

# Postoperative Auricular Perichondritis After an Endaural Approach Tympanoplasty

Chih-Chieh Tseng<sup>1,2</sup>, An-Suey Shiao<sup>2,3\*</sup>

<sup>1</sup>Section of Otolaryngology, Yuan-Shan Veterans Hospital, Ilan, <sup>2</sup>Department of Otolaryngology, Taipei Veterans General Hospital, and <sup>3</sup>National Yang-Ming University School of Medicine, Taipei, Taiwan, R.O.C.

**Background:** Postoperative auricular perichondritis is a problematic and embarrassing surgical complication after an endaural approach tympanoplasty. However, a search through the literature showed only a few papers regarding postoperative auricular perichondritis, and the reported treatment experience is scarce. This study reviews the clinical aspects of postoperative auricular perichondritis and the different treatment methods.

**Methods:** The medical records of 8 patients with postoperative auricular perichondritis over a 5-year period were reviewed. Five patients were treated using the wide excision method, 2 underwent tubal drainage, and 1 was placed on antibiotics alone.

**Results:** In 8 patients with postoperative auricular perichondritis after an endaural approach tympanoplasty, the time between the previous ear operation and the symptoms of infection ranged from 2 to 37 days, with a mean of 17.3 days. The wide excision method was performed after the abscess localized, an average of 8.4 days after initial antibiotic treatment. The culture results found fungus in 4 patients. Multiple excision procedures were required in 4 patients, and the mean number of surgical procedures was 2.6. The mean hospital stay of patients having wide excision was 15.2 days. Two patients had stenosis of the external auditory canal resulting from repeated excision procedures. Two patients underwent tubal drainage, and their mean hospital stay was 51 days.

**Conclusion:** In postoperative auricular perichondritis after an endaural approach tympanoplasty, wide excision seems to be a better choice to treat this problem. Repeated limited excisions could result in ear deformity. Cartilage exposure during chronic ear surgery should be avoided, and early precautions after operation should be taken in order to prevent complications. [*J Chin Med Assoc* 2006;69(9):423–427]

**Key Words:** auricular perichondritis, endaural approach, postoperative complications, tympanoplasty, wide excision

## Introduction

Auricular perichondritis is often caused by trauma, burn, surgery, or autoimmune disease.<sup>1</sup> When it occurs after otologic surgery, it is usually regarded as a problematic and embarrassing complication, which sometimes results in ear deformity.<sup>2</sup>

However, a search through the literature showed only a few papers discussing postoperative auricular perichondritis. Stroud<sup>3,4</sup> advocated the window excision method to treat auricular perichondritis following mastoid surgery, and he emphasized the importance of excision of the diseased cartilage with the overlying

anterior skin and perichondrium. Dowling et al<sup>5</sup> and Martin et al<sup>6</sup> used a similar method and bivalving chondrectomy to treat the auricular perichondritis in the burned ear. The tubal drainage method was introduced by Stevenson<sup>2</sup> to treat auricular perichondritis following mastoid surgery. Wanamaker<sup>7</sup> and Apfelber et al<sup>8</sup> had a similar treatment experience. Bassiouny<sup>9</sup> reported 15 cases using either the excision method or tubal drainage. Although different treatment methods have been used, treatment of postoperative auricular perichondritis is still a difficult clinical problem. Prolonged hospitalization, the need for repeated surgical procedures, and the complications of ear deformity

\*Correspondence to: Dr An-Suey Shiao, Department of Otolaryngology, Taipei Veterans General Hospital, 201, Section 2, Shih-Pai Road, Taipei 112, Taiwan, R.O.C.

E-mail: b8301131@yahoo.com.tw • Received: January 23, 2006 • Accepted: July 4, 2006

**Table 1.** Clinical data of the patients with postoperative auricular perichondritis

Number	Sex	Age (yr)	R/L	Medical history	Previous operation	Operation	Abscess location	Culture	Hospital stay (d)	Complications
1	F	38	R	None	Type I	Excision × 1	Tragus	Sterile	5	None
2	M	39	R	None	Type V	Excision × 2	Tragus	Sterile	16	None
3	F	60	L	None	Type III	Excision × 4	Tragus	Fungus	21	Canal stenosis
4	F	46	L	None	Type I	Excision × 2	Conchal area	Fungus	9	None
5	F	57	R	None	Type III	Excision × 4	Tragus	<i>Staphylococcus</i> , fungus	25	Canal stenosis
6	M	74	L	DM	Type I	None	Conchal area	<i>Enterobacter</i> , <i>Staphylococcus</i> , <i>Streptococcus</i>	14	None
7	M	82	R	None	Type III	Tubal drainage	Tragus	Sterile	64	None
8	F	58	R	None	Type I	Tubal drainage	Tragus	<i>Staphylococcus</i> , fungus	38	None

R = right; L = left; DM = diabetes mellitus.

have challenged most otologists when postoperative auricular perichondritis occurs.<sup>2-4,7,8</sup> Stevenson<sup>2</sup> even suggested that it was regarded as a failure of our work and best left unadvertised, and few people have cared to write about it.

