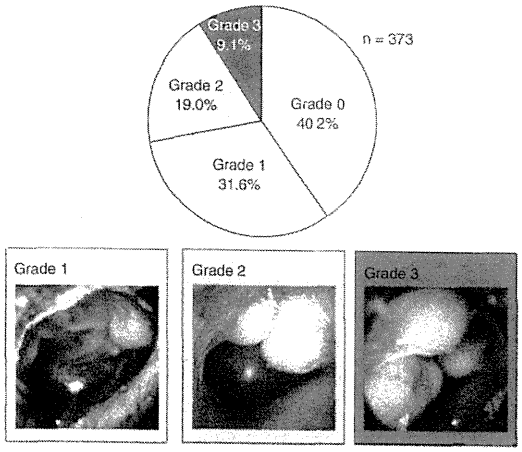

Figure 1. Classification and prevalence of exostoses (exemplification of right ear): grade 0, no visible exostosis; grade 1, less than one-third obstruction; grade 2, between one-third and two-third obstruction; grade 3, more than two-thirds obstruction. Approximately 60% of surfers have some degree of exostoses.

earplugs, previous removal of exostoses, and direction of stance on the surfboard.

All subjects were examined with a battery-powered recordable otoscope (Welch-Allyn, Skaneateles Falls, New York). Each ear was assigned to 4 grades according to the degree of the external auditory canal obstruction due to exostoses (**Figure 1**).

Grade 0: no visible exostosis
Grade 1: less than one-third obstruction
Grade 2: between one-third and two-thirds obstruction
Grade 3: more than two-thirds obstruction

In cases of asymmetric exostoses, the grade was determined by whichever was the most severely affected side. To predict the degree of exostosis formation, we have used a surfing index: the product of the period (the number of years surfing) as an active surfer and the frequency (the number of surfing days per week).

Although participants came from all over Japan, many were from Chiba and Miyazaki prefectures. Both prefectures have surfable coasts and are known as leading areas of surfing in Japan. The mean sea surface temperature in the coldest months is lower in Chiba (16°C) than Miyazaki (19°C), as is the mean air temperature (Chiba, 6°C; Miyazaki, 8.5°C). Subjects who reported surfing predominantly in Chiba were considered cold-water surfers, whereas those who surfed mainly in Miyazaki were considered warm-water surfers.

Statistical analysis was performed using analysis of variance, χ^2 test, and Wilcoxon sum rank test. Statistical significance was defined as a P value $<.05$.

This study was approved by the institutional review board of Miyazaki University.

Table 1. Relationship between the Number of Years Surfing and the Degree of Exostoses Formation

	Number of Years as Active Surfer (Number of Surfers)						
Grade of Exostoses	0-4	5-10	11-15	16-20	21-25	≥26	Mean ± SD
Grade 0	49	45	23	11	3	9	10.6 ± 9.7
Grade 1	17	32	31	15	9	14	13.6 ± 8.3
Grade 2	1	11	9	12	14	24	20.5 ± 9.2
Grade 3	0	4	7	6	9	8	20.4 ± 7.7

Results

Prevalence of Exostoses

A total of 373 subjects completed both the examination and questionnaires. There were 309 male surfers and 64 female surfers. The mean ages of male and female surfers were 33.5 (SD, 10.7) and 31.4 (SD, 6.2) years, and the mean number of years spent surfing was 15.0 (SD, 10.0 years) and 9.9 (SD, 6.4) years, respectively. The number of participants from Chiba (cold-water surfers) was 83 and from Miyazaki (warm-water surfers) was 111. One subject had received surgical treatment for exostoses on both ears.

