Neurootological Aspects of Presbynausea and Old-age Vegetative Dysregulations after Vestibular Stress

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Abstract

The aging person is a victim of a variety of degenerative processes affecting his bodily functions. These changes, which may be regarded as inevitable by nature, are the overt manifestations of a weakening organism also giving in to environmental stresses and strains.

Aging, which is simply the process of growing old, is a little understood phenomenon even in today's world of modern miracles. The old age person, in the twilight of his years, begins to stoop to the ground as his body succumbs to the force of gravity. Likewise, his sensitivity to environmental stimuli diminishes as a direct function of age, leading to a constellation of "old age" symptoms such as presbyvertigo, presbyacusis, presbytinnitus, presbyosmia and presbygeusia. It is concerned, therefore, mainly with neurootological gerontology. Gerontology or geriatrics may be defined as the science of aging, dealing with the different biological, sociological and medical facets of getting old . Especially the sensorial contact of the older persons suffer from the age related decay of their senses. The aim of this work is to discuss the stato-acoustic signs occuring in later life.

The physiological and clinical vertigo syndromes are commonly considered as a combination of four principal phenomena; perceptual (vertigo), oculomotor (nystagmus), postural (ataxia) and vegetative (nausea, vomiting). These four cardinal manifestations of vertigo are related to different levels of the vestibular analyzer and require different methods of investigation

We have compared the all-over statistic with a group of persons with presbynausea and vegetative disregulations after vestibular stress, over 60 years age to compare with a group of 18-41 years age.

Keywords: human aging process, old-age, presbynausea, vegetative disregulation, disequilibrium, age related decay in neurosensorial functions,

INTRODUCTION

An overall assessment of the problems faced by an aging population was arrived at by processing clinical findings (recorded as per the NOASC I scheme) in one of our latest data banks (ASOAC). It can be seen that this group suffers from an increasing and general loss of vitality, which leads to a wide clinical spectrum ranging from weakness, lack of drive and forgetfulness to exhaustion and total confusion. There is also a reduction in alertness, which manifests itself as changes in diurnal rhythm, day

sleeping, somnambulism and sleeplessness. The psychic state of the aging patient and the peculiar problems he is confronted with often reflect on and add to his vertigo. A lonely, depressed and anxious patient is often emotionally irritable and labile, and this may often influence his vestibular system too. This gradual compromising of the balance mechanisms comes to light when one examines the duration of the patient's vertiginous attacks over time. It is often seen that attacks which initially last for a few minutes or even seconds begin to last for hours, days, weeks and months; till the patient finally reaches a stage of chronic vertigo. This is a sure sign that the vestibular apparatus, or the central processing circuits, or both are slowly giving up the fight.

An even more debilitating symptom than episodic vertigo for the elderly patient is constant unsteadiness or instability. Acute crises are relatively less disturbing in that they are present as emergencies and are treatable as such. Chronic, mild vertigo poses a grave social problem to the patient, however, as he is no longer sure of being independent in his social environment. Though he initially tries to battle this growing menace, the patient gradually realises the futility of his efforts and withdraws from all social contacts, i.e. he retreats from his former world. He becomes what one might well term an "equilibrium cripple".

Many lesions in the neurosensorial system are due to drops in the blood perfusion. Either the blood perfusion as such is too low or the penetration of the active substances through the vascular walls into the receptor and / or cerebral tissues is reduced. It must be noted that the cerebral vessels are completely tapered by an endothelium with tight junctions preventing most of the active substances in the blood to simply pouring into the brain. Transport mechanisms are active.

In the course of neurootological examinations of the gerontological population, one comes across a group of patients who exhibit a marked reduction in sensitivity of several major sensory pathways. These patients complain mostly of vertigo, with varying degrees of instability, tinnitus, hypacusis and reduced alertness states. Objectively, they exhibit an increase in latencies in both vestibular nystagmus and brain stem evoked potentials. These latency abnormalities suggest a diffuse affection of the brain stem transmission pathways. This group of cases is collectively included under the heading of the 'slow brain stem syndrome' (Claussen).

The old age cases showed diffuse neurosensorial disturbance affecting both the end organ receptors and the brainstem with the central pathways. These findings are collectively grouped under the heading "combined (peripheral & central) equilibriometric disturbances".

We strongly believe diffuse metabolic changes occurring at the level of the brainstem to be responsible for the Slow Brainstem Syndrome. Possible mechanisms are hypoxias, ischaemias, viscosity changes and other physical/chemical changes and general presby-degenerations. Other possibilities are albumin changes and/or Krebs’s cycle abnormalities. We postulate that parts of the neuronal networks (especially sodium and chloride channels) may be affected in some way in these patients.

