

Vestibular Neuronitis Characteristics of Its Neurotological Findings

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Abstract Neurotological follow-up observations were conducted on 38 out of 43 cases of vestibular neuronitis treated between 1972 and 1983. The observation period was one year and three months in average ranging from one month to nine year and four months, and seventeen cases were followed for more than one year. The tests used for evaluation in this series were the following; spontaneous nystagmus, head positional nystagmus, a caloric test and a computed galvanic body sway test conducted by Yamaguchi University. Changes in subjective symptoms are also noted. 1) In fifty percent of the cases, vertigo subsided by the end of the three months period, but six subjects suffered from an intractable dizzy sensation for over one year. 2) Spontaneous nystagmus, which was usually horizontal and direction-fixed, remained in 50% of the cases at the one year period. 3) Thirteen of the 21 cases with no caloric response at the time of the initial test were examined twice or more in caloric testing. Five of these 13 cases did not recover in the caloric test even over one year. 4) Computed galvanic body sway test reveal a reduced response of body sway induced by galvanic stimulation; slow sluggish response of body sway is unique to vestibular neuronitis. This slow response returned to the normal range in 76.0% of the tested cases. These findings suggest that the prognosis of vestibular neuronitis is poorer than it was expected to be, especially in the case of subjects who have no caloric response to the initial test.

Key Words: Vestibular neuronitis, Spontaneous nystagmus, Caloric response, Computed galvanic body sway test, Slow sluggish pattern

Introduction

Clinical picture of vestibular neuronitis is characterized by sudden severe rotatory vertigo with a loss of caloric response on the affected side and spontaneous horizontal or rotating nystagmus to the healthy side without any accompanying auditory deficit. There are no symptoms from the other cranial nerves. Often there has been preceding viral infection of upper respiratory airways.

The etiology of vestibular neuronitis is still unknown, but the disorder has been linked to neuronitis of vestibular nerve caused by infection (Dix and Hallpike, 1952; Coats, 1969)^{1,2}. Only a few cases have been examined at autopsy (Lindsay & Hemenway, 1956 ; Schuknecht & Kitamura, 1981)^{3,4} because of the benign character of the disease. These reports show nerve cell degeneration of the vestibular nerve with intact or only a partially degenerated end organ, similar to the

pathological change of subjects with Hunt's syndrome⁵⁾.

The central purpose of this paper is to discuss the progress of periodically checked neurotological findings including computed galvanic body sway test (Yamaguchi University) in the long follow-ups for over one year and to detect whether or not signs of a good prognosis exist in vestibular neuronitis.

Material and Methods

The present material consists of 38 out of 43 consecutive patients of the Department of Otorhinolaryngology of Yamaguchi University, diagnosed as vestibular neuronitis treated between 1972 and 1983. There were 23 men and 20 (15) women aged 4 to 65 years (mean age 38 years), who all had experienced spontaneous horizontal nystagmus to the healthy side and total or partial unilateral vestibular loss in caloric tests. The patients still experienced normal symmetric hearing and without any other causative disease in the central lesion during the course of the disease. Neurotological follow-up observations were conducted on 38 out of 43 cases. The average observation period was one year and three months (range was one month to 9 years and 4 months) and seventeen cases were followed for more than one year. Tests used for evaluation in this series were the following: spontaneous nystagmus, head positional nystagmus and a caloric test in which ice water of 0°C (20 ml/10 sec) was also tested if the 30°C and 44°C (240 ml/40 sec) caloric responses were null. All these were recorded by ENG. Computed galvanic body sway test (Yamaguchi University)^{18,19)} and changes in subjective symptoms were also evaluated.

Results

The age distribution of the 43 patients ranged from 4 to 65 years. In both male and female, vestibular neuronitis chiefly affected the 20 to 50 age group (Fig. 1). Recalling the symptom of vertigo at the onset, the record showed that 35 of 39 patients (89.7%) resported rotatory vertigo and only four

patients reported floating sensations and unsteadiness (Table 1). In the follow-up observation, almost all patients reported feeling better, but having an "off balance" sensation, when turning their heads quickly. From the histories, the preceding symptoms were noted: in 17 patients, the "common cold"; in one, diarrhea; in another one, eruption of a skin rash. In 15 patients there was no mention of any common cold, diarrhea, or skin rash, and in eight patients all of the preceding symptoms were unknown (Table 2).