As few articles in the literature discuss postoperative auricular perichondritis, the reported treatment experience is limited. This study reviews the clinical aspects and treatment methods of postoperative auricular perichondritis after an endaural approach tympanoplasty.

## Methods

A retrospective chart review of auricular perichondritis in Taipei Veterans General Hospital from 1997 to 2002 was conducted. In a 5-year period, there were 101 cases of auricular perichondritis and 8 patients had postoperative auricular perichondritis after an endaural approach tympanoplasty. The data on age cohort, gender, age, and medical history were registered from the case sheets. Prior ear operations, auricular symptoms, use of antibiotics, procedures of debridement or tubal drainage, complications, and latest clinical follow-ups were also analyzed.

Empirical antibiotics were chosen according to the previous culture results. After erythematous swelling reduced and abscess localized, surgical intervention was performed. The surgical method was a wide excision method, similar to Stroud's method.<sup>3,4</sup> The excision tissue comprised all the necrotic cartilage and a thin rim of normal cartilage. The overlying skin was preserved if it was not necrotic. Saline dressings were applied between the skin flaps, and pressure dressings were avoided. Antibiotics and wound care

were continued until the wound healed. A skin graft was used to cover skin defects if healing of secondary intension failed.

The tubal drainage method was performed according to Stevenson's report.<sup>2</sup> Two Penrose fenestrated drains were inserted, 1 anteriorly and 1 posteriorly, and a length of polyethylene tube was threaded through each drain. Neomycin-cortisone solution was injected twice daily into the tubes.

## Results

The 8 patients comprised 3 males and 5 females, ranging in age from 38 to 82 years, with a mean of 56.8 years (Table 1). There were 5 right and 3 left ears. One patient had a history of diabetes mellitus. These 8 patients with postoperative auricular perichondritis were from among 1,600 otologic procedures, a complication rate of 0.5%.

In a review of previous operations, all 8 patients had tympanoplasty followed by an endaural approach. Of these patients, the time between the previous ear operation and the symptoms of infection, such as otalgia or auricular swelling, ranged from 2 to 37 days, with a mean of 17.3 days. Follow-up periods ranged from 2 weeks to 29 months, with a mean of 12.1 months (Table 1).

First, all 8 patients were placed on antibiotic treatment. Five patients had surgical excision of the infected auricular cartilage under general or local anesthesia. The wide excision method was performed after the abscess localized (Figure 1), an average of 8.4 days after initial antibiotic treatment. Multiple excision procedures were required in 4 patients, and



**Figure 1.** Swelling over the tragus area after an endaural approach tympanoplasty.



**Figure 2.** One month after wide excision.

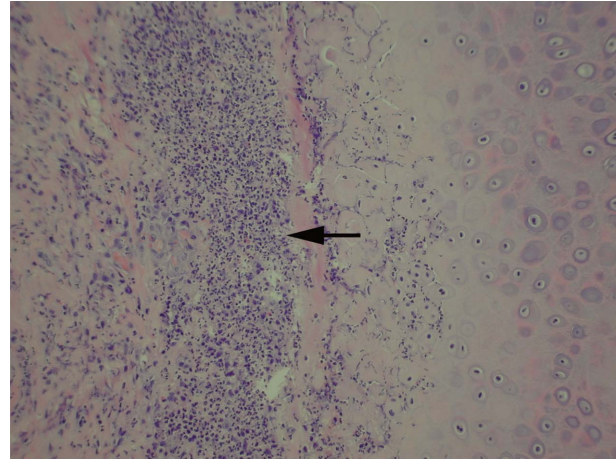
the mean number of surgical procedures was 2.6. The open wound after excision was healed by secondary intention (Figure 2), and none of these patients required a graft later. The mean hospital stay of the patients who had wide excision was 15.2 days. Two patients had stenosis of the external auditory canal after repeated excision procedures.

Three of the 8 patients did not yield any organisms in their culture. Four grew fungus, 3 were *Staphylococcus aureus*, 1 yielded *Streptococcus* species, and another was *Enterobacter*, which are all common pathogens for chronic otitis media.

Two patients underwent tubal drainage after tympanoplasty. Mean hospital stay was 51 days, with no permanent complications.

