosis (CFH) due to its known postoperative complication, compensatory hyperhidrosis (CH). In this study, we evaluated whether the autonomic nerve analysis data via pre-ETS heart rate variability (HRV) test can predict post-ETS CH in patients with CFH.

METHODS: From October 2017 to September 2018, we consecutively included CFH patients who underwent ETS and received preoperative HRV. In this prospective observational study, we evaluated those who developed CH 3 months postoperatively. The CH grades were categorized into none, mild, moderate, and severe.

RESULTS: A total of 39 patients were included; the mean age was 45.2 ± 12.2 years, and there were 31 males (79.5%). Nineteen (48.7%) patients had a post-ETS CH grade of greater than moderate (moderate and severe). We further classified the group into trivial and serious compensation, based on the CH grade for comparison. Among the various HRV values, low frequency/high frequency (LF/HF) value was the only one that achieved statistical significance (P = 0.016). Moreover, among those in the trivial compensatory group, 18 (90.0%) patients had an LF/HF value between 0.40 and 2.60, and therefore, were included in the autonomic balanced group. On the other hand, among those in the serious compensatory group, 18 patients had an LF/HF value of less than 0.40 and greater than 2.60, and thus, in the autonomic dysfunction group.

CONCLUSIONS: According to the present study, HRV test, especially the LF/HF value, appears to be a useful test in predicting post-ETS serious CH.
ANALYSIS OF COMPLICATIONS AND PATIENTS’ SATISFACTION FOLLOWING BILATERAL SYMPATHECTOMY R5-R8 FOR THE TREATMENT OF SEVERE COMPENSATORY HYPERHIDROSIS

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ABSTRACT

Objectives: To assess the life quality of patients undergoing bilateral thoracic sympathectomy from R5 to R8 as a treatment procedure of severe and debilitating compensatory hyperhidrosis (CH). Methods: Twelve patients with severe and debilitating compensatory hyperhidrosis have undergone extended sympathectomy (R5-R8) from September 2016 to May 2019 at Hospital das Clínicas, Federal University of Pernambuco, Recife, PE, Brazil. Outcomes such as the level of patient satisfaction with surgery and life quality scores adapted to compensatory hyperhidrosis as well as postoperative complications have been assessed. Results: There has been an improvement in the life quality response of over 66%. In all spheres of function there has been statistical relevance in the improvement of symptoms related to compensatory hyperhidrosis. Conclusions: Extended sympathectomy from R5 to R8 has shown to be quite effective in most cases that were carried out, making us believe that this approach could be a therapeutic option for severe compensatory hyperhidrosis.

Keywords: Hyperhidrosis; sympathectomy; compensatory.
Kim, Jae Jun

Introduction

The present study was designed to suggest the new sympathicotomy method for primary hyperhidrosis to overcome compensatory hyperhidrosis.

Materials and methods

From March 2014 to December 2018, 212 patients with primary craniofacial or palmar hyperhidrosis who had undergone the thoracoscopic sympathicotomy were included. Telephone surveys were used for collection of data. T2 sympathicotomy for craniofacial hyperhidrosis (53 cases) and T3 or T4 sympathicotomy for palmar hyperhidrosis (159 cases) were performed. Plus this conventional sympathicotomy (145 cases), we expanded the levels of sympathicotomy to R8 or R12 (53 cases) to prevent compensatory hyperhidrosis in caution of the splanchnic nerves (the new sympathicotomy technique). Conventional and the new sympathicotomy techniques were compared in terms of sweat reduction and degree of compensatory hyperhidrosis.

Results

There was no significant difference in sweat reduction between conventional and our new technique in both craniofacial and palmar hyperhidrosis. However, our new technique (full expanded sympathicotomy) showed significantly less compensatory hyperhidrosis in both craniofacial and palmar hyperhidrosis (craniofacial p=0.001 and palmar p <0.001).