Subjective symptoms

The changing process in subjective symptoms over time can be observed in Table 3. The percentage in the parentheses indicates the ratio of the patients who had symptoms continuously during the described periods. At three months after the onset, 50% of the patients reported having no subjective symptoms. However, some patients suffered for more than one year from a "loss of equilibrium", especially when changing their head or body position, accompanied by a heavy sensation in their head.

Spontaneous nystagmus and positional nystagmus

Spontaneous nystagmus and positional nystagmus were observed under Frenzel's glasses and with ENG recordings. It should be noted that, by objective measures, nystagmus remained longer compared to the results suggested by subjective symptoms (Table 4). At three months period, 24 of 38 patients received the follow-up examination. In 19 of 24 patients (79.2%), both objective and subjective symptoms were observable, while 14 patients reported experiencing no subjective symptoms at this time and did not appear for a follow-up examination. Nystagmus was observed in four patients even after three years and, in two of these four patients nystagmus was accompanied by subjective symptoms.

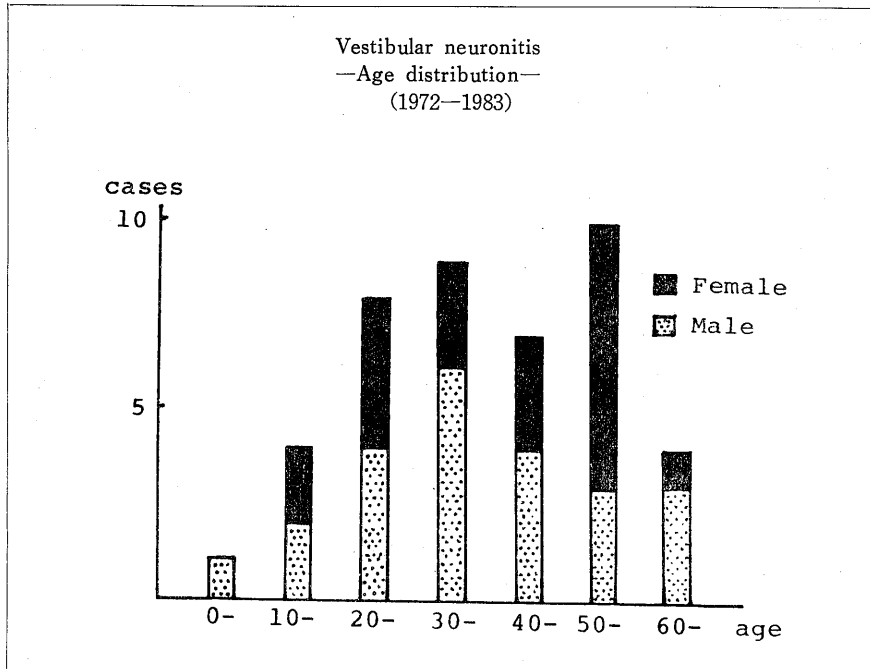


Fig. 1

Table 1 Vestibular neuronitis
—Types of vertigo at the onset—

	Number of cases
Rotatory vertigo	35
Floating sensation & Unsteady feeling	4
Unclear	4
	43

Caloric test

In the progress of the result of caloric tests there were 22 patients who could be monitored satisfactorily. In 22 patients there were thirteen with no caloric response, even with ice water stimulation, nine with severe to moderately reduced caloric response with 30°C cold water (Fig. 2). Five of the 13 subject no caloric response group in the

Table 2 Vestibular neuronitis
—Preceding symptoms—

Symptom	Number of cases
Common cold	17
Diarrhea	1
Skin rash	1
Tonsillitis	1
None	15
Unclear	8

initial test, 38.5%, were normalized in later caloric tests. Three of these five patients recovered normal response within a month. Five patients of the 13 subject no caloric response group remained unimproved for over one year, but many cases tested initially in the reduced caloric response group sho-

