

Could thoracoscopic sympathectomy for hyperhidrosis also improve acne vulgaris?



Tevfik Kaplan¹, Ozge Gunduz², Bahar Oznur³, Serdar Han¹

¹Department of Thoracic Surgery, Ufuk University School of Medicine, Ankara, Turkey

²Department of Dermatology, Ufuk University School of Medicine, Ankara, Turkey

³Clinic of Dermatology, Guven Hospital, Ankara, Turkey

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Abstract

Introduction: The aim of this study is to emphasize the therapeutic effect of thoracoscopic sympathectomy performed at our clinic for facial/scalp hyperhidrosis or blushing on coincidental facial acne vulgaris based on previous reports indicating an association between the sympathetic nerve stimulus, epithelial melanocyte system and sebogenesis.

Material and methods: The possible therapeutic effects of sympathectomy on facial acne vulgaris were analyzed in a study design of retrospective review with prospective collection of the data from March 2005 to March 2013.

Results: Forty-two patients were operated on at our clinic due to facial/scalp hyperhidrosis or blushing and 30 of these also had facial acne vulgaris. However, none harbored a systemic co-morbidity. The patients' medical history indicated that they had used several medical therapies including topical or systemic antibiotherapies to treat their acne for several years but this had met with limited success and the treatment was stopped in all patients an average of 8 ± 2.4 months prior to the operations. Furthermore, the patients with acne vulgaris also underwent a thoracoscopic sympathectomy procedure at the second costal head (R2) for hyperhidrosis or blushing. All 30 patients showed marked improvement of their acne grade at the first postoperative month ($p < 0.01$).

Conclusions: In this study, the patients' facial acne vulgaris grade significantly improved after undergoing a sympathectomy. This can be explained by the possible effect the nervous system had on the epithelial melanocyte system and sebogenesis. However, prospective studies with an increased number of patients are needed to verify our findings.

Key words: acne vulgaris, hyperhidrosis, sympathectomy.

Streszczenie

Wstęp: W pracy przedstawiono terapeutyczny efekt sympatektomii piersiowej, wykonywanej w ośrodku autorów w celu leczenia nadmiernej potliwości skóry głowy i twarzy lub rumieńców, na współwystępujący trądzik młodzieńczy. Autorzy opierali się na wcześniejszych doniesieniach wskazujących na związek pomiędzy bodźcem nerwu współczulnego, układem melanocytów nabłonka i wydzielaniem łoju.

Materiał i metody: Możliwość terapeutycznego wpływu sympatektomii na trądzik młodzieńczy twarzy była analizowana w badaniu zaprojektowanym jako przegląd retrospektywny z prospektywnym gromadzeniem danych z okresu od marca 2005 r. do marca 2013 r.

Wyniki: Czterdziestu dwóch pacjentów poddano operacji ze względu na nadmierną potliwość skóry twarzy lub głowy bądź rumieńce; u 30 z nich na twarzy występował również trądzik młodzieńczy. Żaden z pacjentów nie cierpiał na układowe choroby współwystępujące. Wywiad medyczny ujawnił, że pacjenci stosowali wcześniej przez kilka lat inne rodzaje terapii w celu leczenia trądziku, w tym miejscową i systemową antybiotykoterapię, jednakże ich skutek był ograniczony; z terapii tych zrezygnowano średnio $8 \pm 2,4$ miesiąca przed operacją. Ponadto pacjenci z trądzikiem młodzieńczym przeszli również zabieg sympatektomii piersiowej w miejscu główki drugiego żebra (R2) ze względu na nadmierną potliwość lub rumieńce. U wszystkich 30 pacjentów w ciągu pierwszego miesiąca po operacji nastąpiła istotna poprawa w zakresie zaawansowania trądziku ($p < 0.01$).

Wnioski: W prezentowanym badaniu zaawansowanie trądziku młodzieńczego zmniejszyło się znacznie po zastosowaniu sympatektomii. Wyjaśnieniem tego zjawiska może być ewentualny wpływ układu nerwowego na układ melanocytów nabłonka i wydzielanie łoju. Potwierdzenie powyższych wyników wymaga jednak przeprowadzenia badań prospektywnych na większej próbie pacjentów.

Słowa kluczowe: trądzik młodzieńczy, nadmierna potliwość, sympatektomia.