Exostoses were found in 223 (59.8%) of 373 subjects, with 31.6% being grade 1, 19.0% being grade 2, and 9.1% being grade 3 (**Figure 1**). The relationship between the number of years as an active surfer and the degree of exostosis formation is shown in **Table 1**. Generally, the number of subjects who were defined as grade 0 decreased the longer the subject had been an active surfer. Likewise, the prevalence of exostoses increased with an increasing number of years surfing. Most subjects who had grade 2 or more severe exostoses were found in the group of those whose surfing experience exceeded 5 years. However, the number of years surfing does not seem to correlate well with the severity of exostoses. Especially in the group of those whose surfing experience exceeded 25 years, exostoses were not observed as was expected from the groups with less surfing experience. In this group, the number of surfing days per week was rather low. In contrast, subjects with grade 2 or more severe exostoses and those whose number of years was 5 to 10 years tended to have a higher frequency of surfing days per week.

The relationship between the number of surfing days per week and exostosis formation is shown in **Table 2**. The number of surfing days per week appears to be unrelated to the severity of exostoses alone.

The relationship between exostoses and the surfing index is shown in **Table 3**. The prevalence of exostoses from grade 1 to 3 increased with a higher surfing index compared with grade 0 exostosis ($P < .0001$). Similarly, the prevalence of grade 2 and 3 exostoses increased with a higher surfing index compared with grade 1 exostoses ($P = .013$, $P = .007$). However, pairwise comparisons showed no statistically significant difference between grades 2 and 3. When the surfing index was less than 10, grade 3 exostoses were not observed. Compared with both grade 0 and grade 1 exostoses, the

Table 2. Relationship between the Number of Surfing Days per Week and Exostoses Formation

Grade of Exostoses	Number of Surfing Days per Week (Number of Surfers) ≤1	1 ≤ 2	2 ≤ 4	4 ≤ 6	≥6	Mean ± SD
Grade 0	50	32	32	15	21	2.9 ± 2.2
Grade 1	30	21	26	22	19	3.4 ± 2.2
Grade 2	19	10	14	12	16	3.5 ± 2.3
Grade 3	3	9	8	1	13	4.1 ± 2.4

Table 3. Relationship between Exostoses and the Surfing Index

Grade of Exostoses	Score of Surfing Index (Number of Surfers) 1-10	11-20	21-40	41-8	≥80	Mean ± SD
Grade 0	60	24	21	32	12	31.4 ± 38.4
Grade 1	20	21	29	32	16	42.7 ± 39.1
Grade 2	NS 6	5	12	18	27	70.8 ± 59.1
Grade 3	0	3	7	10	14	82.2 ± 59.6

Abbreviation: NS, not significant; $P > .05$.
*Significant, $P < 0.01$.
**Significant, $P < .05$.
***Significant, $P < .001$ limited in grade 2 and 3 exostoses.

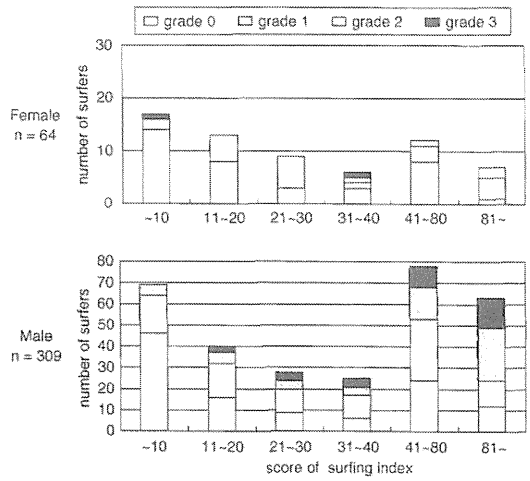

Figure 2. Difference between sexes: males tended to exhibit more severe exostoses than did females with the same surfing index score.

prevalence of grade 2 or more severe exostoses increased when the surfing index exceeded 20 ($P < .0001$).

The average surfing index was 94.9 for 81 professional surfers and 33.9 for 292 amateurs. Professional surfers tended to have a greater surfing index than amateurs did. However, there was little difference in exostosis formation between professional surfers and amateurs if the surfing index was equal.

