Premiere Publications from The Triological Society

Read all three of our prestigious publications, each offering high-quality content to keep you informed with the latest developments in the field.

**The Laryngoscope**

Founded in 1896

Editor-in-Chief: Michael G. Stewart, MD, MPH

The leading source for information in head and neck disorders.

[Laryngoscope.com](http://Laryngoscope.com)

**Laryngoscope Investigative Otolaryngology**

Editor-in-Chief: D. Bradley Welling, MD, PhD, FACS

Rapid dissemination of the science and practice of otolaryngology-head and neck surgery.

[InvestigativeOto.com](http://InvestigativeOto.com)

**ENTtoday**

A publication of the Triological Society

Editor-in-Chief: Alexander Chiu, MD

Must-have timely information that Otolaryngologist-head and neck surgeons can use in daily practice.

[Enttoday.org](http://Enttoday.org)
Sandwich Compression With Rubbery Tourniquet Sheets and Cotton Balls for Auricular Pseudocyst

Ming-Ying Wu, MD; Chun-Bing Chen, MD; Yi-Hsi Chen, MD; Catherine Chang, MD; Kai-Chieh Chan, MD

Objectives/Hypothesis: Pseudocyst of the auricle is a benign, noninflammatory cystic disease that is more common in Asians than in Caucasians. When managed conservatively, the results are often unsatisfactory and recurrences are common. We aimed to introduce a novel modified surgical method that involves a deroofing technique followed by a sandwich compression suture using two rubber tourniquet sheets and an iodine-soaked cotton ball for the treatment of auricular pseudocysts and to ascertain its effectiveness.

Study Design: Case series with or without comparison.

Methods: The charts of 100 patients with auricular pseudocysts who were treated with this new method from 2004 to 2016 in a university-affiliated tertiary teaching hospital were retrospectively reviewed and analyzed.

Results: The mean patient age was 37.7 years, and 84% were male. All of the patients had unilateral lesions, with right-side lesions (53.0%) being slightly predominant. The cymba concha (44.1%) was the most common site. Seven patients (7.0%) had trauma to the ear within 3 months before presentation. Previous aspiration or drainage had been performed for the cysts in 35 patients (35.0%), and the recurrences had been treated conservatively. In comparison, 98 of the 100 patients recovered smoothly from surgery without further recurrence or complications after follow-up for at least 1 year.

Conclusions: Based on our experience, not only does this surgical procedure yield reliable results in the treatment of pseudocysts of auricles, but it also has advantages such as using readily available materials, being simple to perform, improving efficacy, and lowering recurrence rates.

Key Words: Deroofing, sandwich compression suture, pseudocyst of auricles, rubbery tourniquet sheets, cotton ball.

Level of Evidence: 4.

Laryngoscope, 128:1653–1657, 2018

INTRODUCTION

A typical auricular pseudocyst is an asymptomatic cystic swelling at the anterior auricle; it is common in the Chinese population and rarer in Western countries.\(^1\) It is a noninherited disease of young adults, with the mean age of presentation ranging from 30 to 40 years and a male predominance.\(^2\) The lesions are typically located in the scaphoid fossa, triangular fossa of the antihelix, and cymba concha.\(^3\) The pathogenesis of this disease remains unknown. The presence of a potential space originating during embryogenesis of the auricular cartilage or repeated minor injuries leading to cartilaginous degeneration caused by the release of chondrocyte lysosomal enzymes are among many theories explaining the formation of auricular pseudocysts.\(^4\)-\(^6\)

Various treatments for this condition have been reported. Simple incision with drainage or aspiration of the cystic fluid with a pressure dressing usually leads to recurrence with reaccumulation of the cystic fluid.\(^6\) Incisional drainage followed by chemical obliteration with intralesional instillation of corticosteroid is commonly used, but with undesirable side effects such as discoloration and atrophy.\(^7\) Chemical obliteration performed with trichloroacetic acid, bleomycin, minocycline, fibrin glue, or sodium tetradecyl sulfate has also been reported, although with variable results.\(^7\)-\(^10\) By contrast, deroofing with resection of the anterior cartilaginous leaflet of the pseudocyst, followed by a button bolster or plastic sheet compressive dressing, gives better results.\(^11\)-\(^14\)

