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Research Article

Small Incision Apocrine Glands Excision Combining Original Vacuum Sealing Drainage Technique for the Treatment of Axillary Bromhidrosis

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Abstract

Aim: To observe the therapeutic effect by small incision apocrine glands excision combining original vacuum sealing drainage technique in treating axillary bromhidrosis and its complication.

Methods: 120 patients with bromhidrosis were included and randomly divided into two groups. Observation group (60 patients) by small incision apocrine glands excision combining original vacuum sealing drainage technique. Control group (60 patients) by regular small incision apocrine glands excision and rubber drains typically were placed.

Results: Therapeutic effect and complications in two groups were compared. Total effective rate in both groups was 100%. 5 patients in observation group (8.33%) had epidermal erosion or dehiscence at medial margin of the incision and 21 patients control group (35.00%) had epidermal erosion or dehiscence at medial margin of the incision. Incidence in control group is obviously higher than that in observation group and such a difference has statistical significance.

Conclusion: Complication incidence is significantly reduced by small incision apocrine glands excision with application of original vacuum sealing drainage technique than regular small incision apocrine glands excision and rubber drains.

Keywords: Axillary bromhidrosis; Surgery; Vacuum sealing drainage; Small incision; Apocrine glands excision; Complication incidence.

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Introduction

Axillary bromhidrosis is a common multiple skin sweat glands disorder, usually seen in young people about 20-30 years old, which has a familial genetic predisposition [1]. There are many ways treating axillary bromhidrosis, however each has advantages and disadvantages, yet operation is still publicly known as the best radical treatment [2]. After regular small incision apocrine glands curettage, patients often receive pressure dressing at axillary surgical area with bandage for fixing and regular change of dressings; however, the author has multiple observations and finds there are still high incidences of post-operation epidermal erosion, necrolysis at medial margin of the incision, wound dehiscence and undesirable healing after suture removal. Undesirable healing of the incision will cause not only longer sick leave time, worse economic and psychological burdens to the patients, but also higher work load and pressure to medical workers, even more conflicts between doctors and patients. Vacuum Sealing Drainage (VSD) was initially applied in clinical practice by Fleischmann from Germany in the 1990s [3]. It is already proved in modern studies and evidence-based medicine that clinical application of VSD brings advantages, such as shorter wound healing, higher flap survival, especially for post-operative poor flap healing, incision infection, fat liquefaction [4]. Yet, VSD has poor compliance due to its high expenses and other factors in patients and their families, so it cannot be widely applied skin surgery.

Based on VSD and continuous explorations, we have made modifications to the original disposable vacuum sealing drainage technique of Luo Xiuyuan [4], and applied it after small incision apocrine glands excision, by which we have achieved significantly lower complication incidence.

Patients and methods

This study was conducted in the Department of Dermatology of the 63600 Hospital of PLA and Shaanxi Provincial People's Hospital. The evaluation of bromhidrosis lacks internationally recognized standards. In this study, we adopted the method introduced by Park [5]. From Jan 2019 to March 2021, we adopted new surgical techniques to treat patients with grade [2,3] bromhidrosis. 120 axillary bromhidrosis patients treated in our department have been included by criteria: age≥18 years; diagnosed with bilateral axillary bromhidrosis diagnostic criteria, voluntarily to receive operation, no regular surgical contraindications, no previous axillary bromhidrosis physical therapy or surgical treatment. There were 45 male and 75 female patients from 18 to 44 years, averagely 24.31 years old, course of disease 4-25 years, averagely 5.6 years. They were randomly divided into groups, 60 in Observation Group, the other 60 in Control Group. They don't have significant difference in group gender and age, and please refer to table 1 for details.

Table 1: Comparison of general data between the two groups.

Item	Observation Group	Control Group	Statistic	*P* value
Gender (M/F, patients)	24/36	21/39	0.320(1)	0.572
Age ($\bar{x} \pm s$, years)	24.35±5.35	24.29±4.29	0.068(2)	0.946
Course ($\bar{x} \pm s$, years)	5.63±4.31	5.60±4.20	0.039(2)	0.969
Note: (1) is X^2 value; (2) is t value				