Table 3 Vestibular neuronitis
—Duration of subjective symptoms remained—

Observation period	cases (%)
after onset	
1 week	38/38 (100 %)
1 month	26/35 (74.3%)
3 "	16/32 (50.0%)
6 "	11/28 (39.3%)
1 year	6/27 (22.2%)
2 "	4/25 (16.0%)
3 "	3/24 (12.5%)
5 "	1/22 (4.5%)

Table 4 Vestibular neuronitis
—Duration of spontaneous and positional nystagmus remained—

Observation period	cases (%)
after onset	
1 week	38/38 (100 %)
1 month	30/33 (90.9%)
3 "	19/24 (79.2%)
6 "	14/21 (66.7%)
1 year	8/18 (44.4%)
2 "	5/16 (31.3%)
3 "	4/15 (26.7%)
5 "	1/12 (8.3 %)

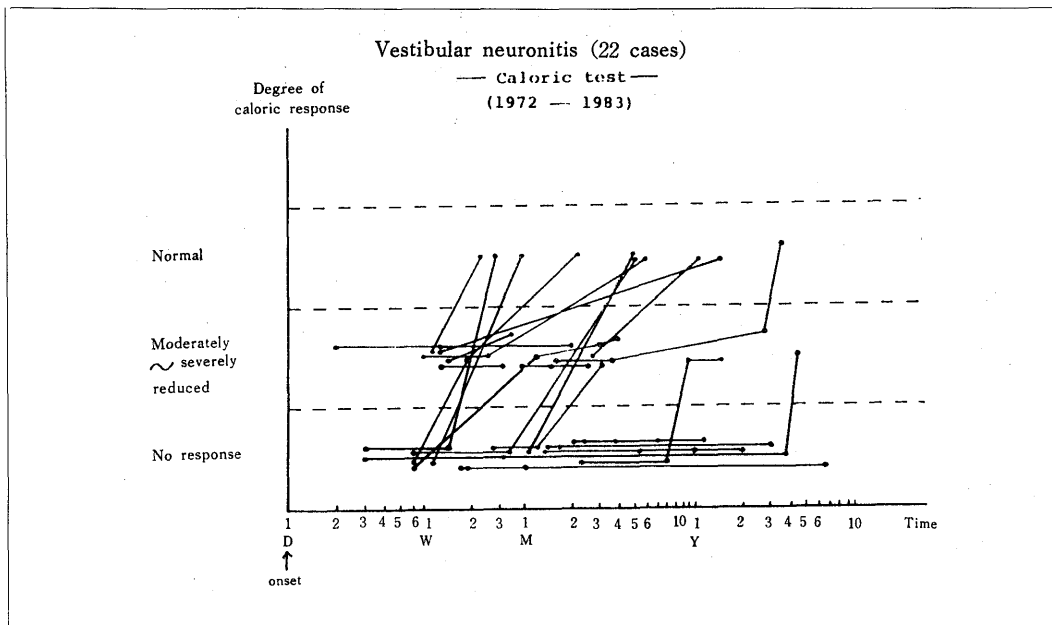


Fig. 2

wed a recovery of caloric response at the time of the later tests. In three of these five patients with continuous no caloric response, subjective symptoms and positional nystagmus under Frenzel's glasses as an objective finding had continued to remain for further

longer periods (Table 5). In case no. 3, subjective symptoms continued to remain for two years and three months and positional nystagmus also remained for three years and five months. Compared to the rate of 38 cases at the time of one year (Table 3, 4),

Table 5 Vestibular neuronitis
—5 cases of no caloric response—

Case No.	Observation period (from onset to first exam.)	Subjective symptoms at the last exam.	Positional nystagmus at the last exam.	Interval B (sec.) of GBST	Treatment (Steroid) (from onset to starting medication)
1	2 years (30 days)*	+	→	2.4→0.8	(-)
2	3 years (40 days)	+	←	1.2→1.1	Hydrocortisone (1900 mg) (43 days)
3	4 years and 6 months (2 days)	-	○	1.5→0.8	Hydrocortisone (1600 mg) (8 days)
4	1 year and 4 months (11 days)	+	↻		(-)
5	6 years and 9 months (10 days)	-	○	1.4→1.2	Hydrocortisone (2750 mg) (14 days)

*Parentheses show the period of first examination after the onset
Note: GBST (See the text)

