

Myringotomy with Grommet and Dexamethasone Instillation as a Treatment for Sudden Sensorineural Hearing Loss (SNHL)

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Abstract

Introduction: Sudden sensorineural hearing loss is a common problem in a busy ENT practice. Although many investigations are done, most of the cases, the cause is not known or properly diagnosed. Steroid either oral or injectable either IV or intratympanic is the chief modality of treatment. The common practice is to give intratympanic injection of steroid which is both painful and cumbersome to patients who after the experience of the initial instillation are frequently averse to repeat the procedure over and over again with variable signs of improvement in hearing. We have been averting this whole situation of frequent injection by placing a grommet via a small one time procedure. The steroid is then instilled via drops which is both safe and painless to the patient.

Materials and Methods: We present a series of twenty five patients who presented with SNHL of varying intensity who were treated with myringotomy and grommet and later on Dexamethasone instillation over a period of three years.

Results and Observation: All the patients in our study showed improvement in hearing of varying degrees. The study is however not on the degree of improvement but the presentation of a better more tolerable technique with good results.

Conclusion: Myringotomy with grommet and Dexamethasone instillation is a better technique to the painful and cumbersome technique of Intratympanic Injection which is the routinely used technique for now. We would urge our Otolologists colleagues to widely adopt this technique.

Keywords: SNHL; Intratympanic Injection; Dexamethasone; Myringotomy; Grommet

Introduction

Sudden sensorineural hearing loss (SSNHL) is most often defined as sensorineural hearing loss of 30dB or greater over at least three contiguous audiometric frequencies occurring over 72 hr. SSNHL is a relatively common complaint in otologic and audiological practices (1.5 - 1.7 per 100 new patients presenting in ENT). For

7% to 45% of patients, a defined cause can be identified and specific therapeutic regimen used for treatment. The majority of patients with sudden SNHL have no identifiable cause for hearing loss and are classified as "idiopathic". Despite extensive research, controversy remains in the etiology and appropriate care of patients with idiopathic SSNHL. Regardless of etiology [1].

The treatment is also varied. When surveyed, 98% of U.S. otolaryngologists reported treating idiopathic SSNHL with oral steroids; additionally, 8% of otolaryngologists reported the use of intratympanic steroids. Corticosteroids are thought to improve idiopathic SSNHL by reducing inflammation and edema in the inner ear [2].

Intratympanic (IT) corticosteroids are being increasingly used frequently used in the management of idiopathic SSNHL. IT-steroid application leads to higher perilymph levels of steroids than systemic administration, at least in guinea pigs; however, IT steroids are not absorbed into the systemic circulation [3].

Intratympanic (IT) corticosteroids are cumbersome to apply frequently and requires a great deal of compliance from both the surgeon and patient alike. Furthermore, it is given in sittings like one to two in a week which may not deliver the required quantity of steroid in the middle ear and in frequent intervals. The procedure involves frequent administration of sedation or short GA and is dependent on high skill of the Otolaryngologist.

With Myringotomy and Grommet insertion which is a simple one time procedure in short GA or sedation, it is ensured that the steroid then reaches in the middle ear in higher doses with the convenience of self application. This is also more comfortable and with a higher return in terms of clinical benefit.

We present here, twenty five such patients diagnosed with sudden sensorineural hearing loss who were treated with myringotomy and grommet insertion and then the steroid was instilled in form of drops.

Aim and Objective of the Study

The chief aim and objective of the study was to place emphasis on a novel method of introduction of Steroid into the ear without much effort and with better compliance and possibly with better results.

Materials and Methods

Twenty five patients with SNHL were taken up for study. They underwent Myringotomy with Grommet under GA or short sedation and the steroid was instilled as drops.

One ML of Dexamethasone injection has approximately 1 mg of Dexamethasone. Approximating that every ML may have around

16 drops and total 12 - 14 drops are placed inside the canal; we can assume that around 1 mg of Dexamethasone is instilled in the middle ear every day. They were followed up for a minimum period of three months for the position of grommet and improvement of hearing. They were urged to place the steroid drops for minimum one month and most had extrusion of the grommet in around two to three months.

Inclusion criteria:

- Patients with sudden sensorineural hearing loss.
- Patients in whom the cause has not been properly diagnosed.
- Patients in the age group of adults between 15 years and older.

Exclusion criteria:

- Hearing loss with recognizable cause.
- Hearing loss which is purely conductive in nature and/or chronic in nature.
- Patients who were not amenable for follow up.

Observation and Results

A total of 25 patients were selected for this study. The youngest patient was 32 years old and the oldest patient was 68 years old. All had undiagnosed unilateral sensorineural hearing loss without any obvious cause. Ten patients were males while fifteen were females in the study. Audiogram was taken immediately after the patient presented with hearing loss and this was repeated in one month after initiation of treatment.

