

Case Report

ARCHIVES OF CLINICAL AND MEDICAL CASE REPORTS

ISSN: 2575-9655

Fully Functional Recovery after Brainstem Infarction in a Young Patient-A Case Report

Pengyu Huang^{1#}, Dandan Lu^{1,2#}, Haixia Lu^{1*}

Abstract

Ischemic brainstem infarction is extremely rare in the young people under 30 years old but with severe symptoms and poor prognosis. It is commonly caused by stenosis and occlusion of the vertebrobasilar artery and its branch vessels. Here we reported a 26-year old male brainstem infarction patient with severe hemiplegia and dizziness on admission. He has no hypertension, obesity, diabetes and other chronic diseases, which are the most common reasons for infarction, but has a long history for smoking and drinking. Immediately after acute drug therapy for circulation improvement, he received personalized treatment with drug medication plus physical rehabilitation. The myodynamia, motor balance and living ability fully recovered 5 months later. This case leads us to call for more attention to brainstem infarction patient younger than 30 years in the hope for new strategies for both diagnosing and treatment.

Keywords: Brainstem Infarction; Hyperhomocysteinemia; Rehabilitation; Youth

Introduction

Ischemic stroke accounts for 85% of all strokes. It is one of the most common cerebrovascular diseases and characterized by high incidence, morbidity, and mortality [1-2]. Stroke has become the major cause of disability and the second leading cause of death in the world [3]. Stroke in people younger than 45 years is less frequent than in older people but has major impact on the individual and society. Due to various factors, the proportion of stroke in adolescents and young adults (aged from 18-50) has increased to approximately 15%-18% in recent years [4,5]. Patients in this age are almost in a critical period of life when important decisions should be made on starting a family or a career. It also remain at high risk for recurrence [6]. Therefore, close attention should be made for the therapy of young patients and the functional recovery is urgently required. Ischemic brainstem strokes constitute about 10% of all ischemic brain strokes. Patients with brainstem strokes may experience minimal functional or cognitive deficits, or devastating injury. A patient under 30 years old and with severe motor deficits after brainstem infarction could fully functional recovered is extremely infrequent. We outline the patient's hospital course and eventual improvement here is for calling more attention to brainstem stroke in young.

Case Presentation

A 26-year old man with sudden right-sided hemiplegia and dizziness was admitted to hospital. On admission, he was diagnosed with brainstem infarction based on the image of CT scan and extremely high level of

Affiliation:

¹Department of Neurobiology, School of Biomedical Sciences, Xi'an Jiaotong University Health Science Center, Xi'an, 710061, China

²Rehabilitation Department of Traditional Chinese Medicine, East District of the 1st Affiliated Hospital, Xi'an Jiaotong University Health Science Center, Xi'an, 710061, China

*Corresponding Author

Haixia Lu, Professor, Department of Neurobiology, School of Biomedical Sciences, Xi'an Jiaotong University Health Science Center, Xi'an, 710061, China.

Citation: Pengyu Huang, Dandan Lu, Haixia Lu. Fully Functional Recovery after Brainstem Infarction in a Young Patient- A Case Report. Archives of Clinical and Medical Case Reports 6 (2022): 741-746.

Received: October 14, 2022 Accepted: November 02, 2022 Published: November 25, 2022



Table 1: Personalized Rehabilitation Traini	ng Strategy
---	-------------

	Butylphthalide	0.2 g, t.i.d.
Drug Medication	Folic acid	0.8 mg, q.d.
	Mecobalamin	0.5 g, t.i.d.
	Acupuncture	q.d.
	Electronic biofeedback	q.d.
Dhysiaal Dahahilitatian	Hand function training	q.d.
Physical Rehabilitation	Hemiplegic limb comprehensive training	b.i.d.
_	Balance function training	b.i.d.
	Endurance training	b.i.d.

Table 2: Brunnstrom stage, Berg Balance Scale and Barthel Index

Evaluation Period	Bru	unnstrom st	age	Porg Palanas Saala	Barthel Index	
Evaluation Period	Upper Limbs	Hand	Lower Limbs	Berg Balance Scale		
On admission	II	II	III	29	55	
50 days after	Ш	III	III	33	60	
120 days after	V	V	V	44	85	

homocysteine (71 µmol/L). He denied for the history of hypertension, diabetes, coronary heart disease or other chronic disorders and felt perfectly well before the symptoms occurred. He has been smoking for over 8 years with 10-15 cigarettes per day and drinking 4 to 6 bottles of beer daily for over 7 years. Physical examination showed the lower myodynamia on right arm and leg. Muscle tension of right limb was normal. He lost balance when made a move and the ability of daily life decreased dramatically (was in moderately dependent). No cognitive deficit was noticed and all the reflex were normal. After admission, he received 12 days treatment with anticoagulants, vasodilator and neuroprotective agents to improve the circulation and enhance collateral circulation establishment. As soon as finishing the acute treatment, function rehabilitation training was admitted (Table 1). The initial treatment effect was noticed by Brunnstrom stage 20 days later and the decrease of homocysteine level (59 µmol/L) was observed 3 months later. Five months later, the myodynamia of right limb, the balance (showed by Brunnstrom stage and Berg Balance Scale, Table 2 and supplement) basically recovered to normal levels. The ability of daily living (showed by Barthel Index, Table 2 and supplement) recovered to almost independent. The homocysteine level reversed to 27 µmol/L.

