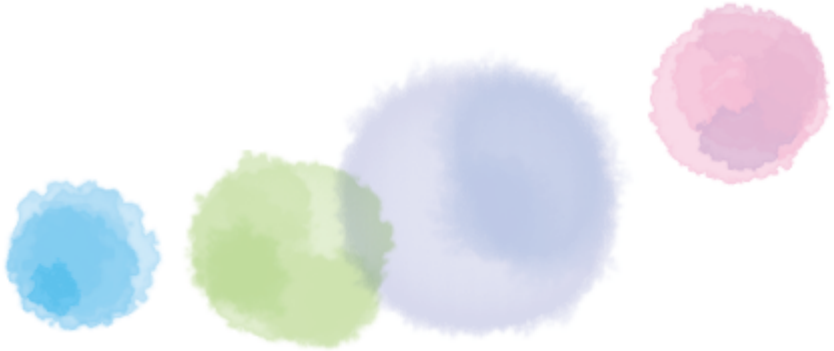
プライマリ・ケア　カンファレンス　抄読会

交感神経切断術後の代償性発汗について

青森新都市　総合診療科
佐々木洸太



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限局性多汗症

《診断基準》

1）最初に症状がでるのが 25 歳以下であること
2）対称性に発汗がみられること
3）睡眠中は発汗が止まっていること
4）1 週間に 1 回以上多汗のエピソードがあること
5）家族歴がみられること
6）それらによって日常生活に支障をきたすこと.

部位	有病率	発症年齢
手掌	5.33%	13.8歳
足底	2.79%	15.9歳
腋窩	5.75%	19.5歳
顔面	4.7%	21.2歳

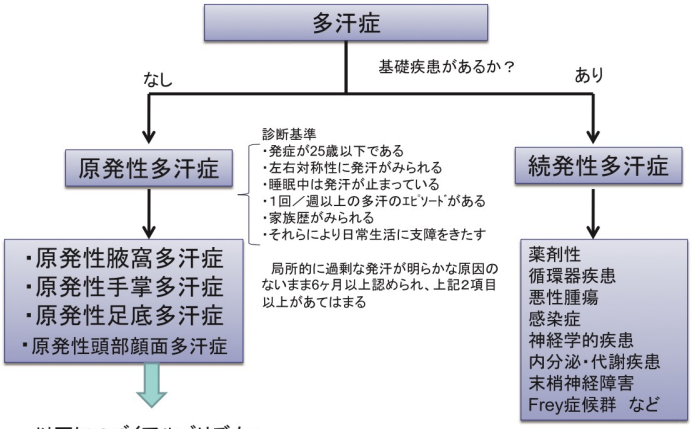
平成21年度厚生労働省難治性疾患克服研究
特発性局所多汗症研究班調査より

《重症度分類》

①発汗は全く気にならず，日常生活に全く支障がない.
②発汗は我慢できるが，日常生活に時々支障がある.
③発汗はほとんど我慢できず，日常生活に頻繁に支障がある.
④発汗は我慢できず，日常生活に常に支障がある.

