Ovidius University Annals, Series Physical Education and Sport / SCIENCE, MOVEMENT AND HEALTH
Vol. XIV, ISSUE 2 Supplement, 2014, Romania
The journal is indexed in: Ebsco, SPORTDiscus, INDEX COPERNICUS JOURNAL MASTER LIST, DOAJ DIRECTORY OF OPEN ACCES JOURNALS, Caby, Gale Cengace Learning, Cabell's Directories

Science, Movement and Health, Vol. XIV, ISSUE 2 Supplement, 2014
September 2014, 14 (2, Supplement): 394-398
Original article

RECOVERY OF PATIENTS WITH BRAIN ATROPHY

DOCU AXELERAD ANY[1], **DOCU AXELERAD DANIEL**[2], **SANDA DEME**[3]

Abstract

Aim. Our study presents correlations between brain atrophy measured by CT-scan/MRI images and clinical diagnostics of these patients and the way in which melotherapy modify possible associated depression. Our study consisted of 110 patients admitted to Neurology Department Constanta between January-December 2012 and diagnosed (by means of brain CT-scan/MRI done in the first days from admission) with diffuse brain atrophy in majority of cases and secondary to a neurologic affection. The patients with vascular brain diseases were divided in 2 groups according to their diagnosis: poststroke and post de generative disease.For all patients we performed BECK depression scale and MMSE and for stroke patients NIHSS scale.

First group consisted in 60 patients admitted to Neurology Department with first acute stroke. Brain atrophy was revealed by CT/MRI -scan on 1-3 days from admission. We performed Beck depression scale and applied melotherapy correlated with the degree of depression. Clinical evaluation performed:10% patients with minor disability, 10% with severe disability 80% of patients was with moderate disability on NIHSS scale.The musical program consisted in 15 minutes three times a day.

Presence of brain atrophy in first days from brain stroke shows clear evidence of underling risk factors: arterial hypertension, diabetes mellitus, atrial fibrillation and presence of associated diseases.

The results on first group were: 81% of patients older than 61, arterial hypertension present in 79% of cases and 61% cases with cortical atrophy. On the latest Beck scale evaluation we observed an improved depression in 67% of patients after melotherapy.

The second group in our study consisted in 50 patients with one or more strokes in their background.

On Beck depression scale we identified 30 patients with medium and severe depression and we conducted a musical program consisting in 15 minutes of music three times a day and after melotherapy, we observe an improvement of depression at 20% of patients.

Conclusions. Presence of diffuse brain atrophy associated with other diseases rather than cerebral vascular diseases was in correlation with oldness of underling disease. The age is an important factor of risk. Compensatory capacity is highly variable from subject to subject and thus, the relationship between the location and size of vascular brain injury and the severity of cognitive impairment is variable from subject to subject. Further study must clarify the correlation of brain atrophy and prognostic of an ongoing stroke and the role of music in recuperation of patients with brain atrophy.

Keywords: brain atrophy, cerebral CT/MRI associated diseases, melotherapy.

Introduction

Numerous autopsy and imaging studies have documented the fact that cerebral atrophy occurs as a feature of usual aging. Several mechanisms have been invoked to explain the senescence and death of cells in normal aging, including loss of hormonal stimulation, accumulation of toxins, genetic errors and internal cellular clock that program death. In neurodegenerative disease, brain parenchymal loss occurs prematurely. Loss of neural tissue leads to the neuroimaging findings of focal and/or diffuse atrophy. As the brain shrinks, the cerebrospinal fluid spaces appear capacious with prominence of the ventricles, cisterns, and sulci. Athough atrophy in gray matter has been noted with senescence (Pfferfferbaum et al, 1994, Christiansen P et all 1994), the longstanding belief that selective loss of neurons occurs in neocortex (Brody, 1955, Brody, 1970) has been challenged by recent studies showing that whereas atrophy is grossly detectable in the frontal and temporal lobes, there is no change in the total neuron population (Terry et al, 1987). Metabolic imaging studies also have tended to find decreases with age, also most prominently in the frontal region (Hazlett et al, 1998, Cabeza et al, 1998)

