

Advances in the Treatment of Bromhidrosis

Jiangpeng Huang¹, Yongfang Wu^{2*}

¹Graduate School, Youjiang Medical University for Nationalities, Baise, China

²Department of Burn and Plastic Surgery, Affiliated Southwest Hospital of Youjiang Medical University for Nationalities, Baise, China

Email: 1622484117@qq.com, *wuyongfang163@163.com

How to cite this paper: Huang, J.P. and Wu, Y.F. (2024) Advances in the Treatment of Bromhidrosis. *Journal of Biosciences and Medicines*, 12, 281-288.
<https://doi.org/10.4236/jbm.2024.127026>

Received: June 23, 2024

Accepted: July 22, 2024

Published: July 25, 2024

Copyright © 2024 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

Armpit odor is a common disease with genetic tendency in cosmetic surgery. The odor emitted by it often affects the quality of life and social communication of patients, leading to psychological disorders in patients and seriously jeopardizing their mental health. With the continuous development and progress of medicine, there are many ways to treat armpit odor at present, but there is still no perfect way to treat armpit odor. This article reviews the progress of treatment methods in recent years.

Keywords

Bromhidrosis, Treatment, Research Progress

1. Introduction

Bromhidrosis, also known as “body odor”, is a common disease in cosmetic surgery. It is clinically believed that the disease is mainly caused by excessive secretion of apocrine sweat glands through the skin surface bacterial decomposition. The highest incidence of the disease is middle-aged people and adolescents, mainly manifested by unusually pronounced underarm odor. Armpit odor causes psychological disorders in patients, thus affecting life, work and social interaction [1] [2]. Although the mechanism of armpit odor formation is not fully understood, the current research shows that it is a physiological state produced by the interaction of bacteria with the secretion of the apocrine sweat gland of the armpit. The number and density of apocrine sweat glands, secretion of (E)-3-methyl-2-hexenoic acid and ABCC11 gene were closely related to axillary odor [3]. The treatment of bromhidrosis can be divided into surgical treatment and non-surgical treatment, among which the surgical treatment mainly includes spindle skin excision, subcutaneous curettage, subcutaneous pruning,

destumescence suction and so on. Non-surgical treatment mainly includes botox type A injection, laser therapy, electroion therapy and so on. Although the therapeutic methods and mechanisms used in clinical practice vary, most of them are aimed at clearing or destroying apocrine sweat glands [4].

2. Non-Surgical Treatment

2.1. Topical Drugs

Patients with armpit odor should pay attention to personal hygiene, take a bath frequently, change underwear frequently, keep the armpit dry and clean, and avoid excessive exercise, which can reduce the odor. At present, the commonly used drugs mainly include antibacterial drugs, antiperspirants, deodorants, etc. [5]. Glononium bromide, as an anticholinergic drug, can block the action of acetylcholine in nerve endings, thereby reducing sweat gland secretion. Gregoriou *et al.* [6] found in a study on the treatment of 19 patients with bromhidrosis that 2% glonium bromide cream was effective and safe in the treatment of axillary bromhidrosis patients. In addition, deodorants work by inhibiting the growth of foul-smelling bacteria through antibacterial bacteriostatic agents such as triclosan, while perfumes, fragrances, and essential oils can mask unpleasant body odor. As for antiperspirants, long-term use can have complications such as pigmentation or dry skin, so they are only suitable for short-term treatment [7]. The search for more sustainable and natural drugs should be the future research trend [8].

2.2. Subcutaneous Drug Injection Therapy

Subcutaneous drug injection is also one of the effective ways to treat bromhidrosis. Although there are many kinds of drugs injected, botulinum toxin type A and Shao Bi injection are widely used, and their mechanism of action is to reduce sweat production by inhibiting or destroying apocrine sweat gland ducts and glands [9].

2.2.1. Local Injection of Botox Type A

Botulinum toxin type A BtX-A, as A neurotoxin, has a therapeutic mechanism by affecting the release of acetylcholine, thereby reducing the secretion of sweat by sweat glands [10]. Intradermal injection of botox type A is one of the effective ways to reduce sweat production [11]. The side effects of botox type A in axillary odor are temporary and are usually described as injection-related pain, compensatory sweating, muscle weakness, local skin infections, and flu-like symptoms. Glaser *et al.* [12] found that type A botulinum toxin injection was also beneficial to adolescents with primary bromhidrosis. However, Naumann *et al.* [13] found that its deficiency was that the curative effect lasted for a short time, and repeated injection was needed to prolong the curative effect. At present, local injection of botulinum toxin type A is the first choice of non-surgical treatment for bromhidrosis.