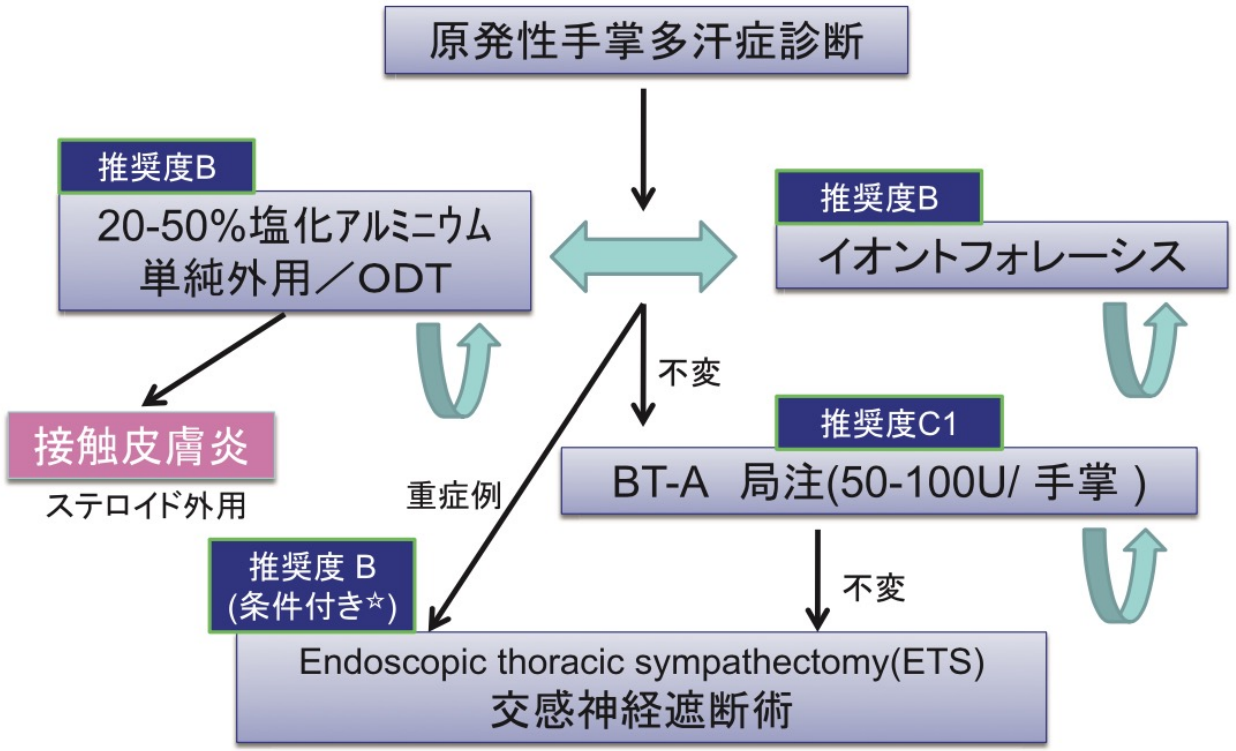
原発性局所多汗症診療ガイドライン 2015 年改訂版

図 1



診断・治療アルゴリズム

図３　原発性手掌多汗症における診療アルゴリズム



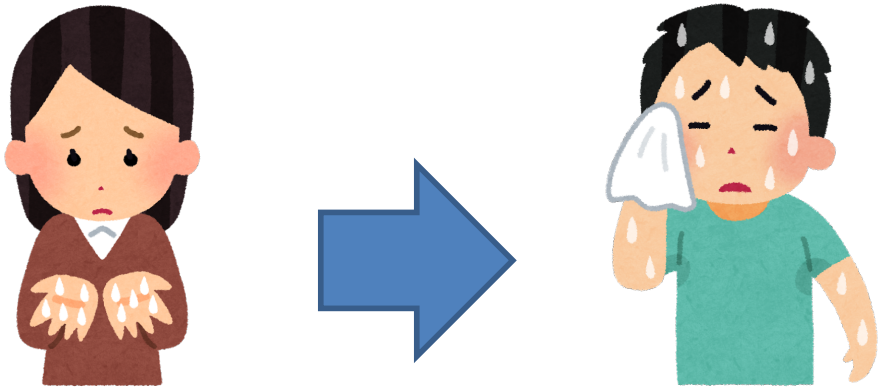
※　この他に、併用療法として内服療法、神経ブロック、レーザー療法(推奨度C1)
　　精神(心理)療法(推奨度C1～C2)を用いてもよい
☆ 交感神経遮断術は**重症**で**保存的治療法に抵抗性**に限り、**患者本人の強い希望**があること
　交感神経遮断術の切断部位として**T2は避ける**ことが望ましい(**推奨度C1**)

代償性発汗の患者さん

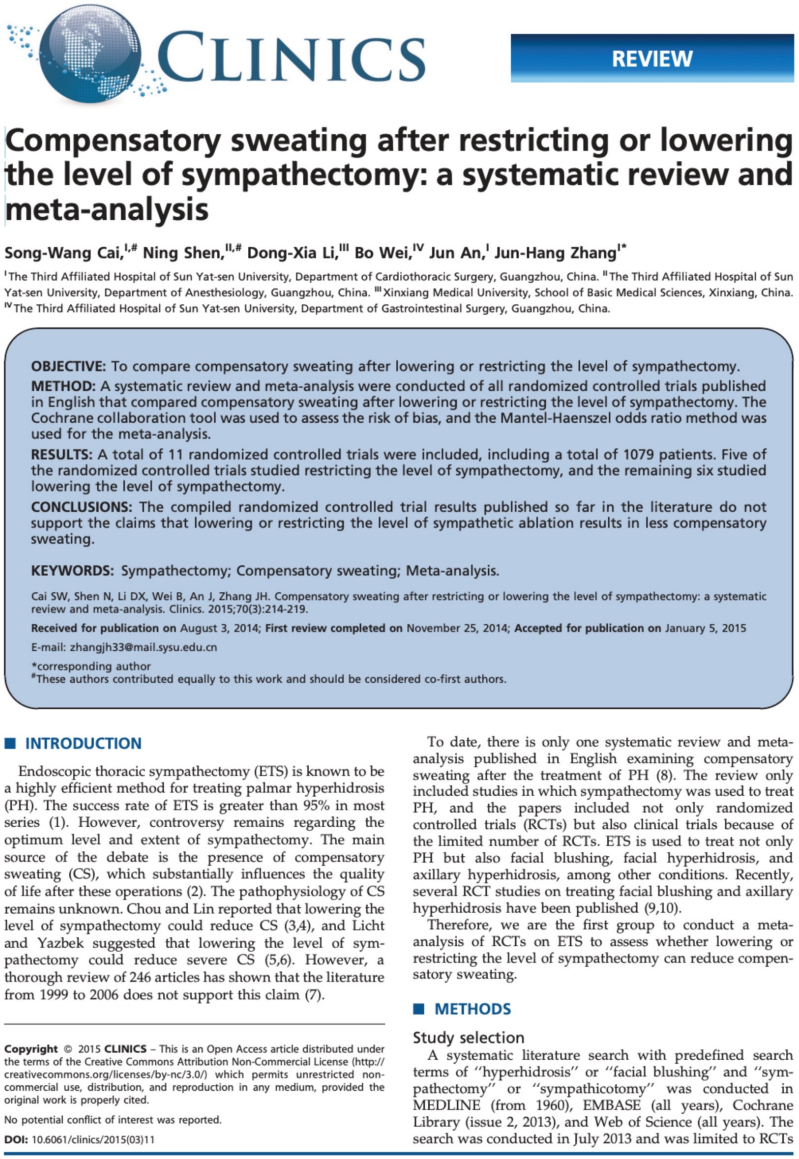
- 42歳　女性
- 24歳　交感神経切断術
- 術後から頭頸部～胸部が火照るけど、汗がかけない
- 常にのぼせたような状態
  胸から下が発汗多量
- 仕事中も着替えなければならないくらいの状態

→現在は白虎加人参湯
　　抗ヒスタミン薬など

代償性発汗の分類	症状・具体例
Slight/mild	熱いお湯飲んだり、運動したりしたときの今までなかった目に見える気にならない程度の発汗
Moderate/disturbing	目に見える外出や滞在に支障がでるほどの発汗
Severe/disabling	完全に（上着まで）着替える必要があり、社会的に、仕事の上でも支障が出る



本日の論文①



CLINICS

REVIEW

Compensatory sweating after restricting or lowering the level of sympathectomy: a systematic review and meta-analysis

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OBJECTIVE: To compare compensatory sweating after lowering or restricting the level of sympathectomy.

METHOD: A systematic review and meta-analysis were conducted of all randomized controlled trials published in English that compared compensatory sweating after lowering or restricting the level of sympathectomy. The Cochrane collaboration tool was used to assess the risk of bias, and the Mantel-Haenszel odds ratio method was used for the meta-analysis.

RESULTS: A total of 11 randomized controlled trials were included, including a total of 1079 patients. Five of the randomized controlled trials studied restricting the level of sympathectomy, and the remaining six studied lowering the level of sympathectomy.

CONCLUSIONS: The compiled randomized controlled trial results published so far in the literature do not support the claims that lowering or restricting the level of sympathetic ablation results in less compensatory sweating.

KEYWORDS: Sympathectomy; Compensatory sweating; Meta-analysis.

