Use of a purse-string suture method and blunt-ended dissector in arthroscopic surgery for axillary osmidrosis

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**ABSTRACT**

**Background/Objectives:** In recent years, the use of a suction-assisted arthroscopic shaver has become a popular method for the treatment of axillary osmidrosis. The dissection method is essential for creating adequate space for the curettage and suction process of the shaver. However, the traditional dissection process using scissors extends the wound and affects the final cosmetic result. Therefore, we developed a method to minimize the surgical wound to decrease the side-effects related to wound size and achieve a better cosmetic outcome.

**Methods:** A 3-mm diameter blunt-ended dissector was used for dissection, and a temporary purse-string suture was used to minimize wound tension during curettage. The clinical efficacy, complication rate, and satisfaction rate of this new method were evaluated in 15 patients recruited over a 6-month period.

**Results:** Using this refinement, postsurgical wound size could be limited to 4 mm with a low complication rate (3.3%). Good clinical efficacy was achieved in 93.3% of patients, with excellent agreement between the clinicians and patients.

**Conclusion:** We introduced a simple method to decrease wound tension during suction-assisted arthroscopic shaver surgery for axillary osmidrosis. This modification is simple and convenient for dermatologists to perform, and the final cosmetic result is satisfactory.

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**Introduction**

Osmidrosis is a common and distressing problem, particularly in Asian society. The condition is characterized by a foul-smelling odor produced by the apocrine glands, which causes embarrassment and is a social hindrance. Many treatment methods have been introduced, including medical and surgical therapies. Conservative medical treatments such as topical astringents, systemic agents and botulinum toxin have only conferred temporary effects; therefore, surgical treatment is preferred for those with more complicated osmidrosis, because it provides a more permanent resolution.

Many surgical techniques have been developed over the years, including surgical excision of subcutaneous tissue, en bloc excision of skin and subcutaneous tissue, ultrasonic liposuction, sympathectomy and electrosiccation. Many of these methods are effective and reasonable for the removal of axillary sweat glands, however, there is concern about the invasiveness, complications, long recovery time, and scar formation associated with these methods, all of which affect the patient’s satisfaction. The surgical technique has been modified and new techniques have been developed to avoid these side-effects. The suction-assisted arthroscopic shaver was introduced recently and has gained popularity, because it is a less invasive procedure and has produced good outcomes. However, complications of the surgery are still noted, such as hypertrophic scar, skin necrosis and wound dehiscence. These complications can be lessened by minimizing the wound size, and we found that dissection is the main process used to extend the surgical wound, although this is rarely stated. Therefore, we modified the dissection process and used a temporary purse-string suture to make the surgery more acceptable to both surgeons and patients.

**Materials and methods**

**Patients**

Fifteen patients with osmidrosis were enrolled in the study from July 2010 to December 2010. The patients included 11 women and four men, and their ages ranged from 18 to 53 years (Table 1). All...
the patients were treated using a modified dissection and liposuction curettage procedure at the Department of Dermatology, Chang Gung Memorial Hospital, Kaohsiung. All the patients had experienced axillary malodor for more than 3 years that was not improved by topical medical treatment, and the condition had greatly limited their social activities and affected their quality of life. None of the patients had received botulinum toxin or undergone previous surgery. All surgical procedures were performed on an outpatient basis.

**Surgical procedure**

One of the authors (WW) performed all the surgical procedures following the protocol described by Lee et al., with a modification. Briefly, patients were placed in a supine position with both arms abducted to 135°, and 100–200 mL 0.1% tumescent solution (100 mL 1% lidocaine, 1 mL 1:1000 epinephrine, and 10 mL 8.4% sodium bicarbonate in 1000 mL 0.9% sodium chloride) was used for local anesthesia on each side. A 1.5-mm punch was used for incision over the center of the axillary fossa. A 3-mm diameter blunt-ended dissector (Figure 1) was passed through the incision. The dissector was then moved in a fan-shaped direction to partially dissect the dermis and the subcutaneous tissue while preserving the fibrovascular septum.

