ORIGINAL RESEARCH

Analysis of Clinical Prognosis of Totally Deaf Idiopathic Sudden Sensorineural Hearing Loss in Different Ages

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ABSTRACT

Objective • The purpose of this study is to analyze the clinical prognosis of idiopathic sudden sensorineural hearing loss in patients with total deafness, and to check the differences in different age groups and hearing loss degrees. Methods • From February 2021 to January 2022, 75 patients with complete deafness and idiopathic sudden sensorineural hearing loss were analyzed retrospectively. According to different age stages, they were divided into five groups: children's group, youth group, middle-aged group, pre-senile group and elderly group, with 15 cases in each group. According to the degree of initial hearing loss, the patients were divided into three groups: 81-89dbhl (81dB Hearing Loss Group), 90-99 dbhl (90 dB group) and ≥100 dbhl (100 dB group), with 25 cases in each group. All patients were given routine comprehensive treatment. Analyze the general situation of each group, the relationship between each age group and the degree of hearing loss, the relationship between each age group and the curative effect, the relationship between each hearing loss group and the curative effect, and the relationship between each age group and the vertigo. To analyze the relationship between hearing loss group and curative effect.

Results • (1) Patients with idiopathic sudden sensorineural hearing loss had more unilateral hearing loss than bilateral

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INTRODUCTION

The average age of totally deaf Idiopathic sudden sensorineural hearing loss is 50-60 years old, and the main group is from the United States, Europe, and Japan.^{1,2} According to the survey of about 7500 cases of sudden deafness,^{3,4} the typical sudden deafness occurs between 43 and 53 years old. Still, it can also occur in children, teenagers, hearing loss, P < .05. (2) The clinical therapeutic effect of (3) 81 dB group was the highest, followed by 90 dB group. Compared with the total effective rate data of 100 dB group, P < .05. (4) The clinical efficacy of patients with complete deafness and idiopathic sudden sensorineural hearing loss without vertigo in all ages was higher than that of patients with vertigo (P < .05). The clinical effect of hearing loss in patients without vertigo was higher than that in patients with vertigo (P < .05).

Conclusion • The patients with total deafness and Idiopathic sudden sensorineural hearing loss are mainly young and middle-aged people aged 14-59, with 100 dB as the boundary, and important information for predicting clinical prognosis and curative effect can be obtained. It is also suggested that for young and middle-aged patients aged 14-59, the focus of treatment may be more on restoring hearing function so that they can continue their work, study and social activities. For patients with mild hearing loss, the goal of treatment may be to maintain the existing hearing level or slow down the process of hearing loss. For patients with severe hearing loss, the focus of treatment may be to restore hearing function to improve their quality of life. (*Altern Ther Health Med.* 2023;29(8):506-511).

the elderly, and other ages. Because the physiological characteristics of different ages are different, patients with sudden deafness have different clinical manifestations and prognoses. Idiopathic sudden sensorineural hearing loss refers to unexplained sensorineural hearing loss with the sudden onset within 72 hours, with hearing loss \geq 20 dBHL at least at two adjacent frequencies.⁵ If there is no accurate diagnosis in the early stage, the treatment will be delayed, which will easily lead to permanent hearing loss and mental sequelae.⁶ The research objects in the existing literature tend to limit the age of total deafness with idiopathic sudden sensorineural hearing loss to 18-65 years old,^{7,8} There are also some documents focusing on children or elderly patients as the main research objects,^{9,10} and found that both young and