Cai SW, Shen N, Li DX, Wei B, An J, Zhang JH. Compensatory sweating after restricting or lowering the level of sympathectomy: a systematic review and meta-analysis. Clinics. 2015;70(3):214-219.

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#These authors contributed equally to this work and should be considered co-first authors.

INTRODUCTION

Endoscopic thoracic sympathectomy (ETS) is known to be a highly efficient method for treating palmar hyperhidrosis (PH). The success rate of ETS is greater than 95% in most series (1). However, controversy remains regarding the optimum level and extent of sympathectomy. The main source of the debate is the presence of compensatory sweating (CS), which substantially influences the quality of life after these operations (2). The pathophysiology of CS remains unknown. Chou and Lin reported that lowering the level of sympathectomy could reduce CS (3,4), and Licht and Yazbek suggested that lowering the level of sympathectomy could reduce severe CS (5,6). However, a thorough review of 246 articles has shown that the literature from 1999 to 2006 does not support this claim (7).

To date, there is only one systematic review and meta-analysis published in English examining compensatory sweating after the treatment of PH (8). The review only included studies in which sympathectomy was used to treat PH, and the papers included not only randomized controlled trials (RCTs) but also clinical trials because of the limited number of RCTs. ETS is used to treat not only PH but also facial blushing, facial hyperhidrosis, and axillary hyperhidrosis, among other conditions. Recently, several RCT studies on treating facial blushing and axillary hyperhidrosis have been published (9,10).

Therefore, we are the first group to conduct a meta-analysis of RCTs on ETS to assess whether lowering or restricting the level of sympathectomy can reduce compensatory sweating.

METHODS

Study selection

A systematic literature search with predefined search terms of "hyperhidrosis" or "facial blushing" and "sympathectomy" or "sympathicotomy" was conducted in MEDLINE (from 1960), EMBASE (all years), Cochrane Library (issue 2, 2013), and Web of Science (all years). The search was conducted in July 2013 and was limited to RCTs

No potential conflict of interest was reported.

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- 広州市にある中山大学からのMeta-Analysis
- 世界でも交感神経切断術後の代償性発汗のMeta-Analysisは希少
- 記載の無い項目については元文献の著者に問い合わせ
- 胸腔鏡下交感神経切断術の限局性多汗症の改善率は“95%以上”
- ただし、代償性発汗がQOL低下

  （別な文献では98%に発生し、11.2%が不満を感じている）

Table 1 - Description of the Included Studies.

Authors	Year	Country	Sympathectomy		Follow-up	n		EG		CG	
			EG	CG	(month)	EG	CG	CS	Severe CS	CS	Severe CS
Baumgartner	2011	USA	T3	T2	More than 12	60	61	37	1	43	1
Inan	2008	Turkey	T2-4,T2-3	T2-4	35.3±15.6	60	20	13	absence	3	absence
Ishy	2011	Brazil	T4-5	T3-4	12	20	20	15	1	20	1
Katara	2007	Singapore	T2	T2-3	2-65	25	25	20	0	20	0
Li	2008	China	T3	T2-4	1-12	117	115	25	4	33	11
Licht	2012	Denmark	T2	T2-3	More than 12	42	51	40	0	46	0
Liu	2009	China	T4	T3	17.8±7.9	73	68	39	0	48	0
Mahdy	2008	Egypt	T3-4,T4-5	T2-3	13±8	40	20	11	5	12	7
Munia	2008	Brazil	T4-5	T3-5	12	33	31	14	0	29	0
Yang	2007	China	T4	T3	13.8±6.2	85	78	38	0	55	0
Yazbek	2009	Brazil	T3-4	T2-3	20	30	30	29	4	28	13

EG, Experiment group; CG, Control group.

- 2719の研究があり、適格基準を満たした11のRCTsをMeta-Analysis
- 合計1079人の患者(介入群:585　対照群:519)　25人は両方に該当
  ∵片側T2のみに切断後、もう片方のT2.T3の切断術を受けているから
- ２つの研究は代償性発汗の正確な数値は記載されていなかったが、
  Eメールで問い合わせたら、重症な代償性発汗はなかったと返信あり