Subsequently, curettage was performed on the upper borders of the separations using a 4-mm diameter arthroscopic shaver (E9005 System; Linvatec Corporation, Largo, FL, USA) at a speed of 1500 rotations/minute to remove the subcutaneous tissue. The temporary purse-string suture was used during the whole process to decrease tension during curettage and suction (Figure 2). Curettage was continued until thin white dermis was encountered. All fat tissue and grayish apocrine glands, including the dermal side and those surrounding the fibrous bands, were removed at the end of curettage, and clear whitish fibrous bands joining the dermis and subcutis were then observed. The dermis was checked for any residual glands and the wound was closed with 4/0 nylon sutures. The size of the final wound was limited to 4 mm (Figure 3). The entire procedure took approximately 30–35 minutes on each side. The procedure did not include anchoring sutures for the defatted skin flaps. After wound closure, external compression was provided with a tie-over dressing on the treated area for 3 days. Sutures were removed 1 week postoperatively.

**Assessment of clinical efficacy and satisfaction**

Complications were assessed by clinical inspection of the wound 1 week after the procedure. The follow-up period ranged from 12 to 17 months, with a mean of 14.5 months.

**Table 1** Patient demographics and clinical results (n = 15).

<table>
<thead>
<tr>
<th>Variables</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td>18–53 (mean 27.8)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>11</td>
</tr>
<tr>
<td>Male</td>
<td>4</td>
</tr>
<tr>
<td>Follow-up duration (mo)</td>
<td>12–17 (mean 14.5)</td>
</tr>
<tr>
<td>Clinical efficacy (clinicians)</td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>14 (93.3%)</td>
</tr>
<tr>
<td>Fair</td>
<td>1 (6.7%)</td>
</tr>
<tr>
<td>Poor</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Clinical efficacy (patients)</td>
<td></td>
</tr>
<tr>
<td>Good</td>
<td>14 (93.3%)</td>
</tr>
<tr>
<td>Fair</td>
<td>1 (6.7%)</td>
</tr>
<tr>
<td>Poor</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Satisfaction (patients)</td>
<td></td>
</tr>
<tr>
<td>Very satisfied</td>
<td>11 (73%)</td>
</tr>
<tr>
<td>Satisfied</td>
<td>4 (27%)</td>
</tr>
<tr>
<td>Dissatisfied</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

Figure 1 A 3-mm diameter blunt-ended dissector.

Figure 2 The temporary purse-string suture is used throughout the process.

Figure 3 The wound size is 4 mm after the surgery.
Clinical efficacy was evaluated by both patients themselves and clinicians as good, fair, or poor, with results reported every 6 months. A good result was considered to be no malodor. A fair result was indicated by mild malodor on either side of the axillae. A poor result was defined as persistence of malodor.

A questionnaire was used to evaluate patients’ satisfaction with the surgery. Patients were asked whether they were very satisfied, satisfied, or dissatisfied with the procedure with regard to convenience of the surgery, surgical complications, and cosmetic outcome.

Statistical analysis

The categorical data were expressed as percentages. Analysis of data was performed using a statistical software package (SPSS version 12.0; SPSS Inc., Chicago, IL, USA). The results were analyzed using kappa statistics to evaluate the agreement of clinical efficacy between clinicians and patients and the agreement between clinical efficacy and patient satisfaction.

Results

Of the total 30 axillae (15 patients) procedures performed, no serious complications (Table 2) were noted except one axilla with ecchymosis that disappeared within 1 week. No hematomas or skin necrosis were observed. The final incision wound was 4 mm and the scar was not visible after the operation. One patient who rated fair efficacy had mild malodor during vigorous exercise, but it was imperceptible during normal daily life. There was no recurrence during the follow-up evaluation of other patients.

Of the total number of patients, 93.3% rated the surgery as having good clinical efficacy, 73% were very satisfied, and 26% were satisfied with the clinical outcome. The evaluation indicated that 93.3% of patients had a good result and 6.7% of patients had a fair result (Table 1). Excellent agreement of clinical efficacy was noted between the clinicians and patients (kappa = 1.0, p = 0.0001). However, there was poor agreement between the clinical efficacy and patient satisfaction (kappa = 0.328, p = 0.086).

