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RECOVERY OF CEREBELLAR DISORDERS IN THE ELDERLY

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Abstract

*Aim.*Maintaining a safe perambulation and autonomy in activities of daily life are main objectives for chronic cerebellar disorders Cerebellar function is usually affected through several mechanisms, which often combine reduced blood flow, edema, mechanical compression and invasion of cerebellar parenchyma, inflammatory response, immune process, cytotoxic effect and neuro degeneration. Brainstem and meninges are also affected. In our patients lateral focal cerebellar lesions induce ipsilateral signs, although expanding lesions may produce a false localization of clinical signs. Cerebellar symptoms are influenced more by location and rate of progression of the disease than the pathological characteristics .Ataxia is a term originally used to describe disequilibrium in tables and is currently applied to describe the jerky or irregular character of movement or posture, when a disorder of coordination cannot be explained by strength or sensation deficits.The most common causes of ataxia in the elderly are stroke, trauma, infections, cerebellar multiple system atrophy, spinocerebellar ataxia (SCA), fragile X-associated tremor/ataxia syndrome (FXTAS), metastases, paraneoplastic diseases, multiple system atrophy (MSA).

Methods: we study 30 patients with ataxia in elderly patients all of them secondary to a cerebellar stroke, for a period of one year (15.01.2011-15.01.2012), 15 patients were medical treated and 15 patients were medical treated and we initiate a recovery program.

Results. For ataxic patients, the recommendation is daily (if possible) rehabilitation with postural training, even if results of large studies on the beneficial effect are still awaited.

Conclusion. Patients participating in daily motor rehabilitation show a less abrupt deterioration after cerebellar stroke.

Key words: elderly, stroke, ataxia.

Introduction

Cerebellar function is usually affected through several mechanisms, which often combine (Holmes (1917): reduced blood flow, edema, mechanical compression, and invasion of cerebellar parenchyma, inflammatory response, immune process, cytotoxic effect and neuro-degeneration Fisher (1977**)**. Brainstem and meninges are also affected. In our patients lateral focal cerebellar lesions induce ipsilateral signs, although expanding lesions may produce a false localization of clinical signs Amarenco (1995).

Cerebellar infarction accounts for about 3% to 4% of strokes. A majority of cerebellar strokes are ischaemic (80%). Given the arterial distribution the simultaneous involvement of the cerebellum and the brainstem is frequent. Macdonnel, Kalnins, Donnan (1987)

The Cerebellum ensures the co-ordination of movements, regulates the muscle tone and equilibrium of the body.

1. Ataxia.
2. Dysmetria
3. Adiadocokinesia.
4. Asynetgy.
5. Intentional Tremor.

6 Hypotony.

ATAXIA: Disturbance of coordination.

DYSMETRIA: Trouble of measuring distance. It can be evidenced by following tests:

1. Finger -Nose Test.(hypometria if stops before nose or Hypermetria if stops after the nose)
2. Heel -Knee Test.
3. Grigorescu or Bottle Test.
4. Test of Horizontal Lines.

ADIADOCOKINESIA: - Trouble of successive movements.It can be evidenced by the following tests:

1. Test of Pronation - Supination of hands.

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2. Test of Flexion - Extension of hands.
3. Test of rotation of one finger around the other.
4. Windmill Test.

ASYNERGY: Trouble of synergy , of contraction of different muscles. It is evidenced by following tests:

1. Rising from bed.
2. Test of walking or gait. (Typical gait resembling that of a drunkard).
3. Test of pushing the patient.(Falls on push.)

INTENTIONAL TREMOR: Tremor that appear at the active movement. Due to this the speech becomes dysoriented and sounds are unequal. The writing is macrographic with unequal size of letters.

HYPOTONY: Patient has diminished muscular tonus. Amplitude of passive movements of joints is increased. Doe to hypotony the Rotulian Reflex is pendullum type.

Diagnosis of cerebellar stroke: techniques and ancillary tests used are MRI, MRA, CT scan, ultrasound imaging, single – photon emission CT, blood studies, cardiac investigations, lumbar puncture in selected cases.

Objective: maintaining a safe deambulation and autonomy in activities of daily life are main objectives for chronic cerebellar disorders.

