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ORIGINAL ARTICLE BREAST SURGERY

Transaxillary Endoscopic Approach to Capsular Contracture Following Previous Breast Augmentation: Operative Technique and Clinical Outcome

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Abstract

Background Capsular contracture (CC) is a complication of breast augmentation that frequently requires revision surgery. The axillary approach reduces the visibility of the postoperative scar. It is unclear whether the previous incision can be used to repair the deformity caused by CC.

Methods This study analyzed 21 patients (42 breasts) with grade III–IV CC during 2012–2017. The mean age of the patients was 32 years (range 23–48). Previous axillary scars were used to expose, and CCs were taken out completely or partially. Breast implants were removed. The dissection was performed with endoscopic assistance, using electrocautery under direct visualization.

Results The mean follow-up period was 13 months (range 6–24 months). The dissection plane was changed to dual plane. Thirty-five CCs were taken out completely. Thirty-eight breast implants taken out remained intact. None of the patients required additional surgery.

Conclusion Endoscopic-assisted treatment may be an effective technique for treating CC and avoiding the additional scar.

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Keywords Endoscopes · Capsular contracture · Breast augmentation · Reoperation · The transaxillary approach · Dual plane

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Introduction

Transaxillary breast augmentation (TBA), introduced in 1973 [1], is technically more demanding than the submammary or periareolar approach. It is the most popular technique employed in China in patients who wish to avoid additional scars in the aesthetic unit of the breast.

Capsular contracture (CC) is a problematic complication of breast augmentation that frequently requires revision surgery. Clinically significant CC, presenting as a firm, tight-appearing breast that may progress to breast distortion and pain, has been divided into four grades (Baker classification) [2]. Grade III–IV contractures require surgical treatment. The gold standard treatment for CC is total capsulectomy with implant removal and replacement [3].

The axillary approach reduces the visibility of the postoperative scar. We sought to use the previous incision to repair the deformity caused by CC.

Methods

Patients

A prospective study was conducted among 21 patients (42 breasts) who experienced CC after TBA from January 2012 to November 2017. The mean age of the patients was 32 years (range 23–48). Thirty-three breasts were Baker Grade III and nine breasts were Grade IV.

Preoperative Evaluation

Preoperative clinical assessment and operative planning for axillary augmentation precisely follow the methods and processes of the High Five Process [4]. The surgeon counseled patients about the possible surgical approaches, and the patients provided informed consent.

The new IMF position is important to preoperative designation. The patient took a standing position. The first step is to evaluate whether the bilateral nipples were at the same level. Then, the size of the new breast prosthesis was designed according to the size of the previous breast prosthesis combined with the patient's breast basal width and skin extension. The new IMF was marked based on the new prosthetic chassis diameter (Fig. 1).

Operative Technique

The entire surgical procedure was done using electrocautery dissection with direct endoscopic visualization. The endoscopic dissection was followed by the transaxillary removal of previous implants. After dissecting the previous implant pockets, new implants were placed under the dual plane.

Under general anesthesia, patients were positioned supine with their arms extended to 90 degrees. Make sure during the operation, the patient can be adjusted from the supine position to the seated position.

Step 1 Incision and Access to the Previous Implant Pocket

The previous axillary scars were used, and the skins were incised until the subcutaneous fat was exposed. From here, the 3-cm subcutaneous dissection was extended to the lateral border of the pectoralis major (Fig. 2). When the pectoral fascia was opened, the previous layer could be accessed. In this process, hemostasis for the lateral thoracic vessels was necessary. It should be noted that, especially to protect the intercostobrachial nerve and medial brachial cutaneous nerve, surgeons should pay attention to avoid damage to the axillary fat pad.