Conclusions

Our new technique of sympathicotomy was safe and feasible to reduce compensatory hyperhidrosis with the same effect on sweat reduction in both craniofacial and palmar hyperhidrosis.
Implementation of a Symptom Management Education Module for patients with Palmar Hyperhidrosis

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Background: Palmar hyperhidrosis is a condition which causes excess sweating of the hands and negatively affects patients socially and professionally. A systematic review of the literature revealed evidence that suggested guided imagery and relaxation technique in this population contribute to symptom reduction. The aim of this project was to implement a symptom management education module (SMEM) based on the current literature using guided imagery and relaxation techniques for patients with primary palmar hyperhidrosis to improve coping, reduce sweating, and improve quality of life. Methods: Rogers’ theory of diffusion of innovation guided the implementation of this evidence-based project. The module consisted of two outpatient visits 2-4 weeks apart to assess the participants’ improvement in coping with their symptom, reduction in sweating and improvement in quality of life. Intervention: The SMEM consisted of a PowerPoint presentation with an overview of the pathophysiology of hyperhidrosis, cognitive restructuring, coping skills and relaxation with guided imagery. The module was administered orally to each participant at the initial visit by the Nurse Practitioner. The participants completed the Hyperhidrosis Disease Severity Scale, the Hyperhidrosis Quality of Life Index questionnaire, the General Self-efficacy questionnaire before and after (2-4 weeks) the module. Results: Following the implementation of the symptom management education module, the majority of participants returned for a second visit. There was improvement in disease severity, the ability to cope, and improvement in quality of life after the implementation of the module. Conclusions: The results of this quality improvement project suggest that the SMEM for participants with palmar hyperhidrosis had a clinically meaningful impact on the participants.
The Safety and Feasibility of Intraoperative Near-Infrared Fluorescence Imaging with Indocyanine Green in Thoracoscopic Sympathectomy for Primary Palmar Hyperhidrosis

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**Objectives:** We investigated the safety and feasibility of intraoperative near-infrared (NIR) imaging using indocyanine green (ICG) during sympathectomy in the management of primary palmar hyperhidrosis (PPH). **Methods:** We performed a retrospective review of 142 patients (ICG group) who underwent endoscopic thoracic sympathectomy (ETS) between February 2018 and April 2019. All patients received a 5 mg/kg infusion of ICG 24 hours preoperatively. The vital signs before and after ICG injection and adverse reactions were recorded. Meanwhile, 498 patients (Non-ICG group) who underwent ETS by the normal thoracoscopy during August 2017 to April 2019 were also reviewed to compare the abnormal rates of white blood cell (WBC), alanine transaminase (ALT), aspartate transaminase (AST), blood urea nitrogen (BUN), and creatinine (Cr) before and after operation between two groups. **Result:** For ICG group, the vital signs including body temperature, heart rate and blood pressure before and after ICG injection were stable. There was no significant difference in abnormal rates of WBC, ALT, AST, BUN, and Cr before and after operation between two groups. Only one patient had mild adverse reaction (0.7%) after ICG injection. The visibility rate of all sympathetic ganglions was 96.7% (1369/1415). The visibility rate from T1 to T5 was 98.23% (278/283), 98.23% (278/283), 97.17% (275/283), 95.76% (271/283), and 94.35% (267/283), respectively. There was no significant difference in the visibility rate with regard to age, gender, height, weight, body mass index, and the grade of the PPH. **Conclusions:** NIR fluorescence imaging with ICG for identifying the sympathetic ganglions is relatively safe and feasible.
Analysis of the curative effect of selective thoracic sympathectomy for primary palmar hyperhidrosis by single-hole thoracoscopy

