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The Value of Vestibular Rehabilitation Training Instruction in the Treatment of Sudden Deafness Accompanied by Vertigo

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Abstract: *Objective:* To analyze the necessity and effectiveness of vestibular rehabilitation training instruction in the treatment of sudden deafness accompanied by vertigo. *Methods:* Sixty medical staff who learned the treatment methods for sudden deafness accompanied by vertigo (vestibular rehabilitation training) from January 2024 to February 2025 were selected as the research subjects. They were divided into two groups according to the time of study: the control group, who participated in the training teaching first, and the observation group, who participated later. Each group had 30 people. The control group received conventional training, while the observation group underwent continuous quality improvement. The effects and assessment results of different teaching methods were compared. *Results:* The theoretical and practical assessment scores of medical staff in the observation group were higher than those in the control group ($p < 0.05$); the satisfaction of medical staff in the observation group with the teaching mode was higher than that in the control group ($p < 0.05$). *Conclusion:* Vestibular rehabilitation training has significant effects on sudden deafness accompanied by vertigo. Training medical staff not only enhances their understanding of training methods but also enables them to provide specialized guidance to patients, improving their vertigo condition.

Keywords: Vestibular rehabilitation training instruction; Sudden deafness; Vertigo

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1. Introduction

Sudden deafness is a relatively common otolaryngological disease, with some patients experiencing vertigo, which has a significant impact on their quality of life. Sudden deafness is a sudden onset hearing impairment disease, often accompanied by ear fullness and tinnitus, further exacerbating patients' discomfort. More than 30% of patients develop vertigo, which affects their ability to live to some extent and may also lead to anxiety and depression [1]. Vestibular rehabilitation training is a non-pharmacological and non-surgical treatment method, which is widely recognized by medical staff. However, some medical staff have not mastered the training methods,

and departments need to provide training for medical staff to enable them to master balance training and eye movement training methods in vestibular rehabilitation training, and provide rehabilitation guidance for patients [2]. Therefore, this study takes otolaryngological medical staff as the research object to analyze the methods and effects of vestibular rehabilitation training guidance.

2. Materials and methods

2.1. General information

Sixty medical staff who studied the treatment method for sudden deafness accompanied by vertigo (vestibular rehabilitation training) from January 2024 to February 2025 were selected as the research subjects. They were grouped according to the time of study, with those who participated in the training and teaching first serving as the control group and those who participated later serving as the observation group, with 30 individuals in each group.

2.1.1. Control group

19 males and 11 females, aged 25–49 (36.32 ± 4.18) years, with working experience ranging from 3 to 25 years, averaging (16.43 ± 2.10) years, including 16 doctors and 14 nurses.

2.1.2. Observation group

18 males and 12 females, aged 25–49 (36.43 ± 4.12) years, with working experience ranging from 3 to 25 years, averaging (16.32 ± 2.15) years, including 17 doctors and 13 nurses; there was no statistically significant difference in the basic information between the two groups of medical staff ($p > 0.05$).

2.2. Method

2.2.1. Control group

The control group received conventional vestibular rehabilitation training instruction. The department provided 2 practical sessions and 5 theoretical sessions. The theoretical sessions covered vestibular anatomical structures and physiological knowledge related to sudden deafness combined with vertigo, enabling medical staff to understand the causes of the disease and the necessity of training. The practical sessions involved specialist doctors providing training guidance to medical staff, demonstrating through their own examples, and after the 2 practical sessions, practical videos were distributed to medical staff for self-study.

2.2.2. Observation group

Continuous quality improvement teaching was adopted.

(1) Theoretical teaching

During this stage of teaching, the supervising teacher prepared courseware in advance, including pathological knowledge and vestibular function training methods, such as specific training methods and stimulating the vestibular system to help patients regain their sense of balance, improve vertigo symptoms, and enhance blood flow in the inner ear. Theoretical teaching was conducted twice, and during the other times, medical staff were instructed to actively learn and memorize, with weekly assessments.

(2) Practical teaching

This course was conducted five times. For example, during static balance training, teaching was

conducted through illustrations and text. The purpose of this training was to enhance patients' balance ability in a static state, with clear instructions on the training points. The supervising teacher demonstrated the training method for standing on both feet, with feet separated shoulder-width apart, keeping the body straight, eyes looking straight ahead, and hands naturally vertical. Medical staff were reminded to place their weight on both feet, feel the contact between the soles of their feet and the ground, and maintain body stability. This trained balance ability. During dynamic balance training, patients were first trained on balance control during movement. During the learning period, medical staff were instructed to keep their legs shoulder-width apart, keep their upper body straight, and move their body slowly without swaying, such as stepping with the right foot first and then following with the left foot. The supervising teacher emphasized precise learning and following the movements. Subsequently, adaptive training and visual and auditory training were conducted, with each course learning one training method. The courses were integrated into videos for medical staff to learn independently after class.

