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A Postimplant Cholesteatoma after Modified Radical Mastoidectomy

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Abstract

A postimplant cholesteatoma is one of surgical complications of cochlear implantation. Hoffman and Cohen (1995) reported that only one out of 172 (0.58%) patients developed a postimplant cholesteatoma. We experienced a case of postimplant cholesteatoma after the modified radical mastoidectomy. **Case:** A 61-year-old man underwent left modified radical tympanoplasty with mastoidectomy for middle ear cholesteatoma at another hospital 40 years ago. We performed right open type tympanoplasty for right cholesteatoma, and at that time there was no recurrent cholesteatoma on the left side. He had already lost the sensorineural hearing in both ears. After three-year-observation with no recurrence of cholesteatoma in both ears, the patient underwent a left cochlear implantation with a Nucleus-24 channel device. After 1 year, we found new lesion of cholesteatoma in the left attic, and removed it by transcanal approach. There has been no recurrence of cholesteatoma for 12 years. **Conclusion:** In long-standing middle ear problems, when we perform cochlear implantation, even though there is good aeration of the middle ear and an intact tympanic membrane, we need to adequately reflect on the area which should be obliterated.

Keywords

Cochlear Implant, Choleateatoma, Modified Radical Mastoidectomy

1. Introduction

Cochlear implantation has become a safe and effective method for auditory rehabilitation of severe to profound sensorineural hearing loss (SNHL). Cochlear implantation has standard procedure, and the overall incidence of complications following cochlear implantation is within acceptable levels. Several condition

may, however, require revision surgery and even explantation; they include device failure, electrode extrusion, flap infection, and middle ear problems (chronic ottitis media, cholesteatoma) [1]. Postimplant cholesteatoma is one of the surgical complications of cochlear implantation (CI). Hoffman and Cohen reported that only one out of 172 (0.58%) patients developed a postimplant cholesteatoma [2]. Kempf *et al.* described the formation of cholesteatoma after CI was found in 0.2% (n = 366) of the pediatric patients [3].

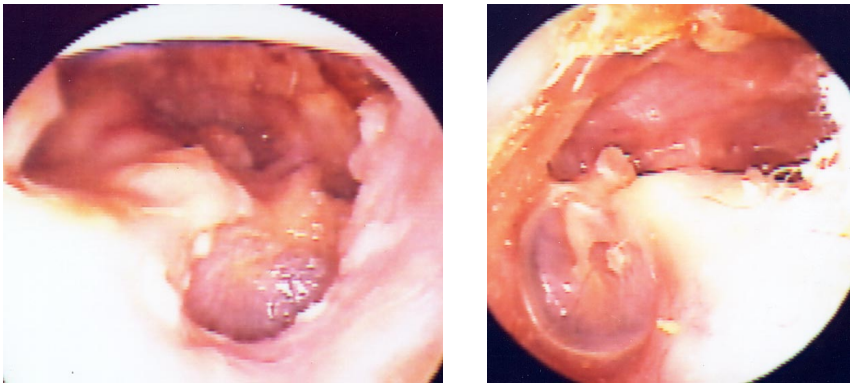
In past, contraindications to cochlear implantation have included chronic otitis media sepsis, since the insertion of a foreign body through a potentially infected field can lead to intracranial spread of infection [4]. Although chronic middle ear disease is one of the etiologies of profound deafness in postlingual adults, many authors reported various surgical strategies for cochlear implantation with chronic middle ear leision to avoid complications [5] [6] [7] [8] [9]. We report a case of postimpalnt cholesteatoma after modified radical mastoidectomy.

2. Case

Postlingually deafened 61-year-old man was introduced to our hospital to be evaluated for cochlear implantation. He received left modified radical mastoidectomy for left cholesteatoma at anther hospital 40 years ago. After the operation, he had profound sensorineural hearing loss in the left ear. He had acute profound sensorineural hearing loss in the right ear by cholesteatoma 22 years ago. He was introduced to our hospital for cochlear implantation in 2002. He had already lost sensorineural hearing in both ears. Although he had wore bilateral hearing aids, he had very little word intelligibility. Clinical examination revealed that there was right open mastoid cavity by cholesteatoma and there was no recurrent cholesteatoma on the left side (**Figure 1(a)** and **Figure 1(b)**). Computed tomography (CT) showed a low density area in the right mastoid antrum (**Figure 2(a)**), but no low density area in the left mastoid cavity (**Figure 2(b)**).