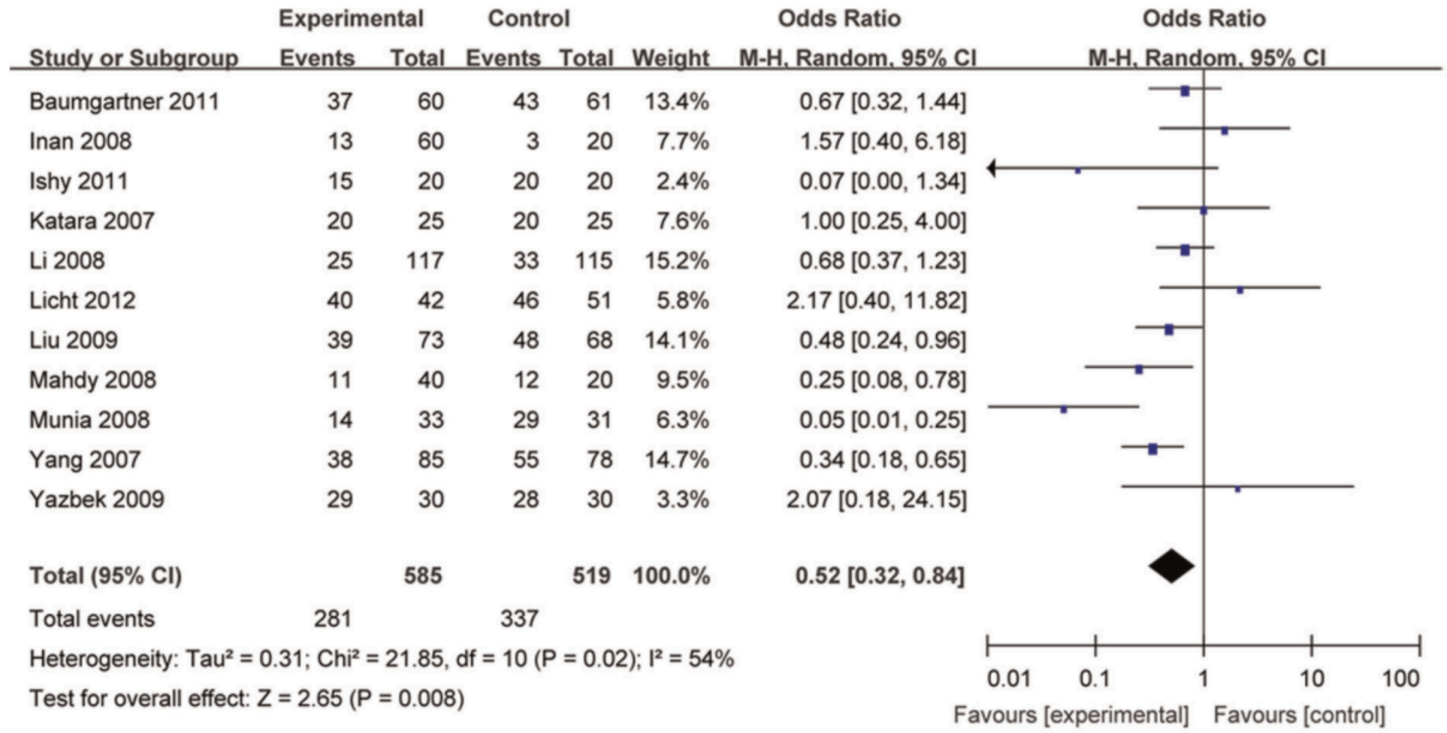


Figure 1 - CS after restricting or lowering the level of sympathectomy. CI, confidence interval; CS, compensatory sweating.

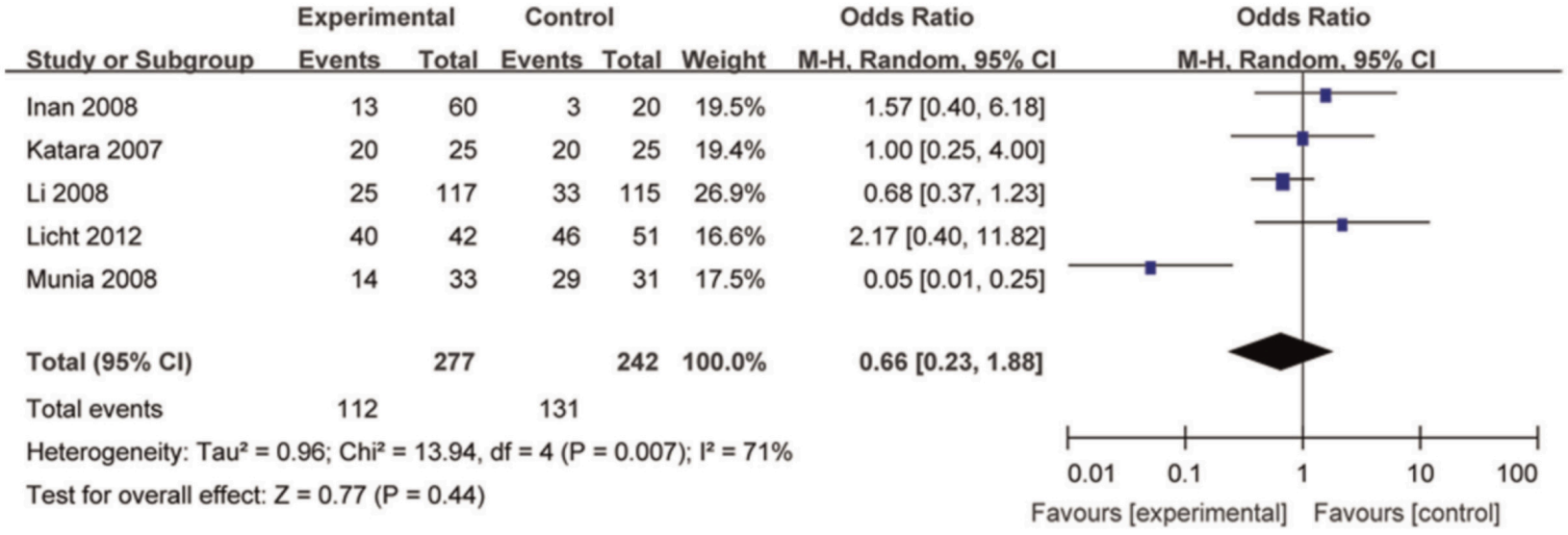


Figure 2 - CS after restricting the level of sympathectomy. CI, confidence interval; CS, compensatory sweating.

