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Physiotherapy Rehabilitation in Cerebellar Stroke: A Case Study

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Case Report
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Abstract

Cerebellar stroke presents a challenging task for rehabilitation. The patient in this case study was a 61-year-old man with a diagnosis of posterior circulation ischaemic stroke. He was referred to our physiotherapy outpatient unit in a major tertiary hospital in Nigeria about two years ago. Patient could not sit up from lying, nor stand or walk independently. Visible and palpable tremors were observed in the entire body but more pronounced in the head, neck and shoulders (titubation). Patient could not perform self-care activities; there was difficulty with speech, language and communication. The treatment included free active exercises, mat exercises, bridging, rolling and sitting and standing balance training, breathing exercises, bicycling, walking within parallel bars, wobble board, facial massage, strengthening exercises, cervical collar use and home programme. Involved repetition of treatment session activities taught to his caregivers who were ascertained competent to effect. Treatment was structured into short term and long term goals. Treatment sessions were initially given twice daily, then once weekly and later once monthly, as the patient gained control, confidence and independence. After 68 sessions of treatment spanning almost 2 years, the patient had gained independent walking, improved quality of life, and in particular titubation disappeared.

Keywords: Cerebellar Stroke; Titubation; Physiotherapy; Innovative Approach

Introduction

This is a case of a 61- year- old man with a diagnosis of posterior circulation ischaemic stroke who was referred to our physiotherapy outpatient unit in a major tertiary hospital in Nigeria about two years ago. Prior to that time he was on admission at the acute stroke unit (ASU) of the same hospital for 7 days and had 4 sessions of physiotherapy.

Presenting Complaint

Difficulty with speech, fine tremors of the neck and shoulders (titubation), inability to stand and walk independently.

Health and Social history

He was a known hypertensive and medication compliant; not diabetic or asthmatic, and no history of surgery or epilepsy. His medication profile included nifedipine, aldomet, omeprazone, aspirin, vitamin E, and alphostatin. He was married with children and lived with his family; neither smoked nor drank liquor.

Objective Assessment

- **Head and Neck -** Marked titubation (tremor of head, neck and shoulder); mild facial palsy and expressive aphasia; no neck tenderness or rigidity, and no visual impairment.

- **Trunk and abdomen -** Trunk ataxia, fair trunk control, poor balance and coordination, poor vestibulochochlea function; no bladder or bowel dysfunction
- **Upper Limbs -** Muscle Power (Right- Oxford grade 4, Left 5), Deep and light sensation - Intact

Proprioception – Impaired Tone- slightly decreased
Deep Tendon Reflexes - hyporeflexia

- **Lower Limbs -** Muscle power apparently normal on both sides

Sensation - Intact
Proprioception – Impaired
Tone- slightly decreased
Deep Tendon Reflexes - hyporeflexia
Ankle Clonus - Not present

- **Postural test-**Romberg's sign was positive
- **Gait-** Only possible with close support and ataxic

Functional Assessment

Patient could not sit up from lying, nor stand or walk independently. Visible and palpable tremors were observed in the entire body but more pronounced in the head, neck and shoulders. Patient could not perform self-care activities; there was difficulty with speech, language and communication.

Problem Analysis

Poor motor and postural control; poor muscle tone, balance and coordination; titubation, vestibulochochlea dysfunction and facial asymmetry.

Plan of Treatment

To promote titubation control, functional capacity, cardiopulmonary efficiency, postural balance and coordination, improve facial muscle function and symmetry, train ambulation, prevent falls and integrate caregivers in the rehabilitation, as well as home programme. Goals were generated with mutual understanding of both the patient and his caregivers (careers) as follows:

Short Term Goals

1. Patient would be able to use cervical collar regularly for 4 weeks, except when bathing or experiencing discomfort, in an attempt to control, reduce or treat titubation
2. Patient would be able to perform prehensile functions, including writing skills, using culturally familiar objects at therapy sessions with targets of achievement for 4 weeks
3. Patient would be able to perform both localized and generalized breathing exercises with short intervals of rest for 5 minutes in supine and sitting positions.
4. Patient would be able to undergo rhythmic stabilization exercises in lying, sitting and standing for 5 minutes.
5. Patient would be able to use finger-to nose and opposition exercise, as well as heel-to- knee exercise for both upper and lower limbs respectively for a total time of 10 minutes to enhance motor coordination and control
6. Patient would be able to carry out facial exercises in front of a mirror for 5 minutes daily
7. Patient would be able to walk within the parallel bars and exercise on a wobble board for 10 minutes at each treatment session
8. Patient would be able to carry graded weights to improve tone and power of the musculature of both upper and lower limbs.

Long Term Goals

1. Patient would be able to walk independently without the use of neck collar, mobility aid or stand- by support at the end of the rehabilitation programme.
2. Patient would be able to transfer and ambulate safely for a tolerable distance without falling at the. of the rehabilitation programme.
3. Patient would be able to use his hand to feed and write for as long as he desired.