In this study, most of the subjects were male. The incidence of exostosis formation in females was not as great as in males, even for professional female surfers. Males tended to exhibit more severe exostoses than females did if the surfing index was equal ($P < .0001$; **Figure 2**).

A total of 83 (21.4%) subjects were classified as predominantly cold-water surfers, whereas 111 (29.8%) were considered warm-water surfers. Grade 3 exostoses were more likely to be formed in cold-water surfers than in warm-water surfers if the score of surfing index was equal but was not statistically significant. On the other hand, grade 0 exostoses were more frequently observed in warm-water surfers than in cold-water surfers ($P = 0.0497$; **Figure 3**).

Analysis of Questionnaire

A total of 166 (44.5%) subjects were otologic symptom free. In this study, the symptoms produced by exostoses are a difficulty to drain water from the ear after surfing, earache, tinnitus, hearing loss, and itching of the ear. Because symptoms associated with exostoses, such as hearing loss, might be masked in deaf surfers, the subjects were assessed in 2 groups: 289 subjects with normal hearing and 84 subjects with hearing loss (**Figure 4**). In the former group, the most common symptom caused by exostoses was difficulty in draining water from the external ear canal after surfing. This symptom was found to occur frequently in subjects with grade 2 or more severe exostoses ($P < .001$). Correlations between severity of exostosis and the other symptoms were not found. Hearing loss was not an accompanying symptom even in cases with grade 3 exostoses. Subjects with hearing loss had symptoms such as earache and tinnitus, although, interestingly, they seldom complained of difficulty in water drainage from the external ear canal.

Although 323 of 373 people (86.6%) had heard about exostoses, only 89 surfers (23.9%) had ever used earplugs, and the use of earplugs was more popular in professional surfers than in amateur surfers. In this study, the use of earplugs was not associated with a reduction in the degree of exostoses.

Laterality of Exostoses

In this study, more than 1 grade of difference between left and right ears was observed in 102 (27.3%) subjects. A relationship between this difference of exostosis laterality and the direction of stance on the surfboard was identified. There are 2 kinds of standing stance on a surfboard. A surfer with a regular stance places his or her left leg forward on the board, whereas a surfer with a goofy stance places the right leg forward. Among the 369 participants (4 body boarders for whom this categorization of stance does not apply were excluded), 304 subjects (82.4%; 293 right-handed, 11 left-handed) used a regular stance and 65 subjects (17.6%; 49 right-handed, 16 left-handed) used a goofy stance. More severe exostoses tended to be exhibited in the right ear among those using the regular stance and in the left ear for