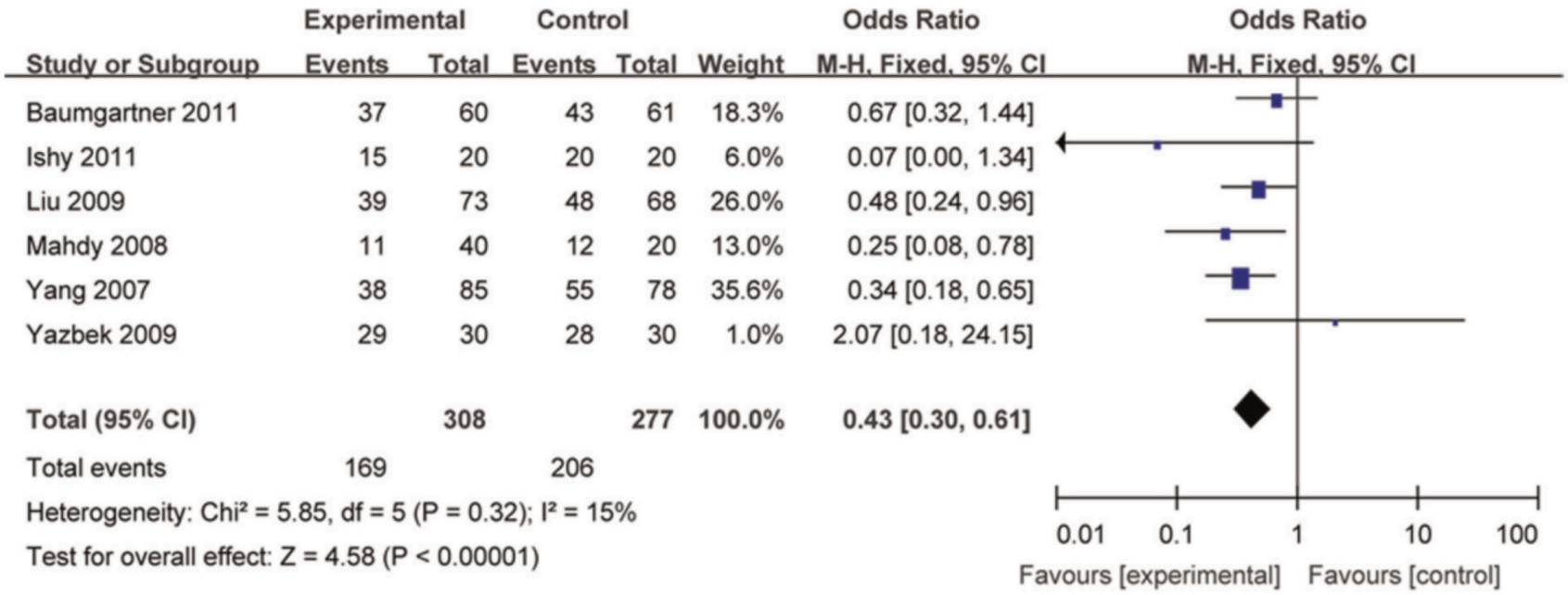


Figure 3 - CS after lowering the level of sympathectomy. CI, confidence interval; CS, compensatory sweating.

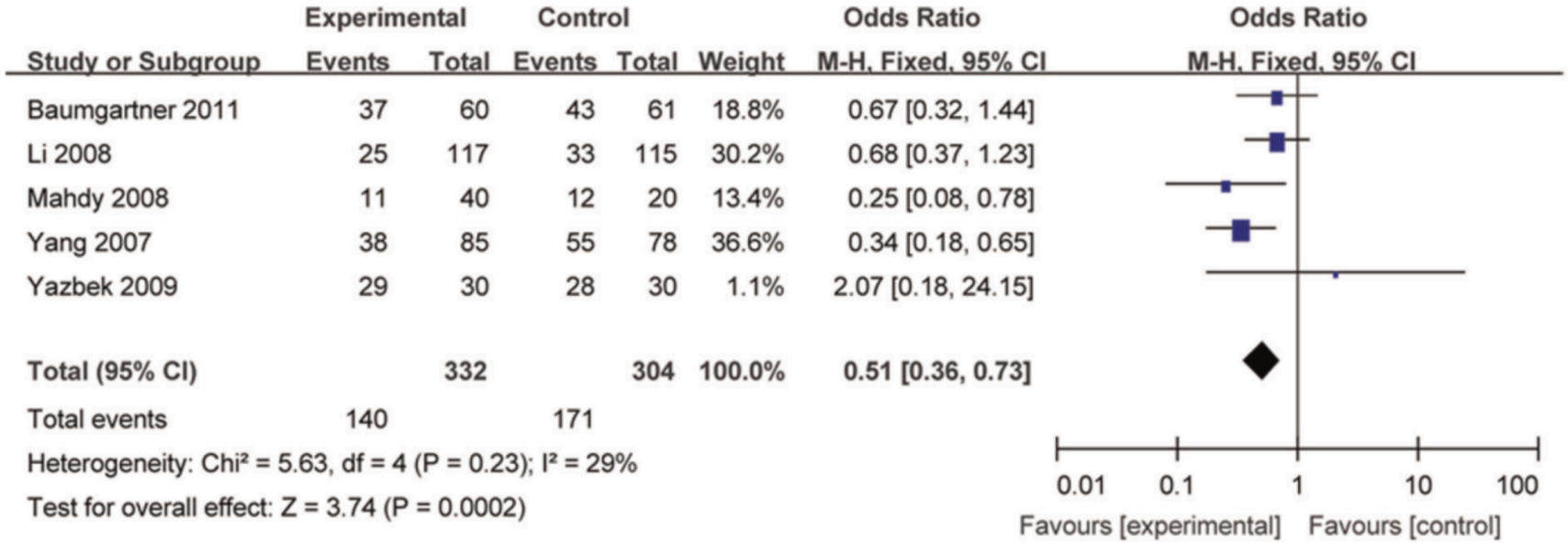


Figure 4 - CS after preserving T2 in sympathectomy. CI, confidence interval; CS, compensatory sweating.