## Discussion

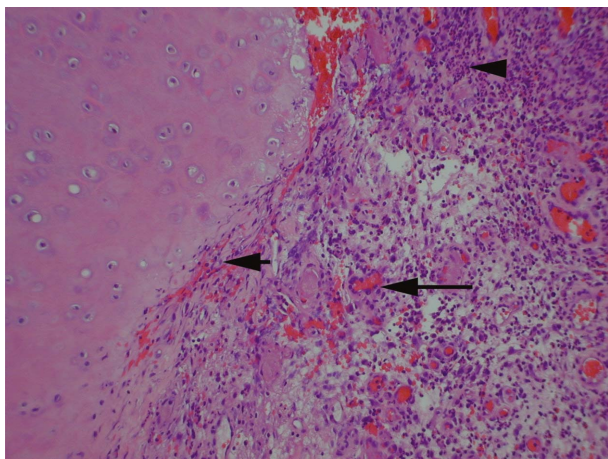
The term auricular perichondritis is, in fact, a misnomer because the infection not only involves the



**Figure 3.** Early inflammatory stage of auricular perichondritis. Infiltration of polymorphonuclear cells at the cartilage–soft tissue interface (arrow). Bacteria colonies are not frequently seen (hematoxylin & eosin, 100 $\times$ ).

perichondrium, but also involves the chondral cartilage.<sup>4</sup> When the formation of abscess dissects along the damaged perichondrium, more destruction of the cartilage will occur because the cartilage has no feeding blood vessels and derives its nutrition by diffusion.<sup>4</sup> Necrotic cartilage will, in turn, cause severe inflammation and act as a culture medium for bacterial growth. To prevent recurrence of auricular perichondritis, Stroud<sup>3,4</sup> emphasized that the extent of excision should include all the necrotic cartilage and a thin rim of normal cartilage. Any cartilage destruction that has already taken place cannot be remedied by the operation, but any further destruction is avoided.<sup>2</sup> In addition, cartilage regeneration is difficult and necrotic chondrocyte will eventually be replaced by dense fibrosis and scar formation, which will cause consequent ear deformity.<sup>3,4</sup>

In our review of the pathologic specimens, loss of basophilic staining of the cartilage matrix accompanied by perichondral inflammation at the cartilage–soft tissue interface was found. The vacuolated and necrotic chondrocytes were replaced by fibrous tissue. Proliferation of fibrocytic and capillary endothelial cells and infiltration of perivascular mononuclear and polymorphonuclear cells were also noted. Surprisingly, bacteria colonies were not seen with great frequency (Figures 3 and 4). The pathologic features of postoperative auricular perichondritis are similar to those of relapsing polychondritis. In patients with relapsing polychondritis, IgG antibodies, which react specifically with collagen type II, IV, and XI (forming the major fibrillar scaffold in cartilage), can be detected.<sup>10</sup> Granular deposits of immunoglobulin and complement have been observed at the chondrofibril junction in biopsies from affected ears. Thus, there is evidence for humoral immune



**Figure 4.** Late inflammatory stage of auricular perichondritis. The vacuolated and necrotic chondrocytes are replaced by the proliferation of fibrocytic cells (short arrow). Proliferation of capillary endothelial cells (long arrow) and infiltration of polymorphonuclear cells (arrowhead) are also noted (hematoxylin & eosin, 100 $\times$ ).

mechanisms being involved in cartilage injury.<sup>11</sup> In addition, earlier reports of cellular immune reactions to proteoglycan and other matrix components have been supported by the more recent demonstration of cell-mediated immunity to collagen type II, IX, and XI paralleling the humoral response to these structural proteins.<sup>12,13</sup> Therefore, necrotic cartilage presumably plays a role in the inflammatory process of both postoperative auricular perichondritis and relapsing polychondritis.

In the culture results, 4 patients grew fungus, 3 yielded *Staphylococcus*, 1 *Streptococcus*, and another *Enterobacter*. All these pathogens are compatible with the previously reported causative organisms for chronic otitis media. In an endaural approach tympanoplasty, the incision is made between the tragus and helical crus and then deep into the bony external auditory canal. If the tragal or crural cartilage is cut accidentally, it may be inoculated with the causative bacteria for chronic otitis media. Then, the infection would spread from the damaged cartilage to the entire pinna. Therefore, cartilage exposure should be avoided in an endaural approach tympanoplasty to avoid the occurrence of postoperative auricular perichondritis. From previous reports, *Pseudomonas* was present in 75–95% of postoperative and postburn auricular perichondritis and *Staphylococcus aureus* in approximately 50%.<sup>5,8,9</sup> However, in this study, fungal infections were found in up to 50% of the patients. We presumed that fungus might invade the exposed cartilage more easily and cause severe inflammatory

process. Therefore, wide excision of the diseased cartilage, perichondrium, and skin is suggested.

