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Research Article

Combined Treatment of Intratympanic and Systemic Corticosteroids in Patients with Sudden Sensorineural Hearing Loss

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Abstract

Introduction: Sudden sensor neural hearing loss is an emergency of low incidence. Its treatment also presents controversial points and has been widely studied; the most recent evidence shows superiority in treatment with systemic and Intratympanic corticosteroids.

Objectives: To expose the experience of the Otolaryngology Service of Unicamp Hospital in cases of sudden sensorineural hearing loss and evaluate the therapeutic response of patients undergoing treatment with intratympanic corticosteroids and / or systemic.

Methods: A retrospective, descriptive study that evaluated all patients with sudden deafness treated at the clinic in a tertiary care hospital in the period from 2013 to 2015. Epidemiological, clinical and pre and post therapy audiometric were analyzed.

Results: The medical records of 11 patients were evaluated, most were idiopathic (n=8). 54% of patients were female and 46% male, aged between 16-54 years, mean 39 years. Of the 11 cases submitted to the application of intratympanic corticosteroids, 1 had improved pure tonal average (PTA) and SRT, 2 patients had improvement of the PTA alone and 2 only of the SRT. The remaining patients had no change in audiometric parameters and 3 showed progression of hearing loss.

Discussion: Several studies have demonstrated the benefit of corticosteroid therapy in the recovery of hearing loss in patients with sudden deafness, but adding intratympanic therapy for systemic therapy still has no proven benefits in the recovery of hearing.

Conclusion: There was improvement of the hearing in 45% of patients with sudden deafness treated with combination steroids, improvement of 20 dB PTA and 20% in SRT.

Keywords: Sudden hearing loss; Sudden deafness; Intratympanic steroid treatment; Steroids treatment

Introduction

Sudden sensorineural hearing loss (SNHL) is an ENT emergency, with a low incidence, about 4,000 new cases per year in the United States with a prevalence of 5 to 20 per 100,000 inhabitants. Early diagnosis and treatment should be established to improve the recovery of hearing of patients and quality of life [1].

SNHL is defined as a rapid onset hearing loss, which occurs within 72 hours, as described by the patient as a subjective sense of hearing loss in one or both ears. Hearing loss is sensorineural hearing with decreased ≥30 decibels (dB), affecting at least three consecutive frequencies, if no prior audiometry is present the opposite ear thresholds may be considered as normal standard [1].

There are various etiologies of sudden hearing loss, among which the most important are infectious (herpes zoster, meningitis, syphilis, CMV infection), diseases of the inner ear (Meniere, otosclerosis, ototoxicity, autoimmune diseases), trauma, cardiovascular disease, cancer and multiple sclerosis. However, only 10-15% of cases have an identifiable cause, and most causes turns out to be idiopathic. It is believed that these idiopathic cases there is a viral factor or vascular involved [1,2].

Several treatment strategies have been proposed for these patients, including the use of vasodilators, thrombolytic agents, antioxidants, antiviral agents, hyperbaric therapy, among others. The most widely accepted is the use of steroids administered systemically and / or intratympanic [3].

Steroids showed a superior effect compared to other substances due to their ability to prevent the reduction of cochlear blood flow, reduce the area of the groove vascular degeneration and its antioxidant effect [4]. The use of intratympanic corticosteroids generates a higher concentration in the inner ear to any another route of administration, leading to better outcomes for being an organ-specific therapy [1-9].

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Table 1: Clinical and epidemiological data.

Cases	Gender	Age	Cause	Comorbidities	Therapy
1	F	16	SSI	-	O + IT
2	F	18	Autoimmune	Juvenile Arthritis	O + IT
3	M	46	Barotrauma	-	O + IT
4	F	30	ISNHL	-	O + IT
5	F	52	Meningioma	AH	O + IT
6	M	54	ISNHL	AH, Hepatitis C	O + IT
7	M	46	ISNHL	DM	O + IT
8	F	35		-	O + IT
9	M	52	ISNHL	Hepatitis C	IT
10	F	29	ISNHL	Anxiety disorder	IT
11	M	51	ISNHL	DM, AH	IT

F: Female; M: Male; AH: *Arterial Hypertension*; DM: Diabetes mellitus; ISNHL: Idiopathic Sudden Sensorineural Hearing Loss; O: Orally; IT: Intratympanic.

Therapy with steroids, either systemic or intratympanic, combined or isolated is being widely studied. Many of the studies comparing groups submitted to corticosteroid therapy versus placebo have shown better results with the combined treatment. Furthermore, it was found that the audiometric responses are related to the length of treatment and the dose [5-8].