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Objective: Study on curative effect for Primary Palmar Hyperhidrosis of selective thoracic sympathectomy of dominant hand T3 and contralateral T4 with five-millimeter thoracoscopy compared with bilateral T4 excision. Methods: From January 2016 to January 2018, general data and follow-up data were collected and analyzed from 68 cases of selective resection and 71 cases of bilateral T4 resection in my treatment group. Results: All operations were successful performed: 68 cases of postoperative dominant palm hyperhidrosis symptoms disappeared immediately (100%); 2 cases of contralateral hand were mild humidity (1.42%), no serious complications occurred during and after surgery. Postoperatively, 25 cases (36.8%) had mild compensatory hyperhidrosis, 20 cases (29.4%) had moderate compensatory hyperhidrosis, and 2 cases (2.9%) had severe compensatory hyperhidrosis. Conclusion: Selective thoracic sympathectomy with 5mm thoracoscopy for the treatment of palmar hyperhidrosis is effective and safe. It is an alternative surgical treatment for primary palmar hyperhidrosis.
VIDEO-ASSISTED MEDIASTINOSCOPY THORACIC SYMPATHECTOMY IN TREATMENT OF PALMAR HYPERHIDROSIS COMBINED WITH PLEURAL ADHESIONS

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Objective: We cut off the sympathetic nerve at the 4th thoracic vertebra level to treat palmar hyperhidrosis combined with pleural adhesions, using video-assisted mediastinoscopy. The effects were observed.

Method: From April 2003 to March 2019, a total of 2,095 patients with palmar hyperhidrosis were collected in our hospital. There were 1165 males and 930 females, and 35 patients combined with pleural adhesions. All patients received video-assisted mediastinoscopy thoracic sympathectomy, and single lumen endotracheal intubation, single-port and single-point were used. If pleural adhesions were mild, we can use a hook-electric to cut off the adhesive band to expose the thoracic sympathetic ganglions. If pleural adhesions were serious, the electrocoagulation suction device or ultrasonic knife was used to cut the adhesive band for reaching the thoracic sympathetic chain. If there was bleeding, we would cauterized the wound or clamp the vessels with Hem-o-lok or titanium clip.

Results: The operation results were satisfied, none required turning to open chest. Less patients with pneumothorax or pleural effusion required thoracic closed drainage for one or two days. Most patients did not have such complications and recovered very well.

Conclusion: We used video-assisted mediastinoscopy to treat palmar hyperhidrosis combined with pleural adhesions. The effects were satisfied. This method was safe and effective.
A New Ultra-minimally Invasive Splanchnic Nerve Dissection for the Treatment of Upper Abdominal Pain in Advanced Pancreatic Cancer

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Pain, malnutrition and obstructive jaundice are the three major factors affecting the quality of life and survival of patients with advanced pancreatic cancer. Sufficient analgesia can improve the quality of life and prolong the survival time of patients.

Objective: The aim of this study is to introduce a new method for the treatment of refractory epigastralgia in advanced pancreatic cancer by ultra-minimally invasive splanchnic nerve dissection. Methods: From 2016 to 2019, 12 patients with advanced pancreatic cancer were enrolled, including 9 males and 3 females with an average age of 46 years. All patients with intractable epigastric pain after exploratory laparotomy and gastrojejunostomy/cholangiojejunostomy. Preoperative pain score was 5.5–9.5 with a median of 6.8. Single-chamber endotracheal intubation combined intravenous anesthesia was performed. The patients were in right prone position, with a 3 mm trocar puncture into the chest though the 5th intercostal space of axillary midline, 8 mmHg of CO₂ inflatable pressure, insertion of pinhole endoscopy, another puncture between axillary posterior line and axillary anterior line between the 6th intercostal puncture and insertion of 1.8 mm self-made ultra-fine hook, and the splanchnic nerve was disconnected under direct vision by endoscopy. Results: The operation time was 5–15 minutes (median 8 minutes), and the bleeding was 0–5 mL. Postoperative hospitalization was 1–2 days. Postoperative pain intensity decreased significantly. The upper abdominal pain score was 0–4.5 (median 1.9) one week after operation. The dosage of analgesics was significantly reduced in all patients, with 2 of them discontinued analgesics. Conclusion: Ultra-minimally invasive splanchnic nerve dissection with needle-hole thoracoscopy and self-made ultra-fine electric hook has less trauma and quicker recovery after operation. It has a definite effect in the treatment of intractable pain in advanced pancreatic cancer and deserves to be popularized in clinic.