Means of Treatment, Treatment Sessions and Progression

Routinely, the patient was treated using free active exercises, mat exercises, bridging , rolling and sitting and standing balance training, breathing exercises, bicycling, walking within parallel bars, wobble board and facial massage. Home programme involved repetition of treatment session activities taught to his caregivers who were ascertained competent to effect and supervised them.. More challenging tasks were added as patient improved performance. Initially, the patient had 2 treatment sessions per week and for 9 months, when significant improvements were noted in all areas of functions. The treatment was then changed to once a week for 3 consecutive months and lastly once a month. At the second treatment session, that was very early in the rehabilitation trajectory, cervical collar was introduced for the purpose of controlling titubation. After 1 month of treatment titubation significantly reduced and completely disappeared after 2 months of management. Balance and postural control also improved in all fundamental starting positions. Patient was referred to a speech therapist early in his management without interruption to his motor rehabilitation.

Along the trajectory of treatment sessions, to telling 68 sessions, periodic assessments were carried out and up till approximately 2 years. The assessment of finger-to- nose and heel-to- knee as a way of determining motor

coordination, balance, precision and timing was taken thrice in 2 fundamental starting positions and the average scores were calculated and recorded (Table 1 and Table 2). Now the patient could walk indoors and outdoors though with a little wide base and very little sways, but never fell at any time whether at the hospital or at home.

Assessment	Right (Second)	Left(Second)
1st Assessment	1.82	1.98
2nd Assessment	1.9	1.88
3rd Assessment	1.78	1.41
4th Assessment	1.32	1.08
5th Assessment	0.97	1.27
6th Assessment	1.26	1.26
7th Assessment	0.89	0.9
Finger- To -Nose Exercise In Lying		
1st Assessment	2.98	2.34
2nd Assessment	2.75	2.15
3rd Assessment	2.43	2.48
4th Assessment	1.08	1.2
5th Assessment	1.15	1.25
6th Assessment	1.52	1.56
7th Assessment	1.23	1.11

Table 1: Finger- To- Nose Exercise in Sitting

Assessment	Right (Second)	Left(Second)
1st Assessment	2.06	1.75
2nd Assessment	1.75	1.53
3rd Assessment	1.43	0.96
4th Assessment	1.21	1.32
5th Assessment	0.88	1.35
6th Assessment	1.43	0.89
7th Assessment	1.08	1.04
Heel- To- Knee Exercise In Lying		
1st Assessment	1.78	1.98
2nd Assessment	1.84	1.79
3rd Assessment	0.97	1.26
4th Assessment	1.08	1.19
5th Assessment	1.08	0.79
6th Assessment	1.25	1.05
7th Assessment	1.64	1.39

Table 2: Heel- To- Knee Exercise in Sitting

Results

At the time of concluding this case study which was approximately 2 years since treatment began the patient had made unprecedented improvements to the satisfaction of him and his caregivers, as well as us the physiotherapists. He could sit, stand, and walk independently without falls. His posture too had improved and he had good motor power. He could carry out all activities of daily living independently with a score of 100 on the Barthel Index [1]. Tables 1 and Table 2 show improvements in coordination and proprioception of the upper and lower limbs. Romberg's sign became negative and titubation had completely disappeared. However, his speech still lacked fluency.

Discussion

Cerebellar stroke is a challenging task for rehabilitation. The length of time, interdisciplinary team work and complex interventions used in this study have proved this fact. This case study has shown that physiotherapy plays a great role in controlling sequelae, improving functional task performance and quality of life for patients. Physiotherapists routinely use exercises to promote motor functions, and exercise has been reported to be paramount in promoting neuroplasticity [2] which is the neurophysiological concept that underlies the great improvement for this patient. The length of time taken to treat this patient as well as the consistency in keeping appointment are assumed to have impact on motor learning as a component of motor behaviour. A very innovative and interesting aspect of this study was the use of cervical collar in managing titubation. A search of literature showed this had never been used before. Our using cervical collar was premised on the assertion that head control is a prerequisite for motor function of other parts of the body in neuromotor development of the infants [3]. Early application of cervical collar seemed to have considerably contributed to the great results seen because at about one and half year into the study another patient with cerebellar stroke and titubation who had the dysfunction 5 years earlier was referred to the authors. This patient was younger, had never been able to walk independently, and had been managed only on medications and never had been referred for physiotherapy. After 6 months of treatment using cervical collar titubation was reduced but still had not been able to walk independently.

The study has revealed that cerebellar lesions typically impair several aspects of motor function, because the cerebellum is responsible for fine motor coordination and body movement, posture, and balance [4] In this study the authors have taken this fact into consideration in their strategic approach to management which differed from managing a typical upper motor neurone lesion such as the corticospinal tract lesion.

Conclusion

Physiotherapy a most vital role in the management of people with cerebellar stroke. Early referral and intervention, as well as consistency, is crucial in achieving results. Physiotherapists must take responsibility in developing innovative strategy that works.

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