โสตประสาทวิทยาศาสตร์ ของอาการเวียนศีรษะในผู้สูงอายุ

(Neurotology of Vertigo-Dizziness in The Elderly)

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บทย่อความ

อาการเวียนศีรษะมึนงงหูอื้อ เป็นอาการที่พบบ่อย และมีสาเหตุที่มากมายในผู้สูงอายุ และวัยหนุ่มสาว ผู้สูงอายุมีการเสื่อมของประสาทสัมผัสโดยรวม มีการเสื่อมของสมองและระบบประสาท มีโรคเรื้อรังทางกาย และมีการได้รับยาหลายๆอย่างเพื่อรักษาโรคเรื้อรังเหล่านั้น และผู้สูงอายุส่วนใหญ่อาจมีการไหลเวียนกระแสโลหิตบกพร่องด้วย ดังนั้นผู้สูงอายุจึงมักมีปัญหาหูอื้อ เวียนหูมึนงง และอาจดูว่าแก้ไขไม่ได้ แต่แท้จริงแล้วผู้สูงอายุมีความจำเป็นในการดูแลสุขภาพ ตลอดการดูแลรักษาโรคอย่างครบวงจร ในคนหนุ่มสาวการหาสาเหตุมีความสำคัญมากเช่นกัน และการให้ยาระงับอาการเวียนศีรษะเพียงอย่างเดียวไม่เพียงพอ ดังนั้นการพิจารณาให้ยารักษาอาการเวียนศีรษะ หูอื้อจะต้องคำนึงถึงสาเหตุและแก้ให้ถูกจุด รวมไปถึงการรักษาสุขภาพโดยรวมไปพร้อมๆกัน และให้ยาเพื่อเสริมสร้างการทำงานของระบบประสาท ควบคุมการดูแลไหลเวียนกระแสโลหิตโดยเฉพาะส่วนสมองควบคู่ไปกับการรักษาโรคที่อาจเป็นต้นเหตุ การใช้ยา Neurotropic drugs และ กลุ่มยาที่ปรับปรุง circulatory อาจจำเป็นทั้งในผู้ใหญ่และผู้สูงอายุ

Introduction:

Hearing loss, Tinnitus and Vertigo/Dizziness are main complaints in the practice of medicine and are common problems in the elderly. The complaints were found in up to 20 % in patents over 65 years old. The symptoms can be accountable to normal physiological change and/or degenerative change of whole body in particular the nervous system, the sense organs and the brain function. This can be an age-related in the elderly or as a result of environmental insult or as complications of chronic illness such as Hypertension, Diabetes, arthritis, heart diseases which are common in elderly population. (Prasansuk Suchitra et al. 2001; National Research Council). It can also present as first symptoms of disorders or diseases that may be hazardous to life. Many physicians see these complaints in the elderly as too common the condition and just accepted it as part of degenerative change in the elderly so many times the conditions were neglected for too long. Although, these symptoms occur in almost all the elderly but

many times they are first symptom and are indicator of serious illness. Indeed, another way round, the conditions must be looked at more seriously and carefully in the elderly. Thorough investigation would take up much of physician time but it is worthwhile than not doing anything since the elderly is more vulnerable and should not be victims of drugs trial study. Different medications which many times do not help much and are too expensive for patients and the country medical services budget and can do more harm than help. Therefore understanding of diseases entity and selection of drugs to be used accordingly as well as physiological control of hearing and balance are cost effectiveness.

Hearing and Balance System at Work:

Hearing and Vestibular system is situated in the inner ear as end organ and have connection to the certain area in the brain through neural pathway to the nuclei in the brainstem. Both hearing and balance system sense the changing in environmentin respect to everyday life either by sound in case of hearing or by changing of head and/or body movement or of environment in case of vestibular system, so call, hearing and vestibular end organ. The interpretation either of sound stimuli or of head and body movement take place in the cortical area of the brain. Experience of particular sound and movement stimuli and able to integrated by the brain are of important to understand the meaning of sound and to control the balance. Therefore, both hearing and balance system need to work in conjunction and in coordination with CNS and the cortex so call vestibulo-cerebellar reflex and vestibulo-cerebral reflex, and in coordination with other sense organs i.e. vision via vestibulo-occular reflex, proprioceptive and joint senses via vestibulo-spinal reflex. System malfunction either in the inner ear itself, the connecting pathway in the brainstem, or in the cortex of brain will give rise to abnormal response and may impair the hearing and/or balance system give rise to hearing loss, vertigo and/or tinnitus.