Step 2 Dissect the Capsule and remove the Implant

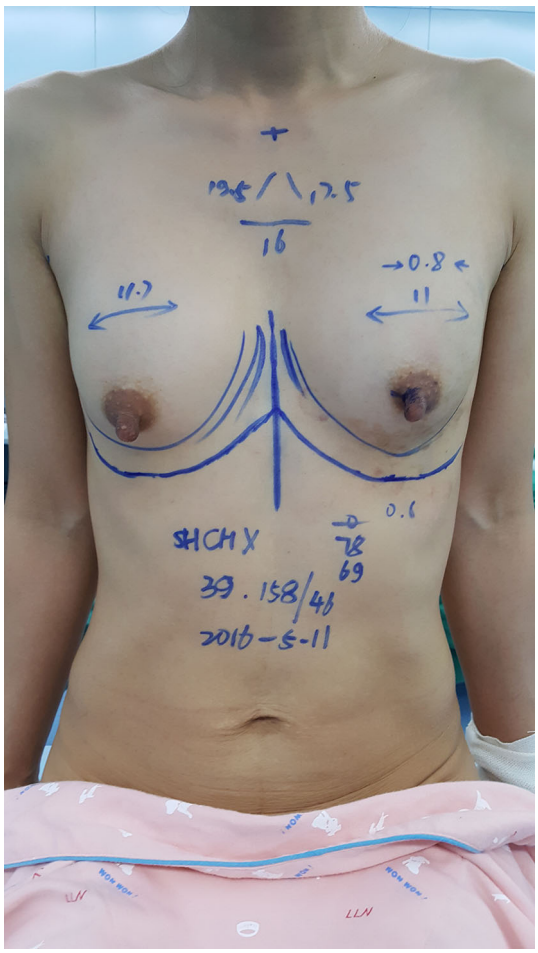

Fig. 1 Anterior preoperative markings of a 39-year-old patient. The initial markings show the anatomic midline, preoperative inframammary fold, and intended level and shape of the proposed inframammary fold. Note that there are fold asymmetry, different

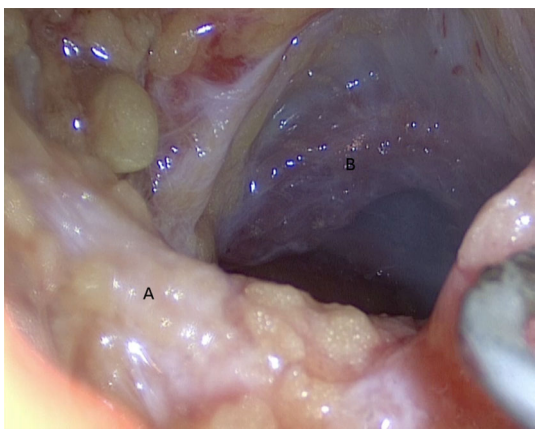

Fig. 2 Accessed the approach through previous axillary scars. A Fat pad; B pectoralis major

Due to the different implant placement, the contracture capsule should be first released at first. Enter the previous

layer, the dissection order should be followed from zone 1 to zone 4 (Fig. 3).

After subcutaneous separation, blunt separation was performed to the outer surface of the breast capsule. Under endoscopic assistance, dissection started from the superomedial area and proceeded to the inferior and lateral areas in a clockwise fashion on the right breast sequential. Care was taken when positioning the endoscope to avoid capsular penetration, especially along medial boundaries. The dissection of the medial boundaries depended on the local tension. The tension between the prosthesis and surrounding tissue can be formed by the drag hook from the endoscope. It was conducive to separation without excessively damaging the internal tissues (Fig. 4). After the surface area had been completely separated (Fig. 5), the implant capsule could be opened (Fig. 6). Before taking the prosthesis out, it is necessary to check the integrity of the prosthesis. After taking the implant out, the basic capsule should be dissected carefully.

Step 3 Remove the capsule

The surface of the prosthesis had been completely dissected, while the base layer had not been peeled off. If the adhesion was light, the basement can be completely peeled off. When the adhesion was severe, the "mesh method" was helpful for peeling off the envelope. The "mesh method" means separating the envelope into 2 cm * 2 cm areas, which was beneficial to remove it (Fig. 7). Figure 8 shows the intact capsule.

Step 4 New Pocket Dissection and new prothesis implantation

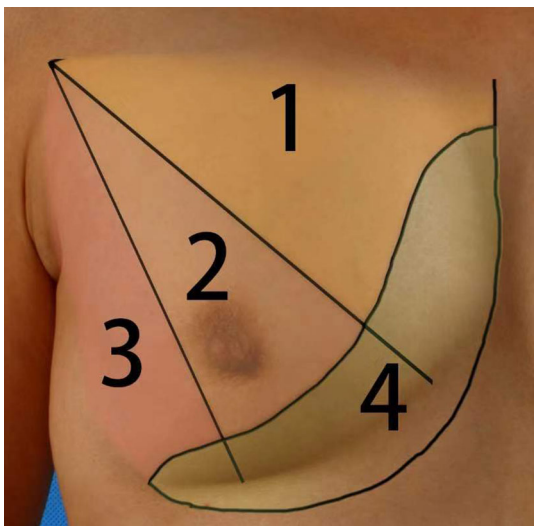

Fig. 3 Sequence of sequential dissection (From zone 1 to zone 4, the zone 4 was the most difficulty area.)