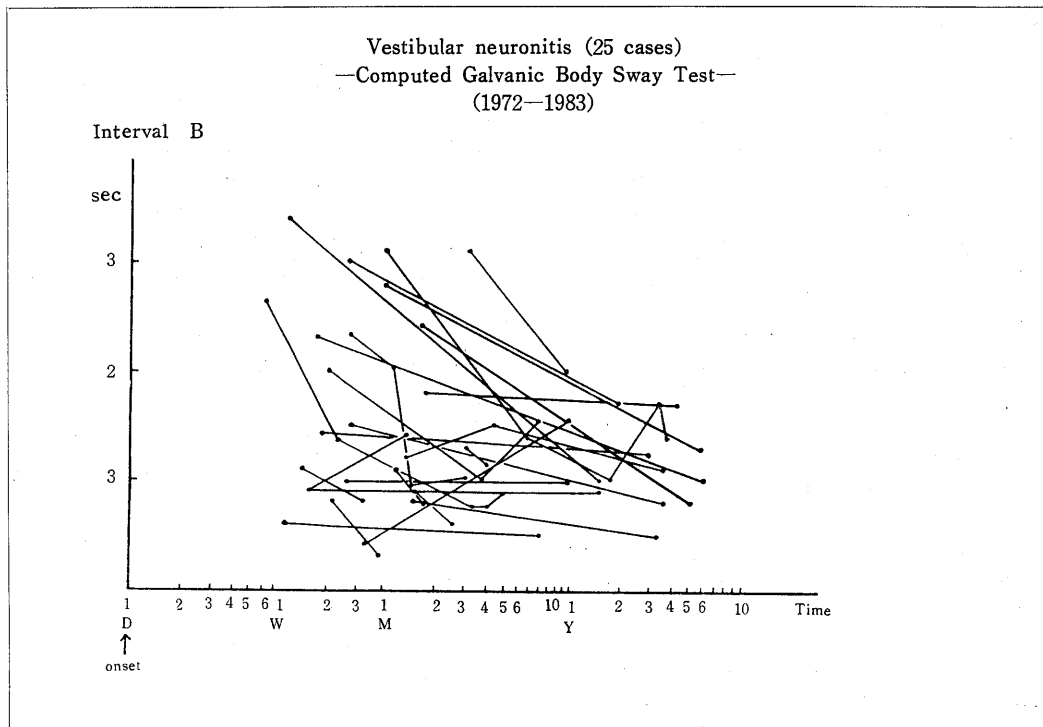


Fig. 3

these four of five cases with continuous no caloric response remained subjective symptoms and positional nystagmus at the higher rate.

Galvanic body sway test (GBST)

We applied the Computed GBST to 25 patients who performed twice or more in the follow-ups. Head and body sway elicited by galvanic stimulation was recorded by two small accelerometers on a helmet. Galvanic stimulation was usually 0.6 mA, induced by unilateral anodal electrodes on the mastoid area. A computer was used to average the response to eight repeated stimuli. The analysis time for each response was 20 seconds and the current stimulus lasted for 10 seconds. We paid special attention to the evaluation of a time of Interval B, the time length of the induced head-body deviation. Prolonged Interval B is frequently seen on the affected side in vestibular neuronitis suggesting some peculiarity^{6,8)}. From the results of the follow-up examination, it was found that the duration of the abnormally prolonged Interval B of 10 patients were all reduced in the process, showing improvement and normalization (Fig. 3). Furthermore, from a comparative point of view, each GBST and caloric test was discussed and measured for its effectiveness in evaluating the prognosis of the disease (Table 6). GBST was improved, whereas caloric test remained unimproved, in six out of 15 patients who improved in at least GBST or the caloric test. But at present we cannot determine the characteristics of that problem and should do further study to make this point clear.