Causes of Impaired Hearing and Balance in the Elderly:

Causes are same as found in adult but many more to add in the elderly.

1. Degenerative change of hearing and vestibular end-organs of inner ear:Since the hearing and vestibular systems demand adequate suppled of blood and oxygen and as they are always lack in the elderly therefore deterioration are more rapidly in the elderly. Normal physiologic alteration as well as age-related degeneration.
2. Poor vision: poor vision is common in the elderly and can cause impairment of vestibulo-occular reflex;
3. Poor locomotive of the body joints and proprioceptive senses, generalize weakness of muscle caused impairment of vestibulo-spinal reflex

4. Overall degenerative changes of the nervous system, cerebellum and the brain caused impairment of vestibulo-cerebellar reflex.
5. Impaired cognitive function, Dementia / Alzheimer can be the causes impaired vestibulo-cerebral reflex.
6. Chronic illness and drugs in used can depress CNS as a whole.
7. Hypoxia and ischaemia is another major causes either acute attack or chronic dizziness or dull headedness. this can also cause positioning and postural vertigo as insufficient blood supply to the brain so as in orthostatic hypotention.
8. Brainstem Vascular Insufficiency or occlusion: Hypoxia and ischaemia may be necrosis (acute) type or apoptosis (slow progressive) type depends on severity of vascular occlusion. It is also depend on action of Glutamate which is neurotransmitter of stimulating type and lead to cells damage. In hypoxic condition, neuronal cells produce more neurotropic factors so that cells can become recovered and survived.
9. Hormonal imbalance in the elderly women is important too since the study found the prevalence of vertigo, dizziness and unsteadiness is double in women (Prasansuk et al. 2001).

All are responsible to deterioration of hearing and balance and caused symptoms of hearing difficulty, noise in the ear and vertigo/dizziness. These disorders are common and should be considered together both in the peripheral sense organs and in the brain itself. Therefore, consideration in management of hearing loss and balance disorders in the elderly are more complicated than adult patients and need careful approach.

Clinical Consideration:

In considering patients with hearing loss, vertigo and tinnitus, physicians in charge have to, therefore, look for any abnormality within the inner ear, the connecting pathway and the CNS as well as the coordinated nervous system like vision, proprioceptive and joint senses and the cortex. Therefore etiologies of hearing loss/ vertigo/ tinnitus can be varied and may be multiple. In many cases physicians need to look for the underlining systemic diseases or physiologically degenerative change.

The nutrition of the nervous tissue is also important for good function and for conveying the nervous impulse along the neural pathway to the brain for interpretation. In order to maintain the function, the inner ear itself requires sufficient oxygen supply through red blood cell and blood circulation. Since the inner ear blood vessels are the end-arterial type, there is no collateral circulation. They are, therefore, more vulnerable to the lack of blood supply and hypoxia which is common in the elderly.

Related illnesses which may cause Hearing Loss and Vertigo in the Elderly. Bangkok Otological Center carried out the study of impaired hearing and balance system in the elderly population (age >60

years) by measuring hearing acuity, study of middle ear function, the brainstem electrical response for brainstem pathway, the balance test using 'Tetrax Inter Balance System Posturography'and blood supply to the brain using 'Doppler Intra-cranial Sonography' together with any chronic illness that the elderly are treated. Evaluation of subjective magnitude of dysequilibrium by using visual analog scale was also carried out. The study was also involved the physiologically adaptive of balance function using Cowthorn & Cooksey Head Neck Balance Exercise. It is found that causes of imbalance in the elderly are multi-disorders of at least two of the systems It is found that almost 90% of the elderly has hearing problem and 45 % with tinnitus and vertigo/unsteadiness, 25 % experienced fall at least one time. The major systemic problems are HT, DM, Arthritis, Heart Disease in 32.4 %,13.8 %, 8.3 % and 4.4 % respectively and 5 % were suffering of Dementia.