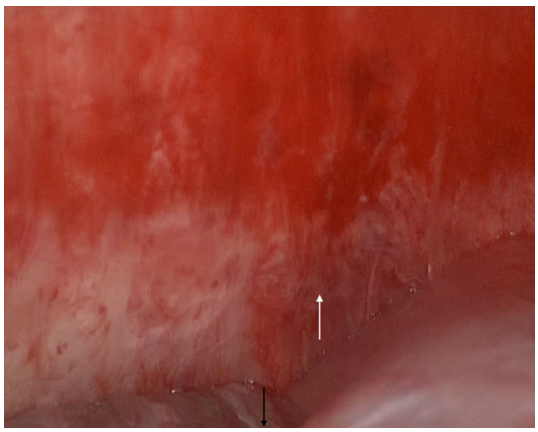

Fig. 4 Medial boundary under the endoscope (Arrows indicate the direction of the tension. The upward force came from the endoscopic hook and the forward force was formed by the oval clamp pulling the envelope)

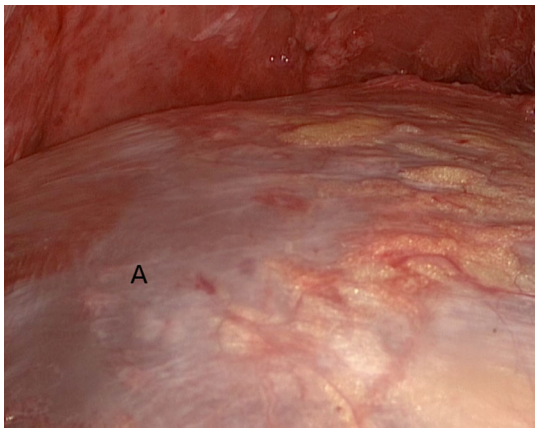

Fig. 5 Surface of the capsule A the prosthetic capsule

Change in pocket location should be considered at the time of revision [5]. A new pocket was made followed by Tebbetts's dual-plane method [6]. Figure 9 shows the process of dual-plane formation. The new pocket was formed after the pectoralis major to increase organizational coverage. After the new prothesis was implanted, the operating bed was changed to the semireclining position to adjust the position. Then, the drainage tube was placed and the incision was sutured.

Results

Twenty-one patients underwent transaxillary dual-plane breast augmentation with the endoscope. The demographic data were as follows: mean age, 32 ± 7 years; mean body mass index, 19.8 kg/m^2.

Forty-two capsular contractures were taken out completely, of which 18 were intact. Thirty-eight breast

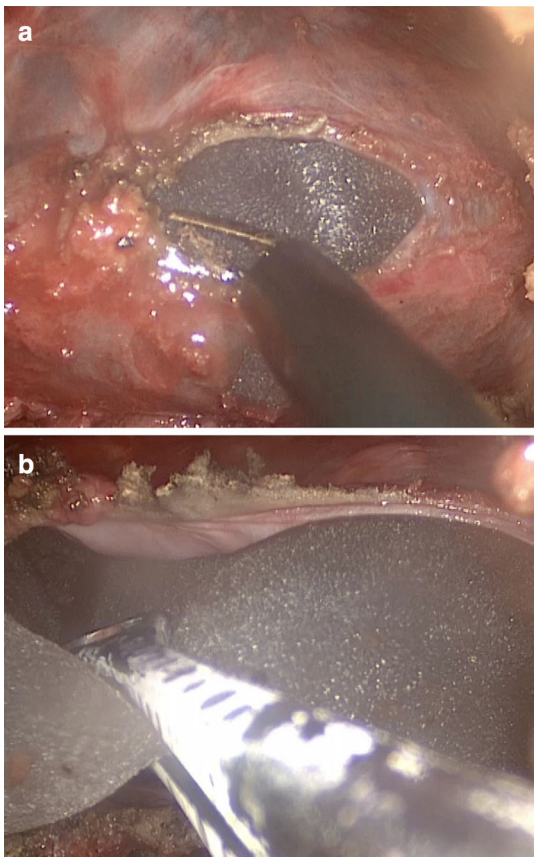

Fig. 6 **a** Opened the capsular and removed the implant A open the capsular. **b** Opened the capsular and removed the implant B removed the implant

