RESEARCH ARTICLE

Treatment of idiopathic sudden sensorineural hearing loss with press needle

Feng Qin[1], Siquan Guo[2], Xiuwen Yin[3], Jinbao Guo[4], Xiaoyu Lu[5], Jing Ma[6]

Abstract

Objective: To compare the effects of conventional therapy and press needle combined therapy on idiopathic sudden sensorineural hearing loss.

Method: The retrospective case-control study was conducted from December 2023 to January 2024 at Department of Otorhinolaryngology, Changzhou Third People's Hospital, China, and comprised patients with idiopathic sudden sensorineural hearing loss ISSNHL admitted from September 2021 to November 2023. The patients were divided into control group CON in which conventional therapy was used, and the PN group in which the press needle therapy was given additionally. The groups were compared with respect to clinical effects. Data was analysed using SPSS 20.

Results: Of the 297 patents, 143(48%) were in group CON and 154(52%) were in group PN. There was no difference between the groups in terms of age and gender ($p>0.05$). The PN group showed greater changes in pure-tone audiometric thresholds than the CON group ($p<0.05$), and the difference was more significant in high-frequency hearing loss patients ($p<0.05$).

Conclusion: The addition of press needle therapy showed better therapeutic recovery in idiopathic sudden sensorineural hearing loss patients compared to the conventional therapy alone.

Key Words: Acupuncture, Hearing loss, Sensorineural, Case-control study.

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Introduction

Idiopathic sudden sensorineural hearing loss (ISSNHL) refers to sudden sensorineural hearing loss of unknown cause that can set in and worsen within 72 hours.[1,2] Hearing at the two connected frequencies decreases by at least more than 20dB. Its incidence rate is 5-20 per 100,000 per year. According to the guidelines, sudden deafness can be divided into low-frequency descent (LFD), high-frequency descent (HFD), flat descent (FD), and total deafness (TD).[3] It is also one of the globally recognised difficult emergencies in otorhinolaryngology, with an unclear aetiology, complex changes, and difficult treatment.

ISSNHL is related to allergy, virus infection and vascular diseases[4], as well as acquired diseases or genetic tendencies[5,6], including hypercholesterolaemia, heart disease, diabetes, hypotension and hypertension, which adversely affect the inner ear circulatory system.[7] Insomnia, prolonged and excessive smoking, mental stress and alcoholism can all lead to insufficient blood supply and spasms in the blood vessels of the inner ear, leading to diseases.[7] In addition, autoimmune diseases, congenital malformations, tumours and trauma can lead to sudden deafness.[8] If it is not treated immediately, ISSNHL often leads to irreversible hearing loss.

Acupuncture is a method of treating ISSNHL in Traditional Chinese Medicine (TCM). It is considered an effective treatment method by stimulating acupoints to activate meridians and improve and regulate the functions of organs, qi and blood, thereby achieving balance and providing a basic idea for later generations of physicians.[9]

Press needle (PN) is part of acupuncture and moxibustion therapy, and involves inserting a specially made small needle into the acupoint on the skin and keeping it there for a long time to stimulate the skin.[10]

The current study was planned to investigate the effects of PN as a supplementary treatment for ISSNHL.

Patients and Methods

The retrospective case-control study was conducted from December 2023 to January 2024 at Department of Otorhinolaryngology, Changzhou Third People's Hospital, China, and comprised all the patients with ISSNHL admitted from September 2021 to November 2023, coinciding with the time when PN (Seirin Pyonex, Seirin Company, Shizuoka, Japan) was added to the institutional

[1,3-6]Department of Otorhinolaryngology, Changzhou Third People's Hospital, Changzhou, China. [2]The First People's Hospital of Changzhou, Changzhou, China.

Correspondence: Jing Ma. **Email:** 675090897@qq.com

ORCID ID: 0009-0004-1672-3702

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practice as a supplementary treatment for sudden deafness. The patients were divided into control group CON in which conventional therapy was used, and the PN group in which the PN therapy was given additionally. After approval from the institutional ethics review committee, the sample size was calculated using the formula11 N=Z2×[P×(1-P)]/E2, with Z=1.96, E=10%, and P=50% on the basis of earlier studies done at the institution.[12,13] Data was collected from the institutional electronic and manual medical records.

Cases were included if they met the latest diagnostic criteria and treatment guidelines for ISSNHL[14], had received no other treatment since disease onset, and presented within two weeks of disease onset.