Discussion

Stroke patients younger than 50 may have etiology varies [7]. According to the traditional TOAST classification of stroke, the patient we reported here could be classified as stroke of undetermined etiology [8]. Based on the risk factor classification given by International Pediatric Stroke Center [9-11], the long history of excessive alcohol consumption and eigarettes smoking might be the main etiology for this

26-year old ischemic brainstem stroke patient. In addition, existed data showed that hyperhomocysteinemia may be risky for ischemic stroke [12-13]. Accordingly, we noticed the homocysteine level of this patient is far beyond the normal value (0-20 µmol/L) and the treatment with folic acid tablets and methylcobalamin capsules was quite successful. The treatment of brainstem infarction mostly relies on drugs and works poorly in most cases. For stroke in young, function recovery is critically required. Therefore, a personalized rehabilitation training was given to this patient immediately after acute treatment and last for 4.5 months [14-17]. An optimistic result, including the regain of postural balance and ability of daily life as well as the reverse of homocysteine level was achieved. In summary, stroke in young patient requires different approach to investigate and management. The recovery from stroke in young patient is quicker and better than that for older adults. To our knowledge, this is the first report of ischemic brainstem stroke in patient younger than 30 years. Our experience leads us to call for more cases and new strategies for diagnosing and treatment of stroke in lower age.

Funding

This research was partially supported by the National Nature Science Foundation of China (Grant No. 81870981 and 82171389).

Disclosure

All authors declared no conflict of interest.

References

1. Hatano S. Experience from a multicentre stroke register: a preliminary report. Bull World Health Organ 54 (1976): 541-553.

Citation: Pengyu Huang, Dandan Lu, Haixia Lu. Fully Functional Recovery after Brainstem Infarction in a Young Patient- A Case Report. Archives of Clinical and Medical Case Reports 6 (2022): 741-746.



- Bamford J, Sandercock P, Dennis M, et al. A prospective study of acute cerebrovascular disease in the community: the Oxfordshire Community Stroke Project 1981-86. 1. Methodology, demography and incident cases of firstever stroke. J Neurol Neurosurg Psychiatry 51 (1988): 1373-1380.
- 3. Go AS, Mozaffarian D, Roger VL, et al. Heart disease and stroke statistics--2013 update: a report from the American Heart Association. Circulation 127 (2013): e6-e245.
- Singhal AB, Biller J, Elkind MS, et al. Recognition and management of stroke in young adults and adolescents. Neurology 81 (2013): 1089-1097.
- 5. Kissela BM, Khoury JC, Alwell K, et al. Age at stroke: temporal trends in stroke incidence in a large, biracial population. Neurology 79 (2012): 1781-1787.
- 6. Arntz RM, van Alebeek ME, Synhaeve NE, et al. The very long-term risk and predictors of recurrent ischaemic events after a stroke at a young age: The FUTURE study. Eur Stroke J 1 (2016): 337-345.
- 7. Babtain, Fawzi A, et al. Stroke Etiology Varies with Age in Patients Younger than 50 Years: Assessment of Stroke Etiology and Classifications in Young Saudi Patients. American Journal of Medicine and Medical Sciences 4 (2014): 14-18.
- 8. Adams HP, Bendixen BH, Kappelle LJ, et al. Classification of subtype of acute ischemic stroke. Definitions for use in a multicenter clinical trial. TOAST. Trial of Org 10172 in Acute Stroke Treatment. Stroke 24 (1993): 35-41.