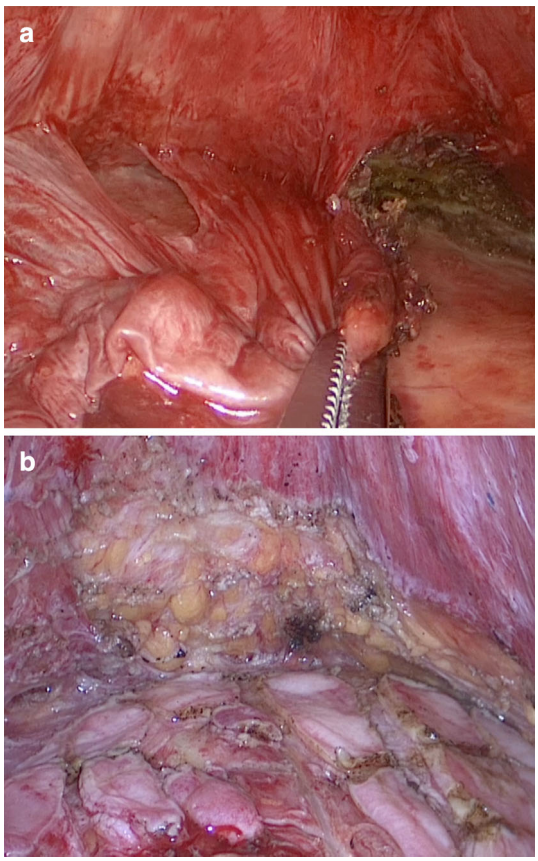

Fig. 7 **a** Dissected the base layer of the capsular A peeled off the capsular completely. **b** Dissected the base layer of the capsular B the mesh method

implants taken out were intact, while four implants were broken. The mean increased volume of the new implants was 100 ± 15 ml.

The mean follow-up period was 13 months (range 6–24 months). No major complications and no severe deformities were found. Figure 10 shows the comparison between the preoperative and postoperative states.

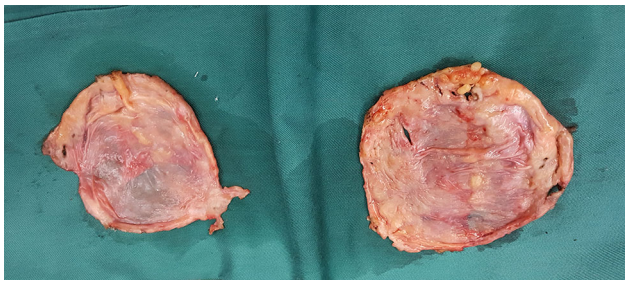

Fig. 8 Intact capsular

Discussion

The complications of breast augmentation include hematoma, seroma, infection, altered nipple sensation, scarring, asymmetry, capsular contracture (CC), and so on [7]. CC remains the most commonly reported complication and reason for reoperation following breast implant surgery.

Surgery is the main treatment for capsule contracture. Using a new breast implant when treating CC is imperative, because of the possible presence of biofilm and their notorious antibiotic resistance [3]. The periareolar incision is appropriate for patients with larger areolas or for patients who want to hide the incision in their social life. The results of meta-analysis demonstrate the contributing effects of periareolar breast augmentation on the rate of CC [6]. The immune system plays a prominent role in CC formation and in general studies have shown a higher rate of bacteria on CC [8]. In order to achieve better vision and clear exposure, the prosthesis and envelope should be removed as completely as possible. Generally, an areola incision is used, which is about 5–6 cm long and 1/2 around the areola. The common problems of the areola incision are inadequate exposure, bleeding, and difficulties in stopping bleeding, especially in small areola. It is more difficult to perform surgery with a non-lacteal incision