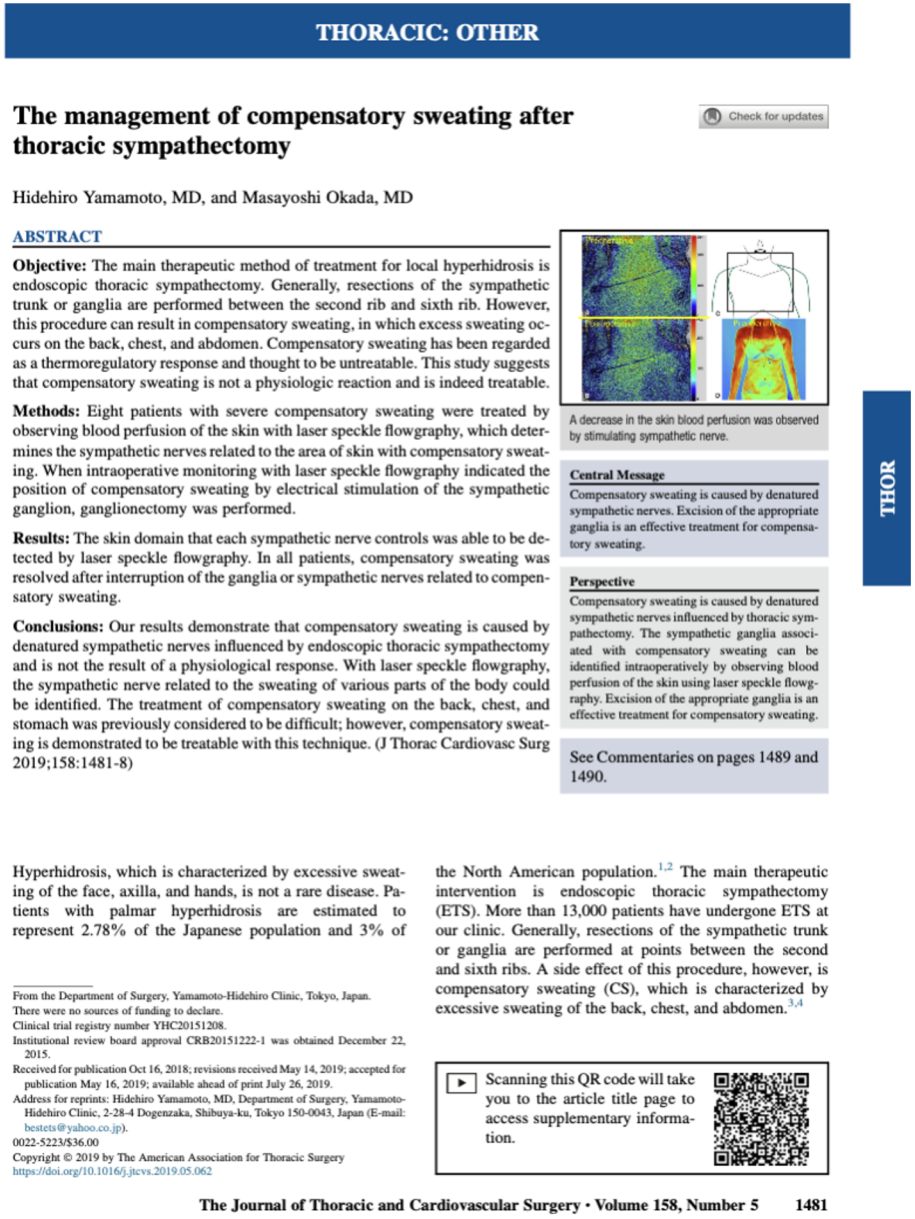
結果の要旨

- T2より下位で交感神経切断術を行った方が、
  代償性発汗は少なそう（ゼロではない）
  切断部位を制限しても減るわけではなさそう
- T2神経節を温存すると代償性発汗が少なめ？
  T2を含まない下位胸椎レベルでの交感神経切断術
  がよいのかどうか、至適な部位は決められない
  ※本文中にはT2神経節を温存すると
  　代償性発汗が増加するという報告も記載あり

Limitations

- 母集団の均一性　外科手術、方法や解析方法について質が担保されているとは言い難い
- 交感神経切断術のプロトコールも一定でない
- 代償性発汗についても診断基準が一定でない
- それぞれの研究のサンプルサイズが小さい
  →これ以上のサブ解析ができない。

本日の論文②



THORACIC: OTHER

The management of compensatory sweating after thoracic sympathectomy

Check for updates

Hidehiro Yamamoto, MD, and Masayoshi Okada, MD

ABSTRACT

Objective: The main therapeutic method of treatment for local hyperhidrosis is endoscopic thoracic sympathectomy. Generally, resections of the sympathetic trunk or ganglia are performed between the second rib and sixth rib. However, this procedure can result in compensatory sweating, in which excess sweating occurs on the back, chest, and abdomen. Compensatory sweating has been regarded as a thermoregulatory response and thought to be untreatable. This study suggests that compensatory sweating is not a physiologic reaction and is indeed treatable.

Methods: Eight patients with severe compensatory sweating were treated by observing blood perfusion of the skin with laser speckle flowgraphy, which determines the sympathetic nerves related to the area of skin with compensatory sweating. When intraoperative monitoring with laser speckle flowgraphy indicated the position of compensatory sweating by electrical stimulation of the sympathetic ganglion, ganglionectomy was performed.

Results: The skin domain that each sympathetic nerve controls was able to be detected by laser speckle flowgraphy. In all patients, compensatory sweating was resolved after interruption of the ganglia or sympathetic nerves related to compensatory sweating.

Conclusions: Our results demonstrate that compensatory sweating is caused by denatured sympathetic nerves influenced by endoscopic thoracic sympathectomy and is not the result of a physiological response. With laser speckle flowgraphy, the sympathetic nerve related to the sweating of various parts of the body could be identified. The treatment of compensatory sweating on the back, chest, and stomach was previously considered to be difficult; however, compensatory sweating is demonstrated to be treatable with this technique. (J Thorac Cardiovasc Surg 2019;158:1481-8)

A decrease in the skin blood perfusion was observed by stimulating sympathetic nerve.

Central Message

Compensatory sweating is caused by denatured sympathetic nerves. Excision of the appropriate ganglia is an effective treatment for compensatory sweating.

Perspective

Compensatory sweating is caused by denatured sympathetic nerves influenced by thoracic sympathectomy. The sympathetic ganglia associated with compensatory sweating can be identified intraoperatively by observing blood perfusion of the skin using laser speckle flowgraphy. Excision of the appropriate ganglia is an effective treatment for compensatory sweating.

See Commentaries on pages 1489 and 1490.

THOR

Hyperhidrosis, which is characterized by excessive sweating of the face, axilla, and hands, is not a rare disease. Patients with palmar hyperhidrosis are estimated to represent 2.78% of the Japanese population and 3% of the North American population.[1,2] The main therapeutic intervention is endoscopic thoracic sympathectomy (ETS). More than 13,000 patients have undergone ETS at our clinic. Generally, resections of the sympathetic trunk or ganglia are performed at points between the second and sixth ribs. A side effect of this procedure, however, is compensatory sweating (CS), which is characterized by excessive sweating of the back, chest, and abdomen.[3,4]

From the Department of Surgery, Yamamoto-Hidehiro Clinic, Tokyo, Japan.
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Clinical trial registry number YHC20151208.
Institutional review board approval CRB20151222-1 was obtained December 22, 2015.
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Address for reprints: Hidehiro Yamamoto, MD, Department of Surgery, Yamamoto-Hidehiro Clinic, 2-28-4 Dogenzaka, Shibuya-ku, Tokyo 150-0043, Japan (E-mail: bestets@yahoo.co.jp).
0022-5223/$36.00