Myringotomy with Grommet was done in short General Anaesthesia in twenty four patients while in one patient who refused General Anaesthesia, it was done in Local Anaesthesia with Lignocaine 2 percent infiltration.

All underwent the procedure well and a loading dose of steroid was given on the table itself. All patients were discharged within 24 hours and were asked to start the steroid drops as soon as possible. The drops were prepared under sterile condition by either the authors or by the nursing staff. A regular sterile antibiotic ear drops were taken and emptied out and four to five ampoules of Dexamethasone injection was injected into the bottle.

The patient was instructed to use the drops in the dose of 3 to 4 four drops three times a day for two to four weeks.

Two of the twenty five patient had mild nausea after the grommet insertion which subsided completely with anti reflex medication.

Three patients had mild burning while applying the drops in the ear which settled in a day or two and they were able to tolerate the drops subsequently without any issues.

All other patients tolerated the drops without any issues and no one developed any infection.

The first follow up was after one week when the state of the grommet was assessed and then the topping of drops was done. The second follow up was done after one month and around twenty of the patients had grommet in the canal while in the remaining five, the grommet extruded in the canal in around three months. The Grommet was removed in the out patient department without any issues.

The first Pure tone Audiometry was done immediately which confirmed the diagnosis and the degree of loss.

The loss ranged from 40 decibels which was the least loss and the highest loss was around 78 decibels. Both being Pure Tone Average. All the loss was in the speech range of between 250 Hertz and 4k Hz.

The second Pure Tone Audiometry was performed after first month and the results were analysed.

There was no case of any persistent perforation and there was no incidence of any middle ear infection in any of the patients. The finding was that even in the late stages of extrusion of Grommet from the Tympanic Membrane, the inner layer would already been in the closed stage.

In around twenty patients there was almost complete recovery of hearing in all the frequency. The report was then given as normal hearing. This was also spontaneously perceived by the patient who was happy with the result.

In four of the patients the results were varied.

Two patients who had pre therapy loss of 62 db and 72 db respectively had hearing average of 34 db and 42 db respectively after treatment.

The remaining two had pre therapy loss of 58 db and 68 db and had recovered hearing of 45 db and 50 db respectively. The improvement in both these cases were not much perceived by the patients. In comparison to the other normal ear, the hearing loss ear was not perceived to be improving which was an expectation mismatch.

Discussion

In one of the early studies by Wilson W R., *et al.* [4], double-blind studies were conducted for the treatment of idiopathic sudden hearing loss (ISHL) with oral steroids. The condition was defined as not less than a 30-dB loss over three contiguous frequencies in three days or less. Follow-up audiograms were obtained four weeks and three months later. Specific audiologic guidelines for the assessment of hearing recovery were used to ensure objectivity. They concluded that steroids had a statistically significant effect on the recovery of hearing in patients with moderate hearing losses. They also opined that the nature of the hearing loss and its susceptibility to improvement with steroid therapy lend support to the hypothesis that viral colitis is the primary cause of ISHL.

Benjamin., *et al.* [5] opined that Sudden Sensorineural Hearing Loss (SSNHL) is a medical emergency requiring immediate attention as delayed treatment can lead to permanent and devastating consequences. Primary care physicians are likely the first to be presented with SSNHL and therefore have the crucial role of recognizing it and initiating timely and appropriate management. The aim of this study was to gain insight into the current knowledge and practice trends pertaining to the diagnosis and management of SSNHL among family physicians in Canada. An 18-question survey targeting Canadian family physicians was marketed through two, physician-only discussion groups on the social media platform Facebook. Responses were collected between August 1st and December 22nd 2019 then aggregated and quantified.

They found that 52 family physicians submitted responses. 94.2% (n = 49) reported that in their practice, unilateral SSNHL warrants urgent referral to otolaryngology and 84.6% (n = 44) reported that unilateral sudden-onset hearing loss warrants urgent

referral for audiological testing. 73.1% of participants (n = 38) reported that they would attempt to differentiate between conductive and sensorineural hearing loss if presented with unilateral, acute or sudden-onset hearing loss. 61.5% (n = 32) would rely on tuning fork tests to inform management decisions, as compared to 94.2% (n = 49) relying on case history and 88.5% (n = 46) on otoscopy. 76.9% (n = 40) would prescribe corticosteroids if presented with confirmed, unilateral SSNHL.

They concluded that the majority of family physicians in the study would make appropriate referral and treatment decisions in the management of SSNHL, understanding it is a medical emergency. Tuning fork tests are under-utilized for informing management decisions compared to other means of differentiating conductive and sensorineural hearing loss. Further research is needed to understand why some family physicians do not prescribe corticosteroids for treatment of SSNHL, which may then identify any gaps in knowledge or inform improvements in clinical protocol. This and many other article does conclude that Steroids are in fact the treatment of choice in the management of SNHL. Our study also used exclusive steroid in a better delivery system for the management of SNHL.