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Title: Hyperhidrosis, endoscopic thoracic sympathectomy, and cardiovascular outcomes: A Korean Health Insurance Review and Assessment service database cohort study

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Abstract

Background: Over activity of sympathetic nerves is known to be associated with hyperhidrosis and cardiovascular diseases. Endoscopic thoracic sympathectomy (ETS) has been considered as one of treatment method for primary hyperhidrosis to reduce sympathetic over activity. We aimed to compare the risk of cardiovascular events between individuals with and without hyperhidrosis, and investigate the effects of ETS on cardiovascular outcomes in Korean population. Methods: we used nationwide population based cohort study named the Korea Health Insurance Review and Assessment (HIRA). Subjects with a new diagnosis of hyperhidrosis in 2010 were identified, and they were divided into two group according to receiving ETS or not. Propensity scores were calculated using logistic regression and matched for the presence of hyperhidrosis. We analyzed risks of cardiovascular events (stroke and ischemic heart diseases and other cardiovascular diseases) with hyperhidrosis and ETS using a Cox proportional-hazards analysis. Results: The hyperhidrosis patients were significantly higher risks of cardiovascular events than the control group (Hazard ratio: 1.83; 95% Confidence interval: 1.60 to 2.09; p = 0.001) after adjusted for age, gender, comorbidities. Also, the hyperhidrosis patients without receiving ETS were significantly higher risks of cardiovascular events than the patients with receiving ETS. (Hazard ratio: 1.88 95% Confidence interval: 1.64 to 2.11; p = 0.001) However, the risk of cardiovascular events in the hyperhidrosis patients receiving ETS, revealed no significant difference from the risk in control group. Conclusion: Hyperhidrosis patients had significantly higher risk of cardiovascular events than individual without hyperhidrosis, and ETS could reduce the risk of cardiovascular diseases in individuals with hyperhidrosis.
ENDOSCOPIC THORACIC SIMPATECTOMY AS A THERAPEUTIC ALTERNATIVE FOR HYPERIDROSIS: TWO CLINICAL CASES

AUTHORS
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AFFILIATION

OBJECTIVE
Hyperhidrosis is a disease characterized by excessive sweating beyond the physiological needs specially involving armpits, hands palm and feet. This condition can severely compromise daily life quality. The main cause of patient dissatisfaction in the post-operative period is compensatory sweating probably sustained by the persistence of some nerve fibers collected in Kuntz's nerve. Basing on this hypothesis, numerous authors suggest the section of this nerve during the surgical procedure.

MATERIALS AND METHODS
Two clinical cases of highly invalidating palmar hyperhidrosis successfully treated at the Thoracic Surgery Division of the University of Turin.

RESULTS
We present two clinical cases of palmar hyperhidrosis in young patients (19 and 32 years) strongly conditioned in their relationship life by this condition. Both are subjected to bilateral thoracoscopy in a single operative session using three 5mm accesses. Through the lower pleurotomy the 30° 5mm thoracoscopic camera is introduced, the other accesses are dedicated to the remaining thoracoscopic instruments. Once the thoracic sympathetic chain has been identified, the IV ganglion is isolated and interrupted by a metal clip after identification and section of Kuntz's nerve. At the end of the procedure a pleural drainage 20Ch is placed and then removed after 45' of aspiration before the patient is discharged from the surgical unit. After a chest X-ray, both patients are discharged in 24 hours. At 6 months both cases are totally asymptomatic.

