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Dynamics of restoring motor functions in post-stroke

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ABSTRACT

Stroke is the most important medical and social problem, that occupies a leading place in terms of overall mortality and disability in the Republic of Uzbekistan. The growing number of vascular diseases of the brain has made the rehabilitation of stroke patients as a priority. The relevance of this problem is determined by the high prevalence of stroke in the population (more than 60 thousand strokes occur annually in Uzbekistan) and the high degree of disability in patients who survived after stroke; this is associated with the development of motor, speech and other disorders, leading to social and mental disadaptation, loss of ability to work and decreased quality of life. More than 80% of people of working age who have had strokes become disabled.

Keywords: Stroke, rehabilitation, motor disorder, disability, mortality.

INTRODUCTION

Stroke is a leading cause of acquired, permanent disability worldwide. Although the treatment of acute stroke has been improved considerably, the majority of patients to date are left disabled with a considerable impact on functional independence and quality of life. As the absolute number of stroke survivors is likely to further increase due to the demographic changes in our ageing societies, new strategies are needed in order to improve neurorehabilitation. The most critical driver of functional recovery post-stroke is neural reorganization. For developing novel, neurobiologically informed strategies to promote recovery of function, an improved understanding of the mechanisms enabling plasticity and recovery is mandatory [1].

The optimal time to begin rehabilitation after a stroke remains unsettled, though the evidence is mounting that for at least some deficits, initiation of rehabilitative strategies within the first 2 weeks of stroke is beneficial. Commencing intensive therapy in the first 24 h may be harmful [8].

Rehabilitation is a process that uses three major principles of recovery: adaptation, restitution, and neuroplasticity. Based on these principles, multiple different approaches, both pharmacologic and nonpharmacologic, exist to enhance rehabilitation. In addition to neurologists, a variety of healthcare professionals are involved in stroke rehabilitation. Successful rehabilitation involves understanding the natural history of stroke recovery and a multidisciplinary approach with judicious use of resources to identify and treat common poststroke sequelae [9].

A reliable prognosis can in all stroke patients be made within 12 weeks from stroke onset. Even in patients with severe and very severe strokes, neurological and functional recovery should not be expected after the first 5 months [20].

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Recovery from stroke

The time after a stroke is often divided into phases. The Stroke Roundtable Consortium proposed to designate the first 24 h as the hyperacute phase, the first 7 days as the acute phase, the first 3 months as the early sub-acute phase, the months 4–6 as the late sub-acute phase, and from 6 months on as the chronicphase [2].

The rationale behind this differentiation is that recovery-related processes post-stroke are time-dependent. Already within hours after the onset of cerebral ischemia, a cascade of plasticity-enhancing mechanisms leads to dendritic growth, axonal sprouting, and the formation of new synapses [3, 4].

Furthermore, the most significant improvements occur in the first few weeks post-stroke, often reaching a relative plateau after 3 months with less significant recovery subsequently, especially concerning motor symptoms [5, 6].

After 6 months, spontaneous recovery is usually at its limit, leading to a more or less stable, i.e., chronic deficit. Nevertheless, with training or other interventions, improvements of some stroke-induced deficits can even be achieved in the chronic phase, primarily for more cognitive domains like language [7].

Functional recovery occurs at least until 24 weeks after acute stroke, but most of the functional gains tend to be achieved during the first 12 weeks. Cognitive function tends to improve earlier than motor function, with the most substantial gains occurring within the first three weeks. From 12 to 24 weeks there are observable numerical gains in patient functionality, highlighting the need to maintain an adequate rehabilitation program [17].

A rule of thumb in stroke recovery is that patients with mild deficits are more likely to make a good recovery than patients with initially more severe deficits. The «proportional recovery rule» assumes that patients can on average improve around 70% (+/– 15%) of their lost function within 3–6 months after stroke [11,15,19]], with the lost function defined as being the hypothetical difference between normal function (e.g., a full score in a motor test) and the initial deficit of the patient. The proportional recovery rule is an interesting concept which assumes that recovery of function follows a fundamental neurobiological process that cannot be substantially influenced by whether a patient receives high- or low-intensity therapy [15].

It has, however, been criticized recently to be spuriously driven by mathematical coupling and ceiling effects, leading to over-estimations of proportional recovery relationships [12,16,18].

Besides, there seems to be a relevant number of patients who do not follow the proportional recovery rule («non-fitters») [12].

Some stroke patients with initially severe deficits like hemiplegia may even recover within the first 10 days [13], challenging current models of recovery with stringent phases.