The rate of cerebral atrophy in usual aging also hase been somewhat of a source of controversy. Most studies report a linear decline in brain volume with advancing age beginning sometime in middle to old age. The "knee" of the volume versus age curve has been variably located in the fifth, sixth, or seventh decade (Meier Ruge et al, 1992, Guttman et al, 1998, Steward et al, 1987, Meier Ruge et al, 1985, Takeda et al, 1985). The rate of age-related brain atrophy was noted to be different in men that in women (Kaye et al 1992, Jernigan et al, 1991, Laffey et al, 1984, Gur et al, 1991). Although most studies have assessed global/ hemispheric atrophy with advancing age, recent studies indicate that the different portions of the brain may

[1] University „Ovidius" Constanta, General Medicine Faculty, ROMANIA
[2] Ovidius University of Constanta, Faculty of Physical Education and Sports, ROMANIA
[3]Vasile Goldis" Western University of Arad, Faculty of Medicine, ROMANIA
Email address: docuaxi@yahoo.com
Received 20.04.2014 / Accepted 27.05.2014

more susceptible to age-related atrophy than others (Zats et al., 1982, Murphy et al., 1992).

Increasing prevalence of focal and confluent areas of increased signal intensity on conventional T2-weighted and FLAIR MR in the white matter and central nuclei of individuals with advancing age is a widely recognized phenomenon.

Our study presents correlations between brain atrophy measured by cerebral CT/MRI images and clinical diagnostics of these patients and the way in which melotherapy and rehabilitation programme modify possible associated depression or evolution of disease.

Material and method

Our study consisted of following 110 patients admitted to Neurology Department Constanta between June-December 2012 and diagnosed (by means of brain CT-scan done in the first days from admission and cerebral MRI) with diffuse brain atrophy in majority of cases and secondary to a neurologic affection. The patients with vascular brain diseases were divided in 2 groups according to their diagnosis: poststroke and confusion post degenerative disease

For all patients we performed BECK depression scale, MMSE and for stroke patients NIHSS scale.

Results

Table 1 Age distribution in first group

Age	Number of cases
Below 40	0
41-50	2
51-60	23
More than 61	35

Table 2 Presence of risk factors in first group

Risk factors	Number of patients
Arterial Hypertension	46
Diabetes Mellitus	10
Arithmias	12
Metabolic syndrome	12
Cardiac disease	9

Table 3 Types of brain atrophy in first group

Brain atrophy	Number of cases
Increased focal and confluent areas of incresed signal intensity on conventional T2-weighted and flair MR in the white matter and central nuclei	41
Triangular –shaped regions posterior and superior to the trigones	3
Lacunae type 3	16

Table 4 Other MRI signs in first group

Other imaging signs	Number of cases
Lacunae type 1	3 cases
Lacunae type 2	4cases

Table 5 Age distribution on second group

Age	Number of cases
Below 40	0
41-50	0
51-60	10
More than 61	40

Table 6 Presence of risk factors on second group

Risk factors	Number of patients
Arterial Hypertension	40

Diabetes Mellitus	5
Cardiac Aritmia	3
Metabolic syndrome	18
Myocardial infarction/ischaemic Cardiopathy	6

Table 7 Presence of associated diseases on second group

Associated diseases	Number of patients
Chronic Alchoolism and nicotine abuse	13
Neoplasma	1
Brain trauma	1

Table 8 Types of brain atrophy on second group

Brain atrophy	Number of cases
Increased focal and confluent areas of incresed signal intensity on conventional T2-weighted and flair MR in the white matter and central nuclei	26
Triangular –shaped regions posterior and superior to the trigones	2
Lacunae type 3	22

Discussion

First group consisted in 60 patients admitted to Neurology Department with first acute ischaemic stroke. Brain atrophy was revealed by CT-scan or IRM. We performed Beck depression scale, NIHSS scale and applied melotherapy correlated with the degree of depression.