old people may have full-death type of Idiopathic sudden sensorineural hearing loss, so both young or old age may be related factors affecting the prognosis of sudden deafness. It can be seen that age will affect the prognosis of totally deaf Idiopathic sudden sensorineural hearing loss, but whether there is a clear age turning point is unknown.^{11,12} Previous studies have shown that idiopathic sudden sensorineural hearing loss can occur at any age, but the incidence rate may be different in different age groups. Patients in different age groups may have different degrees and types of hearing loss. Young people and children may have severe hearing loss, while the elderly may have mild to moderate hearing loss. In addition, young people and children may be more prone to bilateral hearing loss, while the elderly may be more prone to unilateral hearing loss. The prognosis of patients in different age groups may be different after treatment. Young people and children may respond better to treatment and recover faster. The elderly may have poor response to treatment and slow recovery. This paper provides a new insight into the characteristics and mechanism of idiopathic sudden sensorineural hearing loss in different age groups. These findings are helpful to deeply understand the pathogenesis of idiopathic sudden sensorineural hearing loss in total deafness, and provide guidance for the diagnosis and treatment of patients in different age groups. Therefore, this paper mainly analyzed the clinical prognosis of totally deaf Idiopathic sudden sensorineural hearing loss of all ages based on the above background, to provide more theoretical references for treating patients with totally deaf Idiopathic sudden sensorineural hearing loss of all ages.

PATIENT DATA AND METHODS

Patient data

A total of 75 patients with totally deaf Idiopathic sudden sensorineural hearing loss admitted in our hospital from February 2021 to January 2022 were retrospectively analyzed. According to the relevant literature, the cases were divided into groups at different age stages, they were divided into five groups, namely(0-100 years old), the age \leq 13 years (pediatric group), age between 14 and 44 years old (Youth Group), age between 45 and 59 years old (middle-aged group), age between 60 and 74 years old (pre-senile group) and age \geq 75 years old (elderly group). According to the degree of initial hearing loss under different degrees, the patients were divided into three groups: 81-89dBHL (81dB Hearing Loss Group), 90-99 dBHL (90 dB group), and \geq 100dBHL (100 dB group).The Ethical Society approved this study.

The inclusion criteria of the patients were as follows: (1) The patients were diagnosed as totally deaf Idiopathic sudden sensorineural hearing loss; (2) Patients went to hospital within 2 weeks after onset; (3) Pure tone audiometry was performed in all patients. Exclusion criteria: (1) Patients who were allergic to the therapeutic drugs involved this time; (2) Patients with incomplete clinical data; (3) Patients history of mental illness. (4) Imaging examination, such as auditory evoked potential (ABR) test, magnetic resonance imaging (MRI), etc., were performed to rule out other possible causes, such as acoustic neuroma and otitis media.

Methods

All patients were given routine comprehensive treatment. The specific contents include glucocorticoids and drugs for improving inner ear microcirculation (for example, ibuprofen: ibuprofen is a non-steroidal anti-inflammatory drug, Which can improve inner ear microcirculation by inhibiting infection reaction and reducing vasoconstraint.) and heart nourishing drugs (such as enalapril and captopril) can lower blood pressure and reduce the burden on the heart. Improve heart function), saturated oxygen and hyperbaric oxygen therapy (wearing a nasal catheter or mask, inhaling high-concentration oxygen through these devices, or being placed in a hyperbaric oxygen chamber. The time and frequency of treatment will depend on the patient's specific situation) and use these drugs according to the patient's age and weight. Glucocorticoid administration method: oral or intravenous administration, prednisone 1 mg/kg at the beginning. After 3 days, it gradually decreased to 5 mg/d, and stopped using within 3 days after administration. Patients with diabetes, hypertension and hyperlipidemia can be treated according to their symptoms. All patients were treated continuously for one month.

Evaluation criteria

Follow-up survey for 2 months. The general data of each group were analyzed; the relationship between each age group and the degree of hearing loss was analyzed; the relationship between each age group and curative effects was analyzed; the relationship between each hearing loss group and curative effects was analyzed; the relationship between each age group with vertigo or without vertigo and curative effects was analyzed; the relationship between hearing loss group with or without vertigo and curative effects was analyzed.

General data. The data included the number of cases in each group, gender ratio, and monaural lesions / binaural lesions.

