

Main Articles

Vinegar treatment in the management of granular myringitis

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Abstract

To compare the therapeutic efficacy in the management of granular myringitis, 15 patients with chronic granular myringitis were treated with antibiotic ear drops that were used twice to four times a day, and another 15 patients were treated with daily irrigation of the external canal with dilute vinegar solution. All patients treated with dilute vinegar solution had resolution of their original otorrhoea within three weeks, whereas two-thirds of patients recovered within three weeks when treated with antibiotic ear drops. The disadvantages of dilute vinegar therapy were canal irritation with pain and dizziness. When the therapeutic efficacy was compared statistically, a dry ear was attained in the dilute vinegar-treated group at six weeks and six months in the antibiotic ear drop treated group ($p < 0.01$). These results suggest that very low pH therapy using dilute vinegar solution is definitely effective in the management of granular myringitis.

Key words: Polyps; Ear, External; Treatment; Outcome

Introduction

Granular myringitis has been considered as a specific form of chronic inflammation of the tympanic membrane, that is characterized by localized granulation tissue, with the clinical symptoms of a persistent and recurrent discharging ear.¹

In the management of granular myringitis, the treatment regimens are variable with inconsistent results. Placement of a wick impregnated with antibiotic/steroid drops for a couple of days, various antiseptic solutions, or caustics have been applied directly to granular sites on the tympanic membrane after meticulous debridement of polypoid granulation if present.^{1,2} However, to date, there are no single effective therapeutic regimens in the management of granular myringitis.

Recently, selection of medication for the management of granular myringitis has focused on the result of cultures since the causative organisms are usually either bacterial or fungal.^{1,3} These causative organisms may grow best in a narrow range of pH from 6.5 to 7.5.⁴ In the management of various types of external otitis, it is important to maintain the acidity of the external canal which may prevent the growth of bacteria and fungus. Acidification using acetic acid

or Burow's solution has long been used successfully in the management of discharging ears.^{5,6} In folk medicine, vinegar has been used to manage external otitis with good effect.⁷

Since granular myringitis is a specific form of external otitis limited to localized inflammation on the lateral aspect of the tympanic membrane,¹ it is possible that the acidification of the external canal may have good effect on granular diseases of the tympanic membrane by preventing the bacterial growth and stimulation of squamous re-epithelization. In the present study, we have applied dilute vinegar solution to the external canal in the management of granular myringitis and compared its therapeutic efficacy with the use of ear drops.

Materials and methods

Selection of patients

During the years 1992 to 1999, 30 patients with a diagnosis of chronic granular myringitis were selected. The disease affected only one ear in all cases in this group. The diagnostic criteria of chronic granular myringitis in this study include 1) recurrent foul odorous otorrhoea, 2) granulation tissue or

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polyp in the tympanic membrane under microscopic examination, and 3) type A tympanogram. The patients with 1) a history of chronic purulent otorrhoea or chronic otitis media, 2) perforated tympanic membrane under microscopic examination, 3) type B and type C tympanograms, and 4) presence of middle-ear diseases identified by a temporal bone computed tomography (CT) scan were excluded.

Eighteen bacterial culture specimens were taken from the otorrhoea. Pure tone audiograms were also performed at the first and the last visit. To assess the mastoid pneumatization, plain films were obtained. Temporal bone CT scans were also obtained if sclerotic mastoids were present on plain films.

Treatment regimens

The patients were divided into two groups for comparison. The first group was composed of those who were treated with ofloxacin ear drops and the second group was composed of patients who performed self-cleansing using dilute vinegar solution.

From 1962 to 1996, 15 patients with chronic myringitis were treated with ofloxacin ear drops which were used twice to four times a day. This treatment was continued until the tympanic membrane became dry and otorrhoea was not found on microscopic examination. Two polypoid granulations were first treated with meticulous debridement under the microscopic control and then the external canal was packed with a half-inch strip of gauze soaked with ofloxacin ear drops. The gauze strip was removed two days later and then ofloxacin ear drops were instilled twice to four times a day.