Aim

To expose the experience of university hospital in cases of sudden sensorineural hearing loss and evaluate the therapeutic response of patients undergoing treatment with intratympanic corticosteroids and / or systemic.

Methods

This is a retrospective descriptive study, which evaluated all patients with sudden sensorineural hearing loss treated at the otolaryngology service of a tertiary hospital, from 2013 to 2015.

It was performed analysis of epidemiological data, and clinical response to treatment with systemic corticosteroids and / or intratympanic through a chart review. The following variables were analyzed: gender, age, presence of comorbidities, cause of SNHL, associated symptoms, type of therapy used, time between onset of deafness and the beginning of treatment, number of intratympanic applications and range of applications.

Patients underwent audiometry and vocal pre and post treatment. Pure tone average (500Hz, 1000Hz and 2000Hz), speech discrimination score (SDS) and speech reception threshold (SRT) were evaluated.

The medications administered during the study period were systemic prednisone with a dose of 0.5mg / kg / day to 1mg / kg / day and via intratympanic dexamethasone, at a dose ranging from 2 to 4mg. Those patients who had clinical contraindication to the use of systemic corticosteroids, received exclusively via intratympanic therapy.

Criteria for improvement: Adequate clinical response was considered for the patient with improvement of 20 dB in the frequencies of 0.5, 1 and 2 KHz or 20% improvement in discrimination, to consider the therapeutic intervention successful.

Table 2: Therapeutics and results.

Case	Therapy	NA	Pre Corticosteroids			Pos Corticosteroids		
			PTA	SDS	SRT	PTA	SDS	SRT
1	O + IT	4	95,0	0	90	91,6	0	70
2	O + IT	3	Cofosis	0	Null	Cofosis	0	Null
3	O + IT	1	38,3	88	45	36,6	88	35
4	O + IT	2	105,0	0	Null	82,3	0	Null
5	O + IT	2	93,3	0	Null	70,5	0	Null
6	O + IT	2	103,3	0	Null	90,0	0	null
7	O + IT	4	46,6	88	40	70,0	76	75
8	O + IT	4	100,0	0	100	51,6	84	25
9	IT	3	61,6	80	55	73,3	0	75
10	IT	1	60,0	84	60	61	84	60
11	IT	4	81,6	0	80	78,3	72	85
Mean	-	-	64,3	64,0	67,1	62,9	62,0	60,8

PTA: Pure Tone Average; SDS: Speech Discrimination Score; SRT: Speech Reception Thresholds; NA: Number of Applications.

Results

Eleven cases of sudden sensorineural hearing loss were diagnosed in the period surveyed, was 54% of the patients with SNHL were female and 46% were males, the age ranged from 16-54 years, mean 39 years. The etiology, the majority was caused by the idiopathic sudden sensorineural hearing loss (n=8), the other etiologies were: autoimmune (n=1), barotrauma (n=1) and meningioma (n=1). Most of the patients had tinnitus (n=8) and dizziness (n=5) at the beginning of the frame, and right ear the most affected (n=7). Regarding comorbidities, the most frequent were: hypertension (n=3), diabetes mellitus (n=2) and Hepatitis C (n=2). As Table 1.

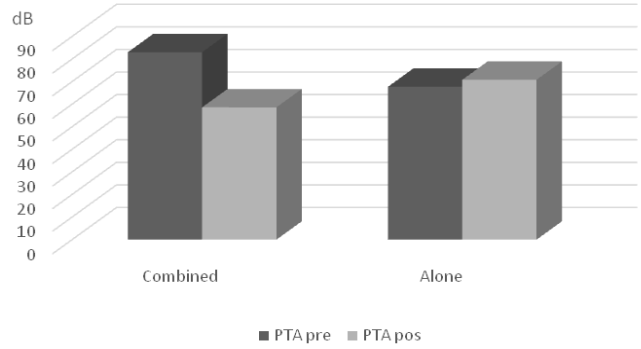
Among the patients treated, three had contraindication to the use of systemic corticosteroids: a patient with hepatitis C and advanced liver involvement, one with decompensated Diabetes mellitus and patient refusal for the same.

The average number of applications was 3 doses per patient (minimum 1, maximum 4), with an interval of seven days between each application in all patients studied. Some patients do not tolerate other applications and treatment was discontinued after the first application (n=2). The time interval between the onset of the sudden deafness and the beginning of treatment ranged from 3 days to 40 weeks, 12 weeks medium.