Degree of hearing loss. The classification scope is divided according to the classification standard of hearing curve with reference to the guidelines for diagnosis and treatment of sudden deafness formulated by the Head and Neck Surgery Branch of Otolaryngology Department of China Medical Association in 2015. Hearing loss in each frequency band: 250 ~ 8000 Hz (250, 500, 1000, 2000, 3000, 4000, 8000 Hz), and the average hearing threshold is ≥81 dBHL, that is, total deafness. According to the range of initial hearing loss, every 10 dB is divided into three groups: 250-8000 Hz (250, 500, 1000, 2000, 3000, 4000, 8000 Hz), and the average hearing threshold is 81-89 dbhl (81 dB Hearing Loss Group) and 90-99 DBHL.

According to hearing tests, such as pure tone hearing test and phonetic hearing test, the curative effect is remarkable: the hearing at the damaged frequency returns to normal, or reaches the level of healthy ears, or reaches the level before illness; Effective: the average hearing loss increased by 30 dB; Invalid: the average hearing improvement of damaged frequency is less than 15 dB (decibel (dB)), which is a unit used to measure sound intensity and audio signal. Decibel is expressed in logarithmic form and is used to compare the difference between two sound intensities. Under normal circumstances, the perceptual change of human auditory system to noise level needs more than 10 dB difference. Therefore, if the improvement of noise level is less than 15 dB, people may not feel or benefit from this improvement obviously. Total effective rate = significant effect rate + effective rate.

Statistical methods

All index data are included in SPSS23.0 software. The general data, counting data and measurement data such as curative effect and age relationship were analyzed by χ company, and the results were expressed in the form of % respectively. The statistical method of multi-group comparison was used to average the standard deviation.

RESULTS

Analysis of the general data of the children group, youth group, middle-aged group, pre-senile group, and elderly group

There was no significant difference in gender ratio and the proportion of left and right total deafness among the children group, the youth group, the middle-aged group, the pre-senile group, and the elderly group, with P > .05. In patients with totally deaf Idiopathic sudden sensorineural hearing loss, the number of unilateral cases was higher than that of bilateral cases, and the data comparison had significant differences, with P < .05, as shown in Table 1 and Figure 1.

Relationship between Age Group and Hearing Loss

In the data analysis of the relationship between the degree of hearing loss and the children group, the youth group, the middle-aged group, the pre-senile group and the elderly group, the number of patients with ≥ 100 dBHL in the youth group was the most, followed by the middle-aged group, while the number of patients with ≥ 100 dBHL in the children group and the elderly group was the least, as shown in Table 2 and Figure 2.

Relationship between age group and curative effect

There was no significant difference in the total effective rate of clinical therapeutic effects among children group, youth group, middle-aged group, pre-senile group and elderly group, with P > .05, as shown in Table 3 and Figure 3.

Analysis of the relationship between each hearing loss group and curative effects

The total effective rate of clinical therapeutic effects of 81dB Hearing Loss Group was the highest, followed by the 90dB group, and compared with the total effective rate of clinical therapeutic effects of the 100dB group, the data comparison had a significant difference, with P < .05, as shown in Table 4 and Figure 4.

Table 1. General data of the children, youth, middle-aged,

 pre-senile and elderly groups

Group	Number of cases	Male / female (%)	Unilateral / bilateral (%)
Children group	15	8 (53.33) /7 (46.67)	12 (80.00%) /3 (20.00)
Youth group	15	9 (60.00) /6 (40.00)	12 (80.00%) /3 (20.00)
Middle-aged group	15	7 (46.67) /8 (53.33)	11 (73.33) /4 (26.67)
Pre-senile group	15	8 (53.33) /7 (46.67)	11 (73.33) /4 (26.67)
Elderly group	15	6 (40.00) /9 (60.00)	9 (60.00) /6 (40.00)
Total	75	38 (50.67) /37 (49.33)	55 (73.33) /20 (26.67) ^a

aindicated P < .05, compared with other groups

Figure 1. Analysis of the general data of the children group, youth group, middle-aged group, pre-senile group, and elderly group