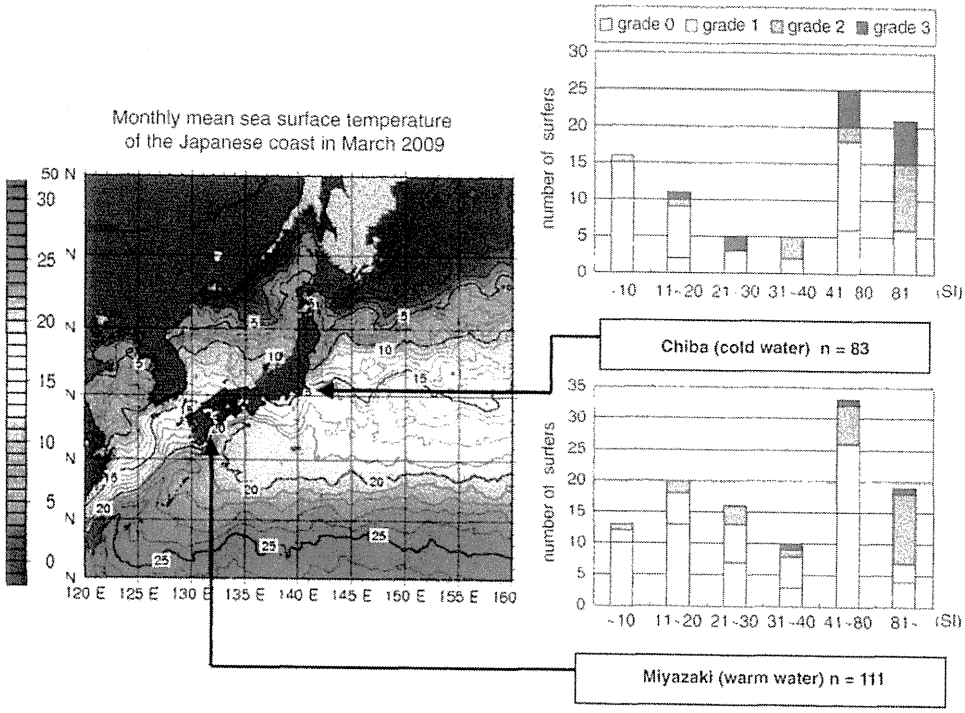

Figure 3. In Japan, the mean seawater temperature is lowest in March. Figure 3 shows the monthly mean sea surface temperature on the Japanese coast in March 2009. Severe exostoses were more common in surfers from cold seawater areas.

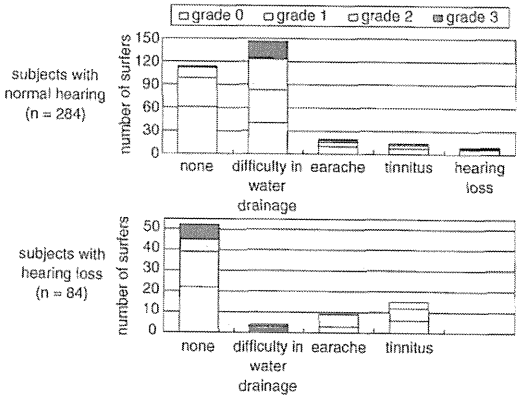

Figure 4. Symptoms of exostoses. When exostoses advanced beyond grade 2, difficulty in draining water from the ear after surfing tended to be exhibited in subjects with normal hearing. On the other hand, the same complaint was rarely found in subjects with hearing loss.

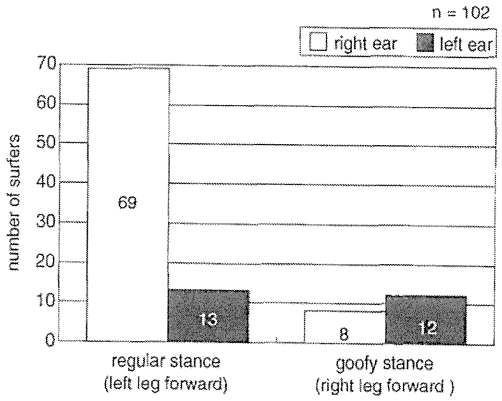

Figure 5. Laterality of exostoses. More than 1 grade of difference between the left and right ears was observed in 102 (27.3%) subjects. In these 102 subjects, exostoses tended to occur in the right ear of those using a regular stance (left leg forward) and in the left ear of those using a goofy stance (right leg forward).

the goofy stance surfers ($P = .0373$; **Figure 5**). This same laterality was found in subjects from Chiba and Miyazaki prefectures.

Discussion

The prevalence of exostoses correlates with the number of years as an active surfer (**Table 1**). However, subjects with

grade 2 or more exostoses were found in the groups with only 5 years of surfing experience. Usually, avid surfers continue surfing for a long time, and 5 years of surfing experience is relatively inexperienced. In this study, 82.0% of subjects had been surfing for more than 5 years. In addition, there were a number of subjects with grade 0 exostoses whose surfing experience exceeded 25 years. Therefore, it was thought to be inappropriate to predict the formation of exostoses from only the number of years spent surfing.