Among our cases, antibiotics alone were generally not effective. Only 1 patient was treated successfully with antibiotics alone. Simple incision and drainage were likely to fail because of the poor drainage from the periphery.<sup>2,3</sup> Through and through tubal drainage also had the drawbacks of poor drainage and prolonged hospital stay, a mean of 51 days. Bassiouny also reported a similar experience of a 4-week tubal drainage method.<sup>9</sup>

The signs and symptoms of auricular perichondritis occurred at a mean of 17.3 days after prior ear operations. Empirical antibiotics were initiated after diagnosis, and an average of 8.4 days was required before the wide excision method. It has been suggested that wide excision should be performed under general anesthesia because patients with an inflamed pinna cannot tolerate the agonizing pain and bleeding under local anesthesia. Inadequate excision of the diseased skin, perichondrium and cartilage will result in the recurrence of auricular perichondritis, and therefore repeated surgical procedures.

The extent of excision is a dilemma because it is difficult to distinguish healthy cartilage from infected cartilage at the operating table. If cartilage excision is performed too aggressively, the pinna will lose its scaffold, resulting in ear deformity. However, if the excision is too limited, recurrence of perichondritis will likely occur, resulting in repeated excision procedures. In our patients, if the helical structure of the ear was preserved, then the ear deformity was minimal. However, repeated excision around the tragal area would cause stenosis of the external ear canal. Two of our patients, each receiving excisions 4 times, had postoperative stenosis of the external ear canal. Although a wide excision method was used, a mean of 2.6 excision procedures and a prolonged hospital stay of 15.2 days were still required.

In conclusion, postoperative auricular perichondritis after an endaural approach tympanoplasty is a challenging and embarrassing surgical complication, which may cause prolonged hospitalization and ear deformity. In this study, antibiotics alone, simple incision and drainage, and tubal drainage were not effective in treating this entity. The wide excision method under general anesthesia had a better treatment result. Repeated limited excisions would result in ear deformity. In addition, avoidance of cartilage exposure during chronic ear surgery and early precautions after operation are important in the prevention of postoperative auricular perichondritis after an endaural approach tympanoplasty.

## References

1. Prasad KC, Karthik S, Prasad SC. A comprehensive study on lesions of the pinna. *Am J Otolaryngol* 2005;26:1-6.
2. Stevenson EW. *Bacillus pyocyaneus* perichondritis of the ear. *Laryngoscope* 1964;74:255-9.
3. Stroud MH. A simple treatment for suppurative perichondritis. *Laryngoscope* 1963;73:556-63.
4. Stroud MH. How I do it—otology and neurology. A specific issue and its solution. Treatment of suppurative perichondritis. *Laryngoscope* 1978;88:176-8.
5. Dowling JA, Foley FD, Moncrief JA. Chondritis of the burned ear. *Plast Reconstr Surg* 1968;42:115-22.
6. Martin R, Yonkers AJ, Yarrington CT. Perichondritis of the ear. *Laryngoscope* 1976;86:664-73.
7. Wanamaker HH. Suppurative perichondritis of the auricle. *Trans Am Acad Ophthalmol Otolaryngol* 1972;76:1289-91.
8. Apfelberg DB, Waisbren BA, Masters FW, Robinson DW. Treatment of chondritis in the burned ear by the local instillation of antibiotics. *Plast Reconstr Surg* 1974;53:179-83.
9. Bassiouny A. Perichondritis of the auricle. *Laryngoscope* 1981;91:422-31.
10. Yang CL, Brinckmann J, Rui HF, Vehring KH, Lehmann H, Kekow J, Wolff HH, et al. Autoantibodies to cartilage collagens in relapsing polychondritis. *Arch Dermatol Res* 1993;285:245-9.
11. Valenzuela R, Cooperrider PA, Gogate P, Deodhar SD, Bergfeld WF. Relapsing polychondritis: immunomicroscopic findings in cartilage of ear biopsy specimens. *Human Pathol* 1980;11:19-22.
12. Herman JH, Dennis MV. Immunopathologic studies in relapsing polychondritis. *J Clin Invest* 1973;52:549-58.
13. Alsalameh S, Mollenhauer J, Scheuplein F, Stoss H, Kalden JR, Burkhardt H, Burmester GR. Preferential cellular and humoral immune reactivities to native and denatured collagen types IX and XI in a patient with fatal relapsing polychondritis. *J Rheumatol* 1993;20:1419-24.