With an increasing number of old age patients we must face the fact that many of them are suffering from degenerations in the most various organ systems. Old age

vertigo and nausea are frequently combined with high blood pressure, cardiac insufficiency, diabetes mellitus and other metabolic impairments. In these cases it is important not to submit the patients to a treatment which for instance untowardly affects blood pressure, liver function or glucose metabolism.

On the other hand, the neurootologist can act in a beneficial manner upon these diseases when cooperating with the familiy practitioner and the internal medical doctor, i.e. if possible the gerontologist. For instance in cases with cardiac insufficiency it should be tried to increase the cardiac output. On the other hand, a patient suffering from high blood pressure should not be reduced too quickly in his effective systolic blood pressure. Also the dietary regulation of the diabetes mellitus can be very beneficial for the patient's neurosensorial complaints.

Furthermore old age patient must also be activated; so that he begins to keep moving himself and that he improves his personal fitness.

We also perform a simultaneous electrocardiographic recording in each vertiginous patient that we investigate an effort to test the effect of vestibular stimulation on his cardiac axis or regulatory network. Electrodes are placed according to Einthoven's principle for deriving 3 channels, and the recordings thus obtained are compared with the patient's vegetative symptoms.

In an effort to be able to quantify and compare vertigo and other related symptoms, all of which are basically subjective and hence difficult to measure, our group designed a detailed questionnaire (NeuroOtologische Datenerfassung Claussen = NODEC III) listing possible neurootological symptoms and their graded characteristics. The diagnostic standards are related to major data banks about neurootological patients, diseases and tests, like for instance NODEC I – IV.

MATERIAL AND METHODS

The data used for this study are taken from a sample of the German population under the name of "NODEC I – IV. We have compared the all-over statistics with a group of persons with presbynausea and vegetative disregulations after vestibular stress, over 60 years age to compare with a group of 18-41 years age. The older group contains 61 persons - 78,69 % male and 21,31% female -, the younger contains 118 persons - 75,42% male and 24,58% female. The mean age in the older group is 61,89 years (standard deviation 3,01 years), in the younger group it is 34,02 years (standard deviation 5,01 years) as we see in table 1.
All patients were submitted during their investigations to a systematized history according to the NODEC (Claussen). When following this type of exploration, we have compared the amounts of positive answers to the different questions.
For the statistical analysis we are using a material being available at the 4GF-Institute Bad Kissingen, Germany. The neurootological patients belong to both genders and many decades of life.

RESULTS

The statistical analyses for obtaining answers to our different clinical scientific questions are exhibited below.

Table 1: Quantitative biometric parameters

	Age group above 60y Mean	Age group above 60y Standard deviation	Age group 18-41y Mean	Age group 18-41y Standard deviation	Old group-young group Δ Mean
Mean age (year)	61,89	3,01	34,02	5,01	27,87
Height (cm)	170,43	8,65	173,91	10,34	-3,48
Weight (kg)	78,63	12,90	80,03	16,87	-1,40
Syst. RR (Hgmm)	141,75	21,35	131,45	22,29	10,30
Diast. RR (Hgmm)	86,25	14,78	77,77	13,82	8,48

Biometric parameters are shown in table1
Physical parameters in table 1, like height and weight are very similar between the two samples.
The lower table shows that the expected elevations of blood pressure values are found in the older group than in the younger. It is not exorbitant but still significant that the elevation of the systolic blood pressure rather than the diastolic blood pressure is seen.

Table 2: Headache

	Age group above 60 years %	Age group 18-41 years %	Difference old group - young group
total	63,93	66,10	-2,17
forehead	26,23	26,27	-0,04
vertex	11,48	6,78	4,70
occiput	24,59	30,51	-5,92
neck	26,23	31,36	-5,13
temple	14,75	8,47	6,28
tension	9,84	7,63	2,21
shoulder-arm	9,84	3,39	6,45

migrain	6,56	5,08	1,47

In these two groups (table 2) the headache symptoms found are above 60 %. It is interesting, that it is higher in the younger group. The occipital and neck related headache types show elevated values in the younger group. However the other types of headache are more frequent in the older one.

Table 3: Vertigo symptoms

	Age group above 60 years %	Age group 18-41 years %	Difference old group - young group
total	81,97	66,10	15,87
rocking	50,82	32,20	18,62
rotating vertigo	24,59	28,81	- 4,22
falling tendency	4,92	6,78	-1,86
staggering	50,82	33,05	17,77
blackout	3,28	4,24	- 0,96
instability	60,66	38,14	22,52

The main part of vertigo symptoms (table 3) are presented in the older group, as it was expected. Among the vertigo symptoms the group of the retirees significantly shows an elevated symptomatology with respect to the rocking up and down vertigo, the staggering and the instability. The older person will be more careful in his movements, for instance, by walking through his house or through the streets, as he feels instable, the world seemingly goes up and down like the rocking on a boat, and he is suffering from falling hazards.