CONCLUSIONS
Endoscopic thoracic sympathectomy should be considered when other therapeutic approaches are unsatisfactory. The surgical technique presents few operational difficulties and to avoid early recurrences it is recommended to identify and dissect the Kuntz nerve.
Use of continuous CO2 insufflation in transthoracic endoscopic sympathectomy

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BACKGROUND:
The objective of our study was to evaluate the advantages of intrathoracic CO2 insufflation in patients undergoing thoracic sympathectomy (TS) under general anesthesia

METHODS:
We retrospectively analyzed 42 patients who underwent bilateral ETS between January 2011 and December 2018. Mean age was 32 years including 25 females (59%). In 20 cases continuous CO2 insufflation was used while 22 cases underwent surgery performed without CO2 insufflation. All patients were ventilated by double lumen.

RESULTS:
In these patients, no CO2 retention was noted. Oxygenation and cardiovascular stability were maintained and there were no complications. Oxygenation and cardiovascular stability were maintained and there were no complications. Operative Time was shorter in the CO2-group (49.71 min VS 57 min). Concerning early post-operative period: 33.3 % of the non-CO2 group presented both apical pneumothorax and subcutaneous emphysema, compared to 28 % in the CO2 group. Concerning resolutions of symptoms 100 % of patients had complete resolutions of symptoms in the CO2 group, versus 95.2% in the non-CO2 group.

CONCLUSIONS:
Continuous insufflation of CO2 in ETS is easy, simple and safe. Advantages of this technique could include a reduced operative time, and possibly a more performing procedure.
ENDOSCOPIC THORACIC SIMPATECTOMY FOR PALMAR HYPERHIDROSIS: QUALITY OF LIFE AFTER LONG TERM FOLLOW-UP

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Objective
This study investigated the long-term impact of thoracoscopic sympathectomy on subjective health-related quality of life (HRQoL) and psychological properties

Methods
This was a prospective, nonrandomized and uncontrolled study. From January 2004 to December 2014, 109 consecutive patients with palmar hyperhidrosis underwent ETS and were included in the study. Patients who underwent thoracoscopic sympathectomy were followed up for more than 5 years. A QoL questionnaire was applied at the preoperative day, 14 days after surgery and after the fifth year.

Results
Fifteen patients (14%) did not answer all the questions and were excluded, and we therefore analysed 94 patients. Their ages ranged from 16 to 66 years old, with a mean of 33 + 7.9 years, including 53 female patients (57%). All patients were assessed on three occasions: before surgery, 14 days after surgery and after the fifth postoperative year. The QoL before surgery was considered to be poor or very poor for all patients. The QoL around 14 days after surgery was better in 87 (93%) of patients, the same in 5 patients (5%), and worse in 2 patients (2%). After 5 years, 86 patients (92%) were better, 6 (6%) were the same, and 2 (2%) were worse. There were no differences between these postoperative times according to the statistical test.

Conclusion
The patients had an immediate improvement in QoL after ETS, and this improvement was sustained until the fifth postoperative year.

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Introduction

Near infrared (NIR) fluorescence imaging of sympathetic ganglia after administration of indocyanine green (ICG) is a recent innovation in sympathetic surgery. We report our initial experience in order to proceed the discussion in the International Society of Sympathetic Surgery.

Patients and methods

Five patients underwent thoracoscopic sympathetic clipping for treatment-refractory hyperhidrosis after preoperative intravenous administration of ICG. NIR fluoroscopy of sympathetic ganglia was performed intraoperatively with OPAL1® device (Karl Storz, Tutlingen, Germany). The fluoroscopy images were correlated with anatomical location of ganglia during sympathetic trunk preparation.

Results

No complications associated with ICG administration occurred. The quality of imaging was dependent on dosis and timing of ICG administration based on indirect visualisation due to slow blood flow in sympathetic ganglion.

Conclusion

Experience with NIR fluorescence imaging after ICG administration in sympathetic surgery has been limited to date. Further analysis are required to define potential indications.
Harlequin-Syndrome following sympathicus clipping: a rare condition.