Address for correspondence: Dr. Tevfik Kaplan, Ufuk University School of Medicine, Department of Thoracic Surgery, Mevlanas Bulvarı No: 86-88, Balgat, 06520 Ankara, Turkey, phone: +90 505 6899344, e-mail: tevfikkaplan@yahoo.com

Introduction

Acne vulgaris is a common human skin disease, characterized by areas of skin with seborrhea, comedones, papules, pustules, nodules and possibly scarring. The classical aspects of multifactorial acne pathogenesis include abnormal follicular differentiation and increased cornification, androgen-mediated enhanced sebaceous gland activity and seborrhea, bacterial hyper-colonization, and inflammation [1]. It has been confirmed that facial skin from acne patients is characterized by increased numbers of substance-p containing nerves and mast cells, and by strong expression of neutral endopeptidase in sebaceous glands compared with normal skin [2]. The sebaceous gland expresses receptors for β -endorphin, corticotrophin-releasing factor, pro-opiomelanocortin, neuropeptide Y and calcitonin. Alpha-melanocyte stimulating hormone (α -MSH) has been evaluated not only as a sebotropin and pigmentation hormone but also as a modulator of inflammatory and immune tissue responses within the pilosebaceous unit [3, 4].

Primary hyperhidrosis is an idiopathic disorder characterized by excessive sweating. Its prevalence in the general population ranges from 0.3% to 4.5%. Video-assisted thoracoscopic sympathectomy (VATS) or sympathectomy has been successfully applied for a long time in the treatment of hyperhidrosis [5].

The skin is innervated by sensory nerves and postganglionic sympathetic and parasympathetic fibers. In general, it is accepted that sebaceous glands are not innervated by the peripheral nervous system. On the contrary, it was shown that facial skin from acne patients showed numerous nerve fibers around and within sebaceous glands whereas in normal facial skin, nerve fibers were reported to be very rare [6].

During our follow-ups, we observed that after sympathectomy, the acne lesions of our patients subsided. The aim of this study is to evaluate the alterations of acne vulgaris grade in long-term follow-up of patients who have undergone thoracoscopic sympathectomy for primary hyperhidrosis and to determine any correlation between acne vulgaris, clinical outcome and sympathectomy.

Material and methods

Patients who had undergone thoracoscopic sympathectomy for the treatment of facial/scalp primary hyperhidrosis or facial blushing in our unit were analyzed in a study design of retrospective review with prospective collection of the data from March 2005 to March 2013.

Tab. I. Acne grading system

Grade 1	Mild, blackheads and rare papules located on the face
Grade 2	Moderate, occasional papules and pustules, mainly located on the face
Grade 3	Severe, extensive inflammatory papules, pustules, and nodules, mainly located on the face
Grade 4	Widespread, extensive lesions involving face and trunk

Data were collected on demographic details, operation, and complication. It was also recorded whether patients had acne vulgaris. The patients were evaluated for their acne severity and classified into 4 grades by dermatologists (Table I) before the surgery and at the follow-up.

The alteration in the severity of acne vulgaris before and after the operation was assessed using the Wilcoxon test. $P < 0.05$ was considered as statistically significant. All patients gave their informed consent before participating.

Results

Forty-two patients underwent thoracoscopic sympathectomy for facial/scalp, hyperhidrosis or facial blushing between March 2005 and March 2013. All patients had undergone bilateral sympathectomies. The 42 patients consisted of 18 females (42.85%) and 24 males (57.14%). The median age for females was 23 years and for males 25 years (Table II).

In 42 patients R2 sympathectomy was done for facial/scalp hyperhidrosis or facial blushing. No patient experienced Horner syndrome, intercostal neuralgias or hemothorax perioperatively or in long-term follow-up. Two patients with facial hyperhidrosis still complain of having hyperhidrosis around their moustache after the surgery. None of the patients experienced a recurrence of hyperhidrosis or blushing at the follow-up.

All patients were advised preoperatively that long-term follow-up was necessary. Patients were contacted and assessed by return evaluation, telephone interviews, or questionnaires. Follow-up of the all patients ranged from 6 to 35 months (mean 19.3 ± 7 months).

Nine patients had developed new mild sweating in other areas after the operation but this does not bother the patients. New areas of increased sweating were most commonly described on the low back, abdomen, buttocks,

Tab. II. Patients' characteristics

Variables	n (%)
Gender	42
Male	24 (57.14)
Female	18 (42.85)
Median age (years)	24 ± 4.8
Range (years)	14-31
Co-morbidity	None
Surgery	R2 sympathectomy
Presence of acne vulgaris	30 (71.4)
Follow-up (months)	
Mean	19.3 ± 7
Range	6-35
Compensatory	
Sweating	9 (21.4)
Recurrence	None

and thighs. In 3 patients compensatory sweating occurred after 1 month following surgery, in 4 patients after 3 months following surgery, and in 2 patients within 2 years of surgery.

Thirty of these patients also had facial acne vulgaris. The patients with acne vulgaris were evaluated by dermatologists before and after the surgery. All 30 patients had undergone medical therapy for acne vulgaris in different medical centers for several years and stopped the treatment at a mean of 8 ± 2.4 months before the operation

on their own decision due to no or minimal response to medical treatment. Twelve of these patients were female and 18 of them were male. Mean age was 18 years (range 14-24 years). Preoperative median acne grade was 2.5 (2-3) and after the operation at the follow-up, median acne grade was noted as 1 (0-1) (Table III and Figs. 1A-B). There was a statistically significant difference in the acne grade after the operation ($p < 0.01$).