Table 2. Analysis of the relationship among the children group, youth group, middle-aged group, pre-senile group, elderly group, and the degree of hearing loss (%)

Group	Number of cases	81dB Hearing Loss Group	90dB group	100dB group
Children group	15	9 (60.00)	4 (26.67)	2 (13.33)
Youth group	15	3 (20.00)	4 (26.67)	8 (53.33) ^a
Middle-aged group	15	4 (26.67)	4 (26.67)	7 (46.67) ^a
Pre-senile group	15	0 (0.00)	9 (60.00)	6 (40.00)
Elderly group	15	9 (60.00)	4 (26.67)	2 (13.33)
Total	75	25 (33.33)	25 (33.33)	25 (33.33)

aindicated P < .05, compared with other groups

Figure 2. Analysis of the relationship between the degree of hearing loss and the children group, youth group, middle-aged group, pre-senile group, and elderly group



Table 3. Analysis of the relationship between each age groupand curative effects (%)

	Number	Significant			Total
Group	of cases	effect	Effective	Invalid	effective rate
Children group	15	0 (0.00)	6 (40.00)	9 (60.00)	6 (40.00)
Youth group	15	1 (6.67)	4 (26.67)	10 (66.67)	5 (33.33)
Middle-aged group	15	2 (13.33)	5 (33.33)	8 (53.33)	7 (46.67)
Pre-senile group	15	1 (6.67)	5 (33.33)	9 (60.00)	6 (40.00)
Elderly group	15	0 (0.00)	5 (33.33)	10 (66.67)	5 (33.33)
Total	75	4 (5.33)	25 (33.33)	46 (61.33)	29 (38.67)



Table 4. Analysis of the relationship between each hearingloss group and curative effects (%)

	Number	Significant			Total
Group	of cases	effect	Effective	Invalid	effective rate
81dB Hearing Loss Group	25	2 (8.00)	17 (68.00)	6 (24.00)	19 (76.00) ^a
90dB group	25	2 (8.00)	5 (20.00)	18 (72.00)	7 (28.00)
100dB group	25	0 (0.00)	3 (12.00)	22 (88.00)	3 (12.00)
Total	75	4 (5.33)	25 (33.33)	46 (61.33)	29 (38.67)

aindicated P < .05, compared with other groups

Figure 4. Analysis of the relationship between each hearing loss group and curative effects



Table 5. Analysis of the relationship between each age groupwith vertigo or without vertigo and the curative effects (%)

	Number		Curative effects	Without	Curative effects
Group	of cases	Vertigo	of vertigo	vertigo	of non- vertigo
Children group	15	8 (53.33)	1 (12.50)	7 (46.67)	3 (42.86)
Youth group	15	9 (60.00)	4 (44.44)	6 (40.00)	6 (100.00)
Middle-aged group	15	7 (46.67)	2 (28.57)	8 (53.33)	5 (62.50)
Pre-senile group	15	8 (53.33)	1 (12.50)	7 (46.67)	3 (42.86)
Elderly group	15	6 (40.00)	1 (16.67)	9 (60.00)	3 (33.33)
Total	75	38 (50.67)	9 (23.68)	37 (49.33)	20 (54.05) ^a

^aindicated P < .05, compared with other groups

Figure 5. Analysis of the relationship between each age group with vertigo or without vertigo and the curative effects



Table 6. Analysis of the relationship between each hearingloss group with/without vertigo and curative effects (%)

	Number		Curative effect	Without	Curative effect
Group	of cases	Vertigo	of vertigo	vertigo	of vertigo
81dB Hearing Loss Group	25	13 (52.00)	5 (38.46)	12 (48.00)	10 (83.33)
90dB group	25	12 (48.00)	3 (25.00)	13 (52.00)	5 (38.46)
100dB group	25	13 (52.00)	1 (7.69)	12 (48.00)	5 (41.67)
Total	75	38 (50.67)	9 (23.68)	37 (49.33)	20 (54.05) a

aindicated P < .05, compared with other groups

Figure 6. Analysis of the relationship between each hearing loss group with/without vertigo and curative effects



Analysis of the relationship between each age group with vertigo or without vertigo and the curative effects

There was no significant difference in the incidence of vertigo or non-vertigo among the children group, youth group, middle-aged group, pre-senile group and elderly group, with P > .05. The clinical effects of patients without vertigo with totally deaf Idiopathic sudden sensorineural hearing loss at all ages were higher than those of patients with vertigo, and the data comparison had significant differences, with P < .05, as shown in Table 5 and Figure 5.