2.2.2. Shao Bei Injection Treatment

Paeoniflorin in Shao Bei injection is used to treat bromhidrosis due to its anti-oxidant and free radical scavenging functions [14]. Shao Bei injection has a softening and atrophy effect, and is also effective in the treatment of internal hemorrhoids [15]. Liu Xiaojun *et al.* [16] found that Shao Bei injection with a concentration of 66.6% had obvious effect in the treatment of bromhidrosis, and was minimally invasive without traces. It has the advantage of being more effective and lasting longer than botox. However, whether a higher concentration of Paeonia can bring a higher efficacy evaluation needs to be verified experimentally.

2.2.3. Local Ethanol Injection

Local injection of ethanol can cause cell dehydration and necrosis, but this method is transient and self-limited. At present, it is rarely used because of the high risk of complications in practical application [17]. Injection therapy is accepted by patients because of its advantages of convenience, speed and less trauma, but at the same time, there are complications such as multiple injection, picitis, skin induration and recurrence, and the therapeutic effect is worse than that of surgical treatment.

3. Methods of Physical Therapy

The main physical treatment of armpit odor includes laser therapy, electroion therapy, microwave therapy, RF microneedle therapy and other methods, and the most commonly used is laser therapy.

3.1. Laser Irradiation Therapy

Nd:YAG laser and CO₂ dot matrix laser are the two most commonly used laser treatment for armpit odor. Among them, the common wavelength of Nd:YAG laser is 1444 nm. YAG laser irradiation can reduce the production of volatile unsaturated fatty acids, steroids and associated unpleasant odors in armpits [18] [19]. Jung *et al.* [20] found that pulse Nd: With a wavelength of 1444 nm, a frequency of 40 Hz and an energy of 15 mJ (operating at 6 W), the YAG laser is the optimal parameter for the treatment of bromhidrosis, providing the highest degree of efficacy for selective ablation and thermal restriction of adipose tissue, allowing the removal of fat from different areas in a short period of time. The study of Jeong *et al.* [21] also believed that laser with wavelength of 1444 nm was found to be a reliable method for the treatment of armpit osmosis, which has the advantages of small wound, rapid operation, no obvious scar and fast recovery. However, the actual parameters in clinical treatment should still be adjusted according to the actual situation of patients.

3.2. Electroion Therapy

Electroion therapy mainly uses its thermal effect to cauterize the hair follicle, and then destroys the apocrine gland to make it lose the function of secreting sweat. Mei Yonghong *et al.* [22] found that the therapeutic effect of electric ion

in the treatment of armpit odor was lower than that of gold microneedles, and the incidence of armpit bleeding, spot pustules, scar and other complications was higher than that of gold microneedles. Sup *et al.* [4] found that electroion treatment was lower than YAG laser and CO₂ laser.

3.3. Microwave Therapy

Microwave can purposefully damage glandular tissues with more water through heat, so glandular tissues with high water content become the target of microwave heating [23]. Chen *et al.* [24] compared the comparative study between subcutaneous scratching and microwave treatment of armpit odor, and found that subcutaneous scratching was more effective, with greater improvement effect, lower short-term complication rate and lower recurrence rate. If there are no long-term sequelae, microwave treatment may be appropriate for patients with armpit odor who have cosmetic problems.

4. Surgical Treatment

With the continuous development of medicine, the surgical methods for the treatment of armpit odor are also constantly changing and improving. Although there are some complications with surgery, more and more people are willing to undergo surgery because of its immediate results.

4.1. Traditional Surgical Treatment of Bromhidrosis

Traditional bromhidrosis surgery can completely remove the sweat gland tissue to achieve the purpose of treating bromhidrosis. However, due to the large surgical trauma, long postoperative recovery time, and the easy occurrence of surgical opening dehiscus and scar, the therapeutic effect is affected, leading to postoperative recurrence [25]. This method is rarely used today.

4.2. Apocrine Excision with Small Incision

As subcutaneous pruning with small incision requires extensive subcutaneous separation of armpits, large subcutaneous space will be formed, and common postoperative complications include hematoma and skin necrosis [26]. Yang Juan *et al.* [27] treated 35 patients with traditional small-incision apocrine excision combined with super-pulse carbon dioxide laser, and found that this method had a lower recurrence rate, better clinical symptoms and better therapeutic effect than traditional small-incision apocrine excision alone. Chen Yan *et al.* [28] found that radical bromhidrosis with small transverse axillary incision not only has the advantages of long operation time, less blood loss, low complication rate, but also beautiful surgical incision. Its safety is higher than fusiform flap resection.