From 1997 to 1999, 15 patients were treated with dilute vinegar solution. Patients used one type of vinegar solution which was used commercially for fermentation. Its original pH was 2.25 ± 0.02 . All patients were scheduled to receive dilute vinegar irrigation once or twice a day according to the instructional manual. Ten ml of the vinegar was mixed with 30 ml of water and its final pH was 2.43 ± 0.02 . This vinegar solution was warmed to $37\text{--}40^\circ\text{C}$ and then it was instilled into the external canal using a 10 ml syringe without a needle. It drained naturally and then the external canals were dried with a hair-dryer for a minute. This self-cleansing was performed once or twice a day during bathing. One polypoid granulation was first treated with meticulous debridement under microscopic control and then the external canal was packed with half-inch strips of gauze soaked with Effexin ear drops. The gauze strip was removed two days later and then self-cleansing with dilute vinegar solution was performed. Daily self-cleansing was stopped one week after the ear discharge had stopped and re-epithelialization of the ear drum was monitored with use of a surgical microscope.

Follow-up assessment and statistical analysis

The patients were re-examined regularly every week and followed up for over six months. All patients at the eight week visit were scheduled to return

monthly to be observed for recurrence of granular myringitis. The dry ear and re-epithelialization of the drum were observed by means of surgical microscopy. Recovery after therapy was defined as cessation of ear discharge and reversion of the tympanic membrane to a normal appearance.

Therapeutic efficacy was analysed by the Kaplan-Meier method and the curves were statistically compared using the log rank test. A value $p < 0.05$ was considered to be statistically significant.

Results

Clinical assessment

Among the 30 patients, 23 were women and seven were men, with a mean age of 38.4 years (range, 18–54 years).

Out of 18 bacterial cultures, the most common bacteria isolated from the external ear discharge, in descending order of frequency, were *Staphylococcus aureus* (eight of 18, 44.4 per cent), *Pseudomonas aeruginosa* (five out of 18, 27.8 per cent), *Proteus mirabilis* (two out of 18, 11.1 per cent). Two (two out of 18, 11.1 per cent) revealed no bacterial growth. One out of 18, (5.6 per cent) showed mixed infection with *Pseudomonas aeruginosa* and *Proteus mirabilis*.

In pure tone audiograms, 18 patients (60 per cent) revealed the normal range of hearing levels, whereas 12 patients showed impaired hearing; five patients (16.7 per cent) had sensorineural hearing loss and seven patients (23.3 per cent) had mild conductive hearing loss with a range of 10–20 dB air-bone gap. Four of seven patients with conductive hearing loss (two out of four ofloxacin-treated patients, two out of three vinegar-treated patients) showed improved hearing after treatment within the normal range of hearing levels, but mild conductive hearing loss with a range of 10–20 dB air-bone gap remained in three patients.

The physical findings and radiologic evaluation of the tympanic membranes showed 19 patients (63.3 per cent) with localized granulation on the lateral tympanic membrane, suggesting a very mild form of granular myringitis (Figure 1(a)), which showed 13 well-pneumatized mastoids and six diploic mastoids on plain films. A diploic mastoid suggests a decrease in size of the mastoid cavity with a normal pattern of pneumatization. Eight patients (26.7 per cent) showed diffuse granulation and there were one pneumatic, five diploic and two sclerotic mastoids. These sclerotic mastoids were free of middle-ear disease when evaluated by a temporal bone CT scan. Three patients (10 per cent) revealed localized polyps, their mastoids were sclerotic and their middle-ear cavities were clear on the temporal bone CT scan.