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Introduction

Harlequin-Syndrome after sympathetic surgery for treatment-refractory hyperhidrosis is a rare complication with unknown incidence. We report two cases with this neurologic disorder after videothoracoscopic sympathicus clipping.

Patients and methods

Two female patients [29 and 20 years] underwent a R4/R5 sympathicus clipping for therapy-refractory hyperhidrosis [1 palmo-plantar and axillar; 1 palmo-plantar]. After uneventful postoperative course, an exercise induced hemifacial erythema and hyperhidrosis have been noted. To identify underlying pathologic mechanism, intraoperative videos and postoperative chest X-rays were reviewed.

Results

Both patients were symptom-free, with dry hands. The cause of neurologic disorder could not be identified. Six months after surgery, harlequin-syndrome was declining and completely disappeared after 9 months in both patients.

Conclusion

Sympathetic surgery can be associated with relevant neurological disorders, such as harlequin syndrome. Pathologenesis remains unclear. Neurological assessment within the postoperative follow-up is recommended.
What is the extent of sympathetic blockage required to have a satisfactory result in facial blushing?

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Objective: Endoscopic thoracic sympathectomy (ETS) is an effective treatment for facial blushing, but the procedure has potentially severe side-effects, which may affect up to 20% of all patients. Different levels of ETS have been proposed. A T3 ETS has less side-effects but is also known to be less less effective then a T2. At our institution sympathectomies are performed monolateral in a staged procedure. In case of dissatisfaction or side-effects patient are given a further appointment at very short notice. Aim of the study was to investigate the number and proportion of patients who proceeded from a monolateral T3 to a full T3 or a T2 sympathectomy or clip removal.

Method: We looked at theater and outpatient accesses of single patients.

Result: 30% of the patients had only a monolateral T3 sympathectomie. The rest of the patients moved on from a monolateral to a bilateral T3 sympathectomy and 20% of the patients moved on from a T3 bilateral to a T2 bilateral procedure. The group of patients who benefitted from a monolateral T3 were satisfied with relief of symptoms. Harlequin syndrome may be present but it is not affecting quality of life. A reduction of blushing of minor degree could be observed also on the non operated side.

Conclusions:

1. One surgical intervention good for everyone patient does not exist. A staged approach is necessary in order to increase overall satisfaction.
2. More studies are needed to determine preoperatively the correct level of intervention.
3. The exact cause of the blushing is poorly understood and reduction of sympathetic tissue may be the clue.
Clip removal after endothoracic sympathetic block: 5-year results in patients with upper-limb hyperhidrosis

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Background: Reversibility of severe compensatory sweating (CS) has been controversially discussed after clip removal (CR) in patients with upper-limb hyperhidrosis (HH). The aim of this prospective study was to explore long-term outcome for the first time.

Methods: Postoperative HH and CS rates were graded from 0 to 10 on a visual analogue scale (VAS: 10 worst sweating) after endothoracic sympathetic block (ESB). Likewise, alterations after CR were evaluated. Moreover, patients’ satisfaction was assessed. Follow-up investigations were performed at 9 months and 5 years after CR.

Results: A median follow-up of 87 months was completed in 24 out of 30 patients (80.0%). Severe CS significantly decreased 9 months after CR (VAS: 3.7; CI: 2.2–5.2; P<0.001) in 11 patients (45.8%). One patient was lost to long-term follow-up. Five years after operation, 13 out of 23 patients (56.5%) experienced significant improvement of CS (VAS: 3.3; CI: 1.5–5.0; P=0.002). None of the patients gained complete cessation of CS. HH rates deteriorated in 11 out of 23 patients (47.8%: 4 palmar HH and 9 axillary HH) after 5 years. 10 out of 23 patients (43.5%) were fully or partly satisfied after CR at long-term follow-up.

Conclusion: There is evidence of recovery of the sympathetic trunk after CR as half of the patients report improved CS even at long-term follow-up. Return of initial HH may impair patients’ satisfaction, which should be considered for future patient information.