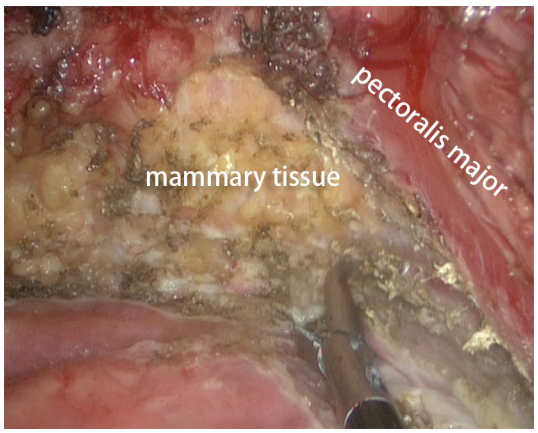

Fig. 9 Dual-plane formation

using conventional methods. At present, the axillary incision is used for most breast augmentations in Asian. In China, the axilla is the dominant incision location used in breast augmentation. For these Chinese women, a scar in the axilla was thought to be easier to hide. Sun et al. [9] found that the axillary incision was the favorable approach by the majority of Chinese patients both before and after they received preoperative education because easily hidden scars were the primary concern of most Chinese patients in the decision-making processes with regard to the incision location. These patients need to use the areola incision to release the capsule, which is difficult for patients to accept sometimes. The areola incision may cause damage to the mammary ducts in patients who are not breast-feeding and

