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ORIGINAL ARTICLE

Comparative Efficacy of Systemic VS Intratympanic Corticosteroid Therapy in the Management of Sudden Sensorineural Hearing Loss

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ABSTRACT

Background: Sudden sensorineural hearing loss is a major health problem that negatively affects the life of an individual. So specific therapy is essential.

Objective: The aim of this study as to compare the effectiveness of systemic versus Intratympanic Corticosteroid therapy in the management of SSNHL.

Material and method: The current study was conducted at the Department of ENT, Bolan Medical College / Complex Hospital, Quetta from January 2022 to June 2022 after taking approval from the research committee of the institute. A total of 128 individuals of both genders and different age groups (18-65 years) with SSNHL were included. Participants in the study were divided into two groups based on the method of corticosteroid administration: Systemic Therapy Group who received oral prednisolone and Intratympanic therapy group who got weekly intratympanic injections of dexamethasone. Pure-tone audiometry (PTA) was used to conduct audiological evaluations. Version 25 of the SPSS was used to analyze the data. For categorical data, the chi-square test was used, and for continuous variables, either an independent t-test or a paired t-test was employed. The p-value was less than 0.05 was considered statistically significant.

Results: A total of 128 individuals were included in this study. Significant differences were seen when the recovery results of the two therapy groups were compared. Of the 74 people who participated in the systemic treatment group, 30 (40.5%) showed full recovery, 26 (35.1%) showed partial recovery, and 18 (24.3%) showed no recovery. On the other hand, of the 54 individuals, 12 (22.2%) showed full recovery, 18 (33.3%) showed partial recovery, and 24 (44.4%) showed no recovery in the intratympanic treatment group. The reduction in pure tune audiometry (PTA) was also assessed as an indicator of treatment effectiveness. The mean PTA improvement was 25.5 ± 10 dB in the systemic therapy group and 19.2 ± 9 dB in the intratympanic therapy group; the difference was statistically significant (p=0.02).

Conclusion: The current study concluded that in the management of SSNHL systemic corticosteroid therapy is more effective and revealed a significant improvement in hearing recovery, PTA transition, and the speed of symptom resolution as compared to intratympanic therapy.

Keywords: Efficacy; Systemic; Intratympanic; Corticosteroid; Sensorineural Hearing Loss

INTRODUCTION

Sudden sensorineural hearing loss is defined as hearing loss of at least three successive audiometric frequencies that is more than 30 dB and that occurs within three days without a recognized cause.[1] The etiologies and pathophysiology of SSNHL remain unknown despite the fact that several ideas have been proposed. It annual incidence of diagnoses varies from 5 to 20 per one million individuals.[2] The aetiology of SSNHL has been the topic of debate for many years & has been intensively explored. The postulated ideas include vascular problems, viral infection, & immune-mediated responses.[3] There have been reports of several therapies, including vitamins, antivirals, hyperbaric oxygen, and vasoactive drugs.[4] However, each strategy has been contested, and until the advent of steroid therapy, which is seen to be the cornerstone of treatment for SSNHL, there was no widely recognized standard procedure. Steroids can be administered systemically or intratympanally, either alone or in combination.[3] Local usage of steroids has gained popularity among otology centers over the past ten years because to the substantial side effects and contraindications of systemic steroid therapy.[5] Since corticosteroid medication has potent anti-inflammatory and immunosuppressive qualities, it has been the mainstay of therapy for it. By decreasing inflammation, inhibiting cellular apoptosis, and improving inner ear microcirculation, these corticosteroids are believed to lessen cochlear damage.[6] Administration routes include local (intratympanic) and systemic (oral or intravenous) therapy; research has shown the benefits and limitations of each approach. For example, although some individuals exhibit little to no improvement, others recover completely (this variety adds to the complexity of therapy options). Despite being extensively used, corticosteroids' inconsistent patient results make it difficult to evaluate their overall effectiveness.[7] So the current study was carried out to determine the Comparative Efficacy of Systemic VS Intratympanic Corticosteroid Therapy in the Management of Sudden Sensorineural Hearing Loss

