Novel Modified Surgical Treatment of Auricular Pseudocyst Using Plastic Sheet Compression

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No sponsorships or competing interests have been disclosed for this article.

Abstract
Objective. To introduce a novel modified surgical procedure of excision of anterior cartilage of the pseudocyst along with plastic sheet compression for the treatment of auricular pseudocyst and ascertain the effect of the surgical modality of this disease.

Study Design. A retrospective study.

Setting. Medical college hospital.

Subjects and Methods. Eighty-seven auricular pseudocyst patients were subjected to excision of the anterior cartilage of the pseudocyst followed by plastic sheet compression from July 2006 to September 2013. The effects of the operation were evaluated.

Results. Eighty patients were males and 7 were females. The median age was 52 years old. The lesions of 86 patients were unilateral and only 1 was bilateral. The clinical features presented a hemispheric painless swelling, which was seen on the ventral side of the auricle, usually the scaphoid and triangular fossa. The average major axis of the pseudocyst was 1.7 ± 0.6 cm. The patients underwent excision of anterior cartilage of the pseudocyst along with plastic sheet compression. The average follow-up period was 51.9 ± 19.1 months. No recurrence was observed with this technique, and the appearance of the auricle was cosmetically acceptable.

Conclusions. Our novel modified surgical procedure of excision of anterior cartilage of pseudocyst along with plastic sheet compression is an effective surgical management for the auricular pseudocyst. The advantages of a simple technique, a short-term therapeutic period, and no recurrence made the surgical procedure worth recommending as the definitive treatment of auricular pseudocysts.

Keywords
pseudocyst, ear auricle, plastics, otorhinolaryngologic surgical procedure

Introduction
Pseudocyst of the auricle is a common benign disease in the Chinese population, characterized by spontaneous, asymptomatic swelling over the anterior aspect of the auricle. Various treatment modalities of the disease have been reported in the literature. Simple aspiration of effusion with contour dressing almost always causes reaccumulation of cystic fluid.1 Intrallesional injection of various agents such as corticosteroid,2 50% trichloroacetic acid,3 bleomycin, or fibrin glue4 have also been employed with reports of recurrence and auricular deformity. Due to the high recurrence rates with these methods, compressive dressing after drainage has been suggested to preclude the recurrence. A compressive ear prosthesis or clip2,5 and plaster fixation with pressure have been used effectively to reduce the recurrence. However, problems of pseudocyst recurrences, prolonged treatment period and thickening of the auricular cartilage still exist. To address this issue, surgical excision followed by button bolster has been applied and established as the definitive treatment of this disease, as it is without complications and is cosmetically acceptable.1,6 In this study, we used a new compressive bolster, namely, plastic sheet, to substitute the button to compress the auricle following the excision of anterior cartilage. The long-term outcome was satisfactory and no recurrence was observed. To our knowledge, the number of cases in the present study is fairly large in the literature, and we are the first to use the plastic sheet in the surgical treatment of pseudocyst of the auricle.

Materials and Methods
Eighty-seven patients (88 ears) diagnosed with pseudocyst of the auricle were recruited in this study from July 2006 to September 2013 in a medical college hospital (Figure 1).
The Human Ethical Committee of the School of Medicine Jiaotong University in Shanghai approved this study. All the patients were subjected to excision of the anterior cartilage of the pseudocyst followed by plastic sheet compression. The operation was performed under either local infiltration anesthesia or general anesthesia, depending on the patient’s compliance. However, 1% lidocaine and 0.1% epinephrine was still supplemented after general anesthesia to prevent operative site bleeding. A helical incision is given along the margin of the cyst. The anterior skin portion of the pseudocyst was dissociated from the underlying regenerative cartilage and perichondrium using an electrical knife, and the superficial surface of the pseudocyst was exposed entirely. Once the cyst wall was cut open, the yellowish fluid was drained out, followed by excising the vaulted cartilage and perichondrium of the anterior aspect of the pseudocyst. The skin incision was intermittently sutured after curettaging the remaining posterior cartilage lining of the cyst. Thereafter, 2 plastic sheets were made by funnel of the infusion set and shaped to appropriate size according to the lesion. The pair of sheets sandwiched the anterior auricular skin and remnant cartilage with 1 or 2 stitches depending on the size of the cyst (Figure 2). The wound was kept exposed, and drying was allowed without an additional external bandage on the auricle. The plastic sheets were removed 5 to 6 days post operation, and stitches were taken out after 7 days (Figure 3). The anterior skin portion of the pseudocyst was dissociated from the underlying floated cartilage (see Supplemental Video at www.otojournal.org).