However, the lack of pliability and availability of the above-mentioned compressive dressing materials can limit their use. As the auricular three-dimensional morphology varies among individuals, an auricular pseudocyst may develop on uneven surfaces or in locations such as the cymba concha, especially at the reflection near the junction of the base of the helix and the crura of the antihelix (Fig. 1). A stiff button bolster will often
fail to compress this irregularly surfaced area completely and uniformly after deroofing, which may lead to recurrence. In addition, if the affected area is too extensive and involves multiple concavities, it may be difficult to find a button of adequate size and shape for use. Another commonly used material is a plastic sheet, which may be more malleable than a button, but which may not be as readily obtainable. To resolve this problem, we developed a novel method we call the sandwich method using a cotton ball and two rubber tourniquet sheets transfixed in a through-and-through manner. The operations were mostly performed under local infiltration anesthesia, unless the patient could not comply. The patients were placed in a supine position, and the skin of the auricle was sterilized with alcohol and iodine. Then, 1% lidocaine and 1:100,000 epinephrine were injected subcutaneously at the lesion site for local anesthesia to block the auriculotemporal, great auricular, and lesser occipital nerves. An adequate incision was made along the margin of the pseudocyst, and the serous fluid inside the pseudocyst was aspirated completely (Fig. 2a). Then, the anterior skin on the pseudocyst was separated from the underlying cartilage and perichondrium, exposing the superficial surface of the pseudocyst entirely. We excised the entire anterior aspect of the pseudocyst, including the cartilaginous leaflet and perichondrium (Fig. 2b). Then, the posterior cartilage wall of the cyst was curetted to remove any granulation tissue debris (Fig. 2c), and the overlying flap of skin was repositioned with 5-0 nylon. Next, we shaped a condensed cotton ball into an appropriate size and shape to match the location and contours of lesion. The cotton ball was soaked in aqueous povidone-iodine and used to hold and compress the deroofed area (Fig. 3a,b). Two sterilized rubber tourniquet sheets, fashioned to 1.5 times the size of the lesion, were placed with one in front of the cotton ball and the other behind the auricle (Fig. 3c). Then, we transfixed these two sheets from back to front with two vertical mattress sutures using 2-0 silk on a straight needle and tied them posteriorly (Fig. 3d–f). These two sheets brought the cotton ball into contact with the affected area completely and with equal pressure. The anterior skin flap firmly adhered to the auricular cartilage without forming dead space, preventing the formation of a hematoma or recurrence of the pseudocyst. Typically, the operation was completed in half an hour. Postoperative oral antibiotics and analgesics were prescribed for 1 week. We kept

**Materials and Methods**

**Study Participants**

We collected clinical data on 100 patients with a diagnosis of pseudocyst of the auricle seen from July 2004 to May 2016, in the Department of Otolaryngology and Dermatology of Chang Gung Memorial Hospital, Linkou branch. The clinical course, location, complications, and recurrence rates were analyzed. All patients were followed in our clinics for at least 1 year postoperatively.

