Revalidation of the Bondy technique

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The results of 37 cases surgically treated using the modified Bondy technique, over a six-year period at the Gruppo Otologico-Piacenza, Italy are reported. This technique, indicated in epitympanic cholesteatoma with intact ossicular chain and pars tensa, provides a one-stage mastoid cavity exteriorization with radical removal of cholesteatoma while preserving the preoperative hearing levels. The technique, indications, results and comparison with other current techniques are discussed in this article. [Turk J Med Res 1994; 12(1): 42-47]

KeyWords: Epitympanic cholesteatoma, Bondy technique.

Epitympanic cholesteatoma arising from epitympanic retraction pocket may sometimes present with intact tympano-ossicular system, intact pars tensa and,good hearing (Figure 1). This constitutes a problem to the surgeon in choosing the appropriate technique to manage this situation. The options are, the closed technique preserving the posterior canal wall with supposed better functional results as regards hearing but with a higher incidence of recurrence necessitating a second look operation. Or the open technique which takes down the posterior canal wall with better control of the pathology in a one-stage procedure but with less functional results as well as the problems of the residual cavity(1).

In 1910 Gustave Bondy(2) described his technique of modified radical mastoidectomy for the treatment of epitympanic cholesteatoma with intact pars tensa. The rational of the technique of Bondy was to produce a safe ear with preservation of hearing by removal of the lateral attic wall and posterior osseous meatal wall to exteriorize the cavity without disturbing the intact ossicular chain and the pars tensa. We have been using the modified Bondy technique in the Gruppo Otologico- Piacenza, Italy in selected cases of epitympanic cholesteatoma. The selected patients have an epitympanic cholesteatoma with intact tympano- ossicular system, good hearing and mesotympanum free of disease. The aim of this study is to evaluate the results of the modified Bondy technique in the surgical management of epitympanic cholesteatoma with intact ossicular chain as regards cholesteatoma control, revision rate, postoperative hearing preservation, complications and, above all, the success in obtaining a stable ear.

Received: Nov.30, 1993 **Accepted:** Dec. 21,1993

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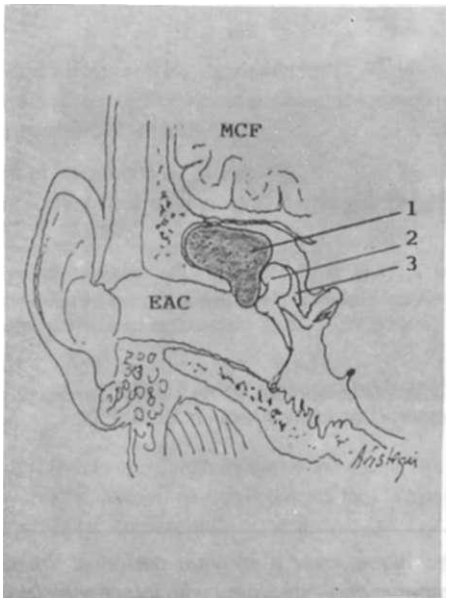
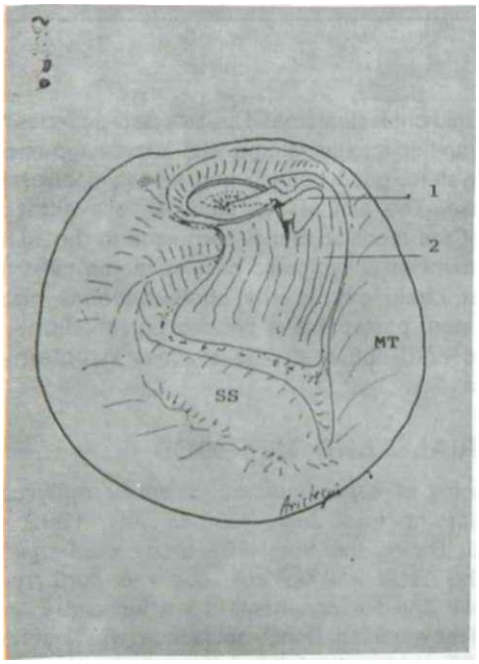
MATERIALS AND METHODS

The records of cases operated upon for epitympanic cholesteatoma from July, 1986 to July, 1992 were reviewed. During this time, 493 cases were operated upon. The canal wall up technique was performed in 302 cases and the canal wall down technique in 154 cases. The modified Bondy technique was performed in only 37 cases who fulfilled the criteria of selection for this technique by having an average air-bone gap not exceeding 30 dB measured in 250 Hz, 500 Hz, 1 kHz, 2 kHz and 4 kHz frequencies (Table 1). The cases were 24 males and 13 females, whose age ranged from 12 to 62 years (average 19 years). All showing an epitympanic cholesteatomatous sac with gross mucosal disease around but with an intact ossicular chain and mesotympanum free of disease. 25 cases had a unilateral disease, 12 in the right ear and 13 in the left. The disease was bilateral in 10 cases. However, the modified Bondy technique was performed in both ears of only two cases who fulfilled our criteria of selection for the technique, thus making the



^jre 1. Epitympanic cholesteatoma with intact ossicular jn- 1- Cholesteatoma. 2: Malleus. 3: Incus. MCF: Middle cra- f o s s a . EAC: External auditory canal.



