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Corresponding Author
Kaustuv Das Biswas,
Department of ENT, IPGME and R and SSKM Hospital, 244, Acharya Jagdish Chandra Bose Road, Bhowanipore, India
dr.kaustuv.82@gmail.com

Author Designation
[1,5,6]Senior Resident
[2,4]Assistant Professor
[3]Associate Professor
[7]Professor
[8]Consultant Statistician

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Study of Combined Treatment of Intratympanic and Systemic Corticosteroids in Patients with Idiopathic Sudden Sensorineural Hearing Loss: A Tertiary Care Centre Experience

[1]Reshma Banu, [2]Anindita Sengupta, [3]Soma Mandal, [4]Kaustuv Das Biswas, [5]Buddhadev Maity, [6]Santosh Prasad, [7]Bijan Basak and [8]Debarshi Jana

[1]Department of ENT, Tulsiram Lakshmi Devi Jaiswal Hospital, 182, SH6, Surendranagar, Liluah, Howrah, West Bengal 711204, India
[2]Department of ENT, Institute of Otorhinolaryngology and Head and Neck Surgery, IPGME and R and SSKM Hospital, 244, Acharya Jagdish Chandra Bose Road, Bhowanipore, Kolkata, West Bengal 700020, India
[3-7]Department of ENT, IPGME and R and SSKM Hospital, 244, Acharya Jagdish Chandra Bose Road, Bhowanipore, India
[8]Department of Science and Technology, Government of India, IPGMER and SSKM Hospital, Kolkata, India

ABSTRACT
Idiopathic sudden sensorineural hearing loss (ISSNHL), defined as hearing loss of ≥30 dB in three consecutive frequencies of pure tone average (PTA) within 72 hrs, is estimated to affect 5-20 people per 100,000 worldwide. to look into the type and exact level of clinical improvement as well as the pre and post-steroid treatment findings based on the sociodemographic traits of patients with idiopathic sudden onset sensorineural hearing loss. This Descriptive study with longitudinal follow up was conducted at department of ENT, IPGMER and SSKM Hospital, Kolkata for 1 year 6 month (February 2020 to july 2021). We collected data from patients who, throughout the aforementioned time, presented with idiopathic abrupt sensorineural hearing loss and were receiving medical attention in the ENT department of SSKM hospital. For our investigation, a total of 100 patients were included. In our study, 79 patients (79.0%) had intratympanic and systemic corticosteroids and 100 patients (100.0%) had both the tympanic membrane and the otoscopy intact. Our study showed that the mean PTA on day 0 of patients was 73.2300±15.4918 the mean PTA after 48 hrs of treatment was 47.6526±15.1821 the mean PTA after 72 hrs of treatment was 37.0964±19.3508 and the mean PTA after 7 days (mean±s.d.) of treatment was 26.4526±25.2432. We concluded that this study may provide important clinical information for patient care as well as substantial evidence of improvement for the intratympanic corticosteroid treatment of idiopathic abrupt sensorineural hearing loss.

INTRODUCTION

In three consecutive pure tone average (PTA) frequencies over the course of a 72 hrs period, a hearing loss of at least 30 dB is referred to as "idiopathic sudden sensorineural hearing loss" (ISSNHL)[1]. is thought to impact 5-20 persons per 100,000 annually globally[2]. Although the exact source of the disorder is unknown, a range of illnesses that impact the cochlea are more likely to be the cause than a single pathological alteration[3]. The fact that between 32-65% of patients recover on their own within 15 days of the onset of the illness complicates the ongoing debate about the best course of treatment and therapies for this condition. Of the many treatments that were tried,[4] oral/systemic corticosteroid is the most common and generally regarded as the most successful first line treatment[5]. Unexpected hearing loss is a terrifying symptom that frequently necessitates an emergency room visit. It is often but not always, accompanied by vertigo or tinnitus. Adult patients between the ages of 15 and 55 who experience sudden sensorineural hearing loss are the subject of this study, with idiopathic abrupt sensorineural loss being the most common type. The affected patient's quality of life and hearing can be improved by early detection and treatment of abrupt sensorineural hearing loss. A large body of research suggests that 32-65% of SSNHL cases could resolve on their own. However, clinical experience suggests that these figures might be inflated. The prognosis for recovery depends on the patient's age, the extent of hearing loss the audiometric configuration, the time elapsed between the start of treatment and the onset of hearing loss and whether or not vertigo was present at the beginning. A strong desire for treatment is further fueled by the psychological and communication harm sustained during an acute episode of SNHL, as well as the risk for permanent tinnitus and hearing loss. For SSNHL, many treatments have been proposed, including middle ear surgery for fistula repair and observation alone, as well as systemic and intratympanic steroids, antiviral medications, hyperbaric oxygen therapy (HBOT), rheologic medications, diuretics and other complementary and alternative therapies. Because up to one-third of patients will have an underlying condition that is eventually discovered but was not evident at the time of initial presentation, long-term monitoring is recommended. Furthermore, patients with dizziness, partial or no hearing recovery, or persistent tinnitus will require ongoing otolaryngologic, audiologic and psychological care.

