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EXPERIENCE WITH OVERLAY TYMPANOPLASTY IN 83 CHINESE PATIENTS

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Abstract

Background In many European and American hospitals, represented by the House Ear Clinic (HEC), the overlay tympanoplasty is used with rare exception, with simultaneous canal wall up or down mastoidectomy being taken if needed. In China, underlay tympanoplasty is used across the country, but the overlay technique is used rarely. The aim of the current study was to report the authors' experience with overlay tympanoplasty in 83 Chinese patients and study its value. **Methods** Eight-three patients (86 ears) underwent overlay tympanoplasty in accordance to the standard of the HEC. The patients were followed up and conditions of the external auditory canal, tympanic membrane and hearing were reviewed and analyzed. **Results** All patients gained stage I incision healing. The size of external auditory canal and tympanic membrane morphology were satisfactory. Hearing either remained unchanged or improved. There were no hearing deterioration or serious complications. **Conclusions** Overlay tympanoplasty carries positive value in treating chronic otitis media and cholesteatoma with the merits of procedure standardization, adequate operative exposure, thorough disease elimination and extensive adaptation.

Keywords: Tympanoplasty; Overlay technique; External auditory canal; Surgery

Introduction

In 1965, the American Academy of Ophthalmology and Otolaryngology publicized the standard classification of surgery for chronic ear infection[1].Development of basic theories and techniques of modern tympanoplasty and mastoidectomy followed. With respect to the relationship between the graft and remnant tympanic membrane, tympanoplasty can be divided into overlay and underlay techniques.When mastoidectomy is done at the same time, there are canal wall up (CWU) and canal wall down (CWD) techniques based on whether the posterior canal wall is retained. All these operation methods require various tympano-meatus incisions in the canal under the microscope.

In many European and American hospitals, represented by the House Ear Clinic (HEC), theoverlay technique is used in tympanoplasty with rare exceptions, with simultaneous CWU or CWD mastoidectomy if necessary. But in China, the underlay technique is widely used in tympanoplasty across the country, with the overlay technique being used on much less occasions. Because the canal width in Chinese is generally narrower than the westerns, canalplasty is a very important part in the procedure of the tympanoplasty. From reviewing the literature in Chinese on otologic surgery from January 1995 to May 2011, only 436 cases of overlay graft placement have been reported, part of them being simple overlay myringoplasty for the repair of tympanic membrane perforation. Some of these reports lack systemic or standardized approach regarding the operative procedure. In this article, 83 patients (86 ears) who received the overlay tympanoplasty comparable to the HEC standards are reviewed, showing good efficacy. The experiences of the authors and clinical value of overlay tympanoplasty are discussed, in which the canalplasty and graft placement are the two important points.

Patients and Methods

Eighty-three patients received overlay tympanoplasty from November 2004 to June 2011 in Beijing Jishuitan Hospital and Beijing Tongren hospital, including 45 males and 38 females, aging from 19 to 70 years (averaged 38.6 years). Procedure was on right in 46 ears and left in 40 ears. The etiology included inflammation (80

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ears), burn (2 ears) and trauma (4 ears). Disease duration was from 3 months to 40 years. Past mastoidectomy (6-30 years ago) was reported in 4 cases.

Comprehensive medical history was collected, and physical examination was done to evaluate the patient's general condition and overall disease situation. Relevant studies, such as pure tone audiometry and the temporal bone CT were performed to obtain additional disease information. The study was performed in accordance to the Helsinki Declaration. In addition, it was approved by the ethics committee of Beijing Jishuitan Hospital. All subjects provided written informed consent.