Patients with clear causes, those unable to cooperate with the treatment, cases not having baseline and post-treatment hearing comparisons, and patients with underlying diseases were excluded.

All the patients received an intravenous (IV) infusion of Ginaton (Ginkgo biloba extract [GBE], Chi Sheng Pharma & Biotech Co., Ltd, Hsinchu, Taiwan, China) and Fibrinolysin (Science Sun Pharmaceutical Co., Ltd, Beijing, China) for intravenous guttae (IVGTT), with dexamethasone (DXMS) (Cisen Pharmaceutical Co., Ltd Jining, Shandong, China) for both IV drip and injection tympanic (IT). A detailed therapeutic schedule was followed (Table 1).

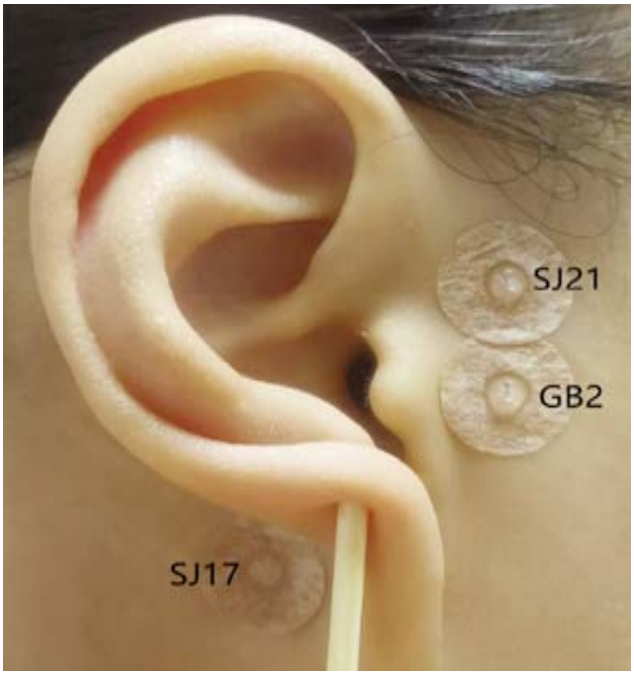

Figure-1: Site of Tinghui (GB2), Yifeng (SJ17) and Ermen (SJ21).

Table-1: The therapeutic schedule.

DAYS	1	2	3	4	5	6	7	8	9	10
IVGTT (qd)										
GBE (mg)	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5	87.5
Plasmin (mg)	100	100	100	100	100	100	100	100	100	100
DXMS (mg)	10	10	10	5	5					
IT (qod)										
DXMS (mg)						5		5		5

IVGTT: Intravenous guttae, GBE: Ginkgo biloba extract, DXMS: Dexamethasone, IT: Injection tympanic.

For the PN group, PN was added to the basic treatment, and three acupoints were targetted for the treatment: Tinghui (GB2), Yifeng (SJ17) and Ermen (SJ21) (Figure 1). The acupoints were selected according to the People's Republic of China National Standard.[3] The treatment process was carried out in collaboration with professionally trained TCM practitioners and nurses.

An appropriate PN was selected according to the point at which the needle was to be inserted. The local skin was disinfected with 75% ethanol. The needle tip was aimed vertically at the selected three points at the same time, and the point was gently punctured. The abdomen was then pressed with the thumb or index finger for 1-2 minutes to enhance the stimulation. During needle retention, the embedded needle was pressed with the hands for 1-2 minutes every 4 hours. The needle was changed every two days. The entire treatment period lasted 10 days. The treatment plan of acupressure was in line with relevant Chinese research.[15,16]

The pure-tone hearing test was used to evaluate the subjects before and after the treatment, and the results of the audiometry were recorded. The mean of the hearing score was calculated to indicate hearing improvement. The main outcome measure was the effectiveness of hearing improvement, defined as the proportion of patients who improved their hearing loss frequency band by at least 15dB. Hearing improvement was categorised into complete, significant, effective and ineffective

recovery. The improvement from the average hearing threshold was <15dB for no change, ≥15dB but <30dB for slight improvement, and ≥30dB for marked improvement. The hearing threshold completely returned to normal or reached the hearing level of the healthy ear for complete recovery. Slight improvement, marked improvement and complete recovery were all considered effective.

Data was analysed using SPSS 20. Count data was expressed as frequencies and percentages, while numerical data having normal distribution was expressed as mean ± standard error of mean (SEM). Independent sample t-test was used for continuous normally distributed data, and chi-square test was used for categorical variables. P<0.05 was considered significant.