Clinical evaluation performed: 10% patients with minor disability, 10% with severe disability 80% of patients was with moderate disability on NIHSS scale. 50 patients was with MMSE more than 23 and 10 with MMSE less than 23.

The musical program consisted in 15 minutes three times a day (music preferred by patient) and passive rehabilitation programme begin.

Distribution according to sex was of 26 cases female and 34 cases male. The distribution according to age is seen in table 1 and the distribution according to urban-rural medium in figure 1.

Presence of brain atrophy in first days from brain stroke shows clear evidence of underling risk factors (1): arterial hypertension, diabetes mellitus, atrial fibrillation etc. All this items are seen in tables 2, 3. Most of patients had two or more risk factors. On brain MRI we also found other imaging signs such as: cerebral lacunae type 1and 2 (table 5).

In this group, cerebral lacunae are not associated with previous clinical symptoms.

Cerebral lacunae type 1 on MRI are old, small, deep cerebral infarcts with irregular cavities containing macrophages and parenchymal fragments surrounded by gliosis and Cerebral lacunae type 2 are old, small hemorrhages with hemosiderin-laden macrophages and iron pigmentation of their walls and type 3 are dilated Virchow-Robin space.

The results on first group were: 81% of patients older than 61, arterial hypertension present in 79% of cases and 61% cases with cortical atrophy. On the latest Beck scale evaluation we observed an improved depression in 67% of patients after melotherapy. The clinical presentation of vascular brain injury is highly heterogeneous. It is very hard to identify specific homogeneous clinical-pathologic subtypes of vascular cognitive impairment and vascular dementia and the fact that the clinical result in any affected individual is a combination of the anatomic areas involved by vascular brain injury plus individual`s cognitive genetic reserve. In 21% of our patients we have a single infarction placed in hippocamp, medial thalamus and caudate nucleus.

The second group in our study consisted in 50 patients with one or more strokes in their background.

They were 22 females and 28 males. The distribution according to age and urban-rural medium is seen in table 6 and figure 3. Most of the patients had two or more risk factors. (tables 7 and 8)

These patients were readmitted to our department for:

- Chronic etilism with trouble of cognition
- Degenerative disease (Alzheimer, mixed or vascular dementia) and due to Parkinson disease;

On Beck depression scale we identified 30 patients with medium and severe depression. 30 patients was with MMSE less than 15 and 20 with MMSE less than 23.We conducted a musical program consisting in 15 minutes of music three times a day (according the information regarding the type of the anterior personal music listening of the patients).

For the second group of study the results showed hypertension is the dominant symptom**.** On further evaluation on Beck scale, after melotherapy, we observe an improvement of depression at 20% of patients.

Cerebral vascular disease is regarded by some to be the second-most-common cause of dementia in the elderly after Alzheimer dementia.

Conclusions

The patients with vascular brain diseases were divided in two subgroups according to their diagnosis; they were diagnosed by CT/MRI scan done in the first days from admission with diffuse brain atrophy.

There is dissociation between brain atrophy diagnosed by MRI and clinical examination of vascular patients. Difficulties in relating imaging to clinical presentation are the same as those in relating pathology to clinical presentation.

The pattern of cognitive deficits varies as a function of the unique location of the areas of the brain involved with vascular brain injury in each individual subject. In first two groups the principal risk factor was hypertension, age more than 61 years in 80% cases, brain atrophy was of cortical type in more than half of them.

Arterial hypertension and metabolic syndrome were most frequent risk factors founded in patients with age more than 61 years old.

Presence of diffuse brain atrophy associated with other diseases rather than cerebral vascular diseases was in correlation with oldness of underling disease.

The age is an important factor of risk. Compensatory capacity is highly variable from subject to subject and thus, the relationship between the location and size of vascular brain injury and the severity of cognitive impairment is variable from subject to subject

Correct treatment of arterial hypertension, metabolic syndrome, diabetes mellitus and other cerebral vascular risk factors delays development of brain atrophy.