Medication for Hearing loss, Tinnitus and Vertigo in the elderly:

It is well accepted that 'Prevention is Better than Cure' very true in cases of hearing and balance disorders since hearing and balance organs are very delicate and prone to many oxidative stress in everyday life. Hypoxia and ischaemia of the system are common disorders. Looking after the health before it deteriorated and early management of of any illness before it become chronic is the key issue. Once abnormality is detected proper management will be needed for selection of medication according to the suspected etiology and location of pathology. Not only prescribe medication but make sure that the patients consume medication properly both in dosage and duration. Watch for the effectiveness of medication and alter the medication if necessary. Get patients to carry on medication for certain period of time having understand that medication is not only for syrnptomatic treatment but for remedy of disorders as well as to restore the well condition of the organs.

Hearing and vestibular system are end-organ types of circulation. They are the smallest and most complicated sense organs in human. It demands good nutrition and blood supply in order to maintain it's delicate function. Therefore good health and well nourished of the system are essential. 'Prevention is better than cure' apply strongly in hearing and balance system. Early detection and early/proper management may be the only solution. Do not consider the old age as too old to help. Consider them the most important group of people for better and greater care. Give them the best you can either medication as nutrient or as curative.

Benefits of Almitrine - raubasine in Patients with Neurosensory Decline

Vertigo, hearing loss, and tinnitus are complaints commonly encountered in general practice. Approximately 10% of younger adults and up to 20% of elderly patients experience these problems.The etiology can vary, and can be multiple. Factors influencing the symptoms can include physical, psychogenic, and environmental causes which can affect the inner ear and its circulation, which is of the end-artery type. Systemic diseases with restricted blood flow to the brain can also be a cause.Whether the cause is known or not, the main concern, both for physicians and patients, is to cure the symptoms if possible.The diagnosis may require a battery of tests involving modern diagnostic tools, and whether or not the etiology is found, treatment still needs to be provided to the patients.There are various treatment regimes according to the type of patient and the diagnosis that the treating physician considers most likely.

Treatment options in neurosensory decline

The majority of physicians use "vestibular suppressant" drugs firstline which can of course limit the symptoms, but do not necessarily cure the disorder.The longer the use of "vestibular suppressant" drugs, the slower the compensation for vestibular disturbances, which may even not happen at all.There are drugs recommended for treating patients with these symptoms, but many physicians do not totally understand the mode of action of the drugs, and their side effects, and may not even know the recommended dosages. Many use them as symptomatic treatment, and often the treating physician reports a failure of medical treatment and goes on to radical treatment, eg, destroying labyrinthine function by medications or surgery, which may cause even more disability.

Some physicians state that the disorders are due to unequal fluid in the inner ear, some refer to lack of cerebral perfusion. Most recommended drugs on the market, therefore, stress improvement of circulation of the inner ear either by reducing blood viscosity for better perfusion, or by reducing the resistance of blood flow, since the inner ear circulation is an end-arterial type with no collateral circulation.

Tolerance of these treatments may be a problem: many drugs have unpleasant side effects of drowsiness, flushing, or itching, and patients therefore stop using them when the symptoms subside.

Almitrine - raubasine combination has been shown in trials to improve both arterial oxygen partial pressure and 0_2 hemoglobin saturation, reflecting an actual increase in oxygen concentration of arterial blood.[1] Since its action also occurs at the carotid artery/internal jugular vein level, it will also increase the

difference in cerebral oxygen and glucose concentrations between arteries and veins, suggesting an actual increase in both oxygen and glucose availability and uptake in cerebral tissues. The pharmacological effects of almitrine-raubasine in experimental conditions correlate with its clinical therapeutic efficacy in the treatment of the cognitive disorders associated with ageing and other cerebral and neurosensory impairments.The drug acts at the cerebral mitochondria level by decreasing the loss of biological free energy for phosphorylation caused by an age-related drop in cerebral enzyme activities and by cerebral pathologies. Since the hearing and balance systems work in coordination with the brain, circulation to the brain is as important as circulation to the inner ear, in particular in the elderly, in both normoxic and hypoxic conditions.