4.3. Subcutaneous Scratching with Small Incision

Studies have found that when the incision is at the outermost edge of the surgi-

cal range and the lower edge of the axillary fold, the curative effect is not only improved, but also the incidence of complications is effectively reduced [29]. The postoperative complication rate and wound appearance of minimally invasive scratching with small incision are the advantages of smaller incision and less damaged tissue. However, the disadvantage is that the surgical field of view is limited, and it may not be able to completely remove a large range of sweat glands, resulting in postoperative recurrence of patients [2].

4.4. Negative Pressure Suction with Small Incision

The incision of negative pressure suction with small incision is generally at the edge of the armpit. After blunt separation, the free skin tissue is held to wrap the inserted negative pressure tube and the sweat gland tissue is repeatedly aspirated. Yang *et al.* [30] showed that improved negative pressure suction with small incision not only has small incision, short operation time and simple operation method, but also has high success rate, fast postoperative recovery and low complication rate. Zhang Yan *et al.* [1] used small incision negative pressure suction and small incision scissors and curettage to observe the treatment of patients with armpit odor, and the results showed that the clinical therapeutic effects of the two methods were similar, but the total effective rate after the treatment of small incision scissors and curettage was slightly higher than that of minimally invasive negative pressure suction, and the removal of sweat glands by small incision scissors and curettage may be more thorough.

5. Other

In addition to the above treatment methods, there are scholars to conduct other treatment research. Qin Qin *et al.* [31] adopted the axillary fold incision thin flap method for the treatment of armpit odor, the total effective rate was 97.44%, and the postoperative complications were 3%, which was superior to the small incision full thick skin method for the treatment of axillary odor. Chen Bo *et al.* [32] found through the combined operation of negative pressure suction and scratching to treat armpit odor that this combined operation made up for the shortcomings of incomplete treatment of single operation, with fast recovery, high cure rate and low complications. Hu Xiaotao *et al.* [33] treated patients with bromhidrosis with small incision and used bromhidrosis clothing to assist in postoperative treatment, which could effectively avoid postoperative complications.

6. Summary and Prospect

At present, the etiology of bromhidrosis has not been fully clarified, and it is mainly believed to be related to apocrine sweat glands, genetics, and sex hormones. Surgical operation is considered to be one of the most effective methods because it can better destroy apocrine sweat glands, but surgical intervention may cause physical damage and postoperative complications. Botulinum toxin

type A injection was the most effective in non-surgical treatment. Non-surgical treatment has the advantages of less injury, rapid recovery and fewer complications, but the disadvantages are incomplete treatment and high recurrence rate. Treatment options for bromhidrosis cannot be determined solely on the basis of safety and efficacy, but should also consider other factors such as gender, age, and patient treatment needs. With the continuous development of medicine and the continuous innovation of surgical methods, the efficacy of some new technologies in the treatment of armpit odor is also being verified, and I believe that the therapeutic effect of armpit odor will be more and more ideal.