Surgical procedure: Patients with normal results in preoperative blood routine, coagulation function as well as four pretransfusion tests could receive their operations. Informed consent was signed before operation which was forbidden during menstruation. Operation area was marked by about 1 cm to the outer margin of armpit hair range for separation and excision, then axillary hair was shaved. The patients took supine position elbow flexion, palm upward, placing behind the occipital, axillary part fully exposed, and an incision line about 2 cm long was marked along the direction of skin fold in the center of axillary hair area. Patients in two groups all received small incision apocrine glands excision, and operations were bilaterally performed simultaneously in order to reduce their discomforts during operation. After routine disinfection each side was injected with 0.4% lidocaine with 0.002% epinephrine solution (50 ml each). After the skin was cut open according to the previously designed marking line to the fat layer, tissue scissors were used to gently separate along the dermal junction and the subcutaneous adipose tissue in different directions until a complete subcutaneous cavity was formed to the outer marking line of axillary hair. Then patients were told to raised their hands slowly from pillow to their ears to relax their axillary skin for flap turning subsequently and reducing traction injury. Flap was turned gently with the index finger and middle finger through the incision, and subcutaneous apocrine glands were cut under direct vision, from the incision to the periphery continuously till the marked margin. Subcutaneous pruning was performed until the skin flap thick-ness approached that of a full-thickness skin graft (steps are shown in Figure 1). Then, we extruded the tissue fragments from the subcutaneous cavity and rinsed it with saline to make sure there were no residues. If the extracted washout was red, it indicated that there was active bleeding at the surgical site. The subcutaneous cavity should be carefully examined and bipolar coagulation should be used to stop the bleeding. In Control Group, a rubber drainage strip was inserted into the surgical area through the incision and sutured with 4/0 suture lines. While the original vacuum sealing drainage technique was applied for Observation Group. Qriginal method: to cut off the scalp needle, thin tube and infusion pot of disposable intravenous infusion, keep the thicker infusion tube. Select one end of the infusion tube as the head; Cut about 8 holes with a diameter of 2 mm on the head of infusion tube with a length exceeding 1/2 of the circumference of the oval mark of axillary bromhidrosis operation. The spacing between holes shall be evenly kept with the tail connected to disposable 50 ml syringe to make a drainage tube. A minimal incision was cut in the skin at the lower edge of the elliptic area in the separated axillary bromhidrosis range among patients in observation group, then the prepared drainage tube was put in operative cavity along the ulnar surgical margin, then back bending once beyond midaxillary line. 4/0 suture lines were used to fixate the drainage tube and then the incision is stitched. A syringe was used to suck the exudation, and incision and the fixation of the drainage tube were observed to check whether they were completely closed and whether there do had a vacuum negative pressure. Once it was confirmed that the closure was totally and had negative pressure, the piston shaft of the prepared 5 ml syringe used to stuck in the empty barrel tail and the piston handle of the 50 ml syringe connected to the drainage tube tail, to maintain negative pressure; then it should be fixed by tape (steps are shown in Figure 2). For replacing tail syringe af-

terwards, the drainage tube tail should be folded and pinched to prevent air entry; then the syringe should be removed and the drainage tube tail disinfected with iodophor then a new syringe should be connected. After operation, pressure dressing was applied with gauze and cotton pad and bandage was applied in an "8" shape for fixation. Observation group patients were observed for their drainage volume and negative pressure maintenance everyday for three days. On the 5th day, negative pressure drainage tube should be removed and followed with pressure dressing and "8" shape fixation; on the 7th postoperative day, pressure dressing and fixation were stopped; on the 10th day, suture lines were removed. Corresponding method in control group patients were given new pressure dressing, On the 4th postoperative day. On the 7th day, routine dressing change, fixation stopped; on the 10th day, suture lines were removed. Thereafter, the incision was only covered with gauze. The patients were allowed to perform some basic daily activities. After 14 days, they could gradually return to normal life. After the operation, if volume of drainage in observation group syringe exceeded 30 ml in a single day, or hematoma or active bleeding was found when changing dressing in control group, sutures should removed to treat active bleeding and blood clot should be cleared; drains could be applied.

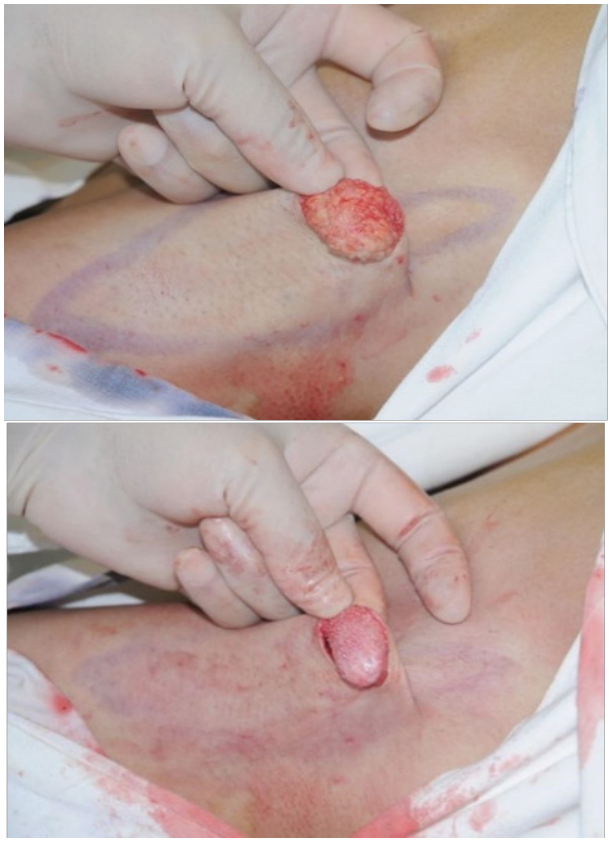

Figure 1: Top: Flap was turned gently with fingers through the incision, and subcutaneous apocrine glands exposed. **Right:** Subcutaneous apocrine glands were cut under direct vision.