**Surgical Procedure**

The patients underwent deroofing with excision of the anterior cartilaginous leaflet of the pseudocyst, including the perichondrium, followed by a sandwich compression suture using cotton ball packing and two layers of rubber tourniquet sheets transfixed in a through-and-through manner. The operations were mostly performed under local infiltration anesthesia, unless the patient could not comply. The patients were placed in a supine position, and the skin of the auricle was sterilized with alcohol and iodine. Then, 1% lidocaine and 1:100,000 epinephrine were injected subcutaneously at the lesion site for local anesthesia to block the auriculotemporal, great auricular, and lesser occipital nerves. An adequate incision was made along the margin of the pseudocyst, and the serous fluid inside the pseudocyst was aspirated completely (Fig. 2a). Then, the anterior skin on the pseudocyst was separated from the underlying cartilage and perichondrium, exposing the superficial surface of the pseudocyst entirely. We excised the entire anterior aspect of the pseudocyst, including the cartilaginous leaflet and perichondrium (Fig. 2b). Then, the posterior cartilage wall of the cyst was curetted to remove any granulation tissue debris (Fig. 2c), and the overlying flap of skin was repositioned with 5-0 nylon. Next, we shaped a condensed cotton ball into an appropriate size and shape to match the location and contours of lesion. The cotton ball was soaked in aqueous povidone-iodine and used to hold and compress the deroofed area (Fig. 3a,b). Two sterilized rubber tourniquet sheets, fashioned to 1.5 times the size of the lesion, were placed with one in front of the cotton ball and the other behind the auricle (Fig. 3c). Then, we transfixed these two sheets from back to front with two vertical mattress sutures using 2-0 silk on a straight needle and tied them posteriorly (Fig. 3d–f). These two sheets brought the cotton ball into contact with the affected area completely and with equal pressure. The anterior skin flap firmly adhered to the auricular cartilage without forming dead space, preventing the formation of a hematoma or recurrence of the pseudocyst. Typically, the operation was completed in half an hour. Postoperative oral antibiotics and analgesics were prescribed for 1 week. We kept
the cotton ball in place for 3 days after surgery and removed the stitches 1 week later.

RESULTS

This study enrolled 100 patients who underwent surgical deroofing of the anterior pseudocyst cartilage followed by sandwich compression using a cotton ball and rubber tourniquet sheets (Table I). There were 84 males (84.0%) and 16 females (16.0%), with an average age of 37.7 years (range 7–78 years). All of the patients had unilateral lesions with right-side lesions (53.0%) slightly more common than left-side ones. The predominant site of the lesions was the cymba concha (60.0%), whereas the triangular fossa was the least common site (14.0%). Eight patients (8.0%) had experienced ear trauma within the previous 3 months, whereas the other cases had no specific etiology. Before the operation, 35 patients (35.0%) had responded poorly to simple needle aspiration leading to recurrence. All of the patients were followed for at least 1 year postoperatively, and 98 of the 100 patients recovered smoothly without recurrence or complications. Two patients (2.0%) had recurrences with the reaccumulation of fluid 5 months and 3 years postoperatively. Both patients recovered without recurrence after surgical revision. One patient experienced wound dehiscence 14 days postoperatively. No cartilage infection or perichondritis with auricular deformity was noted postoperatively. The diagnosis of auricular pseudocyst was confirmed histopathologically. The pathology showed a subperichondrial or intercartilaginous cystic space filled with serous fluid, with lymphocytes scattered over the cyst wall (Fig. 4).

DISCUSSION

In this article, we share our experience of treating 100 patients with auricular pseudocysts using a modified surgical technique involving a new sandwich compression method. A 98% success rate was achieved with this

| TABLE I. Characteristics of 100 Patients With an Auricular Pseudocyst |
|-----------------------------|----------------|
| Characteristics             | Value          |
| Sex ratio, male:female (%)  | 84:16 (84.0%:16.0%) |
| Age, yr, mean ± SD (range)  | 37.7 ± 10.1 (7–78) |
| Location, n (%)             |                |
| Scaphoid fossa              | 5 (5.0%)       |
| Triangular fossa            | 14 (14.0%)     |
| Cymba concha                | 60 (60.0%)     |
| Multiple                     | 21 (21.0%)     |
| Side, right:left, n (%)     | 53:47 (53.0%:47.0%) |
| Previous treatment failure by incision and drainage, n (%) | 38 (38.0%) |
| Trauma history, n (%)       | 8 (8.0%)       |
| Complication, n (%)         | 3 (3.0%)*      |
| Recurrence, n (%)           | 2 (2.0%)       |

*One patient with hematoma and two patients with wound infection. SD = standard deviation.
new method without major postoperative complications. To our knowledge, this is the largest series of deroofing surgery using a sandwich compression method in the English literature.