- van Alebeek ME, Arntz RM, Ekker MS, et al. Risk factors and mechanisms of stroke in young adults: The FUTURE study. J Cereb Blood Flow Metab 38 (2018): 1631-1641.
- 10. Mackay MT, Wiznitzer M, Benedict SL, et al. Arterial ischemic stroke risk factors: the International Pediatric Stroke Study. Ann Neurol 69 (2011): 130-140.
- 11. Smajlović D. Strokes in young adults: epidemiology and prevention. Vasc Health Risk Manag 11 (2015): 157-164.
- Yang G, Wang Y, Zeng Y, et al. Rapid health transition in China, 1990-2010: findings from the global burden of disease study 2010. Lancet 381 (2013): 1987-2015.
- Zhang T, Jiang Y, Zhang S, et al. The association between homocysteine and ischemic stroke subtypes in Chinese: A meta-analysis. Medicine (Baltimore) 99 (2020): e19467.
- Schmid AA, Van Puymbroeck M, Altenburger PA, et al. Balance is associated with quality of life in chronic stroke. Top Stroke Rehabil 20 (2013): 340-346.
- 15. Krakauer JW, Carmichael ST, Corbett D, et al. Getting neurorehabilitation right: what can be learned from animal models? Neurorehabil Neural Repair 26 (2012): 923-931.
- Stinear C, Ackerley S, Byblow W. Rehabilitation is initiated early after stroke, but most motor rehabilitation trials are not: a systematic review. Stroke 44 (2013): 2039-2045.
- Yang ZX, Bian JL, Xu JF, et al. Multi-central controlled study on acupuncture for treatment of cerebral infarction in restoration stage. Zhongguo Zhen Jiu 28 (2008): 239-243.

Volume 6 • Issue 6 | 743



SUPPLEMENTARY FILES

Table S1: Brunnstrom stage

Phase	Upper limb	Hand	Lower limbs	Functional rating
1	No movement at all.	No movement at all.	No movement at all.	Ι
2	Only cooperative movement patterns were observed.	Only slight flexion and extension.	There was only minimal voluntary movement.	П
3	Co-movement can be initiated at will.	A hook grip can be made, but the fingers cannot be extended.	In the sitting and standing positions, there is collaborative flexion of the hip, knee, and ankle.	Ш
4	The appearance of activity that is detached from the co-movement. Forearm pronation and supination with shoulder 0 degree elbow flexion 90 degrees. Elbow straight shoulder flexion 90 degrees. The lumbosacral region was palpable on the back of the hand.	It can pinch and loosen the thumb laterally, and the fingers have a small range of semi- random extension.	More than 90 degrees of knee flexion in the sitting position, can make the foot slide to the bottom of the chair, in the case of heel from the ground can make ankle dorsiflexion.	IV
5	There were relatively independent cooperative movements. Shoulder abduction at 90 degrees with elbow straight. Forearm pronation and supination during shoulder flexion from 30 degrees to 90 degrees with elbow straight. The elbow is straight and the forearm is in the middle position, and the upper limb is raised over the head.	Both spherical and cylindrical grips can be made, with the fingers extended simultaneously but not individually.	Healthy leg stand, the affected limb can first bend the knee and then extend the hip, and do ankle dorsiflexion under the knee extension (the center of gravity falls on the healthy leg).	V
6	The motor coordination was close to normal, and the distance between fingers and nose was not obvious, but the speed was slower than that of the healthy side (< 5 seconds).	All grips could be completed, but the speed and accuracy were worse than those of the healthy side.	The hip can be abducted in a standing position beyond the range that can be reached by lifting the pelvis on that side. In the sitting position, the knee can be extended and internal rotation of the lower limbs, which can complete the varus and valgus of the combined foot.	VI

Table S2: Berg Balance Scale

Project	Completion	Project	Completion	Project	Completion
	4= Able to stand up and maintain stability independently without using hands	6. Close the stand	4= Able to stand safely for 10 seconds	11. Turn 360 degrees	4= Make a safe 360 degrees turn in 4 seconds
	3= Can stand up independently with hand support		3= Able to stand safely for 10 seconds under supervision		3= Can safely turn 360 degrees in only one direction in 4 seconds
1. Rise from a sitting position	2= After several attempts, stand up on hands		2= Can stand for 3 seconds		2= Able to safely turn 360 degrees but move slowly
	1= Need a little help to stand up or hold steady		1= Unable to close eyes for 3 seconds, but stable standing		1= Close monitoring or verbal prompting is required
	0= Need more than a little help to stand up or hold steady		0= It takes two people to keep from falling		0= Need help turning around

Citation: Pengyu Huang, Dandan Lu, Haixia Lu. Fully Functional Recovery after Brainstem Infarction in a Young Patient- A Case Report. Archives of Clinical and Medical Case Reports 6 (2022): 741-746.