Table 4: Vertigo releasing factors

	Age group above 60 years %	Age group 18-41 years %	Difference old group - young group
turning the head	50,82	42,37	8,45
laying	52,46	41,53	10,93
changing body position	54,10	40,68	13,42
bending down	54,10	40,68	13,42
getting up	54,10	44,07	10,03

running	52,46	40,68	11,78
side-glance	49,18	40,68	8,50
down-gaze	32,79	28,81	3,97

All in all, table 4 exhibits that the vertigo releasing factors are active in all events described for releasing vertigo attacks. It is seen, that the sensibility towards vertigo attacks is higher in the older group.

Table 5: Duration of single vertigo attack

	Age group above 60 years %	Age group 18-41 years %	Difference old group - young group
seconds	57,38	39,98	18,39
minutes	18,03	18,64	- 0,61
hours	11,48	11,02	0,46
days	4,92	5,08	- 0,17
weeks	4,92	3,39	1,53
months	4,92	3,39	1,53
equally long lasting	6,56	3,39	3,17

Time measurements and estimations of the durations of the single attacks (table 5) are more frequently found in the older group with a tendency to shorter vertigo attacks, which only last for seconds.

Table 6: Vegetative symptoms

	Age group above 60 years %	Age group 18-41 years %	Difference old group - young group
total	29,51	26,27	3,24
sweating	3,28	0,85	2,43
palpitations	3,28	0	3,28
nausea	27,87	23,73	4,14

retching	1,64	5,93	- 4,29
vomiting	3,28	5,93	- 2,65

Among the vegetative symptoms (table 6) we find a tendency towards an increased symptomatology in the group of elders, like sweating, palpitation and nausea. Retching is found much more frequently in the younger group, because of the stress of daily life and their more activated reactional system.

Table 7: Tinnitus

	Age group above 60 years %	Age group 18-41 years %	Difference old group - young group
tinnitus	90,16	94,07	- 3,90
permanent	62,30	56,78	5,52
fluctuating	16,39	16,95	- 0,56
in the morning	1,64	2,54	- 0,90
day time	1,64	0,85	0,79
in the evening	1,64	5,93	- 4,29
at night	3,28	6,78	- 3,50
crescendo-decrescendo	39,34	44,92	- 5,57

High frequency of tinnitus is found in both examined groups (table 7). The permanent type of tinnitus is higher in the old group. The endogenous type of tinnitus – appeared in the evening or at night – is mainly found in the younger group.

Table 8: Hearing problems

	Age group above 60 years %	Age group 18-41 years %	Difference old group - young group
total hearing loss	90,16	81,36	8,81
right	77,05	71,19	5,86
left	75,41	66,95	8,46
deafness right	0	1,69	- 1,69

deafness left	0	2,54	- 2,54

Hearing problems are represented in both groups (table 8).

Table 9: Other symptoms

	Age group above 60 years %	Age group 18-41 years %	Difference old group - young group
exhaustion	55,74	50,85	4,89
unmotivation	50,82	35,59	15,23
weakness	49,18	50,00	- 0,82
forgetfulness	60,66	54,24	6,42
daze	36,07	38,14	- 2,07
fatigability	55,74	61,86	- 6,13
sleeplessness	63,93	67,80	- 3,86

The elders (table 9) significantly suffer from exhaustion, unmotivation and forgetfulness. The younger group has increased fatigability and sleeplessness because of the stress of daily life.

DISCUSSION AND CONCLUSION

In our concept of old-age persons suffering from various neurootological symptoms like vertigo, dizziness, giddiness, vegetative disregulations and the combined statoacoustic symptoms of hearing loss and tinnitus, we have undertaken a comparative study between a younger group of persons (18 and 41 years) and an older group involving patients above 60 years. The younger group contains 118 neurootological patients, whereas the older group contains 61 persons.

As all the patients were systematically interrogated by the neurootological history scheme NODEC or the further developed system NOASC, we arrive at data which can be well compared between the two samples.

However, we have to make a systematic restriction to the fact that both groups belong to the so-called neurootological patients. They approached us in our neurootological laboratory, as they were suffering from one or the other of the numerous neurootological symptoms. Most of them were referred to us by other doctors. In the introductory part of this paper, we have made many considerations to a wide spectrum of untoward factors which affect the holistic stabilization of the human in the world. The stabilization of the human in the world means that we, at the

same time, regard all the functions and the regulations within our body but also the reflection from the world and beneficial but also bad influences coming from the world upon us.