Patient types recommended for treatment with Almitrine - raubasine are patients with disorders related to aging and chronic cerebrovascular insufficiency as often occurs in the elderly.[3,4] In adults with hearing loss of the inner ear type, one notes particularly onesided-low-frequency loss of sudden onset or high-frequency loss of the progressive type in both ears. A neuro-otologist such as myself is involved in management of hearing deficits, either acute (sudden or chronic cases with or without tinnitus), and also in vertiginous patients, both younger adults and the elderly. One must decide what kind of drugs are to be used in particular cases with different pathological backgrounds. Treatment would seem to be of benefit in adults with suspected impairment of circulation to the inner ear, ie, an inner-ear type of pathology confirmed by special audiometric evaluations such as BekesyType II audiometry, and brainstem evoked response audiometry showing recruitment. Patients with the combination of symptoms of hearing loss, tinnitus, and vertigo such as in Meniere's disease or in cases of expert view sudden hearing loss, in particular in ageing patients with pathology affecting both the inner ear and the cerebral circulation, require either Doppler ultra-sonography or MRI brain scan to confirm suspected ischemic endocochlear hypoacusis or cerebral hypoxia.

Clinical experience with Almitrine - raubasine

Case I : A female patient aged 66 presented with symptoms of unsteadiness while walking, with brief attacks of spinning vertigo for the past 7 days. Head movement made the symptoms worse. She did not notice any difficulty in hearing. Audiometry with pure-tone air and bone conduction showed mild sensorineural hearing loss in the left ear with an average threshold of hearing at 51 dB, and 2 KHz at 32 dB with 80% speech discrimination score (SDS). The right ear was normal, with 100% SDS. Doppler ultrasonography showed diminished blood flow in the internal carotid artery (ICA) and basilar artery (BA) on both the right

and left sites. ICA flow right = 15 cm/s, left = 13 cm/s and BA right =4 cm/s and left = 13 cm/s. Posturography showed a mixture of vestibular end-organ and CNS type of disorders. Almitrine - raubasine was prescribed twice a day for 3 months.The followup study showed improvement in the Doppler study in terms of ICA and BA blood flow. ICA right =20 cm/s and left =30 cm/s and BA right =23 cm/s and left =8 cm/s. Her hearing acuity improved in the left ear from 80%, speech discrimination score to 100%. Overall symptoms disappeared and she felt very well balanced and in perfect condition. Almitrine - raubasine was prescribed for another month.

Case 2: A female patient aged 73 presented with vertigo and dizziness, on and off for the past 10 years. She was on various medications including a "vestibular suppressant," neurotropic drugs, and some drugs intended to improve inner ear and cerebral circulation for the past 10 years, prescribed by physicians. Symptoms were still intermittent. Audiometry revealed hearing loss of an average of 33 dB on the right and 32 dB on the left. Posturography showed a mixture of inner-ear types of abnormality, proprioceptive and CNS types.The BERA test showed poor morphology, and Doppler showed diminished circulation in the ICA and BA, both on the left and right. Medication was changed to Almitrine - raubasine, with a twice-daily dosage for I month to start with. Her vertiginous symptoms improved to near-normal. Medication was continued for another 2 months and she was asked to attend for follow-up studies. The follow-up study showed improved BERA response, with better morphology and less abnormality on posturography. She was asked to stop her medication but the symptoms returned.Therefore she was advised to continue her medication for another 3-month period. She tolerated the medication very well and stated she felt better and had gained more confidence with Almitrine - raubasine.