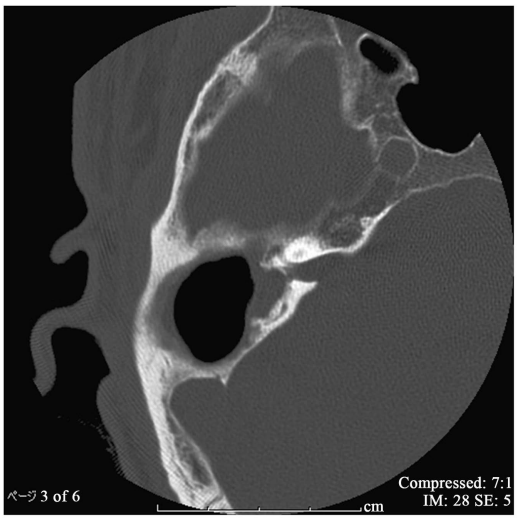
We performed right open type tympanoplasty in 2002, and at that time there was no recurrent cholesteatoma on the left side. After three-year-observation with no recurrence of right cholesteatoma, the patient underwent a left cochlear implantation with a Nucleus-24 channel device. We performed posterior tympanotomy and cochleastomy after the left modified radical mastoidectomy. There was no cochlear ossification and we inserted easily the implant array. The left open mastoid cavity was obliterated with abdominal fat (**Figure 3**) and the posterior wall of the external auditory canal was reconstructed with auricular cartilage. Because the aeration of the middle ear was good, we did not block the eustachian tube and external auditory canal, and did not obliterate the attic. Left otoscopic examination after implantation was good (**Figure 4**). After programming in the ACE mode, his speech discrimination word score was 72%.

In 2006, we found a new cholesteatoma in the left attic (**Figure 5**), and removed it by transcanal approach for preserving cochlear implant device. We

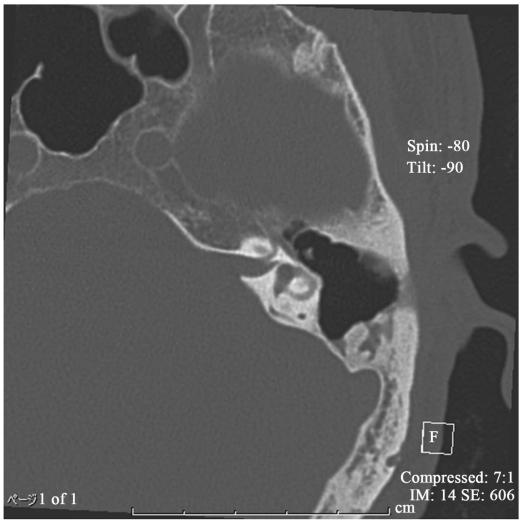


(a) (b)

Figure 1. (a) A right cholesteatoma in open cavity; (b) Left open type tympanoplasty with mastoidectomy for middle ear cholesteatoma.



(a)



(b)

Figure 2. (a) Low density area in the right mastoid antrum; (b) No low density area in the left mastoid cavity.

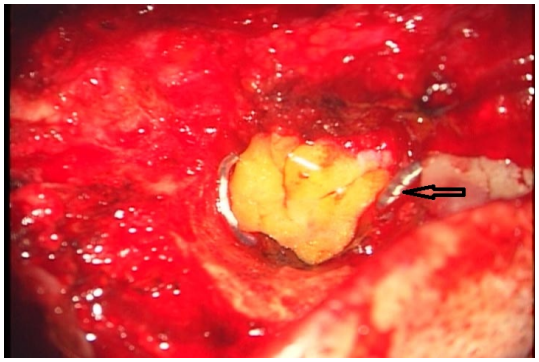


Figure 3. The left open mastoid cavity obliterated with abdominal fat. Arrow: cochlear implant array.

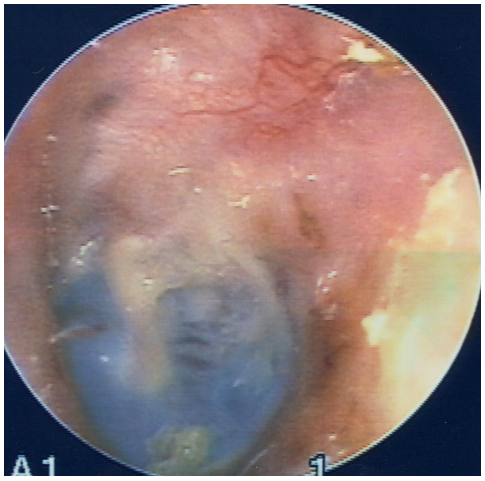


Figure 4. Left otoscopic examination after implantation.

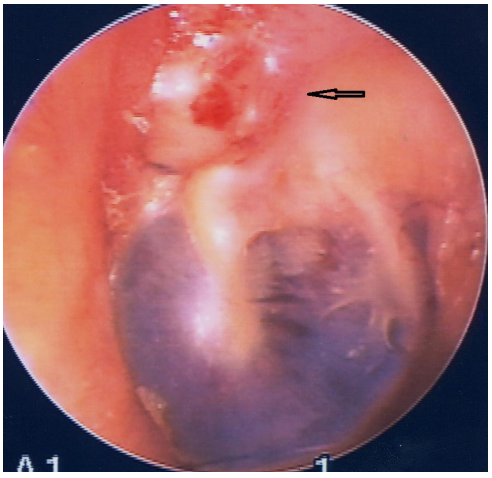


Figure 5. Recurrent cholesteatoma in the attic (*arrow*).

obliterated the attic with bone chips in order to prevent recurrent cholesteatoma (Figure 6). Even after the operation, the function of the left cochlear implant device was not changed. There has been no recurrence of cholesteatoma for 12 years.