Fund Projects

Baise scientific research and technology development plan project assignment (Encyclopedia 2022907). Project name: Application of silicone pad compression technique in postoperative bromhidrosis.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Zhang, Y. and Hong, Y. (2019) Comparison of Clinical Efficacy of Minimally Invasive Negative Pressure Aspiration and Small Incision Curettage in Treatment of Axillary Odor. *Journal of Trauma Surgery*, **29**, 342-344.
- [2] Zhang, J. and Yang, J. (2019) LAYER, Remove Odor Control of Emulsion in the Treatment of Body Odor Effect Observation. *Journal of Clinical Medicine Literature Electron*, **6**, 153-154.
- [3] Natsch, A. and Emter, R. (2020) The Specific Biochemistry of Human Axilla Odour Formation Viewed in an Evolutionary Context. *Philosophical Transactions of the Royal Society B*, **375**, Article 20190269. <https://doi.org/10.1098/rstb.2019.0269>
- [4] Sun, P., Wang, Y., Bi, M., et al. (2019) The Treatment of Axillary Odor: A Network Meta-Analysis. *Medical Science Monitor*, **25**, 2735-2744. <https://doi.org/10.12659/MSM.913932>
- [5] Zhang, W., Zhu, L.K., He, Y.J., et al. (2016) Advances in the Treatment of Bromhidrosis. *Dermatology and Venereal Diseases*, **38**, 421-425.
- [6] Gregoriou, S., Markantoni, V., Campanati, A., et al. (2021) Treatment of Axillary Bromhidrosis with Topical 2% Glycopyrronium Bromide Cream: A Prospective, Non-Randomized, Open-Label Study. *The Journal of Clinical and Aesthetic Dermatology*, **14**, E61-E63.
- [7] Teerasumran, P., Velliou, E., Bai, S., et al. (2023) Deodorants and Antiperspirants: New Trends in Their Active Agents and Testing Methods. *International Journal of Cosmetic Science*, **45**, 426-443. <https://doi.org/10.1111/ics.12852>
- [8] Oliveira, E., Salvador, D.S., Holsback, V., et al. (2021) Deodorants and Antiperspirants: Identification of New Strategies and Perspectives to Prevent and Control Malodor and Sweat of the Body. *International Journal of Dermatology*, **60**, 613-619. <https://doi.org/10.1111/ijd.15418>

- [9] Zhang, Q.R., Zhao, X.Q., Gao, F., *et al.* (2019) Pathogenesis and Treatment of Bromhidrosis. *Dermatology and Venereal Diseases*, **45**, 124-128.
- [10] Xu, X. (2020) Clinical Observation on the Treatment of Axillary Odor by Local Injection of Type A Botox and Compound Xiaozhiling Liquid. Master's Thesis, Yunnan University of Traditional Chinese Medicine.
- [11] Shayesteh, A., Boman, A., Hawas, E., *et al.* (2023) Reconstituted and Frozen Botulinum Toxin A Is as Effective and Safe as Fresh for Treating Axillary Hyperhidrosis: A Retrospective Study. *PLOS ONE*, **18**, E295393. <https://doi.org/10.1371/journal.pone.0295393>
- [12] Glaser, D.A., Pariser, D.M., Hebert, A.A., *et al.* (2015) A Prospective, Nonrandomized, Open-Label Study of the Efficacy and Safety of OnabotulinumtoxinA in Adolescents with Primary Axillary Hyperhidrosis. *Pediatric Dermatology*, **32**, 609-617. <https://doi.org/10.1111/pde.12620>
- [13] Naumann, M. and Lowe, N.J. (2001) Botulinum Toxin Type A in Treatment of Bilateral Primary Axillary Hyperhidrosis: Randomised, Parallel Group, Double Blind, Placebo Controlled Trial. *British Medical Journal*, **323**, 596-599. <https://doi.org/10.1136/bmj.323.7313.596>
- [14] Xu, Y., He, H., Li, P., *et al.* (2022) Paeoniflorin Inhibits Proliferation and Promotes Autophagy and Apoptosis of Sweat Gland Cells. *Experimental and Therapeutic Medicine*, **23**, Article 53. <https://doi.org/10.3892/etm.2021.10975>
- [15] Wang, Q., Feng, Y.N., Bai, Z.Y., *et al.* (2019) Meta-Analysis of the Efficacy and Safety of Shao Bei Injection in the Treatment of Mixed Hemorrhoids and Internal Hemorrhoids. *Shanghai Journal of Traditional Chinese Medicine*, **53**, 69-73.
- [16] Liu, X.J., Jiang, Y.Y., Hu, J.X., *et al.* (2022) Observation on the Curative Effect of Shao Bei Injection on Armpit Odor. *Dermatology and Venereal Diseases*, **44**, 484-486.
- [17] Asilian, A., Shahbazi, M., Abtahi-Naeini, B., *et al.* (2018) Percutaneous Ethanol Injection as a Promising and Minimally Invasive Treatment for Axillary Osmidrosis: Double-Blinded Randomized Controlled Trial. *Indian Journal of Dermatology, Venereology and Leprology*, **84**, 157-162. https://doi.org/10.4103/ijdv.IJDVL_704_16
- [18] Geng, Y.J., Li, T., Wen, L., *et al.* (2020) Percutaneous Interstitial Nd:YAG Laser Therapy for Axillary Osmidrosis. *Lasers in Surgery and Medicine*, **52**, 639-646. <https://doi.org/10.1002/lsm.23187>
- [19] Piccolo, D., Mutlag, M.H., Pieri, L., *et al.* (2023) Minimally Invasive 1,444-nm Nd:YAG Laser Treatment for Axillary Bromhidrosis. *Frontiers in Medicine*, **10**, Article 1034122. <https://doi.org/10.3389/fmed.2023.1034122>
- [20] Jung, S.K., Jang, H.W., Kim, H.J., *et al.* (2014) A Prospective, Long-Term Follow-Up Study of 1,444-Nm Nd:YAG Laser: A New Modality for Treating Axillary Bromhidrosis. *Annals of Dermatology*, **26**, 184-188. <https://doi.org/10.5021/ad.2014.26.2.184>
- [21] Jeong, J.H., Hong, J.M., Pak, C.S., *et al.* (2014) Treatment of Axillary Osmidrosis Using a Laser with a 1,444-Nm Wavelength. *Dermatologic Surgery*, **40**, 851-857.
- [22] Mei, Y.H., Xu, L.H., Xu, T.X., *et al.* (2021) Huang Jinwei Needle with Ions to Curing the Contrast Research. *China Medical Hairdressing*, **11**, 67-69.
- [23] Tan, Y.X., Liu, J.M., Duan, Z.Y., *et al.* (2019) Microwave Treatment of Axillary Hyperhidrosis and Armpits Efficacy and Safety Study. *Journal of Clinical Dermatology*, **13**, 632-636.
- [24] Chen, S.Q., Wang, T.T., Zhou, Y., *et al.* (2022) Comparison of Long-Term Effec-