Analysis of the relationship between each hearing loss group with/without vertigo and the curative effect

There was no significant difference in the data among 81dB Hearing Loss Group, 90dB group, and 100dB group with or without vertigo, with P > .05. The clinical efficacy of the degree of hearing loss in patients without vertigo was higher than that in patients with vertigo, and the data comparison had a significant difference, with P < .05, as shown in Table 6 and Figure 6.

DISCUSSION

Idiopathic sudden sensorineural hearing loss of complete deafness is a common ear disease, which is defined as unexplained sensorineural hearing loss that suddenly occurs within 72 hours, reducing at least two adjacent hearing frequencies by ≥ 20 dB and the incidence rate is about 5-27/100 000 people.^{13,14} The etiology of idiopathic sudden sensorineural hearing loss of complete deafness is still unknown, and hormone therapy is the main treatment method, but the prognosis of each patient is different. The existing research on idiopathic sudden sensorineural hearing loss of total deafness tends to divide patients into children (or teenagers), adults and the elderly according to who or some certain age categories. However, no previous research has explored which age node is the most scientific.^{15,16} In this

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study, after adjusting various possible confounding factors, we studied the relationship between the age and prognosis of completely deaf idiopathic sudden sensorineural hearing loss. At the same time, we discussed the factors that can accurately predict the prognosis of idiopathic sudden sensorineural hearing loss in total deafness. For the first time, we also obtained the age threshold that directly changes the prognosis of idiopathic sudden sensorineural hearing loss with total deafness. This is of great reference significance for guiding the prognosis research of idiopathic sudden sensorineural hearing loss in the future, preventing and treating diseases, reducing the social and medical burden, and scientifically and reasonably formulating the age inclusion standard. Understanding the relationship between age and prognosis is very important to guide the treatment strategy. Age is an important prognostic factor, which can affect the development of the disease and the effect of treatment. Patients of different ages may have different physiological and metabolic characteristics, and their responses to treatment may be different. Therefore, doctors need to consider the patient's age when formulating treatment strategies. In this paper, the research objects are stratified according to mixed factors, and then analyzed independently at each level to eliminate the influence of mixed factors. The significance of studying idiopathic sudden deafness is to deeply understand the pathogenesis, diagnosis methods and treatment strategies of the disease, so as to improve the quality of life and prognosis of patients. This will provide more accurate diagnosis and treatment guidance for clinicians and better rehabilitation and support for patients. In this study, when analyzing the degree of hearing loss and the patients in children's group, youth group, middle-aged group, elderly group and elderly group, the patients with ≥ 100 dbhl are the most in the youth group, followed by the middle-aged group, and the patients with ≥ 100 dbhl are the least in the children's group and the elderly group. The reason for this may be that young people and middle-aged people need to bear more pressure from study, work and life. Long-term high stress may lead to the imbalance of body hormones, such as the increase of adrenaline and cortisol, which may have a negative impact on the hearing system. Excessive release of these hormones may lead to auditory nerve injury or insufficient blood supply, which may lead to hearing loss. There are many factors that affect the prognosis of idiopathic sudden sensorineural hearing loss in complete deafness, such as the degree of initial hearing loss, age, whether it is accompanied by dizziness, etc. In this study, there was no significant difference in the total effective rate of clinical treatment among children, youth, middle-aged, pre-senile and elderly groups (P > .05). The results of this study are similar to those of other researchers^{17,18}; Domestic research data^{19,20} Studies show that the clinical prognosis rate of sudden sensorineural hearing loss in total deafness is generally between 30.6% and 44.4%. However, the common vascular embolism of cochlear artery or spiral artery of cochlear axis is an important factor leading to sudden