(3) Case discussion

To enhance the pertinence of vestibular rehabilitation training, the supervising teacher led medical staff to discuss teaching methods. Through successful case presentations, correct exercise methods were clarified, and vestibular rehabilitation training methods were matched according to each patient's individual needs, with appropriate adjustments to training intensity to achieve the best training effect. Failure cases were also presented, such as unreasonable training intensity and poor compliance. Through case analysis and discussion, medical staff integrated theory and practice, deepened their understanding, and improved teaching quality.

2.3. Observation indicators

(1) Assessment results

The theoretical score and practical score are investigated. The theoretical score is assessed through a questionnaire survey, while the practical score is evaluated through simulated drills. Both scores are on a 100-point scale, with a higher score indicating a better assessment result.

(2) Satisfaction

Survey the satisfaction of medical staff towards teaching methods, including very satisfied, satisfied, and dissatisfied.

2.4. Statistical analysis

The study employed SPSS 27.0 software for statistical analysis of the data. Measurement data were represented by mean ± standard deviation ($\bar{x} \pm s$), with a test value of t. Enumeration data were represented by frequency and percentage, and were subjected to chi-square test. A p-value < 0.05 was considered statistically significant.

3. Results

3.1. Comparison of assessment scores between two groups of medical staff

The theoretical and practical assessment scores of medical staff in the observation group were higher than those in the control group ($p < 0.05$), as shown in **Table 1**.

Table 1. Comparison of assessment scores between two groups of medical students ($\bar{x} \pm s$, points)

Group	Number of cases	Theoretical score	Practical score
Observation group	30	91.34 ± 2.13	91.28 ± 1.83
Control group	30	83.32 ± 2.73	85.39 ± 2.01
t		6.832	5.812
p		0.001	0.001

3.2. Comparison of satisfaction with teaching mode between two groups of medical staff

The satisfaction of medical staff in the observation group towards the teaching mode was higher than that in the control group ($p < 0.05$), as shown in **Table 2**.

Table 2. Comparison of satisfaction with teaching mode between two groups of medical staff (n, %)

Group	Number of cases	Very satisfied	Satisfied	Dissatisfied	Satisfaction rate
Observation group	30	14 (43.33)	16 (53.33)	0 (0.00)	30 (100.00)
Control group	30	10 (33.33)	14 (46.67)	6 (20.00)	24 (80.00)
χ^2					5.712
p					0.024

4. Discussion

Sudden deafness accompanied by vertigo symptoms is relatively typical, encompassing vertigo, hearing loss, and tinnitus. Vertigo is a prominent condition, typically manifesting as dizziness and shaking, where patients feel the surrounding environment rapidly spinning, which may even affect their walking ability. After a vertigo attack, nausea and vomiting, pale complexion, and sweating are common. Some patients experience nystagmus. Hearing loss typically occurs suddenly, decreasing rapidly within minutes or hours, with varying degrees of severity. Tinnitus is a common symptom, where patients experience persistent buzzing, ringing, or other sounds in the ear before hearing loss, and some patients feel a sense of ear blockage. From the perspective of the underlying pathogenesis, it may be due to blood circulation disorders in the inner ear. The blood vessels in the inner ear are delicate, making them prone to thrombosis, vasospasm, increased blood viscosity, or insufficient blood supply. Hypoxia can damage the inner ear capillaries and auditory nerves. Some patients have a history of upper respiratory tract infections, such as mumps virus and influenza virus, which directly damage the nerves and inner ear structures. If patients suffer from autoimmune diseases, it may cause the immune system to mistakenly attack the inner ear tissues or lead to inflammatory cell damage. An imbalance in the inner ear lymph circulation may result in rupture of the membranous labyrinth and damage to hair cell function, triggering sudden deafness accompanied by vertigo. Other factors include ototoxic drugs, trauma and pressure, tumors, and neurological disorders.

For this disease, pure tone audiometry is often used to detect patients' hearing thresholds at different frequencies, facilitating accurate assessment of the extent of hearing loss. Conventional clinical therapies include pharmacotherapy and hyperbaric oxygen therapy. Among them, pharmacotherapy is a commonly used method, involving medications such as corticosteroids, neurotrophic drugs, and microcirculation-improving

drugs. Corticosteroids can exert anti-inflammatory and anti-edematous effects, reducing inflammation in the ear, promoting hearing recovery, and improving vertigo symptoms. In practice, drugs such as dexamethasone and prednisone are commonly used. Microcirculation-improving drugs commonly include ginkgo biloba extract and alprostadil. Neurotrophic drugs such as mecobalamin and vitamin B12 are commonly used to promote nerve cell metabolism and protect inner ear hearing function. However, these methods also have limitations, such as a high risk of adverse reactions, which can harm patients' health. Therefore, medical staff need to learn vestibular rehabilitation training to improve the condition of patients with sudden deafness, understand its principles, and implement it smoothly.