In this study, we used a surfing index to predict the relative risk of exostosis formation. This surfing index was thought to reflect the cold-water exposure of surfers better than only the number of years surfing. In Japan, surfers with a surfing index exceeding 20 are likely to have grade 2 or more severe exostoses (**Table 3**). This relationship between the surfing index and exostosis formation may vary according to the water temperature or other environmental factors. The reason most experienced surfers did not always have the severest form of exostoses may be because of the amount of surfing the subject does in the winter. A number of avid surfers actually start or do a lot more surfing when the water temperature begins to warm up.

The shortest surfing experience of a professional surfer in this study was 8 years. Usually, young professional surfers surf 5 to 7 days each week, so their surfing index may have already exceeded 40 when they become professional surfers. Furthermore, it is not uncommon for them to surf several times a day. Therefore, they have an extremely high number of surfing sessions with comparatively few years of experience. In such cases, exostoses formation tends to remain rather limited. Nonetheless, professional surfers whose surfing index was less than 40 are likely to be classified in a higher surfing index group in the near future, and they would be wise to exercise caution to prevent exostosis formation.

These investigations were held in Miyazaki prefecture and involved a number of local amateur surfers. However, many Japanese professional surfers and top amateurs are based in Chiba prefecture, and in this study, almost half of the subjects were from Chiba and Miyazaki prefectures. When the surfing index was equal, surfers from Chiba tended to have more severe exostoses than Miyazaki surfers, and this was thought to be caused by the lower seawater and air temperature at their home location. It was previously reported that exostoses are likely to form at low seawater temperatures,[3,4] and this same result has been obtained in this study.

When comparing identical surfing index scores, males tended to have more severe exostoses than females did. Male predominance in exostoses has been reported in most reviews of exostoses surgery and epidemiological studies.[4,6,8-11] The cause of this sex difference is unknown, but factors such as hormonal differences between the genders, the length of time spent per surf session, and the time of day the subject went surfing may account for this difference.

The symptoms of exostoses were compared between subjects with normal hearing and subjects with hearing loss. In both groups, most subjects exhibited no symptoms in the early stages of exostoses. In the former group, the most common symptom was difficulty in draining water from the ear after surfing. This is the most frequent initial symptom of exostoses and causes quite a few surfers to feel uneasy. However, without severe hearing loss or earache, they seldom seek treatment. Difficulty in draining water from the ears was thought to worsen if grade 2 or more severe exostoses formed. On the other hand, subjects with hearing loss had very few symptoms, even in grade 3 exostoses. These subjects may have a high threshold of symptoms with exostoses.

While some previous studies have suggested a predilection toward a particular ear in exostoses,[5,11,12] other studies have shown no difference in severity between ears.[6,13] In a study of 47 surfers in San Diego, King et al[12] explained that the greater severity of exostoses in the right ear may be due to the evaporative cooling effect of the wind. They regarded the wind direction as a single parameter taken from the average annual wind data. However, the wind direction changes radically in a day. In the mornings, a cooler, offshore wind often blows before turning onshore as the land temperature rises. Experienced surfers take advantage of this cooler morning wind because it makes the face of the waves clean for surfing. So it seems inappropriate to estimate the wind direction that surfer are exposed to solely from the average annual wind data. All previous reports that found laterality of exostoses noticed the predilection of the right ear.[5,11,12] In addition, more than 80% of surfers use a regular stance. From this aspect, not only the evaporative effect from the wind but also the direction of stance may account for the laterality of the exostoses. In this study, a relation between the direction of stance and the laterality of exostoses was observed. While the reason severe exostoses tended to be exhibited at the right ear among those using the regular stance and at the left ear for the goofy stance is unknown, it is possible that in its early stages, exostoses may develop more severely on one side based on environmental or other factors such as the direction of stance, the time of day, and the use of a leash cord (a cord that connects the surfer's back foot to the surfboard to prevent the board from drifting).