sensorineural hearing loss caused by complete deafness, which will lead to irreversible and serious damage to the hair cells of the whole cochlea, and then damage the hearing, and the curative effect is poor.^{21,22} The data results also show that the number of unilateral cases of patients with sudden sensorineural hearing loss caused by complete deafness is higher than that of bilateral cases, and the data comparison is statistically significant, P < .05. The total effective rate of clinical treatment in 81 dB group was the highest, followed by 90 dB group. Compared with the total effective rate of 100 dB group, the data were significantly different (P < .05). The clinical curative effect of all deaf patients with idiopathic sudden sensorineural hearing loss without vertigo at all ages was higher than that of vertigo patients, and the difference was statistically significant (P < .05). The clinical curative effect of hearing loss in patients without vertigo was higher than that in patients with vertigo, and the difference was statistically significant (P < .05). The data show that the patients with sudden sensorineural hearing loss are mainly in the middle-aged and young group, mostly unilateral, but the hearing impairment of young people is more serious, and the clinical prognosis is better if they are not accompanied by dizziness. On the other hand, it also suggests that patients of different age groups should adopt different treatment methods in the diagnosis and treatment of patients with sudden sensorineural hearing loss,23,24 and should pay attention to whether there is unilateral hearing loss in children with sudden sensorineural hearing loss, and choose appropriate antiviral treatment methods. And attention should be paid to the drugs and dosage of children.^{25,26} The treatment of elderly patients with idiopathic sudden sensorineural hearing loss should also be paid attention to, and the systemic diseases should be controlled during the treatment.^{27,28} In short, we should fully recognize the differences in clinical characteristics and prognosis of patients with idiopathic sudden sensorineural hearing loss in different ages and adopt corresponding treatment strategies. To achieve the best effect.^{29,30} For health care practitioners, knowing the clinical prognosis of idiopathic sudden sensorineural hearing loss of complete deafness at different ages can bring the following practical gains: (1) Diagnosis and treatment decision: Knowing the clinical prognosis of patients at different ages can help health care practitioners diagnose and evaluate the patient's condition more accurately. According to the prognosis, health care practitioners can make appropriate treatment plans. (2) Individualized treatment: Patients of different ages have different response to treatment and rehabilitation ability. Understanding the clinical prognosis can help health care practitioners to make individualized treatment plans for each patient, so as to improve the treatment effect and recovery speed. (3) Education and rehabilitation guidance: Patients of different ages need different guidance and support in education and rehabilitation. Understanding the clinical prognosis can help health care practitioners to provide relevant education and rehabilitation guidance for patients and their families, so as

to help them adapt to hearing loss and improve their quality of life. It can be seen that patients with idiopathic sudden sensorineural hearing loss are mainly concentrated in the middle-aged and young people aged 14-59. With 100 dB as the boundary, important information for predicting clinical prognosis and curative effect can be obtained.

Limitations

However, it is worth noting that there are some limitations in this study, such as no follow-up study and not covering all patients with sudden sensorineural hearing loss, which may lead to some deviations in the conclusion of this study due to the above factors. Therefore, in view of the limitations of the current research, the following solutions can be considered: (1) Follow-up study: Based on the current research, design and conduct follow-up study to understand the long-term effect and recurrence of patients after treatment. Through the follow-up study, we can evaluate the effectiveness and durability of the treatment method more comprehensively. (2) Expand the sample range: The current study may not cover all patients with sudden sensorineural hearing loss, so we can increase the representativeness and reliability of the study by expanding the sample range to include more patients. More patients can be recruited through the cooperation of multiple medical institutions or multi-center research, so as to further verify the reliability of the research results.

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