Results

Of the 297 patents, 143(48%) were in group CON and 154(52%) were in group PN. There was no difference between the groups in terms of age and gender (p>0.05) (Table 2).

Table-2: Baseline characteristics.

	PN (n = 154)	CON (n =143)	P
Age (years)	51.38 ± 1.25	50.76 ± 1.35	0.736
Gender			
Male	78	63	0.256
Female	76	80	
Course of disease (days)	5.28 ± 0.33	5.26 ± 0.33	0.965
Diseased side			
Left	85	81	0.802
Right	69	62	
Diseased type			
Low-frequency	24	23	0.823
High-frequency	12	15	
Flat	65	61	
Total deafness	53	44	
Average pre-treatment hearing level (dB)	66.86 ± 2.56	64.90 ± 2.73	0.600
Complication			
Tinnitus	144	129	0.298
Vertigo	17	13	0.578

Post-treatment, the average hearing level of the PN group was 47.87±2.42dB, and that of the CON group was 51.17±2.73dB. The average hearing level improvement of the PN group was 19.55±1.72dB compared to CON group's 13.81±1.42dB (p=0.005) (Figure 2).

The effective rate of the patients in the PN group 91(59.09%) (Figure 3A) was higher than that of the patients in the CON group 68(47.55%) (Figure 3B) (p=0.046).

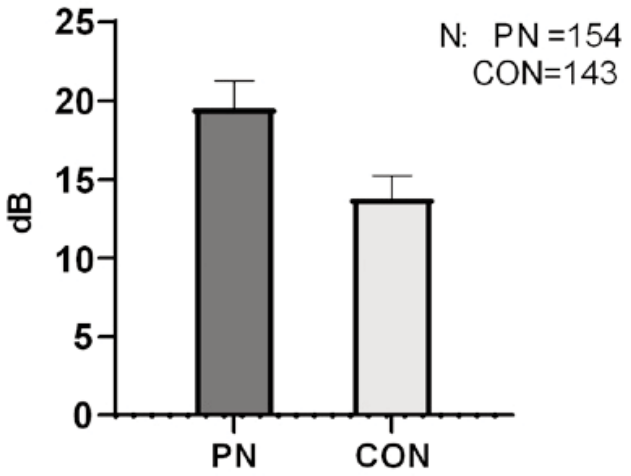

Figure-2: The average hearing improvement between the groups.

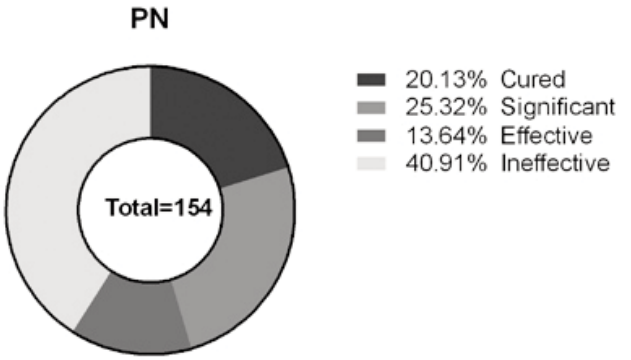

Figure-3A: Clinical efficacy in the press needle group PN.

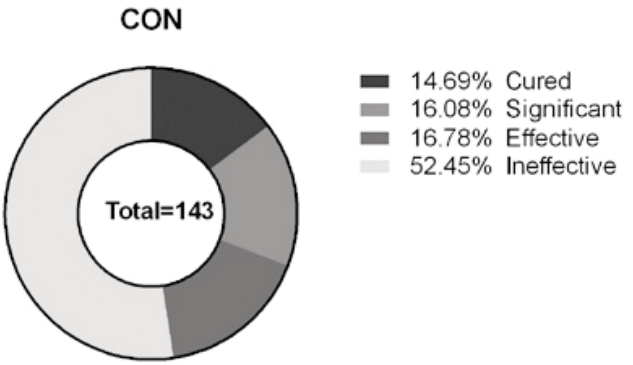

Figure-3B: Clinical efficacy in the control group CON.

The effective hearing rate in PN group 8(66.67%) was significantly better than CON group 4(26.67%) with respect to high-frequency hearing loss (HFHL) (p=0.038). The difference with respect to LFD (p=0.464), FD (p=0.867), TD (p=0.085), male gender (p=0.453), female gender (p=0.056), left ear (p=0.164) and right ear (p=0.147) was not significant between the groups.