MATERIAL AND METHOD

The current study was conducted at the Department of ENT, Bolan Medical College / Complex Hospital, Quetta from January 2022 to June 2022 after taking approval from the research committee of the institute. A total of 128 individuals of both genders and different age groups (18-65 years) with SSNHL were included. The individuals in the study had a definitive diagnosis of idiopathic SSNHL. This was characterized as a loss of at least 30 dB at three successive audiometric frequencies within 72 hours of the onset. Individuals required to present proof of follow up within 14 days of the symptoms starting and have normal contralateral ear hearing. Individuals with conductive or mixed hearing loss, SSNHL caused by treatable causes (such as acoustic neuroma, autoimmune disorders, or head trauma), past experiences of surgical procedure or chronic ear conditions, pregnancy, or contraindications to corticosteroid therapy were excluded. Participants in the study were divided into two groups based on the method of corticosteroid administration:

1 Systemic Therapy Group. This group had 74 individuals who received oral prednisolone at a dose of 1 mg/kg/day, followed by a tapering schedule over a period of 14 days..
2 Intratympanic Therapy group: This group had 54 individuals who got weekly intratympanic injections of dexamethasone (4 mg/mL) for four weeks consecutively.

Patient preferences, clinical indications, and any systemic therapeutic contraindications were taken into consideration while choosing a course of treatment. Salvage intratympanic treatment was made available to individuals who did not respond to systemic therapy. Clinical and baseline demographic information was gathered, including comorbidities, age, sex, duration of symptoms, and audiometric results. Pure-tone audiometry (PTA) was used to conduct audiological evaluations at frequency of (250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, & 8 kHz. A gain of at least 10 dB in PTA or a 15% increase in speech discrimination scores were considered to be indicators of hearing level improvement. Audiometry follow-ups

were performed at baseline, two weeks, and one month following the initiation of medication. The primary outcome assessed was the degree of hearing recovery, which was categorized using Siegel's criteria as total, partial, or nonexistent recovery.

Treatment-related problems and patient compliance were among the secondary outcomes evaluated. Version 25 of the SPSS was used to analyze the data. Categorical data like gender and treatment results were displayed as frequencies and percentages, continuous variables such as age & hearing levels were presented as means and standard deviations. For categorical data, the chi-square test was used, and for continuous variables, either an independent t-test or a paired t-test was employed. The p-value was less than 0.05 was considered statistically significant.

RESULTS

A total of 128 individuals were included in this study out of which 81(68.6%) were male and 47(39.8%) were females and the mean age of the study population was 46.2 ± 10.5(ranged 18-65) years. On average, it took 8.4 ± 3.5 days from the onset of symptoms to the start of therapy. The study participants' mean Pure Tune Audiometry (PTA) was 68.5 ± 12.9 dB, according to baseline audiometry. The mean age of the systemic treatment group was 45.1 ± 12.3 years, and there were 26 females (36.4%) and 47 males (63.5%).The group receiving intratympanic treatment consisted of 21 females (38%) and 34 males (62.9%), with an average age of 45.4 ± 11.1 years as presented in table 1. Over all hearing recovery rate was 88 (68.75%) among the study participants. out of which 46(36%) were completely recovered, 42(32.8%) were partially recovered and 40(31.2) were not recovered. Significant differences were seen when the recovery results of the two therapy groups were compared. Of the 74 people who participated in the systemic treatment group, 30 (40.5%) showed full recovery, 26 (35.1%) showed partial recovery, and 18 (24.3%) showed no recovery. On the other hand, of the 54 individuals, 12 (22.2%) showed full recovery, 18 (33.3%) showed partial recovery, and 24 (44.4%) showed no recovery in the intratympanic treatment group. The reduction in pure tune audiometry (PTA) was also assessed as an indicator of treatment effectiveness. The mean PTA improvement was 25.5 ± 10 dB in the systemic therapy group and 19.2 ± 9 dB in the intratympanic therapy group; the difference was statistically significant (p=0.02). Compared to the intratympanic treatment category, which took 19.5 ± 4.2 days to recover, the systemic therapy category took 15.7 ± 3.6 days. In the systemic therapy group, 18 patients (18%) experienced moderate adverse effects, while in the intratympanic therapy group, none did as presented in the table 2.