Results

Eighty of 87 patients were males. The age of the patients ranged between 20 to 85 years, among which 6 patients were between 20 and 29 years, 15 were between 30 and 39 years, 20 were between 40 and 49 years, 31 were between 50 and 59 years, and 15 were over 60 years. The median age was 52 years. Of the 87 cases, 86 patients had a unilateral lesion and only 1 had a bilateral lesion. None of the patients had any history of trauma. The clinical features presented a hemispheric painless swelling, which was seen mostly on the ventral side of the auricle, usually the scaphoid and triangular fossa, and rarely in the cavity of auricular concha. The average major axis of the pseudocyst was $1.7 \pm 0.6$ cm, ranging from 1.0 to 3.5 cm. The appearance of the swelling is normal in color, accompanied by an elastic or fluctuant feeling. Some of the patients had received conservative treatment elsewhere such as repeated needle aspiration or plaster fixation with pressure.

The average follow-up period was $51.9 \pm 19.1$ months, ranging from 7 to 85 months. Eighty-six of 87 patients were treated successfully without any complication. Only 1 patient experienced a small amount of effusion in the operative cavity 1 week after stitches were taken out. Nevertheless, the swelling was cured eventually by aspiration and pressure dressing. Four of the patients had minor incisional scar thickening, which could be ignored. All of
the 87 patients remained free of recurrence or perichondritis and had a normal looking auricle without deformities in the follow-up period.

All 87 specimens of the anterior wall of the auricular pseudocyst were sent for histologic examinations. The cyst lining was with varying degrees of hemorrhage, degeneration, and lack of epithelium (Figure 4). Desmoplasia, collagen-like degeneration, and infiltration of lymphocytic inflammatory cells were observed in the cyst wall. All pathologic results confirmed the diagnosis of pseudocyst of the auricle.

**Discussion**

**Etiology and Pathology**

Hartman first reported this phenomenon in 1846. Through cystectomy and pathological examination, Engel coined the term *pseudocyst of the auricle* to describe a cystic condition of the auricle devoid of epithelial lining in 1966. Pseudocyst of the auricle is a common condition in ENT practice, which presents as a hemispherical, painless, fluctuating swelling on the scaphoid, triangular fossa, or cavity of auricular concha. All ages may suffer from this disease, but the lesion occurs primarily in middle-aged adults and shows a strong male predominance. In this study, the main age group is 40 to 59 years, accounting for nearly 60% of the total. Ninety-two percent (80/87) of the patients studied are men and only 8% (7/87) are women, which is consistent with that of previous studies.

The etiology of this condition is still largely unknown. Most believe that the histological features of an auricular pseudocyst reveal a subperichondrial or intercartilaginous cystic space with aseptic serous inflammatory exudation. The lesion may be attributed to mechanical irritation or squeezing, which causes local microcirculation disturbance and aseptic inflammatory exudation. Zhang et al found that the anterior aspect of the cyst is composed of skin, subcutaneous tissue, perichondrium, and regenerative cartilage, and the posterior aspect is composed of auricular cartilage, perichondrium, and skin behind. The cystic fluid between the new cartilage and auricular cartilage is gradually originated from the perichondrium, which is the embryonic form of new cartilage, in the anterior wall. Hence, repeated aspiration is ineffective since the perichondrium, which can sustainably produce serous effusion is not eliminated. At worst, this mode might eventually result in recurrence and auricular deformities. The surgical operation therefore aims to remove the floating perichondrium, which is responsible for the pathologic origins generating effusions, and to terminate the serous effusion.

**The Principles of the Surgical Technique**

Several nonsurgical treatment methods have been reported in the literature. The most commonly employed treatment is aspiration of the pseudocyst followed by injection of various agents like corticosteroid or Trichloro acetic acid. However, these methods often result in recurrences or auricular deformity. The other common treatment option is drainage with compression. Kanotra et al reported that 13 patients underwent incision and drainage with curettage followed by buttoning. Five of them showed recurrence, and 3 of them showed permanent thickening of the auricular cartilage. Along with the thorough research of the pathogenesis of auricular pseudocyst, it is widely recognized that the anterior perichondrium wall is the origin of the serous effusion. Once the perichondrium is excised, the fundamental pathology of the pseudocyst is removed, and the pseudocyst can be treated without recurrence. Thus, surgical methods of anterior cartilage excision have been increasingly applied.
Surgical deroofing followed by buttoning has proved to be the definitive treatment of the disease with no recurrence.1,6 Accordingly, we entirely exposed and excised the anterior aspect of the perichondrium and regenerative cartilage in the present study. The treatment procedure has been mostly successful in all our patients. In our series of 87 cases only 1 patient experienced local effusion at 2 weeks and was cured by further aspiration. The reason of the defect, reaccumulation of cystic fluid, might be attributable to a remnant of anterior perichondrium. Four of the patients had minor incisional scar thickening, which could be ignored, so we didn’t regard it as a complication. Patients were followed up for an average of 51.9 months, during which they remained free of recurrence, with the final cure rate of 100%.