Therapeutic outcomes

Of the 15 patients treated with ofloxacin ear drops, 10 patients (66.7 per cent) recovered within three weeks (two recovered after one week, three recovered after two weeks, and five recovered after three weeks). Two patients (13.3 per cent) recovered after

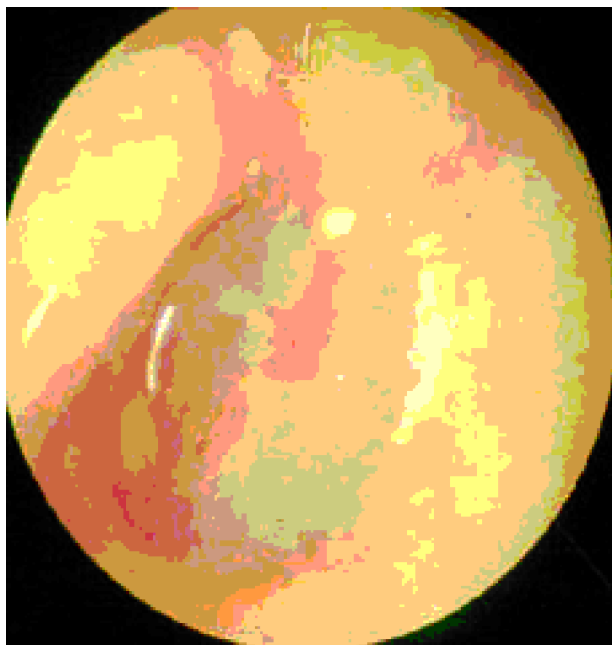


FIG. 1(a)

The tympanic membrane of granular myringitis reveals localized reddish granulation tissue along the handle of malleus with scanty serous discharge.



FIG. 1(b)

Daily cleansing of external canal with dilute vinegar solution for a week revealed a clear tympanic membrane at the end of the first week.

four weeks, whereas three patients (20 per cent) had a prolonged recovery of more than six weeks, though they responded well to ofloxacin treatment initially, the myringitis recurred as soon as the drops were stopped.

Of the 15 patients treated with dilute vinegar solution, most of them (12 cases, corresponding to 80 per cent) recovered after one week and had a dry tympanic membrane (Figure 1(b)). Two patients

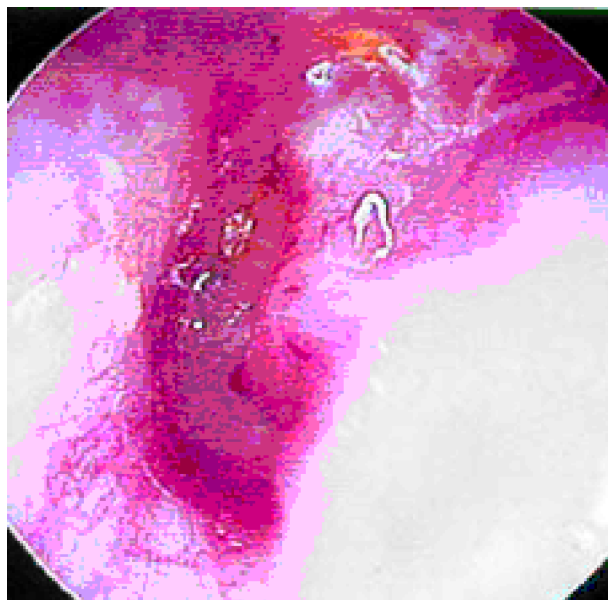


FIG. 2(a)

Diffuse granulation with purulent discharge was often seen in the tympanic membrane of granular myringitis.