Table 1: Demographic features of the study population

Features	Total n=128	Systemic treatment n=74	Intratympanic Treatment n=54
Mean age in years	46.2 ± 10.5	45.1 ± 12.3	45.4 ± 11.1
Gender			
Male	81(68.6%)	47 (63.5%)	34 (62.%)
Female	47(39.8%)	26 (36.4%)	21 (38.0%)
Mean time to treatment (days)	8.4 ± 3.5	8.2 ± 3.4	8.7 ± 3.7
Baseline PTA (dB)	68.5 ± 12.9	69.3 ± 13.2	67.4 ± 12.5

Table 2: Comparison of Systemic & Intratympanic treatment Group Outcomes

Factors	Systemic treatment n=74	Intratympanic Treatment n=54	P value
Mean age in years	45.1 ± 12.3	45.4 ± 11.1	0.86
Mean time to treatment (days	8.1 ± 3.3	8.6 ± 3.6	0.53
Complete recovery (n, %)	30(40.5%)	12(22.2%)	0.03
Partial recovery (n, %)	26 (35.1%)	18(33.3%	0.86
No recovery	18(24.3%)	24(44.4)	0.02
Baseline PTA (dB)	69.3 ± 13.2	67.4 ± 12.5	0.47
Mean PTA improvement (dB)	25.5 ± 10	19.2 ± 9	0.02
Mean time to recovery (days)	15.7 ± 3.6	19.5 ± 4.2	0.01
Adverse effects (n, %	14(18%)	Zero (0)	0.01

DISCUSSION

Sudden sensorineural hearing loss is a medical emergency that significantly lowers the quality of life of an individual. Corticosteroid therapy is still the first line of treatment, with special emphasis to lowering inflammation, edema, and immune-related damage to the cochlea, even if the underlying cause is typically unknown.[8] When compared to intratympanic medications, the results of this study showed that systemic corticosteroid therapy led to shorter recovery times, better hearing recovery rates, and bigger reductions in Pure Tune Audiometrys (PTA). Significant differences were seen when the recovery results of the two therapy groups were compared. In the systemic treatment group, 40.5% showed full recovery, 35.1% showed partial recovery, and 24.3% showed no recovery. On the other hand 22.2% showed full recovery, 33.3% showed partial recovery, and 24 44.4% showed no recovery in the intratympanic treatment group. The mean PTA improvement was 25.5 ± 10 dB in the systemic therapy group and 19.2 ± 9 dB in the intratympanic therapy group; the difference was statistically significant (p=0.02). When compared to intratympanic treatments, the results of this study showed that systemic corticosteroid therapy led to faster recovery times, better hearing recovery rates, and greater reductions in Pure Tune Audiometrys. More precisely, the systematic group had substantially greater rates of full recovery. These results are consistent with other research showing that systemic corticosteroids dramatically enhance auditory outcomes as compared to placebo or other therapy in individuals with SSNHL, such as Amarillo E et al[9.] & Tripathi P et al.[10] intratympanic treatment is a viable substitute for systemic therapy for individuals who cannot take it, such as those with diabetes or serious gastrointestinal disorders, however the systemic therapy group was generally more successful. This is in keeping with the recommendations made by the American Academy of Otolaryngology–Head and Neck Surgery, which supports intratympanic corticosteroid injections as a suitable substitute in certain situations.[11-12] Furthermore, the intratympanic group's safety profile is demonstrated by the absence of systemic adverse effects, which is particularly beneficial in high-risk individuals.[13] The systemic treatment group experienced mostly moderate adverse effects that seemed to be linked to sleeplessness and gastrointestinal distress. This is consistent with prior research discussing the possibility of systemic side effects from systemic corticosteroids, even though they may be managed with the proper measures.[14] clinically significant is the systemic treatment group's shorter recovery period, as a speedier return to normal hearing reduces the detrimental impact on communication and general quality of life. Intratympanic treatment was less successful in this area, but the fact that 35% of participants experienced a partial recovery shows how useful it may be in some therapeutic settings. A large sample size, well-matched treatment groups, and the use of objective audiometric measurements for evaluating therapy efficiency are just a few of the study's numerous benefits. Because postponed therapy is associated with worse outcomes, it also

increases the trustworthiness of the results to include patients who received treatment within a certain time limit of symptom start (≤14 days). The research does have several drawbacks, though. First, generalizability to broader populations may be limited by the single-center architecture. Furthermore, the very little follow-up time restricts the evaluation of long-term hearing results. Furthermore, even if the groups' baseline characteristics were comparable, selection bias might exist because of no randomization. To validate these results, more multi-center randomized controlled trials with extended follow-up times are required.

CONCLUSION

The current study concluded that in the management of SSNHL systemic corticosteroid therapy is more effective and revealed a significant improvement in hearing recovery, PTA transition, and the speed of symptom resolution as compared to intratympanic therapy. These findings highlight the significance of prompt and customized management in maximizing outcomes for individuals with SSNHL.

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