Of the 11 cases submitted to the application of intratympanic corticosteroids, Eight patients also received systemic corticosteroids, and of these, 1 had improved pure tone average (PTA), SDS and SRT; 2 only the PTA and 2 only the SRT. The other three did not show changes in the audiometric parameters (Table 2).

Comparing PTA among the groups that were just submitted to intratympanic therapy with patients who underwent combined therapy was seen that those undergoing combined treatment showed better results (Graph 1).

Regarding the follow-up of these patients, 6 patients started using hearing aid (HA), one is waiting for unilateral cochlear implant, 1 waiting implantable prosthetic bone conduction and 3 lost follow-up.



Graph 1: PTA comparison between groups.

Discussion

The need for treatment of sudden sensorineural hearing loss is still controversial in some respects, mainly due to ignorance of its pathophysiology [10]. Some authors in the past believed that expectant management before a SNHL frame generates final audiometric results similar to cases that are subjected to any form treatment proposed by the otolaryngologist [11].

The use of systemic steroids in the treatment of SNHL redemption is one of the most accepted practices in the literature, although limited because of their side effects such as gastric ulcers, insomnia, mood changes, and in the case of contraindications to its use. In these cases the indication of the use of intratympanic steroid becomes the choice of therapy [12].

The SNHL is easily diagnosed, but attention should be paid to the differential diagnosis, since some pathologies begin the frame with sudden sensorineural hearing loss, such as meningioma, which also present the first case in our sample [5,8]. So the need for additional tests (such as computed tomography or magnetic resonance imaging) in those cases where there is a hearing improvement over a period of time.

The most frequent symptoms present at diagnosis of the SNHL, reported in this study were dizziness and tinnitus, which is consistent with other studies. Other manifestations described in the literature related to SNHL, are symptoms of upper respiratory infections, ear pain and fullness headset [7].

In a recent systematic review evaluating the use of intratympanic corticosteroids in patients with SNHL, concluded that intratympanic steroids have equivalence to treatment compared with high doses of prednisone orally. Thus the rescue therapy with intratympanic steroids offers additional potential for hearing recovery, although it remains uncertain whether this improvement is clinically significant and what percentage of patients are likely to show benefit [13]. Some studies suggest hearing improvement ranging from 53-90% of patients [8]. A US study showed an improvement in 73% of patients, regardless of gender, age and medical illnesses associated with the patient [14]. In another Chinese study, patients with severe and profound SNHL had a recovery rate of 44.4% and 9.5% respectively [12].

A meta-analysis evaluating the use of systemic and intratympanic corticosteroids in patients with SNHL highlighted the paucity of randomized controlled trials with control groups. It has been shown that treatment of redemption in patients who have not responded to other therapy had an additional advantage, although this result should be interpreted with caution, given the poor quality of the methodology of the tests published [3].

In this case series, three patients only used the steroids via intratympanic and did not obtain improvement in their hearing loss, however, had worsening of pure tone thresholds and SRT long-term (3month average). This deterioration is difficult to explain because the study designs, small sample size and heterogeneity between groups. In common, two of the patients had comorbidities unmatched clinically, which may have exacerbated the degree of cochlear injury, one with Hepatitis C and other DM and hypertension. The third patient had anxiety disorder but no correlation is found in the literature regarding the use of anxiolytics and hearing disorder. The mean number of applications was three, which is consistent with that used in other studies, which suggest more than one application [15,16].

In the group of patients undergoing the combined therapy has shown an improvement in PTA 45% of the sample (n=5). We associate this favorable result to be better employed therapeutic response seen the increased level of systemic corticosteroids and cochlear, however this group had a higher sample cannot be compared to the group only submitted to intratympanic therapy.

This paper presents some biases of confusion due to small sample size and heterogeneity enters treatment groups. Also to be retrospective, there was a lack of a standard protocol for the application of intratympanic corticosteroids as well as failure to follow these patients, which a significant number lost follow-up and could not make new audiometric testing at a later time period the same applications all patients, which compromises our assessment, however the results are consistent with other studies in the literature suggest that the benefit of treatment of intratympanic corticosteroids for many of the patients presenting with sudden deafness. Future studies are needed to determine what factors related to the success rate of sudden deafness treatment with intratympanic corticosteroids.

Conclusion

There was hearing improvement in 45% of patients with sudden deafness treated with combination steroids with an improvement of 20 dB pure tone average and 20% in speech recognition threshold.

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