Role of melotherapy at this patients was important (but mostly in the first group), we see that the Beck depression scale it was improved the quality of life of this patients. There must appear future research in this field to saw in what way melotherapy improve cognition and quality of life.

Both vascular brain injury and Alzheimer Dementia increase with age.

Further study must clarify the correlation of brain atrophy and prognostic of an ongoing stroke and the role of music in recuperation of patients with brain atrophy.

References

Pfefferbaum A, Mathalon DH, Sullivan EV, et al., 1994, A quantitative magnetic resonance imaging study of changes in brain morphology from infancy to late adulthood. Arch Neurol; 51:874-887.

Cortical brain atrophy was present in all patients, 26 with increased focal and confluent areas of incresed signal intensity on conventional T2-weighted and flair MR in the white matter and central nuclei, 2 with Triangular –shaped regions posterior and superior to the trigones on cerebral MRI and 22 with lacunae type 3.

Christiansen P, Larsson HBW, Thomsen C, et al., 1994, Age depend white matter lesions and brain volume changes in healthy volunteers. Acta Radiol; 35:117-122.

Brody H., 1955, Organization of the cerebral cortex, part three, a study of aging in the human cerebral cortex. J Comp Neurol;102:551-556.

Brody H., 1970, Structural changes in the nervous system. Interdiscip Top Gerontol;7:9-21.

Terry RD, De Terra R, Hansen LA., 1987, Neocortical cell counts in normal human adult aging. Ann Neurol;21:530-539.

Hazlett EA, Buchsbaum MS, Mohs RC, et al., 1998, Age-related shift in brain region activity during successful memory performance. Neurobiol Aging;19:437-445.

Cabeza R,Mc Intosh AR, Tulving E, et al., 1997, Age-related differences in effective neural connectivity during encoding and recall. NeuroReport;8:3479-3483.

Meier-Ruge W, Ulrich J, Bruhlmann M, et al., 1992, Age-related white matter atrophy in the human brain. Ann Ny Acad Sci; 673:260-269.

Guttman CRG, Jolesz Fa, Kikinis R, et al., 1998, White matter changes with normal aging. Neurology; 50:972-978.

Stewart PA, Maglioco M, Hayakawa K, et al., 1987, A quantitative analysis of blood –brain barrier ultrastructure in the aging human. Microvasc Res;33:270-282.

Meier-Ruge W, Hunziger U, Schultz U, et al., 1980, Stereological changes in the capillary network and nerve cells of the aging human brain. Mech Age Dev;14:233-243.

Takeda S, Matsuzawa T., 1985, Age-related brain atrophy: a study with computed tomography. J Gerontol; 40:159-163.

Kaye JA, De Carli C, Luxenberg JS, et al., 1992, The significance of age-related enlargement of the cerebral ventricles in healthy men and women measured by quantitative computed x-ray tomography. J Am Geriatr Soc; 40:225-231.

Jernigan TL, Archibald SL, Berhow MT,et al., 1991, Cerebral structure on MRI. Part I: Localization of age-related changes. Biol Psychiatry; 29:55-67.

Laffey PA, Peyster RG, Nathan R, et al., 1984, Computed tomography and aging: results in a normal elderly population. Neuroradiology; 26:273-278.

Zats LM, Jernigan TL, Ahumada AJ., 1982, Changes on computed cranial tomography with aging.

Intracranial fluid volume. AJNR Am J Neurology; 3:1-11.

Coffey CE, Wilkinson WE, Parashos IA, et al., 1992, Quantitative cerebral anatomy of the aging human brain: a cross-sectional study using magnetic resonance imaging. Neurology; 42:527-536.

Murphy DGM, De Carli C, Schapiro MB, et al., 1992, Age-related differences in volumes of subcortical nuclei ,brain matter ,and cerebrospinal fluid in healthy men as measured with magnetic resonance imaging. Arch Neurol; 49:839-845.

Gur RC, Mozley PD, Resnick SM, et al., 1991, Gender differences in age effect on brain atrophy measured by magnetic resonance imaging. Proc Natl Acad Sci U S A; 88:2845-2849.