Therapeutic effect analysis and observation of complication: Therapeutic effect judgement: cured: no peculiar smell, and both the operator and the patient were satisfied with the operation effect; significantly effective: peculiar smell obviously reduce, yet slight smell after heavy activity or sweating, while patients would accept and require no further operation, and operator would think a further operation unnecessary; ineffective: no improvement in treating peculiar smell, operator and patient would not be satisfied with the result; recurrence: in 6

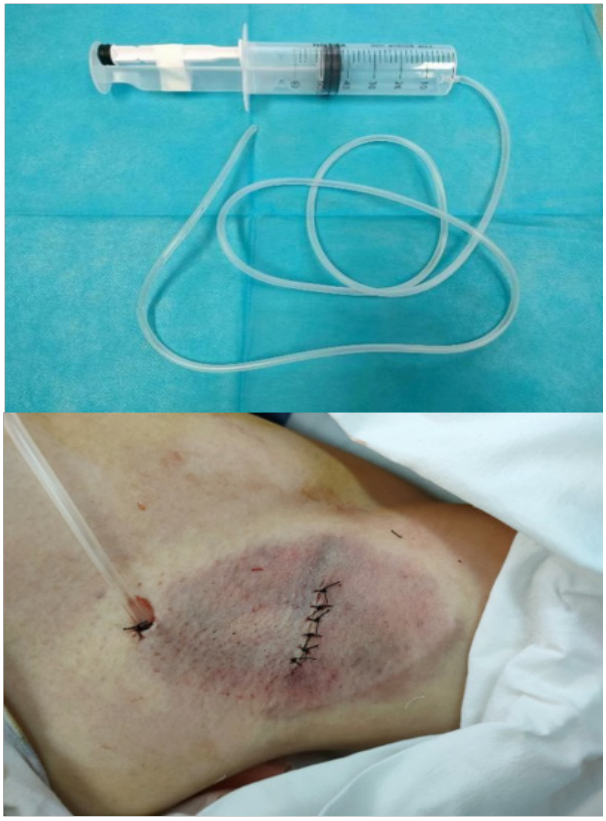

Figure 2: Top: Complete original vacuum sealing drainage technique. **Bottom:** drainage tube is placed in the operation area.

months after operation, if any patient meets diagnostic criteria again, then it is a recurrence. Effective rate = (cured number + effective number)/total number×100%, recurrence rate = recurrence number/total number×100%. Observation on complication: when changing dressing or removing suture lines, to check if there is hematoma, epidermal erosion or dehiscence at medial margin of the incision, if there is scar hypertrophy, smell residue in 6 postoperative months.

Statistical analysis: SPSS statistical software was applied to analyze and X^2 Test was applied to compare recurrence rate and complication incidence between two groups; when $P<0.05$, difference was statistically significant.

Results

In Observation Group, 58 patients were cured, 2 cases were significantly effective, no case was ineffective, with a 100% total effective rate. In Control Group, 57 patients were, 3 cases were significantly effective, and case was ineffective, with a 100% total effective rate. In Observation Group, 1 recurrence case (1.7%); in Control Group, 2 recurrence cases (3.3%), difference between 2 groups has no statistical significance ($X^2=0.342$, $P=0.559$. In Observation Group, there were 1 patient of bleeding, 0 patient of subcutaneous hematoma, 5 patients of epidermal erosion or dehiscence at medial margin of the incision, 1 patient of scar hypertrophy, and 2 patients of smell residue. In Control Group, there were 2 patients of hematoma, 21 patients of epidermal erosion or dehiscence at medial margin of the incision, 2 patients of scar hypertrophy and 3 patients of smell residue. No skin flap necrosis was found at all. By comparing the two groups, we found that patients in Observation Group had a significantly lower epidermal erosion or dehiscence incidence at their incisions than Control Group (Table 2).

Table 2: Comparison and analysis of complication between the two groups case (%).