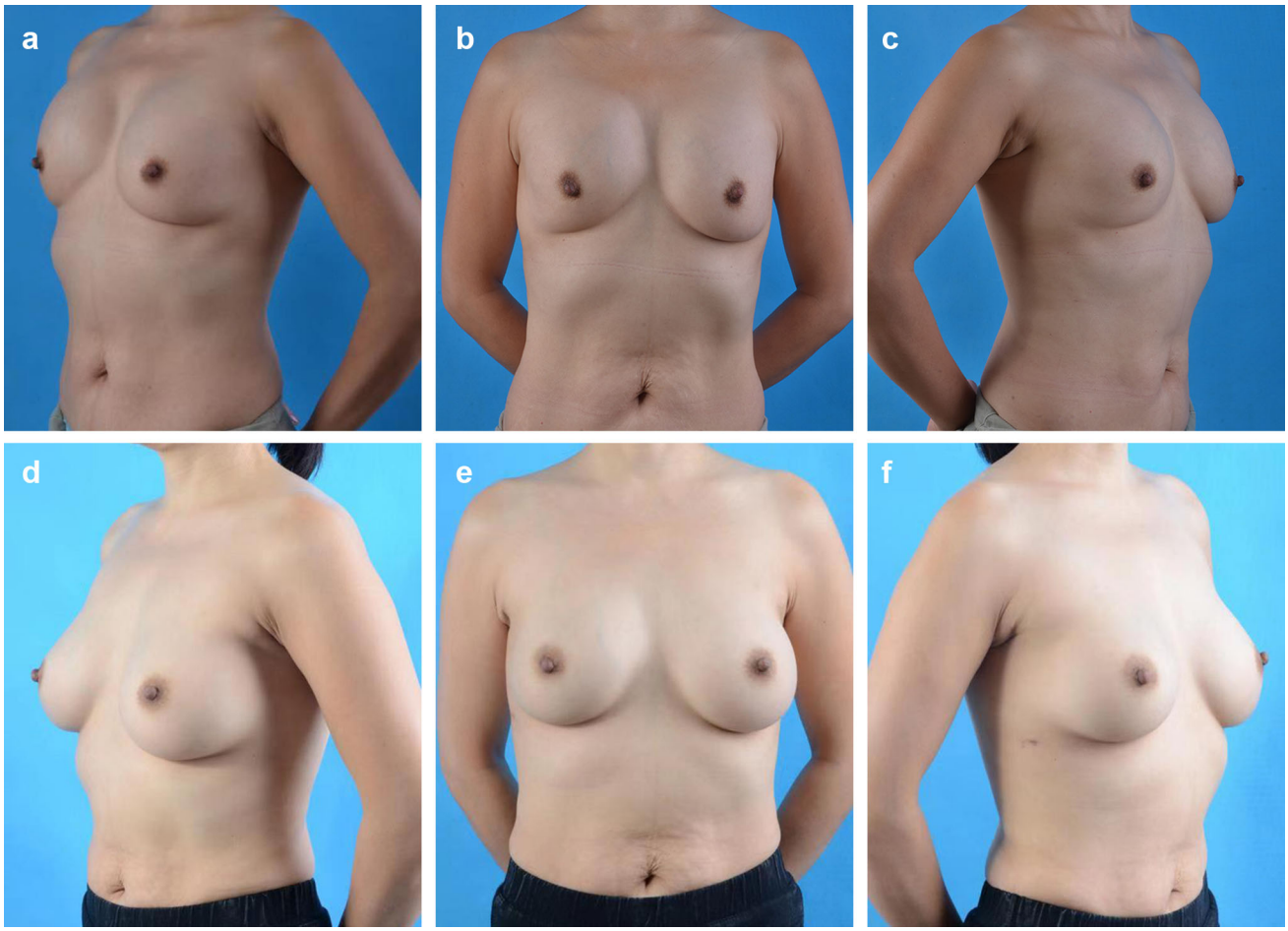

Fig. 10 The case shows the comparison between preoperative and postoperative photos. The implants were changed from 175 to 245ml. The photos of **a**–**c** show the preoperative states. The photo **d**–**f** show the postoperative photos

need to be relieved. There is a certain degree of uncertainty in the postoperative results. The transaxillary incision has been favored in our institution mainly because the incision was not in the breast area, especially in small breasts with small areolas [10]. Therefore, in order to reduce the scar of the surgical incision and make the operation clear and clean, a new surgical operation is needed. Endoscopic-assisted transaxillary breast augmentation has been an established method for breast augmentation for a long time [11]. Transaxillary breast augmentation has been considered a more technically difficult approach, especially when associated with shaped implants [12]. A study by Dr. Lee has compared the use of the inframammary and endoscopic transaxillary approaches for shaped implants in breast augmentation surgeries. The results showed that both options of surgical approaches are comparable, and one is not inferior to the other [13].

Dr. Yu had used endoscopic technique to treat CC [14]. But Dr. Yu and his team only released the tension of CC and he had reported only four cases. We attempted to use the endoscopic technique to retract the capsule and prosthesis through the original axillary incision and re-peel the double plane for repair. The base part was difficult to separate. An improper operation might cause a pneumothorax. We used the "mesh method" to divide the large-area envelope into multiple grids. It reduced the excessive tissue damage caused by large-area peeling. And it made surgical operation easier under endoscopic operation to shorten the operation time. And the method we used is different than Park [15]. The bacterial etiology is considered a major contributor to the development of CC, and it is believed that microorganisms located on the surface of the implant can alter the course of the inflammatory response and outcome [16]. Based on the biofilm hypothesis, in order to reduce the recurrence rate of CC, it is necessary to remove the residual capsular as much as possible. In view of the thermal injury caused by electrotome, the power should be adjusted down appropriately. It is necessary to inject tumescent fluid to the stripping zone. Although it affected the effectiveness of the electrotome, we believed that it has significance in reducing tissue thermal injury and postoperative pain.

The application of endoscopic techniques requires certain indications. It may not fit all cases. Class III and IV are clinically significant and symptomatic, with III describing moderate contracture with some firmness felt by the patient and IV describing severe contracture which is obvious from observation and symptomatic in the patient [17]. According to our experience, grade III–IV can be operated on under the endoscope. Particularly, when peeling off, the inner side is separated not only by the tension caused by the pulling of the instruments, but also by the large tension more likely formed by the heavier capsule, so it is easily peeled off.

Park [15] divided the costal origin of the pectoralis major muscle completely to produce the dual plane type I, which could reduce the chance of displacement or malposition of the implant, and achieved a definite inframammary fold. Transaxillary breast augmentation has been conducted with sharp electrocautery dissection under direct endoscopic vision throughout the entire process. Attention was turned to minimizing the tissue damage by means of sharp dissection, shortening the period of recovery, relieving pain, and reducing the risk of capsular contracture. Transaxillary breast augmentation has been conducted with sharp electrocautery dissection under direct endoscopic vision throughout the entire process [18]. The benefits of this method were clear: a bloodless pocket, a sharp non-traumatic dissection, and no new scar formation.

Conclusion

Through our clinical observation, the transaxillary endoscopic approach is suitable for grade III–IV capsular contractures. The advantages of this method are obvious, little bleeding, and capsule can be moved completely. The surgical technique is highly demanding, and the surgeon should be proficient in the operation of the endoscope.

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Compliance with Ethical Standards

Conflict of interest All the authors have no conflict of interest regarding the content of this article.

Human and Animal Rights This article does not contain any studies with human participants or animals performed by any of the authors.

Informed Consent For this type of study informed consent is not required.

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