

Sudden Sensorineural Hearing Loss - Prognostic Factors

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Abstract: Sudden sensorineural hearing loss (SSNHL) remains a controversial problem with respect to etiology and the factors that might predict prognosis. Sudden sensorineural hearing loss (SSNHL) is commonly encountered in audiological and otolaryngologic practice. SSNHL is most commonly defined as sensorineural hearing loss of 30dB or greater over at least three contiguous audiometric frequencies occurring within a 72-hr period. Although the differential for SSNHL is vast, for the majority of patients an etiologic factor is not identified. We used logistical regression analysis to determine which factors are most strongly related to outcome for patients with SSNHL. In so doing, we employed a retrospective study. The study group consisted of 122 patients (122 ears). The outcome of SSNHL was *cured* (full recovery) in 34, *recovered* (partial recovery) in 62, and *no change* in 26. A detailed history of demographic features, side of hearing loss, previous SSNHL and/or ear surgery, recent upper respiratory tract infection, season of admission, duration of symptoms and the presence of co-morbid diseases was obtained. Radiological and audiological evaluations were recorded and treatment protocol was assessed to determine whether systemic steroids were administered or not. Treatment started ≤ 5 days was regarded as “early” and >5 days as “delayed”.

Keywords: Audiological configuration, delayed treatment, prognostic factors, sudden sensorineural hearing loss, systemic steroids

INTRODUCTION

Sudden sensorineural hearing loss (SSNHL) is defined as an acute onset, within a 72-hour period, with loss over 30 dB, in at least three consecutive frequencies in one or both ears (1-2). However, in clinical practice, the definition is expanded to cases with less than 30 dB loss or in 2 consecutive frequencies (1,3). SSNHL is usually unilateral in 98-99% of cases (4-5).

Many hypotheses have been advanced to explain its etiology: vascular diseases, viral inflammation, trauma, or other lesions. In most cases, the cause of SSNHL cannot be identified. Approximately 85-90% of SSNHL cases are considered idiopathic. The lack of understanding of the etiological mechanism of SSNHL has rendered the development of a specific treatment very difficult and, currently, empirical therapies are used. The prognosis of SSNHL is variously reported as ranging from cured to no change.

The incidence of SSNHL is reported as 5-20/100,000 per year (5). Spontaneous recovery rates are reported to range from 32- 70% by different authors (6-7). Steroids, rheological agents, vasodilators, antiviral, vitamin-electrolyte complexes, anticoagulants and hyperbaric oxygen therapy are being used for SSNHL in form of “gun-shot” therapy (2,7,8,10).

None of the treatment options have superiority on the others in randomized clinical trials (5,9,10). Certain prognostic factors have been defined for SSNHL. Increased age of the patient, presence of vestibular symptoms, accompanying systemic diseases, such as diabetes, hypertension, and hypercholesterolemia, severity of initial hearing loss, longer period between the onset of symptoms and initial therapy are known as poor prognostic factors (10).

The aim of this study is to analyze various prognostic factors in Sudden sensorineural hearing loss outcome.

MATERIAL AND METHODS

A retrospective study was performed involving patients diagnosed with SSNHL between February 2016 and April 2018 in an otolaryngology department of SKIMS-MCH. All subjects with SSNHL who completed full course treatment and attended follow-up examinations were included in the study. The age of the patients was not an exclusion criteria; both adults and children were enrolled in the study group. Patients without radiological and follow-up audiological evaluations were not included. When these assessments were not available from the files, those patients were also excluded. Patients were reviewed in terms of demographic features, side of hearing loss, previous history of SSNHL and/ or ear surgery, recent history of upper respiratory tract infection, season at admission, duration of symptoms before admission, radiological evaluation and results, exploration surgery with suspicion of perilymphatic fistula and results, presence of co-morbid diseases (such as diabetes mellitus, hypertension and other systemic diseases), initial pattern of audiogram, and audiological evaluation at initiation and at the end of the treatment. From the day of presentation, we provided treatment with steroids (prednisolone, 60-mg taper); 24 mg peroral betahistine with 200 mg oral acyclovir 5 times daily. The patients who had uncontrolled diabetes mellitus, coronary heart disease, hypothyroidism, hyperlipidemia, chronic kidney disease and schizophrenia were regarded as contraindications to systemic steroid administration according to internal medicine consultation. Recovery of hearing level to 20 dB HL or less for all frequencies (0.25 kHz, 0.5 kHz, 1 kHz, 2 kHz, and 4 kHz) or an improvement to a level similar to that of the healthy side was designated as *cured* (full recovery). Improvement of 10 dB HL or more (mean hearing level at five frequencies) was evaluated as *recovered* (partial recovery). Other responses to treatment were assessed as *no change*. Time elapsed between onset and treatment initiation was also derived from the records. Treatment initiation ≤ 5 days was regarded as “early” and >5 days as “delayed”, arbitrarily. The audiograms were performed on initial admission and at the end of treatment on the 10th day. Pure tone audiogram (PTA) from 250 Hz to 4000 Hz was taken into consideration for the comparison of groups. The types of initial audiograms were classified as: upward-sloping type (hearing loss more severe in low