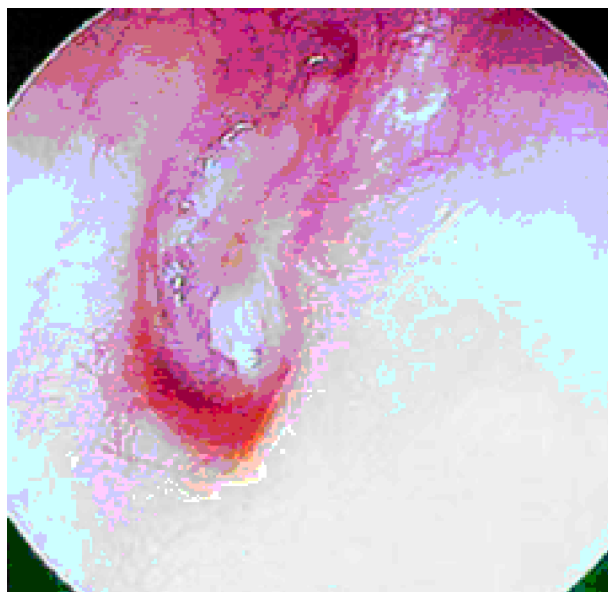


FIG. 2(b)

Vinegar treatment is dramatically effective in the management of discharge and granulation in granular myringitis. Granulation with discharge disappeared the third week after dilute vinegar treatment.

(13.3 per cent) recovered after two weeks and one patient (6.7 per cent) recovered after three weeks (Figures 2(a),2(b)). During the follow-up for over six months, there were no recurrences. All tolerated self-cleansing of the external canal with dilute vinegar solution very well, although two patients experienced mild ear-ache and one felt mild dizziness once. None experienced severe ear-ache or dizziness.

When the therapeutic efficacy was compared statistically by the Kaplan-Meier method (Figure 3), a dry ear could be attained more quickly in the

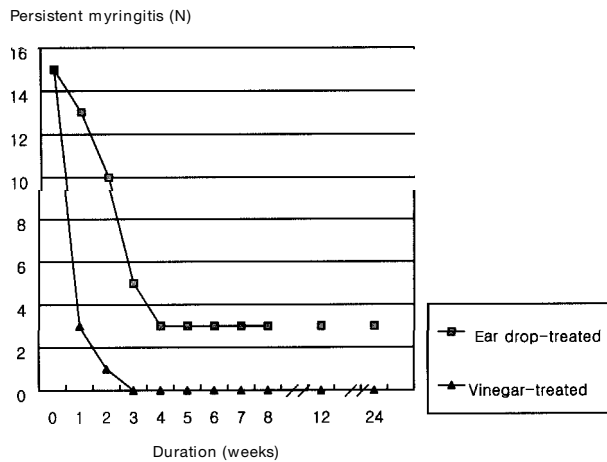


FIG. 3

Overall recovery after treatment with dilute vinegar solution ($n = 15$) and ear drops ($n = 15$) revealed that a dry ear could be attained earlier in the dilute vinegar-treated group than the ear drop-treated group at six weeks and six months respectively ($p < 0.01$)

dilute vinegar-treated group than the ear drop-treated group, at six weeks and six months respectively ($p < 0.01$).

Discussion

In the present study, very low pH therapy induced by dilute vinegar solution is definitely superior to antibiotic ear drops. All patients treated with dilute vinegar solution had resolution of their original otorrhoea within three weeks, whereas only two-thirds of patients recovered within three weeks when treated with antibiotic ear drops.

It is interesting to investigate why vinegar treatment is effective for the management of chronic otorrhoea caused by granular myringitis. Two possibilities can be suggested. The first one is its antibacterial activity. Dilute vinegar solution has a very low pH of 2.43 ± 0.02 and may have antibacterial activity. The antibacterial activity of acetic acid and Burow's solution as topical otological preparations has been reported.⁶ Alternately, continuous irrigation with dilute vinegar solution also maintains an external canal pH of lower than four and this may not permit the re-growth of bacteria. The second possibility is the stimulation of epithelial proliferation. Low pH may facilitate epithelial proliferation and prevent the over-growth of fibrous tissue. It was reported that acidification of colonic contents by diet modification leads to increased epithelial cell proliferation.⁸ In contrast, the pH of ofloxacin is known to be approximately 6.0 and this could not be effective in maintaining the canal's acidity as the pH of the external ear is much lower than that of the ear drop. This vinegar solution may be effective in the management of cavity problems in an open mastoidectomized cavity and some types of external otitis.