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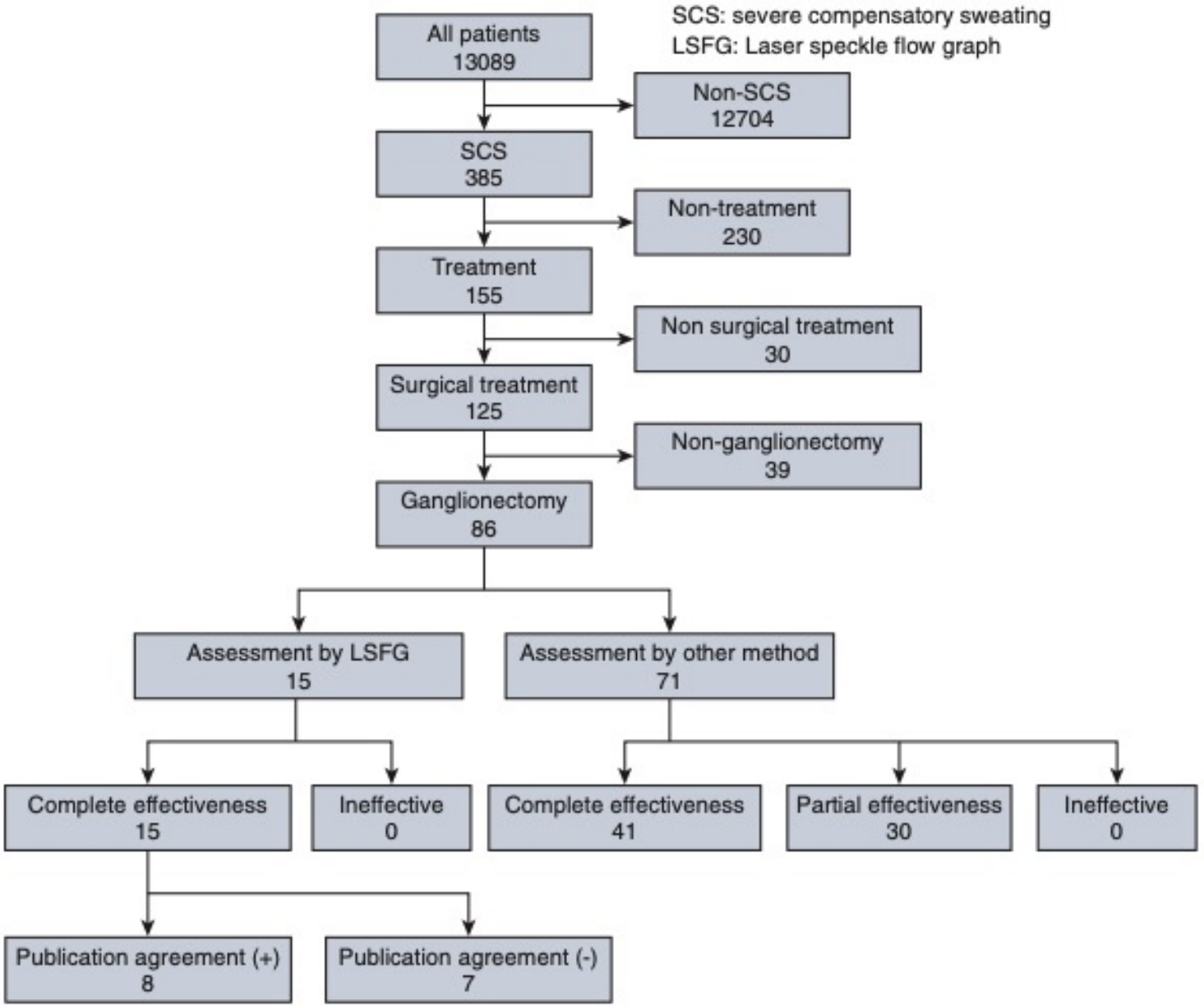
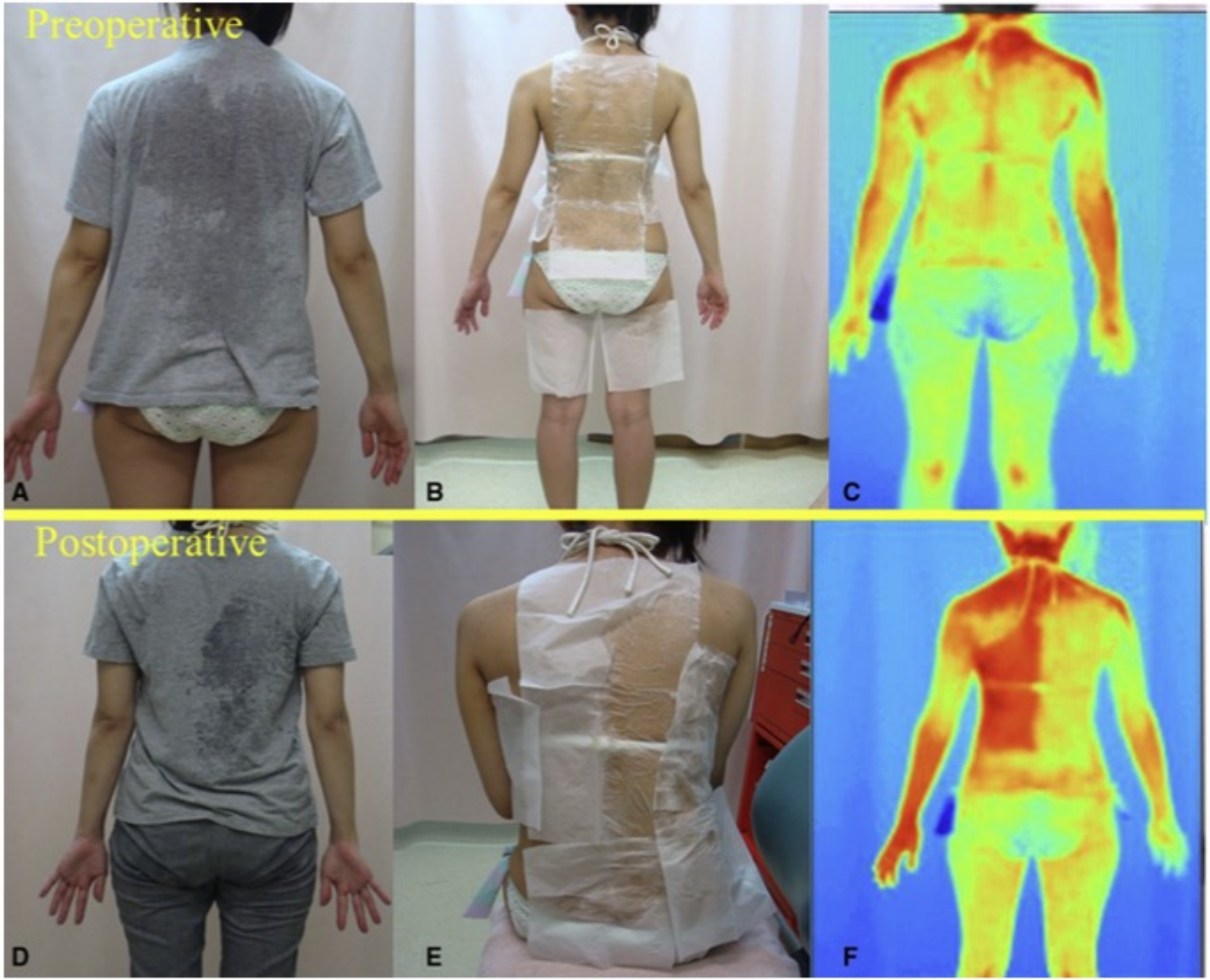
Scanning this QR code will take you to the article title page to access supplementary information.