Future 2. The tinal appearance of the mastoid cavity after per- ing the modified Body technique. 1: Incus. 2: Temporalis a.. M T : Mastoid tegmen. SS: Sigmoid Sinus.

c o u n t of 12 cases. In the other eight cases, one a previous contralateral radical cavity done else- *re.* two had staged open cavities performed in our t e r . The rest six cases were scheduled for surgery -1 J u l y 1992. All unilateral cases were reviewed for s t a t u s of their contralateral ears. The operated a w e r e reviewed for their postoperative hearing l t s by comparing their pre and post-operative air-bone gaps measured in the 250 Hz, 500 Hz, 1 kHz, 2 kHz, and 4 kHz. The incidence of recurrence of cholesteatoma, revision rate, complications and the status of the cavities resulting in these cases after utilizing the modified Bondy technique were reviewed.

Surgical technique

Under anaesthesia, the mastoid is exposed through a retroauricular incision. A simple mastoidectomy is done after saving the posterior canal skin as a vascular strip. All the air cells are removed with the particular attention to remove the perilabyrinthine and the retrosigmoid air cells, to avoid the formation of mucous cysts postoperatively. The sinodural angle is widely opened and the facial bridge is removed as well as the anterior and the posterior buttresses. Special care is taken to avoid contact with the intact ossicular chain at this point. To create a round cavity, the facial ridge is lowered followed by the widening of the anterior meatal wall after reflecting the anterior meatal skin interiorly to the tympanic membrane which are protected with an aluminium plate during drilling. To avoid retraction of skin around the ossicles postoperatively, a piece of cartilage is put under the body of incus and head of malleus.

Another piece of cartilage can also be put over the long process of the incus to prevent retraction around it. A temporalis fascia graft is split to encompass the incus passing over its long process and under its body. Another separate piece of fascia is used to cover the exposed body of incus. A meatoplasty is done in all cases except when having a small sized cavity attributed to the forward placement of the sigmoid sinus and a low middle fossa dura (Fig 2-3).

RESULTS

The average postopearative air-bone gap improved 5-15 db in 11 cases (30 %), unchanged in 16 cases (43 %), and became worse in 10 cases (27 %). In the latter group, the air-bone gap deteriorated by 5-10 dB

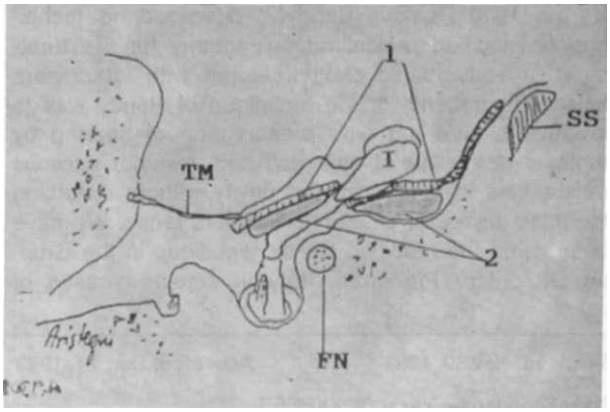


Figure 3. Section in the ear showing the position of the cartilage pieces and the fascial graft. 1: Fascia. 2: Cartilage. SS: Sigmoid Sinus. FN: Facial nerve. TM: Tympanic membrane. I: Incus.

Table 1. Number and percentage of patients with average air bone gap in dB. measured in 250, 500, 1000, 2000, 4000 Hz frequencies. Preoperative versus postoperative. SNHL: Sensorineural hearing loss.

Average A-B gap in dB	Preoperative Number of patients	°A	Postoperative Number of patients	°A
<5	2	5.5	6	16
6-10	6	16	6	16
11-20	25	67	18	49
21-30	4	11	6	16
31-40	0	0	1	3
SNHL	0	0	0	0
Total	37	100	37	100

Table 2. Pathologies detected in contralateral ears in cases presented with unilateral epitympanic cholesteatoma. (n=number of patients).

	n
Perforated pars tensa	3
Tympanosclerosis	1
Attic retraction pocket	3
Monomeric	1
Retracted pars tensa	1
Total	9

in nine cases and in one case by 30 dB. Compared to 88.5 % of cases that started with a preoperative air-bone gap equal or less than 20 dB, the postoperative results show that this level was preserved in 81 % of cases. However, 16% had a postoperative air-bone gap in the range of more than 20 dB to 30 dB. In only one case (3 %) that the postoperative air-bone gap exceeded 30 dB compared to zero % preoperatively. There were no cases of postoperative sensorineural hearing loss (Table 1).

Revising the status of the contralateral ears in cases presented with unilatreal cholesteatoma (25 cases), normal contralateral ears were detected in only 16 cases with the remaining nine cases showing different pathologies in the contralateral ears as described in Table 2.