About 10-15% of cases of abrupt sensorineural hearing loss have a known cause. Retro-cochlear disorders, in about 1% of instances are recognized due to conditions such vestibular schwannoma, while the remainder cases are primarily linked to autoimmune diseases, Ménière illness and perilymphatic fistulas[2].

With an equal distribution of sexes, ISSNHL typically affects individuals between the ages of 43 and 53. It is primarily unilateral. Oral corticosteroid tapering is a common first-line treatment for ISSNHL. However, systemic steroids can have serious side effects, such as mood swings, appetite loss, insomnia, increased thirst, weight gain, hypertension and hyperglycemia. Furthermore, patients with chronic conditions like glaucoma or diabetes mellitus cannot benefit from systemic steroid therapy[6].

Silverstein *et al*.[7] first suggested intra-tympanic injection of corticosteroid as a substitute for systemic therapy in. In addition to lowering the possibility of systemic side effects, local steroid injection into the ear enables the drug to enter the cochlea and reach a high concentration there even at low dosages.[8,9] one Steroid improves cochlear blood flow, lessens inflammation linked to labyrinthitis and strengthens the function of the stria vascularis. Intratympanic steroid therapy has benefits but it's more costly, necessitates repeated office visits and comes with risks like pain, temporary vertigo, infection, and long-term tympanic membrane perforation.

Objectives:

- To investigate the sociodemographic makeup of individuals who exhibit sudden onset idiopathic sensorineural hearing loss
- To assess the nature and precise extent of the clinical improvement by pre and post steroids treatment findings

MATERIALS AND METHODS

Study design: Descriptive study with longitudinal follow up.

Place of study: Department of ENT, IPGMER&SSKM Hospital, Kolkata.

Period of study: one year 6 month (February 2020 to July 2021).

Study population: patients presenting with idiopathic sudden sensorineural hearing loss in the above-mentioned period and undergoing medical management at ENT dept. SSKM hospital.

Sample size: 100 patients.

Inclusion criteria:

- Patients between 15-55 yrs. of age with sudden hearing loss
- Patients don't have any ear pathologies

- patients must be willing to take part in the study through written informed consent
- Patients without any debilitating systemic disease like diabetes mellitus, hypertension etc

Exclusion criteria:

- Patients less than 15 years and more than 55 years of age with sudden hearing loss
- Patients unwilling for study or are incapable in any means to take part
- Patients with co-existing symptomatic co morbidity of ear
- Patients with any uncontrolled debilitating systemic disease like diabetes mellitus, hypertension etc. not responding to medical treatment

Data collection and interpretation All selected patient was observed clinically and documented according to criteria, a detailed history was taken, a proper and thorough clinical examination was conducted with special reference to ENT region. Otoscopic examination and tuning fork tests were dine in all patients followed by pure tone audiometry (PTA) and tympanometry. Post treatment hearing level evaluation after 48 hrs, 72 hrs and after 7days of intra-tympanic and oral steroid administration. Study was conformed to the principles of the declaration of Helsinki. The proposal was approved by the institutional ethics committee. Written informed consent or informed assent was obtained from all study participants.