2. No support standing	4= Able to stand safely for 2 minutes	7. Stand with your feet together	4= Able to stand securely with feet together independently for 1 minute	12. Stand with one foot on a step or stool	4= Able to stand safely and independently and complete 8 reps in 20 seconds
	3= Able to remain standing for 2 minutes under supervision		3= Able to stand independently with feet together and under supervision for 1 minute		3= Able to stand up for 8 times over 20 seconds
	2= Able to remain standing for 30 seconds under supported conditions		2= Able to bring feet together independently, but not for 30 seconds		2= Can be completed 4 times without assistance under supervision
	1= It takes several attempts to stand unsupported for up to 30 seconds		1= Stand with feet together for 15 seconds		1= Can be completed > 2 times with little help
	0= Cannot stand for 30 seconds without assistance		0= Need help to stand with feet together and can't hold for 15 seconds		0= Need help to prevent falling or being unable to do it at all
	4= Able to safely remain seated for 2 minutes		4= Able to extend forward > 25cm	13. Stand with one foot in front of the other	4= Able to position your feet in front of each other for 30 seconds without spacing
3. No supporting seat	3= Able to remain seated for 2 minutes under supervision	8. In the standing position, extend the upper limb forward and move forward	3= Can safely extend forward > 12cm		3= Able to position your feet in front of you and behind you for 30 seconds independently
	2= Can sit for 30 seconds		2= Can safely extend forward > 5cm		2= Able to take small, independent steps and hold them for 30 seconds
	1= Can sit for 10 seconds		1= Upper limbs may protrude forward but will require monitoring		1= Step forward needs help, but can hold for 15 seconds
	0= Can't sit for 10 seconds without back support		0= Losing balance or needing external support while stretching forward		0= Lose balance while stepping or standing
	4= Use minimal hand help to sit down safely		4= Able to accomplish tasks easily and safely	14. Stand on one leg	4= Able to raise legs independently and hold for > 10 seconds
4. Sit from a standing position	3= With the help of both hands can control the body's descent	9. Pick up items from the ground while standing	3= It can be done but requires monitoring		3= Able to raise legs independently and hold for 5-10 seconds
	2= Use the back of lower legs against the chair to control descent		2= Reach down 2-5cm and balance independently, but cannot complete the task		2= Able to raise legs independently and hold for 3 seconds or more
	1= Sit independently, but do not control body descent		1= Trying to reach down to pick up an object requires monitoring, but still can't complete the task		1= Attempt to lift the leg, unable to hold for 3 seconds, but able to maintain independent standing
	0= Need help sitting down		0= Do not try to reach down to pick up objects or need help to avoid losing your balance or falling		0= Unable to lift legs or need help in case of a fall

Citation: Pengyu Huang, Dandan Lu, Haixia Lu. Fully Functional Recovery after Brainstem Infarction in a Young Patient- A Case Report. Archives of Clinical and Medical Case Reports 6 (2022): 741-746.



	4= It can be safely transferred with a little hand support		4= Can see from side to side and back, good body transfer	
	3= It is absolutely necessary to use your hand to transfer it safely	-	3= Looking back only from one side, the other side has poor body transfer	
5. Transfer	2= Verbal instructions or supervision are required for transfer	look back in a standing position	2= Can only turn to the side, but the body balance can be maintained	
	1= Need the help of one person to move		1= Need monitoring when you turn around	
	0= To be safe, two people are needed to help or supervise the transfer		0= Need help in case you lose your balance or fall	

Note: 0-20 points: poor balance function, the patient needs a wheelchair. 21-40 points: a certain balance ability, the patient can walk with assistance. 41-56: balance function is good, the patient can walk. < 40: Risk of falling.

Project	Scoring criteria	Project	Scoring criteria		
Have a meal	0= Rely on others		0= Incontinence or coma		
	5= Need some help (cutting bread, buttering, picking up the dishes, filling the rice)	To move bowels	5= Occasional incontinence (< 1 time per week)		
	10= Comprehensive self-care		10= Can control		
	0= Rely on		0= Incontinence or coma or catheterization by another person		
Take a shower	5= Provide for oneself	To urinate	5= Occasional incontinence (< 1 every 24 hours, > 1 per week)		
			10= Can control		
5 Modified h	0= Need help		0= Rely on others		
	5= Wash your face, comb your hair, brush your teeth, and shave independently	Use the toilet	5= Partial help Needed		
			10= Provide for oneself		
	0= Rely on others		0= Can't move		
Dress	5= Need half the help	Activity (walking) (in and around the	5= Independent mobility in a wheelchair		
Diess	10= Provide for oneself (fasten buttons, switch zippers and put on shoes)	ward, excluding distance walking)	10= Need 1 person to help you walk (physical or verbal) 15= Independent walking (with assist)		
Transfer (bed-chair)	0= Totally dependent on others, can't sit		0= Can't move		
	5= Lots of help needed (2 people), can sit	Go up the stairs (up and down a flight of stairs with a cane counts as	5= Need help		
	10= Need a little help (1 person) or guidance	independent)	10= Provide for oneself(physical or verbal)		
	15= Provide for oneself				

Table S3: Barthel Index

Notes: Scores represent the degree of activities of daily living (ADL) capability deficit. 0-20= Very severe functional defect. 25-45= Severe functional deficits. 75-95= Mild functional deficits. 100= Provide for oneself.

Citation: Pengyu Huang, Dandan Lu, Haixia Lu. Fully Functional Recovery after Brainstem Infarction in a Young Patient- A Case Report. Archives of Clinical and Medical Case Reports 6 (2022): 741-746.