- tiveness and Safety of Microwave and Surgery in the Treatment of Axillary Osmidrosis: A Single-Center Retrospective Study. *Dermatologic Surgery*, **48**, 126-130. <https://doi.org/10.1097/DSS.0000000000003276>
- [25] Deng, F. (2019) Traditional Methods and the Clinical Effect of Small Incision Minimally Invasive Method of Curing Observation. *World's Latest Medical Information Abstract*, **12**, Article 50.
- [26] Wu, C., Yan, Z., Wang, G.M., *et al.* (2019) Comparison of Plasma Fiber Removal and Small Incision Pruning in Treatment of Axillary Odor. *Chinese Journal of Aesthetic Plastic Surgery*, **34**, 539-542.
- [27] Zhang, J., Wang, D.W., Zhao, L.D., *et al.* (2021) Effect of Apocrine Gland Pruning and Minimally Invasive Scratching with Small Incision on Postoperative Wound Aesthetics and Complications in Patients with Bromhidrosis. *Dermatology and Venereal Diseases*, **43**, 455-457.
- [28] Chen, Y. (2022) Observation on the Effect of Axillary Transverse Small Incision in the Treatment of Armpit Odor. *Health of Urban and Rural Enterprises in China*, **37**, 136-138.
- [29] Xiong, T., Ou, Y. and Zha, P. (2020) Modified Minimally Invasive Incision Surgery for Axillary Osmidrosis. *Aesthetic Plastic Surgery*, **44**, 614-616. <https://doi.org/10.1007/s00266-020-01623-3>
- [30] Yang, H.H., Miao, Y., Chen, Y.T., *et al.* (2019) Minimally Invasive Approaches to Axillary Osmidrosis Treatment: A Comparison between Superficial Liposuction with Automatic Shaver Curettage, Subcutaneous Laser Treatment, and Microwave-Based Therapy with a Modified Technique. *Journal of Cosmetic Dermatology*, **18**, 594-601. <https://doi.org/10.1111/jocd.12731>
- [31] Qin, Q., Wang, X.B., Zhang, J.L., *et al.* (2024) Efficacy Comparison of Thin Skin Flap in Axillary Fold Incision and Full-Thickness Skin Graft in Small Incision in the Treatment of Axillary Osmidrosis. *Chinese Journal of Aesthetic Medicine*, **33**, 14-17.
- [32] Chen, B., Zhu, X.X., Zhang, D.M., *et al.* (2021) Comparison of the Therapeutic Effect of Negative Pressure Suction Combined Scratching and Small Incision Subcutaneous Ablation in the Treatment of Axillary Odor. *Chinese Medical Cosmetology*, **30**, 67-69.
- [33] Hu, X.T., Li, W. and Peng, H.F. (2022) Analysis of Clinical Effect and Related Factors in the Treatment of Bromhidrosis with the Aid of Small Incision Sweat Gland Excision. *Chinese Medical Cosmetology*, **31**, 29-31.