frequencies), downward-sloping type (hearing loss more severe in high frequencies), flat type (no more than 10 dB deviation on PTA thresholds) and profound type (PTA thresholds worse than 70 dB on all frequencies).

We evaluated the prognosis for hearing recovery, which was the fixed hearing level, using the criteria established by the Sudden Deafness Research Committee (as described later). Recovery of hearing level to 20 dB HL or less for all frequencies (0.25 kHz, 0.5 kHz, 1 kHz, 2 kHz, and 4 kHz) or an improvement to a level similar to that of the healthy side was designated as *cured* (full recovery). Improvement of 10 dB HL or more (mean hearing level at five frequencies) was evaluated as *recovered* (partial recovery). Other responses to treatment were assessed as *no change*.

RESULTS

The outcome of SSNHL was cured in 34 ears (28%), recovered in 62 (51%), and no change in 26 (21%). The factors most strongly related to outcome were the number of days until presentation age. A longer period until presentation and advanced age were associated with lower rates of recovery. We found no significant relation to outcome for other factors.

The vestibular symptom and initial mean hearing level were most strongly related to outcome. A longer period until presentation, subjective vestibular symptom, advanced age, and profound hearing loss were associated with lower rates of cure. No other factor was significantly related to the outcome. Furthermore, we considered hearing level at five frequencies separately (0.25, 0.5, 1, 2, and 4 kHz). In patients in the no-change and cured groups, hearing levels at 2 and 4 kHz were significantly related to the outcome. Profound hearing loss at 2 kHz and mild hearing loss at 4 kHz were associated with high rates of cure.

DISCUSSION

Sudden sensorineural hearing loss is a sophisticated process with multiple possible etiologies and treatment modalities. Approximately 85-90% are considered idiopathic. Similarly, in this study, 94.5% of the cases were found to be idiopathic (1,2).

The outcome of SSNHL was related to the number of days until presentation and age. A long interval before the presentation and advanced age were associated with lower rates of recovery and cure (full recovery). Furthermore, subjective vestibular symptoms and profound hearing loss were associated with lower rates of cure. Our observation that age is a significant prognosticator differs with that of Moskowitz et al. [11] and Roman et al. [12] but agrees with that in several previous reports [13,14]. According to several reports, advanced age, hypertension, diabetes, and hyperlipidemia are poor prognostic factors, suggesting that microvascular dysfunction in the cochlea gives rise to poor outcome [13,15]. The time elapsing from the onset of hearing loss to the initiation of treatment is reported to be another important prognostic factor; the sooner treatment is initiated, the better the outcome (6,16). Treatment should be started as soon as possible and is probably not helpful after 30 days, as active disease may have resolved and damage may be permanent (17). In our patient group, an arbitrary cut-off value was determined as 5 days in order to define "early" and "delayed" treatment. Recovery rates of early and delayed treatment groups did not differ; however, there was a statistically significant difference when unchanged patients were compared. As expected, starting therapy within the first 5 days lowered the number of patients who failed to respond to treatment. In a way, this might reflect that the initiation of therapy as soon as possible may not guarantee the probability of recovery but helps to lower the incidence of failure.

The treatment of SSNHL is still open to debate, even after 60 years of research. The only treatment that has proven more effective than placebo is the early application of steroids. Cochlear damage seemed to be limited by the anti-inflammatory properties of the steroids [13]. What has become clear is that SSNHL is not the result of a single disease process.

There are no standardized criteria and it is evident that the method of defining recovery has a significant impact on the reported outcome of the study. In this study, treatment failure was defined as hearing recovery less than 10 dB. When stricter values are used, these rates would obviously differ.

CONCLUSION

SSNHL is a common complaint in audiological and otolaryngologic practice. SSNHL is usually an idiopathic disease and both its treatment and outcome parameters remain controversial. We found the prognosis for SSNHL to be better in patients who present early are young and who have mild hearing loss and to be worse in those with vertigo. Although SSNHL treatment is controversial, directed therapy against discernable causes of SSNHL and corticosteroid therapy for idiopathic SSNHL are mainstays of the care of these patients.

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