Methods

We studied 30 patients with ataxia in elderly patients all of them secondary to a cerebellar stroke, for a period of one year (15.01.2011-15.01.2012), 15 patients were medical treated and 15 patients were medical treated and we initiate a recovery program. All patients included were older than 65 years. The majority of measurement scales used to evaluate outcome in rehabilitation are ordinal in nature and consequently statistically valid assessments of change are difficult to make. All our patients were investigated performing functional staging for ataxia Dobkin (2003). Inclusion criteria were a primary indication for admission for inpatient rehabilitation of first cerebellar hemorrhage or cerebellar infarction (with and without secondary hemorrhagic change

Results

Rehabilitation with postural training, if possible on daily basis, is recommended in ataxic patients, although we are still missing large studies confirming a beneficial effect. Clinical features at the time of acute hospitalization were recorded from referral information and categorized as (1) vertigo/ ataxia without other deficits, (2) altered level of consciousness with or without other symptoms, (3) hemiparesis with or without other symptoms, or (4) other syndrome. All patient performed, CT or MRI scans at admission.

After performing functional staging for ataxia (10) result displayed in Table 1:

Table 1. Functional staging for ataxia

Nr.patients	N%	Stage0	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Total	30	0(0%)	3(10%)	4(13.4%)	15(50%)	6(20%)	2(6.65%)	0(0%)
Male	22(73.3%)	0(0%)	2(9.1%)	3(13.6%)	12(54.5%)	4(18.1%)	1(4.5%)	0(0%)
Female	8(6.4%)	0(0%)	1(12.5%)	1(12.5%)	3 (37.5%)	2(25%)	1(12.5%)	0(0%)

After this scale we saw that 10% of patients are in stage 1, 13.4% in stage 2, 50% in stage 3, 20% in stage 4 and 6.65% stage 5. Assistive therapy improves the autonomy of patients. For patients with moderate disability we utilized recovery methods and between them we used an orthotics devise to stabilize joints. For patients mild disability we perform with physical and occupational therapies to reinforce muscle activity and maximize functional capacities.

Baseline characteristics of the study are displayed in Table 2. Thirty cases were identified that fulfilled inclusion criteria (17 men, 13 women; 22 infarcts, 8 hemorrhages).

Table 2. Baseline Characteristics of Study

	All (n=30)	Infarcts (n=22)	Hemorrhages (n=8)
Sex n (%)			
Male	17 (56.6%)	12 (54.5%)	5 (62.5)
Female	13 (43.4%)	10 (45.5%)	3 (37.5)

Age group repartition is displayed in Table 3:

Table 3. Baseline Characteristics of Study

	65 - 70	71 - 80	81 - 90
Sex n (%)			
Male	11 (64.7%)	4 (22.3%)	2 (11.1%)
Female	10 (76.9%)	2 (15.3%)	1 (7.69%)

Initial clinical syndromes at the time of presentation to the acute-care hospital were classified into 4 categories based on their anticipated effect on functional outcome (Table 4).

Table 4. Clinical Characteristics of Study

	All (n=30)	Infarcts (n=22)	Hemorrhages (n=9)
Presenting clinical syndrome, n (%)			
Vertigo/ataxia alone	23(76.6%)	19(86.3%)	4(44.4%)
Hemiparesis+/− other symptoms	3(10%)	1(4.5%)	2(22.2%)
Altered level of consciousness	0	1(4.5%)	1(11.1%)
Other syndrome	3(10%)	1(4.5%)	2(22.2%)
Acute treatment, n (%)			
Medical treatment only	15 (50%)	10 (66.6%)	5(33.4%)
Medical and recovery	15 (50%)	14 (93.3%)	1 (6.7%)

All patients underwent neuroimaging: 17 (56.6%) by CT and 13 (43.4%) by MRI.

Overall, we found that most patients in the group were moderately disabled at the time of admission to inpatient rehabilitation, attained functional score of ataxia consistent with functional independence by the time of discharge, and continued to functionally improve after discharge.

Compared with patients with cerebellar infarction, those with cerebellar hemorrhage had greater degrees of functional impairment at admission and at discharge from inpatient rehabilitation, most of which was attributable to greater impairment in items measured by the functional score of ataxia.

We found strong correlations between outcome and functional status at the start of rehabilitation therapy and preexisting comorbid conditions. Perhaps less expected.