RESULTS

In our study, 100(100.0%) patients had both tm intact Otoscopic finding. In our study, 79(79.0%) patients had intratympanic and systemic corticosteroids. In that the mean PTA day 0 (mean±s.d.) of patients was 73.2300±15.4918. That the mean PTA after 48 hrs (mean±s.d.) of patients was 47.6526±15.1821. In above table 1 that the mean PTA after 72 hrs (mean±s.d.) of patients was 37.0964±19.3508. In above Table showed 2 that the mean PTA after 7 days (mean±s.d.) of patients was 26.4526±25.2432.

DISCUSSIONS

For one year and six months (February 2020 to July 2021), a descriptive study with a longitudinal follow-up was carried out in the ENT department of the IPGMER and SSKM Hospital in Kolkata. We collected data from patients who, throughout the aforementioned time, presented with idiopathic abrupt sensorineural hearing loss and were receiving medical attention in the ENT department of SSKM hospital. Total 100 patients were taken in our study.

We used in our study any patient between 15-55 yrs. age, patients don't have any ear pathologies and patients don't have any coexisting systemic diseases like diabetes mellitus, hypertension, glaucoma etc. Patients must also be ready to participate in the study by providing written informed consent. Hara *et al*.[10] showed that to investigate the application of intratympanic (IT) therapy in the treatment of idiopathic sudden sensorineural hearing loss (ISSNHL). This investigation was a retrospective review. Utilizing a multivariable generalized linear model for repeated measures, PTA changes for treatment groups adjusted for age, gender, time-to-treatment and vertigo were investigated. Improved results were statistically connected with greater age and earlier time to therapy. Every day that passed until the end of the treatment resulted in a 0.324 (95% CI [0.12, 0.52], p = .002) decrease in PTA.

Haynes *et al*.[11] found that Intratympanic steroids are being used more frequently to treat inner ear problems, particularly in individuals who have not responded to systemic therapy and have abrupt sensorineural hearing loss (SNHL). Patient characteristics that were evaluated in relation to recovery included the patient's age the duration since therapy started the state of the contralateral ear the presence of diabetes the degree of HL and the presence of concomitant symptoms (tinnitus, vertigo). According to our analysis, of the patients, 20 (20.0%) were under the age of 20, 10 (10.0%) were between the ages of 21 and 30, 18 (18.0%) were between the ages of 31 and 40, 24 (24.0%) were between the ages of 41 and 50, 20 (20.0%) were between the ages of 51 and 60 and 8(8.0%) were over the age of 60.Z is 0.5625 in value. The value of P is.57548. At p<.05. The result is not noteworthy.

Also found that 33 patients (34.0%) were female, while 67 patients (67.0%) were male. P has a value of less than.00001. 48 patients (48.0%) resided in an urban region and 52 patients (52.0%) lived in a rural one. Z has a value of 0.3162. P has a value of.74896. At p<.05. the finding is not significant. In our study, 58 (58.0%) patients had Lower Class, 27(27.0%) patients had Lower Middle Class and 15 (15.0%) patient had Middle Class.

Oue *et al*.[12] showed that to ascertain whether patients with idiopathic sudden sensorineural hearing loss, whose affected ear's hearing did not improve after taking oral steroids, would benefit from low-dose intratympanic dexamethasone therapy. In a prospective pilot study, eight patients with idiopathic acute sensorineural hearing loss whose hearing had not improved with prednisolone treatment were included. In our study 39(39.0%) patients had Left Side of Ear and 61 (61.0%) patient had Right Side of Ear. Z has a value of 2.846. P has a value of .00438. At p<.05, the finding is significant.

Table 1: Distribution of Otoscopic finding and Intratympanic and systemic corticosteroids

Otoscopic finding	Frequency	Percentage
Both tm intact	100	100.0
Total	100	100.0
Intratympanic and systemic corticosteroids		
No	21	21.0
Yes	79	79.0
Total	100	100.0

Table 2: Distribution of mean PTA day 0

	No.	Mean	SD	Minimum	Maximum	Median
PTA day 0	100	73.2300	15.4918	38.0000	91.0000	77.0000
PTA after 48 hrs	100	47.6526	15.1821	18.0000	88.0000	42.0000
PTA after 72 hrs	100	37.0964	19.3508	15.0000	88.0000	27.0000
PTA after 7 days	100	26.4526	25.2432	10.0000	88.0000	12.0000