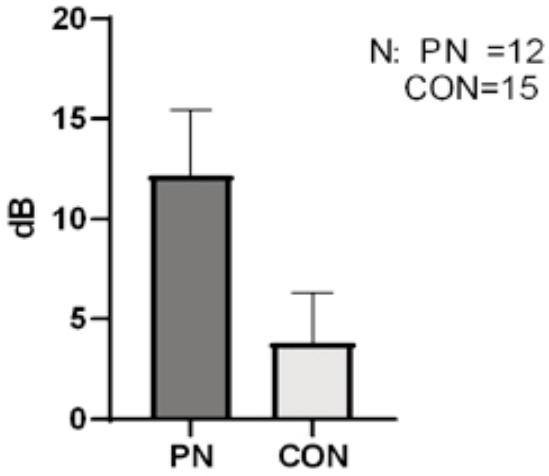

Figure-4: Average hearing improvement in high-frequency hearing loss (HFHL) patients in the two groups.

The mean hearing level improvement of the PN group was 12.29±3.27dB compared to CON group's 3.83±2.50dB (p=0.049) (Figure 4).

Discussion

The acupuncture treatment of deafness in TCM has a wide range of applications. Many studies have proved that acupuncture and moxibustion treatment have a positive effect on hearing recovery[16], and other research suggests that acupuncture can promote blood circulation in the ear and reduce blood viscosity.[17] Acupuncture can improve the oxygen supply by encouraging blood circulation in the ear, thus promoting hearing recovery.[18] Other studies have found that acupoints near the ear can inhibit the damage to spiral ganglion neurons in noise-induced hearing loss in animals.[19] A study on mice showed that acupuncture could alleviate gentamicin ototoxicity through the nuclear factor erythroid 2-related factor 2 (NRF2) signalling pathway.[20] Acupuncture and moxibustion are also effective in the treatment of tinnitus.[21,22] Nevertheless, the exact mechanism to explain the effect of acupuncture on ISSNHL needs further detailed research and discussion.

In acupuncture therapy related to PN, the needles are fixed to the acupoint or a specific part beneath the skin to provide long-lasting and soft, benign stimulation, thereby enhancing the analgesic effect.[23] PN body is thin and short, and it cannot pierce internal organs and deep tissues. Thus, the needles are safe and almost painless. It is easier for patients who are afraid of needles in clinical applications, including children, to submit themselves to acupuncture.[24,25] This needle can also be used by the patients themselves, thus reducing follow-up visits. Its use hardly affects patients' daily activities.[26]

PN is widely used for supplementary treatment of pain-related vomiting control after chemotherapy or surgery. Liu et al.[27] found that PN effectively alleviated nausea, vomiting and retching in patients with gastrointestinal cancer undergoing chemotherapy. Jiang et al.[28] suggested PN as a feasible adjunctive intervention for postoperative analgesic management after thoracoscopic pulmonary resection. Ruengwongroj et al.[10] found that PN had the same efficacy as electroacupuncture in postherpetic neuralgia. There has been one case report of skin infection after PN treatment[29], while no infection or other adverse case has been reported. Conventional acupuncture is widely used for ISSNHL treatment and has a positive effect.[9,16] Therefore, exploring the therapeutic effect of PN therapy for deafness has certain practical significance.

The current study showed that clinical efficacy in the PN group was higher than that in the CON group. After treatment, the hearing recovery of the PN group was higher than that of the CON group, and the difference was significant in HFHL cases.

The current study has limitations. First, the sample size of HFHL cases was small, and more data is needed to support the conclusion. Second, due to the actual situation of clinical work, the study failed to set up a treatment group that would only receive normal acupuncture or a sham PN treatment group. Third, as it was a case-control study, the study was unable to control for other confounding factors with high randomness. The therapeutic effect of PN on ISSNHL still needs to be confirmed through strict randomised controlled trials (RCTs).

Conclusion

The use of PN has a positive effect in the treatment of sudden deafness, and it was more effective in HFHL cases. The therapeutic effect of PN on ISSNHL still needs to be confirmed through strict randomized controlled trials.

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Conflict of Interest: None.

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AUTHOR'S CONTRIBUTION:
FQ: Design research, performed research, analysed data and wrote the paper.
SG: Analysed data and wrote the paper.
XY & JG: Performed research and analysed data.
XL: Design research, performed research and analysed data.
JM: Design research and performed research.