The positive correlation between outcome and the presenting syndrome of vertigo/ ataxia likely reflects isolated cerebellar involvement without brain stem infarction or significant mass effect. Conversely, the strong inverse correlation between outcome and altered level of consciousness at presentation is probably related to early hydrocephalus and/or brain stem compression associated with larger cerebellar strokes. This finding is consistent with other studies that have reported that reduced level of consciousness at initial presentation is strongly correlated with poor outcome Jauss, Krieger, Hornig, Schramm, Busse (1999), Manto (2010).

Flexion/extension movements: all the patients started the movement in a position where the elbow was on the table and the forearm in the vertical position. The movement was done in regular rhythm give by the kinetotherapist. We recorded 20 flexion/extension movements. 7 from 15 patients can perform this task. We recorded the time performing the task and we observe that after two weeks they became 10-20 secunde faster.

Progressive resistance exercises performed three to four times weekly for a period of from 14 weeks by our patients with adequate motor control improved strength and functional activities.

After this exercise we observe that after one year evaluation a considerable improvement in the patients who performed recovery exercise (Table 5)

Table 5. After one year end with recovery program

No. patients	Number of patients	Stage 0	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Total	15(initial)	0	3	2	5	3	2	0
RECOVERY PROGRAM	After one year	0	7	5	3	0	0	0

Patients without recovery program (Table 6) there not are significant differences from the beginning of the disease

Table 6. After one year without recovery program

No. patients	Number of patients	Stage 0	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Total	15(initial)	0	3	2	5	3	2	0
Medical treatment	After one year	0	3	3	4	4	1	0

Discusses

For the whole study, comparing results from beginning with results after one year of treatment we admit working hypothesis because we found t = 4.130 p <.001, which means that we have a more than 99.99% confidence that the difference found is not accidental but is due to treatment.

After comparing the two ways of treatment after one year, working hypothesis because we found t = -4.298 p = .001, which means that we have a 99.99% confidence that the differences found are not due to chance but to the use of recovery treatment on the first group of patients (the experimental group).

Applying the same assumptions, we use a different method of comparing results, to be confident, because the sample is small and having doubts about the normality randomisation pooling and distribution, weaver and a nonparametric test (Wilcoxon for related samples). The result is similar, admit working hypothesis because we found Z = -3.066 p = .002, which means that we have 99.98% confidence that the results are not random but due to recovery treatment.

We observe that preexisting conditions such as painful osteoarthritis or cardiopulmonary disease may limit exercise tolerance in our patients 1 patient has painful osteoarthritis who limits flexion/extension movements and 1 has cardiopulmonary disease who limits resistance exercises.

Our study has certain limitations that must be bore in mind when interpreting these results. In particular, our findings may not be generalized to all patients with cerebellar stroke but are likely to be representative of recovery only in that subset of patients who undergo inpatient rehabilitation therapy. This study has several advantages because we measured functional impairment and recovery, which is of greater relevance to the patient. Second, use of functional ataxia staging that is easy to use and very clear. Third, we describe new information predictors of postrehabilitation and long-term outcome at elderly patients, which may be of practical utility in determining prognosis at the time of acute presentation. Fourth, preexisting comorbid conditions were taken into account in the analysis for final prognosis.

Depression is especially prevalent, affecting 25 to 40 percent of patients within the first year after a stroke. Eriksson, Asplund, Glader et al. (2004). Guidelines of the American Heart Association and the Royal College of Physicians WADE DT (2002) recommend the long-term use of aerobic training; exercises to enhance flexibility, balance, and coordination; and resistance exercises within daily activities for patients after a stroke.

Conclusions

Patients participating in daily motor rehabilitation show a less abrupt deterioration after cerebellar stroke. Physical and occupational therapies should attempt to reinforce muscle activity and maximize functional capacities. Passive movements under various condition of inertia might improve coordination. Patients who are wheelchair-bound or confined to beds should receive specific care to prevent complication such as pressure sores. These data confirm and extend previous reports indicating that excellent functional recovery frequently occurs among survivors of cerebellar infarction. These data will improve determination of prognosis in the acute stage and may help refine strategies for rehabilitation therapy. Most of the time rehabilitation in old person is usually not accepted but our study try to show that the rehabilitees process it is nonage depending. The results indicate that there can be substantial benefit from organized inpatient multidisciplinary rehabilitation in the postacute period; even they are more than 65 years old.

At present, the opportunity to achieve maximal improvement is probably constrained by a lack of adequate data to define the optimal intensity (performance time, pace, and duration) of training strategies for cerebellar stroke.

Refereces

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