



CASE REPORT: TRUE MOTOR RECOVERY OF UPPER LIMB BEYOND 5 YEARS POST-STROKE

Occupational Therapy

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ABSTRACT

Most of motor recovery usually occurs within first 3 months following stroke(1) . Herein is reported a remarkable late recovery of the right upper limb motor function following an ischaemic stroke attack . This recovery happened progressively from 5-7 years post stroke onset . Standardized clinical assessment was done to assess the movements of the joints of the upper limb and were repeated over time to characterize the recovery . The patient was able to perform reach to grasp movements with fair to good grip strength . These findings support the idea that the motor control of the paretic hand is mediated mainly by the contralateral sensorimotor cortex and the corresponding Corticospinal Tract and also by a plasticity of motor related areas in both hemispheres .

KEYWORDS

INTRODUCTION

Stroke is a leading cause of disability. The ability to live independently after stroke depends largely on the reduction of motor impairment and the recovery of motor function(2). Motor recovery is more limited for upper limbs than lower limbs. In the majority of stroke patients, the upper limb is more severely involved than the lower limb, as most strokes occur in the territory of the middle cerebral artery. (3) The probability of recovery of upper limb motor function has been found to be extremely limited 12 weeks post stroke onset (1). A patient with a complete motor deficit of the right upper limb after stroke was followed for 2.5 years . He presented a remarkable late recovery of upper limb motility in terms of hand functions which included reach to grasp function and grip strength 7 years post stroke onset.

The aim of the present study was to assess objectively the upper limb recovery of the patient over a long time period .

CASE DESCRIPTION

The patient was a 42 year old male with right side being dominant. He underwent an Ischaemic Stroke Attack affecting the Middle Cerebral Artery in the year 2017 . He had an initial complete Right hemiplegia . Although the patient was able to walk with a Circumductory Gait Pattern 6 months post stroke but he was unable to initiate movement in the right upper limb . The patient was discharged home 10 days post stroke onset . He did not receive any therapy post discharge . After 4.5 years he was referred to Occupational Therapy Department in NILD , Bonhooghly in December 2021 . Loss of functional movement is a common consequence of stroke for which a wide range of interventions has been developed (4). Bobath, Roods &Brunnstrom Movement Therapy was started which included Weight Bearing , Reflex Inhibitory Pattern (5). Trunk Rotation with Bilateral Clasp hand Activity , Axial and Limb weight Shifts ; Tapping and Fast brushing on the Extensor aspect of Right upper limb with slow brushing and gentle stroking on the flexor aspect ; Associated reactions & Bilateral Rowing (6)(7) . Slight Proximal Movements at shoulder and elbow re-appeared 5 months of receiving Therapy sessions . Proper shoulder and elbow movements with patient at Brunnstrom stage 3-4(Arm) appeared after 1 year after receiving Therapy Sessions . Slight Movement began at the forearm and wrist region in the 2nd year . The patient was referred to BTE work simulator in the 2nd year to perform Continuous passive motion of forearm pronation-Supination , Wrist flexion & Extension with isotonic strengthening of the shoulder flexors , abductors , external rotators & elbow extensors of the right upper limb . At 2.5 years the patient was able to perform wrist dorsi-palmar flexion and was able to grasp objects with slow release .

PATIENT PERSPECTIVE

The patient was well informed about the prognosis of stroke . He spontaneously reported at a follow-up consultation that he was able to reach and grasp and slowly release objects and could easily perform movements of the shoulder joint . When proposed to participate in a clinical study to characterize and better understand this recovery , he was interested . He was able to perform his leisure activities using both hands.

MATERIALS AND METHODS

Function of the Upper limb along with hand functions including reach to grasp movements , grip strength along with range of motion of the upper limb were measured with standardized tools /tests at 1st , 2nd & at 2.5 years . Grip strength was measured with BTE work simulator(Attachment No.162) ; Range of motion was measured using Goniometer and Functions of the upper limb and hand were measured using Action Research Arm test ; Motor Function (movement pattern) of the Upper Limb was measured using Fugl-Meyer Assessment for Upper extremity . The Results were expressed in as values in correspondence with the normal/maximum scores.