Group	Hematoma or bleeding	Skin flap necrosis	Epidermal erosion or dehiscence at medial margin of the incision	Smell residue	Scar hypertrophy
Observation Group	1(1.67)	0	5(8.33)	2(3.33)	1(1.67)
Control Group	2(3.33)	0	21(35.00)	3(5.00)	2(3.33)
X^2 value	0.342	-	12.570	0.209	0.342
P value	0.559	-	0.000	0.648	0.559

1 patient in Observation Group had bleeding in 6 hours after operation in the same day by finding of over 30 ml bloody fluid drained in vacuum sealing drainage technique, so we removed suture lines for hemostasis and did the same bandage and drainage. 2 patients in Control Group were found with subcutaneous hematoma and given hematoma cleaning; then they received pressure dressing and were ordered to stop activities. After suture removal, patients with epidermal erosion or dehiscence were given cleaning on surface or marginal necrotic tissue; when changing dressing, they received external application of Recombinant Bovine Basic Fibroblast Growth Factor Gel regularly, and wounds healed. By revisit in June, they received local injection of glucocorticoid to treat hypertrophic scar.

Discussion

Patients with axillary bromhidrosis usually have human communication disorders and most of them have an impact on life quality [6]. Though axillary bromhidrosis has multiple causes, interaction of excessive apocrine sweat glands secretion and local microbial is the key one, and also hyperhidrosis is another key cause. In order to treat axillary bromhidrosis, we shall reduce smell, but also secretions of apocrine sweat glands and eccrine glands [7]. There are expectant treatments such as local astringent, iontophoresis and botulinum toxin injection, however they are not a permanent solution for they need regular treatments. While axillary bromhidrosis patients need permanent and confirmed treatment. Surgical excision of apocrine glands is the most effective way to permanently remove or reduce armpit odor and hyperhidrosis. As of now, excision of apocrine glands is the most effective way to cure axillary bromhidrosis, which also brings a good long-term therapeutic effect, high satisfaction [8]. In recent year, subdermal vascular network flap has been widely applied in clinical practice, bringing a new surgical method for treating axillary bromhidrosis and its biggest advantage is keeping the original skin of the armpit and only destroying its subcutaneous fat and skin appendages, so axillary morphology and therapeutic effect were significantly improved, meanwhile, small incision subcutaneous apocrine glands excision along axillary wrinkle wall is considered a good method for more application due to its minimal wound, concealed incision, small postoperative scar and low recurrence rate etc [9]. Yet, it has higher operative complication risks for it is common to see skin erosion, necrosis, dehiscence and poor healing at incision [10]. Analysis of complication causes: small incision apocrine glands excision at armpit requires operation through the whole process, so skin incision margin is pulled repeatedly for turning, cutting, hemostasis, which furtherly causes poor and delayed healing, as well as epidermal erosion at the incision; and when doing apocrine glands curettage, partial subdermal vascular network is cut too, which brings less flap blood supply, and local blood flow slows down during pressure bandage, however flap blood supply is normally the worst in the middle, i.e. the least blood supply at the incision, that is the cause of epidermal erosion and delayed wound healing. Therefore, operators are continuously modifying operation methods, so as to reduce postoperative complications, however many new surgical methods would bring more incisions with more scars, and higher skin tension at the scar are more likely cause more obvious scars. Once complication occurs, it usually brings great pains on patients, meanwhile their lack of medical knowledge would worsen conflicts between doctors and patients under current medical conditions. VSD was introduced for domestic clinical application in 1990s. It is reported in literatures that VSD has advantages such as lower work load, shorter healing time in abdominal infection operation, bedsore, especially during course of massive skin trauma or defect compared with traditional dressing change [11-13]. VSD brings a certain pressure difference to the wound and its surrounding tissue chiefly by vacuum aspiration, so to improve local tissue blood circulation and local microenvironment, reduce local tissue edema and bacterial breeding, promote the discharge of bacteria, necrotic tissue and exudation, as well as the proliferation of local granulation tissue, furtherly to better tissue healing [14]. In this research, we had multiple application of the modified disposable vacuum sealing drainage technique post apocrine glands curettage, by which we had significantly reduced complication incidence without bringing any impact on therapeutic effect. Currently the other VSD products are limited in clinical application due to its expensive price, complicated replacing and its supply channel, however our original vacuum sealing drainage technique is lower in its price, so we can help patients relieve their financial burden, more acceptable among their families; meanwhile it is light, portable and convenient; containing mark can help accurately record the drainage and make it easy to observe active bleeding; easy to operate and change. During drainage, drainage tube and syringe shall be kept unobstructed, so to avoid poor drainage of exudate due to blockage or reverse folding. To conclude, our original vacuum sealing drainage technique has accessible material source, cheap consumables, and simple operations, so it deserves a wide application in clinical practice.

Declarations

Competing interests: None declared.

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Ethics approval: Ethics approval was obtained from the ethical review committee of The 63600 Hospital of PLA.

Data availability statement: Data are available on request. Any requests for data can be made to the corresponding author and are subject to ethics approval.

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