The comparison between a steroid-treated group of 11 cases and a non-steroid-treated group of 15 cases was also discussed at the time of three months later after onset (Table 7). The steroid-treated group consisted of four men and seven women aged 18 to 55 years (mean age 36.9 years), and the non-steroid-treated group, 10 men and five wom-

Table 6 Vestibular neuronitis

—Parallelism of the responses of computed GBST and caloric test in the recovery process—

A. Improved cases	15
Only GBST	6
Only Caloric test	1
Both at the same time	8
B. Not improved	2
17 cases	

Table 7 Vestibular neuronitis

—Effect of Steroid Therapy—

	Steroid improved rate (%)	Other drugs improved rate (%)
	cases	
Subjective symptoms	7/9 (77.8%)	6/12 (50.0%)
Nystagmus	5/10 (50.0%)	5/11 (45.6%)
Caloric test	5/7 (71.4%)	4/7 (57.1%)

en aged 17 to 61 years (mean age 37.9 years). Administration of steroids proceeded as follows: 1) an infusion of Hydrocortisone was dropped through the I.V. route in eight cases; 2) Betamethazone was administered orally in three cases. Steroid therapy began an average of two week after onset. No statistical difference of the disease process exists between the non-steroid-treated group and the steroid-treated one.

Discussion

Neurological follow-up observations carried out on 38 out of 43 patients diagnosed as vestibular neuronitis. The criteria of vestibular neuronitis is as follows: sudden onset of vertigo with total or partial unilateral vestibular loss of function and without hearing impairment or any symptoms of central nervous involvement. All patients had spontaneous nystagmus to the healthy side and either no caloric responses or reduced caloric responses on the affected side. There were no subjects who had

cochlear symptoms during the follow-ups or changed into the disorder similar to Ménière's disease. In order to discriminate the other central disorder and to look for abnormal signs of a subclinical state we also utilized auditory brainstem response (ABR), impedance audiometry (measuring stapedius reflex threshold and reflex decay)⁹⁾, CT-scan and ophthalmoscopic examination over the past six years. In addition, we studied cerebrospinal fluid (including the viral antibody titers) and made special blood examinations (lipids, complement, immunoglobulin and platelet function test) over the past two years. Vestibular neuronitis is still a problematic disease because initially the symptoms of vestibular neuronitis resemble the early stage of other diseases. As far as we know, it seems that the risk factor to vascular disorder contributed less to our cases. At any rate it should be time to get the accurate diagnosis as vestibular neuronitis, considering the duration of the follow-up. Therefore, it seems to be significant to comprehend the neurotological progress of this disease¹⁰⁾. Concerning sex and age, there was no significant difference between the results of our cases and the Vestibular Disorder Research Committee's result conducted by the Ministry of Health and Welfare of Japan in 1982¹¹⁾.

Conclusion

The conclusions from our study are as follows:

1. Fifty percent of the subjects were relieved from the dizzy sensations at the three months period, but six subjects have suffered from intractable dizziness for more than one year. Even after three years had passed, three of them were bothered by a dizzy sensation, especially when moving in a dark place. At this point, as Harrison¹²⁾, Greisen¹³⁾ and Reker¹⁴⁾ have already mentioned, there are cases with continuous unsteadiness

and can even be observed among a few cases.

2. Spontaneous nystagmus remained in 40 % of the cases throughout the one year period. Compared to subjective symptoms, spontaneous nystagmus under Frenzel's glasses remained much more longer¹⁵⁾, even if the patient never has any subjective complaints.

3. Five out of 13 patients with no caloric response at the time of the initial test did not recover in the caloric test even after one year. Compared with the reduced caloric response group, the no caloric response group showed a poorer recovery to the normal level. Five of the 13 no caloric response cases, 38.5%, were normalized in later caloric tests. These cases with good prognosis seemed to recover normal caloric response within a month. In some cases of no caloric response group, both subjective symptoms and positional nystagmus as an objective finding have continued for further longer periods.

4. Computed GBST (Yamaguchi University) revealed a reduced response to body sway induced by galvanic stimulation; prolonged Interval B, i.e. slow response of the body sway is peculiar in vestibular neuronitis. This slow response showed recovery to the normal range in 76.0% of the cases. We have reported this characteristic of GBST and called it a "slow sluggish pattern".

5. There is a difference between the recovery progress of caloric test and galvanic test.

6. Steroid therapy is not related to good or bad prognosis, according to otoneurological findings.

These findings suggest that the prognosis of vestibular neuronitis is not always good, especially in some of the cases that had no caloric response at the initial test^{16,17)}.

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