In the follow up period ranging from one to six years (average three and half years), dry cavities were achieved in all cases except two. These were revised for draining cavities where a revision of their meatoplasty was performed for a postinfection stenosed meatus. All tympanic membranes remained intact. No signs of recurrent cholesteatoma were detected during this follow up period. The meatoplasties were aesthetically accepted by all patients who enjoyed their usual activities as regards water sports and showering.

DISCUSSION

The objectives of cholesteatoma surgery should include the identification and elimination of intractable disease, to achieve dry, safe ear, and if possible, without compromizing this goal, preservation or improvement of hearing . Analysis of the hearing results obtained utilizing the modified Bondy technique in 37 ears with epitympanic cholesteatoma shows that this technique has fulfilled these objectives. While in the majority of cases (43 %) there was a preservation of the preoperative air-bone gap, 30 % of cases had improvement in their air-bone gap compared to their preoperative gap. Only in 27 % of cases that the air-bone gap became worse than that preoperatively. Nevertheless, this deterioration in the air-bone gap was in the range of 5-10 dB. In only one case the air-bone gap deteriorated by 30 dB.

It is well known that eradication of the cholesteatoma usually excludes maintenace of the normal anatomy of the ear and therefore disfavors the improvement of hearing. Yet, comparing our overall results of the percentage of cases which had air-bone gaps equal or less than 20 dB, it becomes clear that we achieved this level in 81 % of cases treated with the one-stage technique of modified Bondy's compared to 68 % and 55 % achieved by Bonding[3] and Kinney[4] respectively using a one stage canal wall up procedure, 68% achieved by Shelton and Sheehy[5] using staged procedures , 49 % and 58 % achieved by Lau and Tos[6] using canal wall down and canal wall up techniques respectively, 34 % with modified radical and 62 % with intact canal wall technique as reported by Brown[7].

This comparison of hearing results is only to stress the value of early identification of attic cholesteatoma since we are comparing a pathology with no tympano-ossicular involvement to more extensive ones. It is also meant to indicate that although no technique can achieve a 100 % hearing improvemnt or even preservation, the modified Bondy technique stands out to be the best technique available as compared to other techniques in achieving the highest percentage of hearing preservation and\or improvement in indicated cases.

Several attempts have been described reconstructing the lateral attic wall after removal of an attic retraction cholesteatoma such as those described by Zollner and Mannolidis[8], Pappas et al.[9] and, Mc-

In the modified Bondy technique we have at- to exteriorize and obliterate the epitympanic ith the use of cartilage in order to prevent fu- raction pockets especially at the anterior anic space which we have noticed to occur y if reconstruction of the attic was attempted esence of tubal dysfunction. we also adopted ting the posterior part of the tympanic ne by placing a piece of cartilage over the cess of the incus for the same reason.

concept was further augmented by finding that the cases had abnormal contralateral ears of athologies which could be attributed to a defec- dle ear ventilation as has been previously [3,4]. Added to the 27 % of bilateral cases that d in our series, it appears that the assumption of and deguine11 that the contralateral ear in toma is particularly predisposed to the develop- his lesion compared to the normal population justified. We therefore agree with deguine and that an open technique with exteriorization considered in epitympanic cholesteatoma of ble size in which a poor eustachian tube func- ggested. This prevents the need for multiple for residual cholesteatoma which has a high in the epitympanum12 , and also prevents the e of cholesteatoma if a closed cavity is per- those predisposed patients with the final need n an open cavity after the ossicular chain has naged thus losing the initial chance for better ffered by the one-stage open cavity proce-

nited cavity, however, was not adopted in this we find it a drawback in the original bondy e as also stated by Glasscock[14]. Our ions create an extended mastoid cavity by f the sinodural angle and exenteration of the id and perilabyrinthine air cells and beveling s of the cavity as prerequisites for achieving llow cavity. Also, removal of the anterior and rior buttresses, lowering of the facial ridge ging the bony meatus are important for ob- a round cavity. Performing a suitable ty, in addition, not only permits the aeration vity but is also important for the early detec- urrence.

y surgical procedures are currently available urgeons treating otological diseases. The technique relies significantly on the identifica- e disease as well as on the surgical training rience of the surgeon. The modified bondy simply provides another option among pro- vailable for such treatment. İt is indicated in epitympanic cholesteatoma with intact tym- cular chain, good hearing, and mesotym- e of disease. it achieves the salient ob- f cholesteatoma surgery and, in one stage, hearing.

Bondy tekniğinin yeniden canlandırılması

Modifiye Bondy tekniği kullanılarak İtalya, Piacenza, Gruppo-Otologico'da cerrahi olarak tedavi edilen 37 hastanın sonuçları bildirilmiştir. Bu teknik intakt kemikçik zincir ve pars tensası olan epitimpanik kolesteatom vakalarında endike olup preoperatif İşitmeyi korurken tek evrede radikal kolesteatom çıkarılmasıyla berabermastoid kavite exteriorlzasyonunu sağlar. Teknik endikasyonlar, sonuçları açısından diğer mevcut tekniklerle tartışılmıştır. [Turk J Med Res 19Q4;12(1): 42-4 7]

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