Nima LS, *et al.* [6] sought to assess and compare the current management of sudden sensorineural hearing loss (SSHL) between primary care physicians and general otolaryngologists. This was a study design of Written survey of physician practice patterns. The method involved a multiple choice and Likert scale survey was mailed to 1306 otolaryngologists and primary care physicians in the upper midwest with respect to management of SSHL. The results they obtained included that a significant number of general practitioners treat SSHL independent of an otolaryngologist. General practitioners are significantly less impressed than otolaryngologists that steroids are an effective treatment ($P < 0.0001$). Over 98 percent of otolaryngologists use oral steroids as compared with 73 percent of general practitioners treating on their own. The vast majority of otolaryngologists start therapy with at least 60 mg of prednisone whereas lower doses and medrol dosepaks are more commonly used by general practitioners. Otolaryngologists are more likely to treat with steroids beyond one week of onset of hearing loss whereas general practitioners overwhelmingly will only treat within the first week. Approximately 50 percent of oto-

laryngologists add antiviral medications in contrast to 16 percent of generalists.

They concluded that the approach to SSHL differs between otolaryngologists and general practitioners. The lack of strong evidence-based guidelines for the treatment of SSHL may underlie the variability in management by first line providers.

Slattery WH, *et al.* [7] conducted a clinical trial of intratympanic steroid injection for idiopathic sudden sensorineural hearing loss in subjects who failed oral steroid therapy. The study design was an Open-label methylprednisolone injection clinical trial in a tertiary neurotologic referral center. Twenty subjects (14 males; 6 females) received 4 injections within a 2-week period (4 days apart). Hearing, dizziness, and tinnitus were evaluated before and after treatment.

They observed that there were no serious unexpected adverse events and 2 types of expected adverse events (tympanic membrane perforation, nausea after injection). No increases in dizziness or tinnitus lasting longer than 24 hours were observed after injections. One of 20 (5%) improved to near-normal hearing. In addition, there was statistically significant improvement in 4-frequency pure-tone average and speech discrimination score at 1 month after treatment. They concluded that four intratympanic injections of methylprednisolone improved pure-tone average or speech discrimination scores for a subset of sudden hearing loss subjects that failed to benefit from oral steroids.

There were very few trials on this particular method of treatment of SNHL. In one such trial Tsz Chang, *et al.* [8] also conducted a randomized trail to compare different means of intratympanic steroid delivery in the treatment of idiopathic sudden sensorineural hearing loss. Their design was a prospective, multicentered, randomized controlled trial. The setting and participants were Fifty-six patients who fulfilled the inclusion criteria for idiopathic sudden sensorineural hearing loss who failed or were contraindicated for oral steroids were included in this study. Patients were randomly divided into 2 groups according to delivery methods: group A received 4 sections of intratympanic dexamethasone injection and group B received grommet placement with dexamethasone delivery followed by 3 sections of dexamethasone ear drop application. Self-administered paper-based questionnaires were

filled out to measure subjective pain scores, vertigo, anxiety, and overall satisfaction immediately after each procedure. Hearing threshold was measured with pure tone audiogram in the follow-up. The results however show that was no statistical significance detected in hearing threshold improvement between both groups ($P = 0.30$). Grommet placement followed by dexamethasone ear-drop application demonstrated a significant difference in shorter waiting time (24 min in grommet group vs 52 min in injection group; $P < 0.01$); and better overall satisfaction (1.6 in grommet group vs 2.5 in injection group; $P < 0.05$). They thus concluded that Grommet placement followed by dexamethasone eardrop application is a good alternative for a patient indicated for intratympanic steroid, with less administrative cost, shorter waiting time, and more satisfaction.

Since even this study is limited by the numbers, the benefit may not be representative but the method of administration of steroid into the middle ear is most definitely better in terms of patient satisfaction and follow up.

Conclusion

Sudden sensorineural hearing loss is a common entity in the ENT practice with unrecognizable cause in most of the cases. Steroid is the main stay of treatment world over especially since no other treatment has been shown to be as effective. The delivery of steroid is usually done via oral, Parenteral or by Intratympanic infusion. Since Intratympanic infusion is a difficult and cumbersome process, we thus present a better and more effective way of delivering steroid to the middle ear. Myringotomy is a simple effortless surgery which in experienced hands can be done in a few minutes and then the Grommet insertion is also easy. After that the instillation of Steroid drops is both easy and more compliance ensuring. Given the small sample size, this study is not intended to demonstrate the efficacy of steroid in treatment of SNHL but to demonstrate a better technique for the delivery.

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