Pseudocysts of the auricles are commonly seen in dermatology and ear, nose, and throat practices. Engel first described the lesion in 1966 as an auricular cystic swelling without a true epithelial lining within the intracartilaginous space. An auricular pseudocyst presents as a benign asymptomatic swelling cystic lesion on the scaphoid, triangular fossa, or concha. Most are located in the scaphoid area and triangular fossa, although our series and some other reports found predominance at the concha. Demographically, most of our patients were young males, which is consistent with previous studies. This phenomenon might be explained by a proposed mechanism in which androgens modify the inflammatory response induced by chronic trauma in susceptible individuals, which leads to cartilage destruction and pseudocyst formation.

Various surgical methods have been proposed for the treatment of auricular pseudocysts. The method of incision and drainage was the earliest and easiest, but involves a very high recurrence rate, with recurrence occurring within 2.3 days postoperatively. Compression after incision or aspiration decreased the recurrence rate. Although many chemical obliteration methods have been used after making a conservative incision, deroofing surgery is now considered the standard treatment for auricular pseudocysts (Table II).

Surgical deroofing with excision of the anterior segment of the auricular pseudocyst was first described in 1984 by Choi et al., with no recurrence and cosmetically good results in 90% of their 31 patients. All of the patients were operated on under local anesthesia. A contour dressing was used for compression. Lim et al. modified the technique by using buttons instead, and also reported good cosmetic outcomes without recurrence.

![Fig. 4. Histopathological appearance of an auricular pseudocyst.](image)

The histopathology of the auricular pseudocyst shows an intercartilaginous cystic space with degeneration of the cartilage and lymphocytes scattered over a cyst wall overlaid with granulation tissues. The arrow shows the intercartilaginous cystic space and the asterisk indicates the degeneration of the cartilage (hematoxylin and eosin stain, original magnification \( \times 100 \)). [Color figure can be viewed in the online issue, which is available at www.laryngoscope.com.]

**Table II. Literature Review With Different Compression Methods After Deroofing Surgery**

<table>
<thead>
<tr>
<th>Reference</th>
<th>Case No./Sex ratio (M:F)/Age, yr</th>
<th>Ethnicity</th>
<th>Previous Treatment</th>
<th>Recurrence, %/Follow-up Period</th>
<th>Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choi et al., 1984</td>
<td>31/NA/NA Chinese NA</td>
<td>0%/NA</td>
<td>One patient with perichondritis and resolved with a resultant cauliflower ear</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lim et al., 2002</td>
<td>41/36:5/38.9 Thirty-one Chinese (75.6%), four Malays (9.8%), four Indians (9.8%), and two others (4.9%)</td>
<td>0%/NA</td>
<td>1/41 (2.4%) (initial perichondritis with a resultant cauliflower ear deformity)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kanotra and Lateef, 2009</td>
<td>20/20:0/32.6 Indian Five patients received incision and drainage with buttoning</td>
<td>0%/1 month</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wang et al., 2013</td>
<td>14/6:8/43.8 Taiwanese Ten patients underwent aspiration following by intralesional steroid injections</td>
<td>0%/6 to 30 months (average 14 months)</td>
<td>One patient with perichondrial reaction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shan et al., 2014</td>
<td>87/80:7/52 (median) Chinese Some of the patients received conservative treatment elsewhere, such as repeated needle aspiration or plaster fixation with pressure</td>
<td>0%/51.9 months (average)</td>
<td>One patient with perichondrial reaction; four patients with incisional site scarring</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NA = not available, M = male, F = female.
cause temporary staining of the skin. Last, the transcartilaginous compression suture may cause temporary postoperative pain and adequate oral analgesic is necessary.

CONCLUSION
Pseudocysts of auricles are common, but conservative management gives unsatisfactory results with high recurrence rates. Our novel modified surgical method—deroofing followed by sandwich compression using rubber tourniquet sheets and an iodine-soaked cotton ball—is a promising, reliable alternative treatment. This method has the advantages of using clinically available materials for compression, being simple to perform, offering more comfort, and having an extremely low recurrence rate.

Acknowledgments
The authors thank their colleagues who were involved in treatment of the patients.

BIBLIOGRAPHY