During the surfing boom that started in the 1990s in Japan, a number of people of all ages centered their lives around surfing and surfed throughout the year. Unlike the thermal insulation provided by a high-performance wetsuit, the surfer's external ear canal is frequently exposed to the cold water. Therefore, cases of severe exostoses that need treatment are expected to increase in the future, and otolaryngologists should be concerned as these cases become more common. According to Umeda et al,[5] exostoses were observed in 41 of 51 (80.4%) professional surfers and in 98 of 186 (52.7%) amateurs as a result of external ear canal examinations performed in 1986.[5] In this study, we observed a similar result of exostoses in 66 of 81 (81.5%) professional surfers and in 157 of 292 (53.8%) amateurs. However, the severity of the exostoses for both professional and amateur surfers that reached approximately 50% obstruction of the external auditory canal increased from 37% to 50.6% and from 12% to 21.9% in comparison with the previous report.

Only 24.9% of the subjects had ever used earplugs, although 84.9% of subjects knew about exostoses to some degree, which seems to indicate a lack of awareness among

surfers on how to prevent exostoses. It is not known exactly to what degree water temperature causes exostoses. However, at present, there is no other way to prevent exostoses other than to use earplugs or some form of ear protection when surfing in a relatively cold water area where a wetsuit is required for surfing. Therefore, at the very least, the use of earplugs is recommended in cold weather. In this study, the use of earplugs was not associated with a reduction in the degree of exostoses, possibly because most surfers began to use earplugs after they already had some symptoms of exostoses.

Misunderstandings, inaccuracies, and rumors concerning complications caused by the treatment of exostoses have spread fear among surfers. Even if they have to drain water from the external ear canal with cotton swabs after every surf session, they place priority on continuing surfing and seldom present themselves to an otolaryngologist for treatment. If exostoses require treatment, it is necessary to stop surfing for a certain period. So preventive publication about exostoses is necessary, even though few symptoms are exhibited at the early stages. Otolaryngologists should realize their role is not only in the treatment of exostoses but also in its prevention by recommending the use of earplugs to keep surfers' external auditory canal free from exostoses for as long as possible.

Conclusion

As a result of 373 external auditory canal examinations conducted on surfers in Japan, we found a 59.8% overall prevalence of exostoses and a positive association between the score on the surfing index and the severity of exostoses. Difficulty in draining water from the external ear canal after surfing was found to occur frequently in subjects with grade 2 or more severe exostoses. And when the surfing index exceeded 20, grade 2 or more severe exostoses were likely to be exhibited in the water temperature of Japan. Our findings suggest that it is possible to assume the likelihood of exostoses formation from the surfing index, and this may be of help to spread awareness of exostoses among surfers.

Author Contributions

Haruka Nakanishi, corresponding design, conduct, analysis; **Tetsuya Tono**, conduct; **Hirokazu Kawano**, conduct.

Disclosures

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Sponsorships: None.

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4) メチコバール注　1回500μg　1日1回　点滴静注　連日　1-2週間 (保外)

Ⓑ 内服療法

℞ 処方例　下記を併用する.

1) プレドニン錠　30-60 mg　分3-1から漸減　2週間
2) アデホス顆粒（10%）　300 mg（成分量として）(保外)
メチコバール錠（500 μg）　3錠 (保外)
(分3)

Ⓒ 鼓室内投与療法

℞ 処方例

デカドロン注　1回2 mg（0.5 mL）　鼓室内投与　週1回　4週間

患者説明のポイント

- 原因不明の疾患であり，突発性難聴である可能性が高いが，同様の症状を起こす他の疾患を否定鑑別する必要があること，突発性難聴では治療を早期に行ったほうが予後良好とされており，まずは突発性難聴として治療しながら検査を進めていくこと.
- 安静を含めた早期治療の必要性，特に発症後2週間以内の治療が重要であり，2-3か月で聴力はほぼ固定するので治療時期が限られていること.
- 現時点では特効的な治療法はなく，いくつかの薬剤，治療法を組み合わせて治療を行うこと.
- 治療により必ず難聴が改善するわけではなく，約40%が治癒，約40%は治癒までは至らないが何らかの改善を示し，約20%は難聴の改善が認められないこと.