Discussion

Primary hyperhidrosis presents most commonly in adolescents. It is a pathological condition of sweating in excess of that required for thermoregulation or psychological response with an unknown etiology. Excessive sweating usually affects the palms or axillae but may also affect other areas of the body [7]. Many reports have shown that thorac-

Tab. III. Acne grade of patients

N	Age	Sex	Acne grade		Compensatory sweating
			Before sympathectomy	After sympathectomy	
1	14	M	3	1	No
2	17	M	2	2	No
3	18	F	4	1	No
4	21	F	1	0	Yes
5	20	M	3	1	No
6	23	F	2	0	No
7	19	F	3	1	No
8	18	M	1	0	No
9	17	M	4	1	No
10	16	M	4	1	No
11	24	F	3	0	No
12	21	F	3	1	No
13	19	F	3	0	No
14	18	M	3	1	No
15	17	F	2	1	Yes
16	16	M	3	1	No
17	15	F	1	0	Yes
18	18	M	2	1	Yes
19	19	M	2	1	Yes
20	24	M	2	0	No
21	21	M	3	1	No
22	18	F	4	1	No
23	17	M	3	0	No
24	19	M	2	0	No
25	16	F	2	0	No
26	17	M	2	1	No
27	18	M	1	0	No
28	15	F	1	0	Yes
29	18	M	3	1	No
30	19	M	2	0	No



Fig. 1. A) A 17-year-old girl with facial acne vulgaris and acne grade of 2. B) The same patient, one month after surgery with acne grade of 1

ic sympathectomy for palmar hyperhidrosis is an efficient procedure, even after long-term follow-up periods [8, 9]. In this study there was no recurrence of hyperhidrosis after a follow-up period of 19.3 months.

Acne is a chronic disease which begins in the early teens with the onset of facial sebum production, and can persist in some cases into adulthood for unclear reasons. The pathogenesis of acne is multi-factorial, including hyperkeratinization of pilosebaceous ducts, enhanced sebaceous gland activity, bacterial hyperproliferation resulting in inflammation and an immunological reaction. Prevalence studies of acne by age showed an 85% prevalence rate in those aged 12-24 years [10]. Similarly, in our study mean age was 18 years. Postoperatively all 30 patients showed statistically significant improvement in their acne grade ($p < 0.01$).

The association between sympathectomy and acne was not reported before. However, Westphal *et al.* reported 2 patients, who had undergone bilateral VATS, who presented with hypopigmentation at the dermatomes corresponding to the sympathectomized regions [11]. The nervous system has an influence on skin (especially melanocytes which originate from neural crest cells) via neuropeptides; therefore a blockade on the sympathetic nerve stimulus through VATS might cause alterations in the epithelial melanocyte system. The skin can also locally produce adrenocorticotropin hormone (ACTH), melanocyte stimulating hormone (MSH), β -endorphin and corticotrophin-releasing hormone [12]. The alterations in the epithelial melanocyte system may affect α -MSH, which has modulatory effects via its receptor, melanocortin-1 receptor (MC1R). It was shown that epithelial cells of eccrine, apocrine and sebaceous glands also express MC1R [13]. Melanocortin-1 receptor immunoreactions were reported to be more accentuated in sebaceous glands of acne patients than healthy controls [14]. Additionally, an analogue of α -MSH (afamelanotide) was reported to be effective in the treatment of inflammatory acne recently [15].

In another hypothesis, another neurotransmitter hormone, melatonin (MT), might be the missing link between cutaneous and neural systems. Melatonin is synthesized by the pineal gland, and its production is suppressed by light (photoneuroendocrine control). The light generates an impulse, which is transferred to the pineal gland from the superior cervical ganglion via coronary nerves. In low light, the sympathetic system activates the synthesis of MT [16]. Melatonin is also synthesized and metabolized by keratinocytes. In contrast to the pineal gland, cutaneous MT exerts its effects in a receptor-dependent or independent way [17]. Melatonin receptor-1 (MT1R) was detected in eccrine sweat gland epithelial cells, whereas MT2R was present in eccrine sweat gland cells [12]. Interestingly, Maietta *et al.* concluded that possibly higher MT levels were related to seborrheic dermatitis pathology. The decrease in MT due to the blockade of the sympathetic system might cause a decrease in sebum synthesis which appears in acne pathogenesis [18].

In conclusion, we have observed that there is a significant improvement in the facial acne of patients who were sympathectomized for hyperhidrosis. Possibly, the neuroendocrine molecules have more interactions than known in skin biology. The decrease of acne lesions after sympathectomy might be due to alterations of these molecules (α -MSH and MT). In order to better confirm this hypothesis, there is a need to design more detailed molecular prospective studies with an increased number of patients, investigating the effect of the nervous system on sebogenesis.

Disclosure

The authors report no conflict of interest.

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