Long-term hearing outcome after intratympanic gentamicin instillation for intractable Ménière’s disease

S. Verhoeven, O. Vanderveken, V. Van Rompaey, P. Van de Heyning
Department of Otorhinolaryngology, Head and Neck Surgery, Antwerp University Hospital
Faculty of Medicine and Health Sciences, University of Antwerp
vincent.van.rompaey@uza.be

Introduction

In 1956, Schuknecht reported on successful chemical vestibular ablation therapy in the management of Ménière’s disease (MD) by administering streptomycin into the middle ear. Over the years, intratympanic gentamicin (ITG) has been increasingly used because of its preferentially vestibulotoxic effect, rendering the patient insensitive to vertigo spells provoked by endolymphatic hydrops.

Up until now, no consensus exists about the best treatment schedule to achieve optimal vertigo control and minimize hearing loss.

Aim

To investigate our current hospital ITG protocol for

- Short- and long-term (> 2 years) hearing outcome
- Long-term (> 2 years) vertigo control

ITG protocol

- 1 hour round window application of 40 mg/ml gentamicin solution
- Outpatient clinic, general anesthesia
- Supine position, head turned to non-affected side
- Two myringotomy incisions: anterior-inferior quadrant (air relief hole) and posterior-inferior quadrant (close to round window niche)

Material and methods

- Retrospective cohort study on 60 cases with unilateral definite MD with intractable vertigo spells despite optimal medical treatment (diuretics, betahistine, salt restriction, caffeine-free)
- Pure-tone audiometric data were grouped by follow-up periods: baseline before first ITG (N=60), week 1-2 (N=28), week 3-4 (N=17), month 2 (N=23), month 3-4-5-6 (N=41), month 7-12 (N=29), year 2 (N=31) and > 2 years (N=28).

Vertigo control

- Evaluation of vertigo outcome was performed for 56 patients who had a minimum follow-up of 2 years.
- Control of vertigo: 52 out of 56 patients (93%).
- Among these 52 patients, 36 patients needed 1 gentamicin treatment, 13 patients needed 2 treatments and 3 patients needed 3 treatments to obtain vertigo control.
- Three out of 56 patients (5%) experienced lack of vertigo control at 2-years follow-up.
- One out of 56 patients underwent surgical selective vestibular neurectomy because of persistent disabling vertigo spells despite three ITG procedures.

Hearing outcome

- For all follow-up periods, there was no statistically significant difference in mean PTA or 8000 Hz in comparison to baseline (paired t test, p>0.05). (Figure 1)
- Evaluation of long-term hearing outcome was performed for 28 patients who had a minimum follow-up of 2 years
- Improved 32% / Unchanged 54% / Worse 14%
- Multiple gentamicin injections did not result in more hearing deterioration. (Table 1)

Vertigo outcome

- 52 out of 56 patients (93%).
- Among these 52 patients, 36 patients needed 1 gentamicin treatment, 13 patients needed 2 treatments and 3 patients needed 3 treatments to obtain vertigo control.
- Three out of 56 patients (5%) experienced lack of vertigo control at 2-years follow-up.
- One out of 56 patients underwent surgical selective vestibular neurectomy because of persistent disabling vertigo spells despite three ITG procedures.

Conclusion

The present treatment protocol of a single intratympanic application of 40 mg/ml gentamicin during 1 hour for unilateral Ménière’s disease is effective in achieving vertigo control in 92% of patients, but carries a risk of hearing loss. Long-term hearing was negatively affected in 14% of the patients. Multiple gentamicin injections may have been necessary to obtain vertigo control but did not result in more hearing deterioration.

Table 1. There was no statistically significant difference between final (after second or third treatment) and initial (before any treatment) mean threshold for PTA and 8000 Hz (paired t test, p>0.05). Mean threshold shift of PTA and 8000 Hz were calculated as the final threshold minus initial threshold. There was no statistically significant difference in threshold shift between treatment groups with 1, 2 or 3 gentamicin injections (Kruskal-Wallis H-test, p>0.05).

<table>
<thead>
<tr>
<th>Treatment</th>
<th>1 x ITG (N=16)</th>
<th>2 x ITG (N=9)</th>
<th>3 x ITG (N=3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial PTA</td>
<td>59±15</td>
<td>58±22</td>
<td>50±19</td>
</tr>
<tr>
<td>Final PTA</td>
<td>52±24</td>
<td>56±13</td>
<td>61±2</td>
</tr>
<tr>
<td>Threshold shift PTA</td>
<td>-7±26</td>
<td>0±13</td>
<td>4±5</td>
</tr>
<tr>
<td>Initial BkHz</td>
<td>70±18</td>
<td>62±23</td>
<td>50±10</td>
</tr>
<tr>
<td>Final BkHz</td>
<td>75±29</td>
<td>78±13</td>
<td>77±23</td>
</tr>
<tr>
<td>Threshold shift BkHz</td>
<td>5±21</td>
<td>12±12</td>
<td>2±10</td>
</tr>
</tbody>
</table>