Six-month functional recovery of stroke patients: a multi-time-point study

The aim of this study is to compare the time-course changes in neurologic impairments (trunk control, motor function, sensory, and cognition) and recovery in functional impairments (activity of daily living and gait) simultaneously from initiating rehabilitation to 6 months after stroke. Consecutive stroke patients were recruited from the Department of nervous surgery and transferred to the department of Rehabilitation Medicine and continued treatment during the acute stage. Outcome measures were examined at the initial rehabilitation baseline, 1, 2, and 4 weeks after rehabilitation treatment, and 3, 4, 5, and 6 months after stroke. Patients were assessed using the Trunk Impairment Scale, the Fugl-Meyer Motor and Sensory Assessments for the upper and lower limbs, the Mini-Mental State Examination, the Functional Ambulation Category, and the Modified Barthel Index. Twenty consecutive patients were analyzed in the study with complete assessments. The recovery was relatively rapid during the 4 weeks after treatment (P value ranges from <0.001 to <0.007) and then to a lesser extent decelerated between 3 and 6 months after stroke (P value between <0.001 and 0.080). Statistical comparison by repeated measures analysis showed a significant interaction between time points and measures of all recovery variables (P<0.001). Significant differences in the level of impairments and functional recovery were found at different time points. In comparison with the lower leg and trunk control, the upper arm showed less recovery, with a significant difference. All variables except for leg motor function improved continuously over 6 months after stroke. Nevertheless, this study confirms the importance of the period within 3 months for recovery after stroke, during which most of the recovery occurred, ranging from 48 to 91%. Therefore, intensive treatment targeting motor and sensory functions early after stroke may be beneficial for recovery of impairments and functional performance [14].

Quality of life after stroke

Health-related quality of life (HRQoL) is a recognized and important outcome after stroke. An increased

survival and the presence of moderate impairment in long-term stroke survivors impact their HRQoL.

Stroke is the leading cause of long-term disability in Western countries. Specific HRQoL scales have been developed in the last years, such as the Stroke Impact Scale, the Stroke Specific Quality of Life Scale, the Stroke and Aphasia HRQoL Scale, and the Burden of Stroke Scale. Disability and poststroke depression are consistent determinants of HRQoL. Other determinants include female sex, coping strategies, and social support. Poststroke depression affects HRQoL, functional recovery, cognitive function and healthcare use in stroke survivors. Stroke caregivers have lower HRQoL, greater prevalence of stress and depression, economic burden, and changes in social relationships. Advancing age and anxiety in patients and caregivers, high dependency and poor family support identify caregivers at risk of adverse outcomes.

Physical and psychosocial well-being is greatly affected in stroke survivors and their caregivers [10].

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INSULT O'TQAZGAN BEMORLARDA HARAKAT TIZIMINING BUZILISHLARININI TIKLANISH DINAMIKASI.

ABSTRAKT

Insult eng katta tibbiy-ijtimoiy muammo bo'lib, O'zbekiston Respublikasida umumiy o'lim va nogironlik darajasida yetakchi o'rinni egallaydi. Qon-tomir kasalliklar sonining ortib borayotgani insult bilan og'rigan bemorlar reabilitatsiyasi ustuvor vazifaga aylanmoqda. Bu muammoning dolzarbligi aholi orasida insultning yuqori tarqalishi (O'zbekistonda har yili 60 mingdan ortiq insult sodir bo'ladi) va insultdan omon qolgan bemorlarning nogironlik darajasi yuqoriligi bilan belgilanadi; bu harakat tizimi, nutq va boshqa buzilishlarning rivojlanishi bilan bog'liq bo'lib, ijtimoiy va aqliy moslashuvga, mehnat qobiliyatini yo'qotishga va hayot sifatini pasayishiga olib keladi. Insultga uchragan mehnatga layoqatli odamlarning 80% dan ortig'i nogiron bo'lib qoladi.

Kalit so'zlar: insult, reabilitatsiya, harakat tizimining buzilishlari, nogironlik, o'lim.

ДИНАМИКА ВОССТАНОВЛЕНИЯ ДВИГАТЕЛЬНЫХ РАССТРОЙСТВ У ПОСТИНСУЛЬТНЫХ БОЛЬНЫХ.

АБСТРАКТ

Инсульт является важнейшей медико-социальной проблемой, занимающей ведущее место по общей смертности и инвалидности в Республике Узбекистан. Растущее число сосудистых заболеваний головного мозга сделало реабилитацию больных, перенесших инсульт приоритетной задачей. Актуальность данной проблемы определяется большой распространенностью инсульта в популяции (ежегодно в Узбекистане происходит более 60 тыс. инсультов) и высокой степенью инвалидизации больных, выживших после инсульта; это связано с развитием двигательных, речевых и других нарушений, приводящих к социальной и психической дезадаптации, потере трудоспособности и снижению качества жизни. Более 80% людей трудоспособного возраста, перенесших инсульт, становятся инвалидами.

Ключевые слова: инсульт, реабилитация, двигательные нарушения, инвалидность, смертность.