Case 3: A male patient aged 57 presented with noise in the left ear for 6 years.The symptom was worse when he exercised with his feet touching the ground. His hearing test showed mild sensorineural hearing loss at high frequencies in both ears. He was found to have high cholesterol of 267 mg/dL, and triglycerides of 403 mg/dL.The BERA test showed poor morphology on the left side, compared with the right, and with lower amplitude. Posturography showed a mixture of inner ear, proprioceptive,joint abnormalities, and CNS abnormality in combination. He was prescribed lopid (600 mg) for his hypercholesterolemia, together with Vitamin BI-6-12 bid.Tinnitus still persisted after control of cholesterol, and he developed unsteadiness during the 3 years of follow-up. Caloric tests showed labyrinthine imbalance. A Doppler showed reduced circulation in the right BA and a caloric test showed diminished caloric response on the left side, and hearing was reduced in the left ear also. He also complained of recent memory loss. He was sent for a CT scan of the brain and was found to have generalized cortical atrophy as seen in Alzheimer cases.

Almitrine - raubasine was prescribed twice a day for 3 months. His tinnitus was reduced and he was not as forgetful as before. He was advised to continue Almitrine - raubasine twice a day. He has now been on Almitrine - raubasine for more than I year. He reports having better quality of life, being more steady, with less tinnitus and better memory. His state at 63 years of age is better than when he was 57.

Conclusion

Why prescribe Almitrine - raubasine With the case histories mentioned above, one can judge the advantage of Almitrine - raubasine over other drugs. Almitrine - raubasine is very well tolerated, even in the elderly (only a very few cases of digestive disturbances are reported).There is no drowsiness, and the process of vestibular compensation is not inhibited. As we have observed, both hearing and balance function in the inner ear works in coordination with other neurosensory systems and with the brain. Correction of abnormalities, in particular the oxygen supply, needs to be done for both the inner ear and brain. Elderly patients do have multiple neurosensory deficits, and the majority are due to insufficient oxygen supply, either due to poor circulation, arteriosclerosis, chronic illness, or aging degeneration. Almitrine - raubasine is effective in treating these neurosensory deficits, with a good tolerance in the long term, compared with other drugs.

References

1. MIMS neurology & psychiatry guide (2003-2004)

2. MIMS Annual -Thailand TIMS (1997)

3. Prasansuk S., et al. Study of Vertigo and dysequilibrium in the Elderly population. In Faculty of Medicine Report on 'Population Survey of Disorders in the Elderly Population' National Research Council Grant. J. Med Assoc Thai Vol.87 No.10, 2004.

4. Memin Y Effet du Almitrine-raubasine sur la PaO_2 de repos chez des suiets âgés insuffisants cérébraux. Essai croisé à double insu contre placebo. *Presse Med.* 1983;12:849-851.

5. Depresseux JC, Rank G, Van Cauwenberge H. Evaluation métabolique et circulatoire de l'accident cérébral ischémique aigu chez l'homme par tomographe d'émission positonique. *Presse Med.* 1987;23:1145-1150.

6. Bordes LR, Grison C, Mercier J. Activité thérapeutique de Almitrine - raubasine dans les troubles vestibulaires. Etude à double insu.
Les cahiers de l'ORL. 1983;18:403-410.

7. Soubeyrand L, Bordes LR, Blondin E Evaluation de l'activité de Almitrine-raubasine dans les hypoacousies endocochléaires d'origine ischémique.
Rev Med Interne. 1988;TIX, special issue:45-50.

8. *แสงดี ชัยชาญ, เภสัชวิทยาของอาการเวียนศีรษะบ้านหมุน*
Thai J. Otolaryngol Head Neck Surg. Vol.4 no.1/May 2003

9. Bourgeois H et al.
Rev Optalmol Fr. 1983;39:23-36.

10. Rapisarda V.
Press Med. 1987;16:1163-1166.

11. Shunwie Li et al;
Assesment of the therapeutic activity of a combination of almitrine and raubasine on functional rehabilitation following ischaemic stroke, Current Medical Research and Opinions, Vol 20 No.3, 2004 Page 409-415.