Haynes *et al*.[11] found that Intrathecal steroids are being used more frequently to treat inner ear problems, particularly in individuals who have not responded to systemic therapy and have abrupt sensorineural hearing loss (SNHL). They evaluated overall effectiveness, morbidity and prognostic variables by reviewing their experience treating patients with abrupt SNHL with intratympanic steroids. Intratympanic steroids have little morbidity and may help patients with acute SNHL who have not responded to systemic therapy restore their hearing. A 20% improvement in SDS or a 20 dB gain in PTA was deemed significant. Forty patients met the criteria necessary to be part of the study. The patients were between the ages of 17 and 84, with a mean age of 54.8. In all, PTA and SDS improved in 40% (n = 16) of cases.

Yang *et al*.[13] Sudden sensorineural hearing loss is linked to diabetes mellitus (SSNHL). Systemic and intratympanic corticosteroids are the two primary treatments for SSNHL in individuals with diabetes mellitus. Reduced systemic steroid exposure and related systemic side effects are the advantage of intratympanic versus systemic treatment. The use of intratympanic corticosteroids shows promise as an alternative to conventional systemic therapy. Present study showed that all patients 100(100.0%) patients had both tympanic membrane intact Otoscopic finding. 79(79.0%) patients had intratympanic and systemic corticosteroids. The value of p is <.00001. The result is significant at p<.05.

Baek *et al*.[14] found that Idiopathic sudden sensorineural hearing loss (SSNHL) prognostic factors and hearing outcomes were examined in patients receiving combination intra-tympanic and systemic steroid therapy. Age was found to be an independent, unfavorable prognostic factor for hearing recovery. According to audiogram the profound and downsloping kinds had worse recovery rates than the upsloping type. The study's findings indicate that age and the downsloping and deep forms of audiogram patterns are poor prognostic variables and that high hearing recovery rates are achieved when intratympanic and systemic steroids are used together to treat idiopathic SSNHL.

Shewel *et al*.[15] showed that Finding out whether different intratympanic PTA threshold concentrations were recorded at 0.5, 1, 2 and 4 kHz before and one month after the treatment was the aim of this study. The average PTA in the group treated with IT Dex 10 mg mL^{-1} improved dramatically from 75.50±12.59 to 49±24.04 dB, with an average gain of 26.50±14.25 (p = 0.0007). With an average gain of 17.65±8.36 dB, PTA significantly changed in the group receiving IT Dex 4 mg mL^{-1}, it went from 76.92±11.89 dB pre-treatment to 59.27±92.10 dB post-treatment. The group treated with 10 mg mL^{-1} of IT Dex improved more than the group treated with 4 mg mL^{-1}, according to a comparison of the PTA gains in the two groups following treatment.

We found the mean was displayed in the above Table PTA day 0 (mean±s.d.) of patients was 73.2300±15.4918. PTA after 48 hrs (mean±s.d.) of patients was 47.6526±15.1821. Also found in above Table showed that the mean PTA after 72 hrs (mean±s.d.) of patients was 37.0964±19.3508. PTA after 7 days (mean±s.d.) of patients was 26.4526±25.2432. Hara *et al*.[10] (2018) showed need to investigate intratympanic (IT) therapy for the treatment of idiopathic sudden sensorineural hearing loss (ISSNHL). The main outcomes that were measured were the pure tone average (PTA) scores before and after treatment. PTA changes improved by 8.0±19.5 dB (p = .004) for all treatment groups; PTA improved by 13.8±16.6 dB (p<.001) for 31 patients treated $\leq$2 weeks after onset. Utilizing a multivariable generalized linear model for repeated measures, PTA changes for treatment groups adjusted for age, gender, time-to-treatment and vertigo were investigated. Hence our results closely conforms to the data available from various literatures reviewed here. None of the patients included in our study suffered from any long term complications.

CONCLUSION

We concluded that a safe and effective treatment modality for ISSNHL is a combination of systemic and intratympanic steroids, which, if started early, offers the patient the best chance of hearing recovery. Therefore, this study may provide important clinical

information for patient care as well as substantial evidence of improvement for the intratympanic corticosteroid treatment of idiopathic abrupt sensorineural hearing loss.