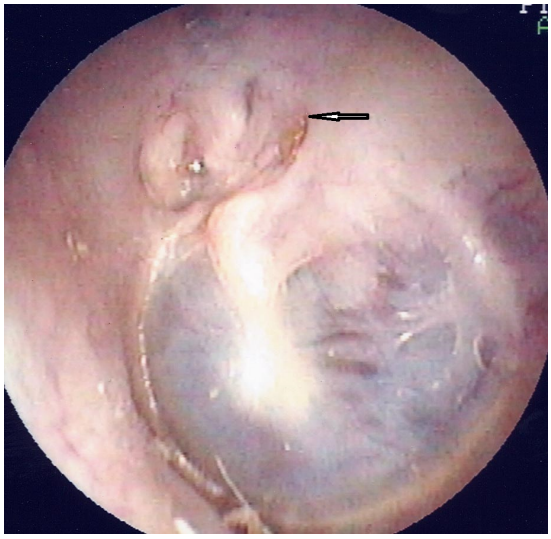


Figure 6. The attic obliterated bone chips (*arrow*).

3. Discussion

Some of the surgical problems encountered in cochlear implant surgery are related to cholesteatoma. Furthermore, cholesteatoma has occurred as a complication of cochlear implant surgery itself. Hoffman and Cohen reported that only one out of 172 (0.58%) patients developed a postimplant cholesteatoma [2].

In past, contraindications to cochlear implantation have included chronic otitis media sepsis such as previous radical mastoidectomy [4]. In patients who performed radical mastoidectomy, one of the most common postoperative complications is the extrusion of the electrode array into the mastoid cavity or external auditory canal [1]. In these chronic middle ear diseases, it requires surgical management to render an ear safe.

During recent years, different surgical strategies for cochlear implantation with chronic middle ear problems demonstrated that the selection of closed technique or open technique for arrangement of open mastoid cavity [10]. Many surgeons recommend the closed technique that obliteration and isolation of the cavity from the outer environment by blind sac closure of the external auditory canal and obliteration of the eustachian tube opening [1] [10] [11] [12]. There are bone pate, hydroxyapatite, pedicled temporalis muscle graft, and autologous abdominal fat graft as obliterating materials. Autologous abdominal fat graft have many advantages such as abundant supply, easy accessibility, low metabolic and resistance to necrosis when used as a free graft in a bony cavity [13]. Closed technique is that the infection risk associated with the insertion of foreign material is reduced but is at risk for residual or recurrent cholesteatoma. On the other hand, open technique is better control a potential recurrent cholesteatoma, but difficult to control the infection. Karatzanis *et al.* reported that open technique should be chosen in some cases [14].

Another surgical strategy for cochlear implantation with chronic middle ear problems is the selection of single-stage or second-stage operation. In patients

who have middle ear problems, depending on the presence of active infection or choelesteatoma, a second-stage operation should be considered to enable a successful CI [1]. In patients who performed radical mastoidestomy with no cavity problem, the selection of single-stage or second-stage operation is controversial issue. Gray and Irving [6] proposed the obliteration technique prior to cochlear implantation for cases which have middle ear disease with no active infection. This techinique involves obliteration of the eustachian tube, obliteration of the mastoid cavity with free abdominal fat, and permanent closure of the external ear canal. Meanwhile, Himi *et al.* [12] suggested that in patients with "safe type" chronic otitis media did not need the second-stage operation. In an old radical cavity with no cavity problem, they had no postoperative complication using a single-stage operation.

In our case, there has been no middle ear problem in the left ear for 20 years with good aeration in the tympanic cavity. We decided to perform a single-stage operation and mastoid cavity obliteration. We did not perform eustachian tube occlusion, blind sac closure of the external canal and obliterate in the attic. As a result, a new cholesteatoma appeared in the left attic. We had to perform re-operation to remove the new cholesteatoma, but could preserve the function the implant device. Although we should have obliterated the attic which was a open cavity before the operation, we could find the new cholesteatoma since we did not perform closed technique and patially obliterate only open mastoid cavity. When we perform the cochlear implantation in modified radical mastoid cavity, we need to adequately reflect on the area which should be obliterated. In some cases with modified radical mastoid cavity, we think that closed technique and second-staged operation have not always been performed.

4. Conclusion

In long-standing middle ear problems, when we perform cochlear implantation, even though there is good aeration of the middle ear and an intact tympanic membrane, we need to adequately reflect on the area which should be obliterated.

Conflicts of Interest

The authors declare no conflicts of interest.

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