Discussion

The principle of axillary osmidrosis surgery involves eliminating the apocrine ducts in the subcutaneous tissue. The first surgical treatment for this condition was introduced in the 1970s. Conventional surgery using excision of the subcutaneous fatty tissue, with or without partial to total removal of axillary hair-bearing skin, has marked long-term improvement but has high complication rates, as reported by Perng et al.5 The complications include skin necrosis, hematomas, seromas, and ugly scarring. In treating this nonlife-threatening but troublesome condition, less aggressive procedures with moderate efficacy are preferable.

Suction-assisted liposuction is one of the treatment options that was first introduced by Shenaq et al6 for hypertrichosis, which was then expanded as a treatment for osmidrosis because of the similar treatment process required for both conditions. Liposuction will remove subcutaneous tissue with minimal trauma, thus facilitating a short recovery time and low complication rate. Various techniques and modifications for treatment were introduced, including ultrasound-assisted liposuction,7 endoscopic shaver and liposuction,8 and suction-assisted arthroscopic shaver.4 The recently introduced suction-assisted arthroscopic shaver can successfully remove subcutaneous tissue and preserve the subdermal bundles from injury during suction curettage because of the special double-cannula design of an inner rotating part and an outer protecting device.
part.\textsuperscript{9} Through this method, results comparable to those obtained with traditional surgery and with other liposuction techniques have been reported.\textsuperscript{2–4}

In earlier studies, only modest success rates\textsuperscript{5} were achieved, and Grazer\textsuperscript{10} reported a 30% recurrence rate. The recurrence rate was high because part of the glands are tightly bound to the dermis and are difficult to remove completely with the liposuction procedure.\textsuperscript{2}

Therefore, dissection to create a space between the dermis and subcutaneous tissue before the curettage process is essential, and dissection scissors were the most popular devices used for this purpose (Table 3). However, during the repeated movement of opening and closing the scissors to dissect the layers, the initial incision would become extended to more than 8 mm (Table 3). The 3-mm diameter blunt-ended dissector (Figure 1) can create an adequate space by pushing forward and backward repeatedly in a fan-shaped direction. This not only preserves the initial wound size but also carefully protects the subcutaneous fibrovascular cords, which is important to prevent the occurrence of epidermal necrosis and hematomas.\textsuperscript{9}

We also use a temporary purse-string suture method during the liposuction, which according to our review, was not used in other surgeries for axillary osmidrosis. This technique is readily learned and simple to perform in many surgeries. Recently, it was introduced for closure of cutaneous surgical wounds because it allows the application of tension to the surgical wound edge, which helps in establishing hemostasis of the wound.\textsuperscript{11,12} Use of a temporary purse-string suture allows centripetal force to be maintained and provides tension on the edge of the defect during the whole process of curettage and liposuction. It can prevent the extension force created by the shaver and decrease the minor trauma of the incision wound. The final wound size after the procedure is 4 mm (Figure 3). The combination of these two simple modifications can decrease local complications related to wound size, such as local infection, skin necrosis, partial wound disruption and dehiscence.\textsuperscript{7,13} Huang et al\textsuperscript{3} reported that 7% of patients had scarring in the incision line and were concerned about this postoperative problem. Our new modification resulted in a better cosmetic outcome by minimizing the wound size.

We refined the procedure by using a smaller dissecting device, a 3-mm diameter blunt-ended dissector, to carefully dissect the tissue and by using the purse-string suture method during the liposuction process to minimize the extension of the wound. This new procedure achieved 93.3% good clinical efficacy with a low complication rate (3.3%). This was represented by the excellent agreement of efficacy between the clinicians and patients.

Compared with other suction-assisted arthroscopic shaver methods, this method achieved smaller wound size with satisfactory patient results (Table 3). Because satisfaction is subjective and multifactorial, disagreement between the efficacy and satisfaction of the patients was recorded. In summary, a high degree of satisfaction was still noted. This was attributed to the non-invasiveness of the procedure, the good clinical efficacy, and the excellent cosmetic outcome. This modification is convenient for dermatologists to perform, and we recommend this simple and effective method to achieve better outcomes for patients with axillary osmidrosis.

References