REFERENCE

1. Rauch, S.D., 2008. Idiopathic sudden sensorineural hearing loss. New. Engl. J. Med., 359: 833-840.
2. Stachler, R.J., S.S. Chandrasekhar, S.M. Archer, R.M. Rosenfeld and S.R. Schwartz., 2012. Clinical practice guideline. Otolaryngo. Head. Neck. Surg., 146: 1-35.
3. Byl, J.,R. and FMJ, 1984. Sudden hearing loss: Eight years' experience and suggested prognostic table. Laryngoscope., 94: 647-661.
4. Lim, H.J., Y.T. Kim, S.J. Choi, J.B. Lee, H.Y. Park, K. Park and Y. Choung, 2012. Efficacy of 3 different steroid treatments for sudden sensorineural hearing loss. Otolaryngo. Head. Neck. Surg., 148: 121-127.
5. Gundogan, O., E. Pinar, A. Imre, S. Ozturkcan, O. Cokmez and A.C. Yigiter, 2013. Therapeutic efficacy of the combination of intratympanic methylprednisolone and oral steroid for idiopathic sudden deafness. Otolaryngo. Head. Neck. Surg., 149: 753-758.
6. Hong, S.M., C.H. Park and J.H. Lee, 2009. Hearing outcomes of daily intratympanic dexamethasone alone as a primary treatment modality for isshl. Otolaryngo. Head. Neck. Surg., 141: 579-583.
7. Ahn, J.H., M.H. Yoo, T.H. Yoon and J.W. Chung, 2008. Can intratympanic dexamethasone added to systemic steroids improve hearing outcome in patients with sudden deafness. Laryngoscope., 118: 279-282.
8. Tsounis, M., G. Psillas, M. Tsalighopoulos, V. Vital, N. Maroudias and K. Markou, 2017. Systemic, intratympanic and combined administration of steroids for sudden hearing loss. a prospective randomized multicenter trial. Eur. Arch. Oto-Rhino-Laryngo., 275: 103-110.
9. Swachia, K., D. Sharma and J. Singh, 2016. Efficacy of oral vs. intratympanic corticosteroids in sudden sensorineural hearing loss. J. Basic. Clin. Physiol. Pharmacol., 27: 371-377.
10. Hara, J.H., J.A. Zhang, K.R. Gandhi, A. Flaherty, W. Barber, M.A. Leung and L.P. Burgess, 2018. Oral and intratympanic steroid therapy for idiopathic sudden sensorineural hearing loss. Laryngo. Invest. Otolaryngo., 3: 73-77.
11. Haynes, D.S., M. O'Malley, S. Cohen, K. Watford and R.F. Labadie, 2007. Intratympanic dexamethasone for sudden sensorineural hearing loss after failure of systemic therapy. Laryngoscope., 117: 3-15.
12. Oue, S., J. Jervis-Bardy, L. Stepan, S. Chong and C.K.L. Shaw, 2014. Efficacy of low-dose intratympanic dexamethasone as a salvage treatment for idiopathic sudden sensorineural hearing loss: The modbury hospital experience. J. Laryngol.. Otol.., 128: 27-30.
13. Yang, W., X. Li, J. Zhong, X. Mei and H. Liu., 2020. Intratympanic versus intravenous corticosteroid treatment for sudden sensorineural hearing loss in diabetic patients: Proposed study protocol for a prospective, randomized superiority trial. Trials., 21: 1-8.
14. Baek, M.K., C.H. Cho, Y.J. Bang, N.R. Oh, M.J. Baek and J.H. Lee, 2018. Hearing outcomes and prognostic factors in idiopathic sudden sensorineural hearing loss patients with combined intratympanic and systemic steroid therapy. Korean. J. Otorhin. Head Neck. Surg., 61: 242-246.
15. Shewel, Y. and S.I. Asal, 2020. Intratympanic injection of dexamethasone 4 mg mL^{-1} versus 10 mg mL^{-1} for management of idiopathic sudden sensorineural hearing loss. Egypt. J. Otolaryngol., 36: 1-6.