- 代償性発汗の日本からの外科治療の報告
- 13,000以上の治療歴のある専門クリニック
- 385例の重度代償性発汗
  155例で治療
  86例で交感神経節切除
- Laser Speckle Flow–Graphy（LSFG) で術中評価
- 2mm胸腔鏡器具
  3mmの皮膚切開
- 全身麻酔、片肺換気の日帰り手術


SCS: severe compensatory sweating
LSFG: Laser speckle flow graph
All patients
13089
Non-SCS
12704
SCS
385
Non-treatment
230
Treatment
155
Non surgical treatment
30
Surgical treatment
125
Non-ganglionectomy
39
Ganglionectomy
86
Assessment by LSFG
15
Assessment by other method
71
Complete effectiveness
15
Ineffective
0
Complete effectiveness
41
Partial effectiveness
30
Ineffective
0
Publication agreement (+)
8
Publication agreement (-)
7


Preoperative
A
B
C
Postoperative
D
E
F

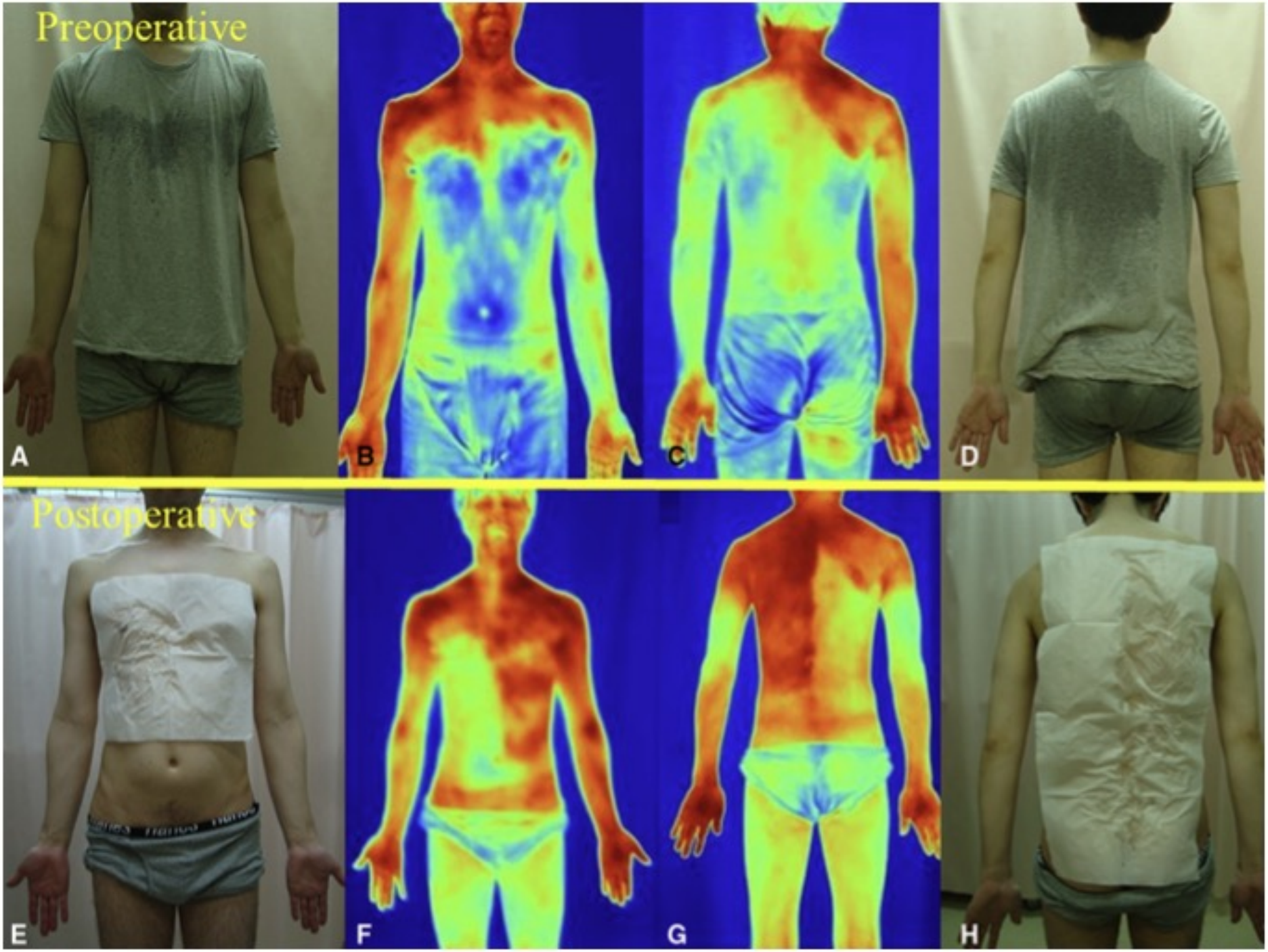


FIGURE 2. Postoperative sweat pattern and skin temperature after completion of 80 full squats (patient 5). A, Severe compensatory sweating is recognized


Preoperative
Postoperative (unilateral)
Postoperative (bilateral)
A
B
C
D
E
F

本日のまとめ

- 手掌多汗症を始め、限局性多汗症は
  プライマリ・ケア領域では実は埋もれている疾患
- 安易な交感神経切断術は禁物
  代償性発汗の十分なインフォームドコンセントと
  フォロー体制が必要
- 交感神経の異常発火が原因なので、
  漢方治療が有効な可能性あり

本日の文献

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