Figure 1 : Action Research Arm Test

RESULTS

Grip strength improved between 2-2.5 years . Range of Motion of the upper limb continued to improve between 1.5-2.5 years . Motor function also improved in the similar Function as Range of motion . Functional abilities of upper limb including specific hand functions showed improvement at 2.5 years indicating proximal-distal gradient in recovery.

Table 1: Standardized Clinical Evaluation Of Upper Limb Motility At 1 , 2,2.5 years

SCALES (SCORE)	1 st year	2 nd year	2.5 year
FMA-UE	15/66	25/66	29/66
ARAT	10/57	17/57	26/57
BTE(attachment 162) Grip strength in lbs	12.2	16.7	19.3

Table 2: Range Of Motion Of All Joints For The Paretic Upper Limb At 1st , 2nd , 2.5 years

Joint Motion	1 st year	2 nd year	2.5 year
Shoulder Flexion	0-65°	0-90°	0-107°
Shoulder Abduction	0-50°	0-72°	0-93°
Shoulder Ext Rotation	0-25°	0-47°	0-59°
Elbow Extension	0-40°	0-65°	0-79°
Wrist Extension	0-3°	0-10°	0-21°

DISCUSSION

This case report highlights a remarkable instance of late motor recovery in a patient with right upper limb hemiplegia following an ischemic stroke. Conventionally, motor recovery after a stroke is thought to plateau within the first three to six months with minimal improvement thereafter. However, this case demonstrates that meaningful functional recovery can still take place even 5 to 7 years after stroke onset, shedding light on the remarkable potential of neuroplasticity in chronic stroke rehabilitation.

One of the most striking aspects of this case is that the patient did not receive rehabilitation therapy immediately after discharge. Despite this prolonged gap, he experienced substantial improvements once occupational therapy was introduced nearly five years later. This suggests that, even after a long delay, the nervous system retains the ability to adapt and reorganize when provided with the right therapeutic interventions. The use of Bobath, Rood's, and Brunnstrom movement therapy, combined with strengthening exercises and functional training, likely played a crucial role in stimulating motor recovery.

The progressive improvements in grip strength, range of motion, and motor function scores (FMA-UE, ARAT, BTE) over 2.5 years of therapy further reinforce the idea that targeted rehabilitation can drive functional gains long after the initial stroke.

Plasticity in the adult brain after stroke is enabled by a surprising amount of diffuse and redundant connectivity in the CNS and the ability of new structural and functional circuits to form through remapping between related cortical regions. Carine et al. (2022) conducted a study investigating the potential for motor recovery in patients more than five years post-stroke. The authors reviewed mechanisms such as cortical reorganization, recruitment of alternative motor pathways, and changes in sensorimotor network excitability. They highlighted the role of the corticospinal tract and compensatory activation of the contralesional hemisphere in facilitating recovery. Their findings suggest significant potential for neuroplasticity and recovery even in chronic stroke patients, raising important questions about long-term rehabilitation strategies.

Clinically, this case underscores the importance of re-evaluating rehabilitation timelines and providing long-term therapy options for stroke survivors. It serves as a powerful reminder that recovery is not limited to the early post-stroke period and that individuals may continue to benefit from rehabilitation, even years after their stroke. Moving forward, further research is needed to explore the optimal types, intensity, and duration of therapy that can maximize late-stage motor recovery.

In conclusion, this case provides compelling evidence that true motor recovery can occur well beyond the traditionally accepted window.

CONCLUSION

The improvement in motor scores and movement characteristics is in favour of true motor recovery. This remarkable late motor recovery of the upper limb provides opportunities for further research regarding the time course of recovery after stroke.

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