Human life is limited to a period of several decades. Formerly, life expectancy was at 40 – 45 years of age. Nowadays, in our countries, we see life expectancy going close to 80 years in average. But we also know many persons living longer than 10 decades, i.e., up to 100 years ore more. Therefore, nowadays, we have to put the question: “is there an impact upon the quality of life or upon the quality of regulation in our daily holistic existence in the world which goes parallel to the aging process of the human?”

With respect to our patients, whom we have exposed with their symptomatology in various categories in the tables 2 to 9, we find differences between the two samples of the younger adult group between 18 and 41 years in comparison the old-age group about 60 years.
When regarding the principle symptom of headache, we find that many qualities of headache are more frequent to occur in the younger age group than in the older. However, the specific headache at the temple of the head and the relation with shoulder-arm syndromes is more frequently to be found in the old-age group. In respect to migraine headache, there is not much difference between the two samples.
Within the vertigo symptoms, we find a clear differentiation between the old and the young group with much more symptomatology in the rocking vertigo, the staggering gate and the instability. Now, this insecurity and instability is an important factor, which makes the old-age group live more carefully. They will not leave their houses as frequently as the younger group. They are always afraid of undergoing falling hazards and disorientations. This, however, is bad for their keeping up health due to training the space concept and the equilibrium regulating systems. This is a symptomatology which is much untoward to staying fit in age.
The vertigo releasing factors are underlining the tendency of the old-age persons to be afraid to get up to move and to get out. So, in all the body positions and especially changes in body positions as well as in gaze changing, especially towards the sides, patients feel that vertigo attacks could be released. This has to overcome by a guiding and coaching therapy by a neurootologist, who explains to the patient, which are the untoward sensations but that he still has to stay in an active position.
When regarding the vertigo attacks, we find that the dizzy spill, which is short-lasting, is much more frequent in the old-age group than in the younger. This also explains that, much more frequently, the old-age group suffers from vertigo or is reminded on disorientation and destabilization due to short vertigo attacks. They usually overcome these attacks by getting into a calming position.
The history analysis of the vegetative symptoms is teaching us that the major and general but softer vegetative symptoms like sweating and palpitations occur more frequently but on a low level in the old-age group. However, severe nausea symptoms expressing themselves with retching and vomiting are more frequently found in the younger group. This shows that the span of reactional abilities is much wider in the younger group than it is in the old-age group. But we have also to interpret that the softer signs like sweating and palpitation and a general feeling of nausea is alarming the old-age patients earlier.
When talking about equilibrium regulation, we always have to know that our equilibrium regulation is bound into a complete statoacoustic system. Therefore, we

also have to look for accompanying untoward acoustic problems, like, for instance, the spontaneous hearing noise. We are astonished to find that the tinnitus occurs all in all more frequently in the younger group than in the older group. This may also be due to the selective factor of the groups of patients who were referred to our neurootological laboratory. However, the permanent tinnitus is more frequent in the old-age group. At the different qualities - which were reported by the patients, we can find - are more detailed description of the tinnitus in the younger group.
As we have expected, the hearing problems leading to hearing deficits occur more frequently in the old-age group than in the younger group. Astonishingly, the level of hearing impairments in the younger group is rather high. This then may also be due to the fact that these were selected neurootological patients.

The latter remark also finds its expression in the occurrences of other basic important symptoms like exhaustion, drop in motivation, personal weakness, forgetfulness, daze, fatigability, sleeplessness. Only the sign of forgetfulness is systematically higher in the age group above 60 years as well as the drop of motivation and personal drive.

By means of this paper, we have tried to give a picture of a charted symptomatology with respect to the neurootology of two different groups of our patients, i.e. older patients above 60 years and younger patients between 18 and 41 years.

In the future, we also have to add on the details of our neurootological findings being measured with an objective and quantitative procedure of equilibriometry and audiometry in a test battery as described above.

The description we have given here of the symptomatology of the patients, of course, leads to the demand of depthening our knowledge about the functional status of the patients not only from their personal sensation but also from the aspect of an objective and quantitative neurootometric analysis. For performing such a neurootometry, we then should go into the pathway analysis of the statoacoustic system with a vestibular ocular nystagmus (electronystagmography) with the vestibulospinal system (cranio-corpo-graphy with the stepping and standing test) and the vestibulovegetative system (polygraphic electrocardiography under vestibular stress conditions).

The analysis of the statoacoustic pathway has to be performed by a series of pure tone audiometry with hearing threshold and discomfort level, i.e. acoustic dynamics, tinnitus masking, speech audiometry, acoustic brainstem and acoustic cortically evoked potentials. Many other classical audiometry tests can be added on like various recruitment tests and the stapedial reflex and otoacoustic emissions etc.

For fencing in the territory where we have to place our investigations, this paper is especially dealing with the map of symptomatology.

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