Procedures

All patients received general anesthesia and ample local anesthetic was injected in the external meatus and post-auricular area. The overlay tympanoplasty involved 8 steps [2-4]. Briefly the procedure included: 1) Transmeatal incision - two longitudinal incisions were made along the tympanomastoid and tympanosquamous suture lines respectively with a sickle knife. A semilunar incision was made on the posterior canal wall near the tympanic membrane to connect the two incisions with a lancet or round knife. In the early stage, a second semilunar incision was also made at the bone-cartilaginous junction on the immediate anterior wall (Fig. 1, revised from reference 2), but later we found that this incision could be made after deciding which operative style was to be taken;

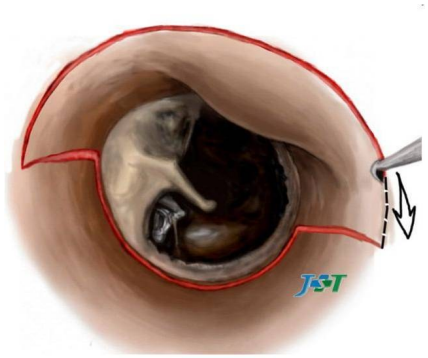

Figure 1 Transcanal incision.

2) Post-auricular exposure and harvest of temporalis fascia. The C incision in the post-auricular fold was designed to allow harvest of a 2 by 2 cm temporalis fascia which was then trimmed and laid on a Teflon plate for later use. Periosteum over the mastoid was lifted anteriorly using an elevator. A retractor was inserted to retract the auricle and vascular strip of the canal forward to expose the bony ear canal; 3) Removal of the canal skin. Depending on the anatomy of the canal and the pathology in the tympanic cavity, the choice of overlay or underlay tympanoplasty was made. If overlay procedure was chosen, a second semilunar incision was made at the bone-cartilaginous junction on the anterior wall. The anterior flap of the canal was freed carefully and kept in normal saline. The dissection remained superficial to the fibrous layer of the remnant tympanic membrane in such a way that the tympanic membrane was de-epithelized in continuity with the canal skin; 4) Enlargement of the ear canal. Part of the anterior and inferior canal walls was drilled off (Fig 2);

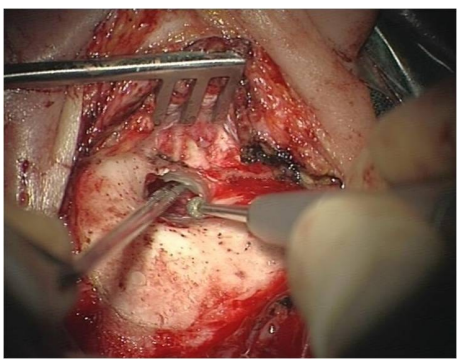

Figure2 Drilling of bone in the anterio-inferior canal wall.

5) De-epithelization of the remnant tympanic membrane. Since most epithelium of the remnant membrane was removed in the former step, the surgeon payed particular attention to the anteroinferior area 1 mm lateral to the annulus at this moment, for the epithelium remnant here may result in the formation of cysts. Meanwhile, the epithelium covering the manubrium was also removed. Calcified lesions or local atrophy in the membrane were also removed. Preservation of the annulus was sufficient for fascia placement. Upon completion of de-epithelization, middle ear diseases were assessed based on the history, temporal bone CT and observation during the operation to determine whether mastoidectomy or tympanoplasty prosthesis would be needed; 6) Placement of the fascia. The dried fascia was trimmed to an oval shape measuring approximately 1.3 by 1.5cm. A slit was cut in the fascia to allow placement under the manubrium, with the apex of the slit in the fascia coming into contact with the tensor tendon. When adjusting the fascia anteroinferiorly, care was taken not to over-extend it onto the bony wall. A 1 mm overlap would be the limit. The anterior flap was turned back over the exposed manubrium, resulting in a better appearance of the membrane when healed. When the malleus was absent or mostly absent, the fascia was cut twice, creating a flap that could be tucked under the lateral wall of the epitympanum to stabilize the graft. The anterosuperior edge of the fascia was then swung posteriorly to overlap the upper edge of the graft and secure the seal of the middle ear. A piece of silicon sheet was placed in the middle ear to avoid membrane adherence and in favor of recovery of the mucosa (Fig 3);

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