**Modifications of Compression**

Surgical treatment of auricular pseudocyst has been widely applied in recent years. However, the subsequent compressive methods are varied. Han et al employed pressurized sutures with infusion tubes.7 Adjacent 2 to 5 infusion tubes were applied depending on the size of the pseudocyst lesion. Inadequately, this approach needed repeated penetrating suture on the auricle, which might cause injury to the posterior cartilage of the auricle, and increase the pain of the patients. Lim et al used the treatment modality of excision of the anterior cartilage with compression buttoning with no recurrence.6 We considered the disadvantages of button bolsters are that buttons could not be resized by the cyst lesion and need disinfection in advance. Therefore, we made some improvement and substituted the button with plastic sheet in our study. The use of plastic sheet has definite effects on the auricular compression. The plastic sheet is made from the funnel of a disposable infusion set, which is made of PVC material (ie, polyvinyl chloride) and shaped to arbitrary size. The sheet is applied to sandwich the anterior and posterior aspects of the auricle and were sutured in place.

To sum up, the use of plastic sheet made from the infusion set has the following advantages: (1) Infusion set can be provided in the operation room conveniently, and also the expense is low and prior disinfection is not required. (2) Infusion set is aseptic, safe, and reliable, which might reduce possible intraoperative contamination and the incidence of perichondritis greatly. (3) The appropriate strength and thickness of the plastic sheet make it convenient for the surgeons to trim and shape it to the lesion size and to provide equal amounts of pressure on both sides of the lesion. (4) The plastic sheet has little effect on the skin and is not apt to affect local blood supply of the auricular skin. The transparency of the plastic sheet makes it simple to observe the wound. (5) Compared with plaster pressurized fixation, compression of plastic sheet does not cause discomfort such as hearing decline, ear fullness, and earache and may minimize the impacts of appearance and inconvenience postoperatively. (6) Compression of plastic sheet is firm and can provide equal pressure on both sides of the pinna, prompting the adhesions of ventral skin and dorsal cartilage, elimination of the dead cavity, and the inhibition of effusion as well. The plastic sheet can be removed in 5 to 6 days after operation, and stitches can be taken out at 7 days after operation. It’s not necessary to change the dressing and visit the clinic every day.

**The Operative Indication**

Based on the pathogenesis of auricular pseudocyst, we hold the opinion that the early and medium stage patients can be treated by surgical methods, that is, excision of the anterior cartilage with plastic sheet compression. Patients with smaller cysts within 1 cm in diameter can make attempt to adopt nonsurgical therapies like aspiration with pressure dressing. At present, Western scholars are more likely to regard puncture and aspiration as a means of diagnosis.6 We believe that early- and midterm patients who haven’t received conservative treatment or have failed with conservative treatment can adopt this surgical procedure. Surgery is the first choice therapy for the patients whose cysts are greater than 1 cm in diameter and with fluctuant feeling. The late-stage patients, whose auricular cartilage has been thickened, organized, and is lacking fluctuant feeling, should not adopt this surgical method.

**Precautions**

We believe that the surgical methods for the treatment of auricular pseudocyst, excision of the anterior cartilage of the auricle along with plastic sheet compression, can be performed either in the OPD or in the ward. Importantly, the operation should be completed under strict aseptic conditions in order to prevent intraoperative and postoperative infection of the auricle. Postoperative dressing changes can avoid the risk of secondary infection and sequelae in the maximum extent, such as suppurative perichondritis, auricle deformities, and so on. Patients who adopt outpatient clinic surgery need to have good personal hygiene habits and good return visit behavior.

**Conclusion**

Pseudocyst of the auricle is a benign disease, and there are no effective measures for its prevention so far. Conservative treatments always result in recurrence and unsatisfactory therapeutic effect. Our novel modified surgical procedure, excision of the anterior cartilage of the pseudocyst along with plastic sheet compression, is the definitive treatment for the patients whose pseudocyst is greater than 1 cm in diameter and with fluctuant feeling. This therapeutic method is therefore recommended for application and promotion clinically for its advantages of simple technique, short-term therapeutic period, and no recurrence.

**Acknowledgment**

The authors thank Dr Yuan Fei from the Department of Pathology, Ruijin Hospital for her assistance in the evaluation of the pathologic slides and support in the writing of this article.

**Author Contributions**

Yamin Shan, the acquisition, analysis, or interpretation of data for the work; writer; Jing Xu, the acquisition, analysis, or
interpretation of data for the work; drafted the work; Changping Cai, surgical procedure, revised the work critically for important intellectual content; Shili Wang, surgical procedure, revised the work critically for important intellectual content; Hao Zhang, substantial contributions to the design of the study and surgical procedure, provided important suggestions and intellectual content in the manuscript writing especially in the discussion part and revised the draft critically, final approval of the version.

Disclosures
Competing interests: None.
Sponsorships: None.
Funding source: None.

Supplemental Material
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References