Vestibular rehabilitation training is a non-pharmacological and non-surgical therapy that has demonstrated significant efficacy in the treatment of patients with sudden deafness accompanied by vertigo. The vestibular system perceives head movements and positional changes, transmitting the information through the central nervous system. After receiving the information, the central nervous system regulates muscle relaxation and contraction through efferent muscle commands, maintaining body balance. The vestibular system is closely related to eye movements, and this association is achieved through vestibular reflexes. Vestibulo-ocular reflex is an important physiological reflex that acts on head movements, maintaining clear vision through the reciprocal movement of the eyeballs.

Under scientific teaching guidance, medical staff can master the theory and practical skills of vestibular rehabilitation training, providing patients with scientific and personalized rehabilitation training. During the theoretical knowledge teaching period, a comprehensive and in-depth explanation of vestibular anatomical structures and physiological knowledge lays the foundation for medical staff to understand the knowledge [3]. Practical training focuses on the practical operation ability and skills of medical staff. Through various training methods such as static balance training and dynamic balance training, combined with case analysis and practical training, medical staff can grasp the key points of various training methods and ensure patient safety during training [4]. For example, during static balance training, medical staff learn how to adjust the training intensity and exercise time according to the patient's condition to achieve the desired training effect [5]. The observation group implemented standardized training, reasonably planning the time for theoretical and practical courses, which significantly improved the assessment scores and training satisfaction of medical staff. In practical teaching, standardized vestibular rehabilitation training teaching guidance is a complex process, covering assessment and diagnosis, plan formulation, training implementation, and effect evaluation. For example, during the assessment stage, rehabilitation therapists should understand the patient's medical history, including the onset period and symptoms of sudden deafness and vertigo, and comprehensively complete vestibular function examinations, such as electronystagmography and vestibular evoked myogenic potentials, to assess the impairment of vestibular function. During the teaching process, medical staff develop a rehabilitation plan for patients, such as setting clear teaching goals and learning vestibular function training, including vertigo, balance training, and improving eye control ability. During the training process, medical staff should grasp the training intensity, understand the necessity of gradual and progressive training, and avoid excessive initial training intensity that may burden patients. For example, during the teaching period, start with simple static balance training, then allow patients to adapt to the training frequency and transition to dynamic balance training, with the training duration extended accordingly [6]. This avoids the rapid increase in training intensity, which may cause fatigue and fear in patients and affect their enthusiasm for training. Encouraging patients to actively cooperate is very important. Rehabilitation therapists introduce the necessity of vestibular rehabilitation training to patients, so that they understand the

training goals and expectations. Teachers need to explain the significance of encouragement, making medical staff realize that it is not only about training, but also about combining methods such as psychological support to enable patients to cooperate with the training [7].

In addition, during the training process, through balance training and eye movement training, medical staff are made aware of the impact of standardized training on head perception ability, thereby continuously improving vertigo symptoms and enabling patients to complete various activities in daily life [8]. During the teaching process, teachers need to conduct one-way teaching for each training item, so that medical staff understand the reasons for learning such knowledge, to avoid randomly combining vestibular rehabilitation training content for unknown reasons. The teaching teacher displays vestibular rehabilitation training methods and movements in detail through a large screen, taking eye movement training as an example [9]. The patient is instructed to sit in a chair and follow the movement of an object with their eyes, while keeping their body still. During the demonstration, the key points of the movement are emphasized: the eye movement needs to be slow and not too fast, to avoid causing discomfort and worsening vertigo in patients. For non-moving objects, the eyes should focus and not move randomly [10]. Such targeted and specialized teaching facilitates medical staff to understand the actual operation process and internalize the absorbed knowledge. Another point to note during practical training is to maintain a safe training environment, clear obstacles from the area, and keep the ground dry and flat to prevent patients from falling during training [11]. For example, during balance training, medical staff are informed to set up guardrails and soft cushions nearby to prevent accidental falls. The training intensity and time should be adjusted based on the patient's physical condition to avoid excessive training fatigue or causing other complications. If the sudden deafness patient faced in practical application is elderly, physically weak, and has a severe condition, the training frequency and number of times need to be appropriately reduced, and the rest interval should be increased. If the patient suddenly experiences worsening vertigo and nausea/vomiting during training, the training should be stopped, and the patient should be asked to sit down and then stop training, maintaining a comfortable position and avoiding violent head movements [12]. Provide warm water for the patient to gargle to alleviate nausea. If severe symptoms occur during training, oral anti-vertigo medication should be administered, and the patient's heart rate and blood pressure should be monitored. In teaching precautions, teachers need to emphasize this point, marking it in red on the large screen, and remember that medical staff can complete emergency treatment in practical application [13]. Through standardized teaching, breaking through the limitations of traditional teaching modes, medical staff acquire rich knowledge, clarify specific training processes and key points, and accurately apply the learned vestibular rehabilitation training methods in practice.

5. Conclusion

In summary, implementing standardized vestibular rehabilitation training instruction for patients with sudden deafness accompanied by vertigo during treatment will enhance the mastery of medical staff regarding this treatment method and provide support for patient treatment.

Disclosure statement

The authors declare no conflict of interest.

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