外リンパ瘻
perilymphatic fistula

内藤　泰　神戸市立医療センター中央市民病院・副院長（兵庫）

病態と診断

Ⓐ 病態

外リンパ瘻とは内耳の外リンパ腔と中耳の間の異常な交通路により難聴，めまい，耳鳴(水の流れるような音)を生じるもので，先天性と後天性のものがある．先天例では内耳奇形に伴う例が多く，後天例としては，中耳真珠腫や腫瘍などの骨破壊病変，側頭骨骨折，圧外傷(潜水，飛行機旅行など)，中耳手術などによる医原性のもの，怒責や咳などによる脳脊髄圧の上昇，頭部打撲などが挙げられ，原因が特定できない特発例もある．圧外傷や特発例での瘻孔好発部位は卵円窓，正円窓付近にある．特発性外リンパ瘻の存在や頻度については諸家の意見が分かれるが，最近，外リンパ特異的蛋白であるCTP（cochlin-tomoprotein）の鼓室腔での検出による本症診断が報告され，議論の新たな進展が期待されている．

Ⓑ 診断

外リンパ瘻の診断には瘻孔症状が有用で，外耳道に陽圧あるいは陰圧を加えてめまい感や眼振，眼球偏位が観察されれば陽性とする．筆者は過大な負荷を避けるために患者自身の指を外耳道に入れてもらって自分で加圧あるいは減圧をしてもらうようにしている．強大音を聞くとめまいを生じるTullio現象も迷路瘻孔の診断に役立つ．ただし，メニエール病の高度例では拡大した球形嚢がアブミ骨底板に接して外耳道圧負荷や強大音聴取でめまいを生じる偽瘻孔症状がみられることがあり，慢性に生じる外リンパ瘻との鑑別が難しい．

治療方針

圧外傷やアブミ骨の損傷が明らかな例などではできるだけ早期に手術治療を行う．その他の場合はまず，保存的アプローチをとる．

Ⓐ 保存的治療

頭部を高くした床上安静を保ち，怒責や鼻かみも禁じて，1-2週間程度経過を観察する．本症に有効な薬物療法は確立していないが，筆者は内耳の外傷や突発性難聴に準じてビタミンB_{12}，循環改善薬とステロイドの投与を行っている．ステロイドの投与にあたっては全身状態を十分に把握し，副作用の発現防止に努める．また排便時の怒責で病状が悪化する可能性があるので，便秘がある場合にはその治療も併せて行うようにしている．

℞ 処方例　下記を併用する.

1) メチコバール錠（500 μg）　3錠
アデホスコーワ顆粒（10%）　3.0 g（製剤量として）
(分3　朝・昼・夕食後　10日間)
2) 水溶性プレドニン注　1回100 mg　1日1回　点滴静注　10日間で漸減して終了

Ⓑ 外科的治療

保存的治療で改善がみられない，あるいは悪化する場合には鼓室試験開放術を行って瘻孔の有無を確認し，外リンパ漏出部の粘膜を除去して骨膜や軟骨膜を留置，充填し，フィブリン糊で接着固定する．術中，即座に漏出がみられない場合でも頸静脈を圧迫したり頭部を低くしたりすると漏出が確認できる例がある．最終的に漏出が確認できなくても，臨床的に本症の可能性が高ければ予防的に好発部位の正円窓，卵円窓周辺に同じ処置を行う．術後は，保存的治療と同じく頭部を高くして安静臥床させる．本

手術でめまいの多くは軽快する．難聴の改善は難しい場合が多いが，手術治療後，数週間の経過で聴力が改善する例も経験されるので，手術治療の選択肢は常に念頭に置くべきである．