Adverse effects of vinegar treatment included canal irritation and pain. If it remains in the canal, it may irritate the canal and cause severe erosion. When using dilute vinegar solution in the external canal, it needs natural drainage and immediate drying with a hair dryer otherwise the drum may perforate. Some patients may not like the smell of the vinegar. The solution must be instilled at body temperature.

Although the clinical features of granular myringitis have been well described by several authors, its pathogenesis is still obscure. Recently, Kunachak³ described the diagnostic criteria of granular myringitis as a lack of history of profuse mucous otorrhoea, normal hearing, an intact tympanic membrane under microscopic examination, and normal mastoid radiography. In the present study, we used two different criteria. One was hearing levels and the other was mastoid pneumatization on radiography. Eighteen of 30 patients (60 per cent) revealed a normal range of hearing. Five patients (16.7 per cent) had sensorineural hearing loss which could be related to ageing and it is acceptable within the category of granular myringitis, but seven patients (23.3 per cent) had mild conductive hearing loss with a range of 10–20 dB air-bone gap. The aetiology of mild conductive hearing loss may be related to a thickened tympanic membrane. However, it is also possible that it is a sequel of chronic otitis media as granular myringitis can be caused by external otitis or perforated tympanic membrane from middle-ear inflammation.^{1,9} A mild form of granular myringitis is usually caused by local inflammation of the lateral tympanic membrane, but diffused granulations or local polyps could be caused by chronic otitis media. Mastoid radiography may support this hypothesis. In the present study, 14 patients revealed normal pneumatization, and 11 patients revealed diploic mastoids. In the case of 11 diploic mastoids, six patients had a diploic mastoid on the opposite side, but five had pneumatic mastoid on the opposite side. On the other hand, five patients had both sclerotic mastoids and their middle-ear spaces were clear on the temporal bone CT scan. These sclerotic patients had mild conductive hearing loss possibly caused by slightly thickened tympanic membranes or mild limitation in the movement of ossicles.

Restoration of the external ear to an acidic pH is very important in the treatment of granular myringitis and the natural pH of the skin can be achieved by the use of dilute vinegar solution.

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References

- 1 Stoney P, Kwok P, Hawke M. Granular myringitis: a review. *J Otolaryngol* 1992;**21**:129–35
- 2 Brown OE, Meyerhoff WL. Diseases of the tympanic membrane. In: Paparella *et al* eds. *Otolaryngology*, 3rd edn. Philadelphia: W.B. Saunders Company, 1991;1281
- 3 Kunachak S. Intractable granular myringitis: possible etiology and management. *J Otolaryngol* 1992;**21**:297–8
- 4 Aminifarshidmehr N. The management of chronic suppurative otitis media with acid media solution. *Am J Otol* 1996;**17**:24–5
- 5 Smathers CR. Chemical treatment of external otitis. *South Med J* 1977;**70**:543–5
- 6 Thorp MA, Kruger J, Oliver S, Nilssen EL, Prescott CA. The antibacterial activity of acetic acid and Burow's solution as topical otological preparations. *J Laryngol Otol* 1998;**112**:925–8
- 7 Jahn AF, Hawke M. Infections of the external ear. In: Cummings CW *et al* eds; *Otolaryngology Head and Neck Surgery*, 2nd edn. St. Louis: Mosby-Year Book Inc, 1993 2787–94
- 8 Lupton JR, Coder DM, Jacobs LR. Influence of luminal pH on rat large bowel epithelial cell cycle. *Am J Physiol* 1985;**249**:G382–8
- 9 Hoshino T, Yano J, Ichimura K, Hashimoto H, Nozue M. Chronic myringitis and chronic suppurative otitis media. *Arch Otorhinolaryngol* 1982;**234**:219–23

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