患者説明のポイント

・安静によって瘻孔の自然閉鎖を期待するのが第1の治療法であることを説明する．
・怒責（重い物を持ち上げる，排便で力む，咳やくしゃみ）や鼻かみ，急な頭部運動など日常の何気ない動作が病状を悪化させ得るので，これらを極力避けるように指導する．
・手術治療は，めまいには有効性が高いが，難聴の改善は困難な場合が多いことを説明する．

メニエール病
Ménière's disease

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病態と診断

めまい発作を繰り返し，難聴や耳鳴などの蝸牛症状を反復・消長することを特徴とする．めまいは数分から数時間持続することが多い．発作間隔は数日から数年とさまざまである．本疾患の病態は，内耳全体に生じた内リンパ水腫と考えられている．

病初期の聴力像は，低音障害型でかつ病期に応じて変動する感音難聴で，病変の進行とともに難聴が進行する．発作時，発作直後は患側向き（刺激性眼振），一定時間経過後は健側向き（麻痺性眼振）の水平・回旋混合性眼振が認められる．

温度検査にて患側半規管麻痺を認める．内リンパ水腫の存在を証明することを目的に脱水検査（グリセロールテストなど）が行われる．蝸電図（electro-cochleogram：ECoG）における－SP/AP比の増大もこれを示す有用な指標となる．近年，ガドリニウム造影剤を用いた3T-MRIで，内リンパ水腫を撮影することが可能になった．

治療方針

Ⓐ 急性期の治療

急性期の治療は他のめまい疾患と同様，対症療法が主体となる．悪心や嘔吐を伴うことが多く，これらに対する対症療法が優先される．また心身の安静を第一とする．

下記の処方例を症状に応じて適宜組み合わせて用いる．

1. めまいや悪心が強く，内服が困難なとき

℞ 処方例

1）メイロン注（7%）　1回250 mL　点滴静注
2）プリンペラン注（10 mg）　1回10 mg　筋注
3）アタラックス-P注（25 mg）　1回25-50 mg　筋注
4）セルシン注　1回5-10 mg　筋注 8

2. 内服が可能なとき

℞ 処方例

1）トラベルミン配合錠　1回1錠　頓用（1日3回まで）
2）ナウゼリン錠（10 mg）　1回1錠　頓用（1日3回まで）
3）セファドール錠（25 mg）　3錠，またはメリスロン錠（6 mg）　3錠　分3　食後

Ⓑ 間欠期の治療

内リンパ水腫の軽減を目的に，浸透圧利尿薬の内服療法が行われる．めまいについては有効とされるが，耳鳴，聴力の長期成績については有効率が低いとする報告が多い．

℞ 処方例　下記の薬剤を症状に応じて適宜用いる．

1）イソバイド液（700 mg/mL）　90 mL，またはメニレットゼリー　90 g　分3　食後
2）アデホス顆粒（100 mg/包）　3包　分3　食後
3）デパス錠（0.5 mg）7　1錠，またはセルシン錠（2 mg）8　1錠　分1　就寝前

Ⓒ 手術的治療

保存的治療に抵抗する症例が適応となる．ゲンタマイシン鼓室内注入術，内リンパ嚢手術，前庭神経切断術，迷路破壊術などがある．近年はゲンタマイシン鼓室内注入術が広く行われるようになった．

Ⓓ 生活指導

メニエール病の発症，増悪にはストレスが強く関連していることが知られている．心身ともにリフレッシュし，ストレスを解消する，睡眠時間を十分にとるなど，生活習慣を改善するよう患者に指導する．

良性発作性頭位めまい症
benign paroxysmal positional vertigo（BPPV）

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病態と診断

Ⓐ 症状

良性発作性頭位めまい症（BPPV）の特徴は，「良性発作性頭位めまい症診療ガイドライン」を要約すると，以下のようになる．

a）特定の頭位をとると回転性（症例によっては