

STROKE



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Dear Doctor,

Greetings from Micro Labs. We are happy to bring you “Stroke Newsletter” which contains latest and interesting news in the field of Neuropsychiatry.

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Evaluation and Monitoring of Upper Extremity Functions: Using Novel sensor embedded Holding Device

Introduction: Normal aging might alter physical, mental, and social health. Physical changes include decreased strength and mobility, mostly upper extremity (UE) functions and strategies may affect activities of daily living (ADL). There are other causes responsible for causing the Upper extremity dysfunction, that include stroke, trauma, Parkinson disease and other musculoskeletal disorders¹. UE impairment leads to limitation of activities and worse health-related quality of life and the Fugl-Meyer Assessment (FMA) is a comprehensive measurement tool for motor function after stroke. Motor domain is most widely used Among the five FMA domains and has the primary value of monitoring motor recovery after stroke². Almost all the traditional evaluation tools (TETs) and assessments require clinicians to assist and limited to clinical settings. Thus aim of our study to develop a novel UE assessment device that is user-friendly and which requires minimal assistance.

Methods: In this study three groups of participants were recruited that includes healthy young adults, healthy elderly, and stroke survivors. Healthy young adults aged between 20 and 30 years having no neurological or musculoskeletal disorders and healthy elderly of aged above 65 years having no neurological or musculoskeletal disorders were included in the study. Purdue Pegboard Test (PPT) was conducted according to the guidelines of the clinical tutorial which is a common clinical evaluation tool for UE and hand movement. All the data related to the movements were collected while the participants were sitting and holding the Sensor Embedded Holding Device (SEHD) with their dominant hand. The SEHD has 14 force sensors with an array designed to fit holding positions and a six-axis inertial measurement unit (IMU) to monitor grip strength, hand dexterity, acceleration, and angular velocity

Results: The study result shows that study participants were right-side dominant. Traditional evaluation tool results show that stroke survivors performed the worst among the three groups across all assessments. Healthy young adults performed slightly better when compared to the healthy older adults on all outcomes assessed. Study participants with stroke are mostly with the condition ischemic stroke on the left side of brain. The average Fugl-Meyer motor score for the affected side and less affected side was 28.3 and 36.3. After the Pearson's correlation coefficient analysis, there was a highly positive correlation between the maximum grip force



and Jamar dynamometer. Middle finger offered a better correlation coefficient with the Purdue Pegboard Test.

There was also a highly positive correlation between the maximum pressing task and Jamar dynamometer in maximum grip strength. Study suggests that the application of affordable force sensors on this device can provide a reference for monitoring one's power gripping ability and that this device can be used for the rehabilitation and monitoring of people with hand disabilities.

Table:1 Correlation between Purdue Pegboard Test and data from SEHD during sequential pressing task

Correlations	Finger Independence (Index Finger)	Finger Independence (Middle Finger)	
Purdue (dominant)	Correlation coefficient Sig. (2-tailed) N	-0.448 0.082 12	-0.615 0.011 12
Purdue (both)	Correlation coefficient Sig. (2-tailed) N	-0.072 0.790 12	-0.565 0.023 12

Conclusion: The study concluded that SEHD system can be used as a monitoring tool for users in need. The integrated hardware and software in the SEHD offer proper usability and feasibility for people who need UE rehabilitation, allowing them to understand their upper extremity ability at home or in hospitals

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Evaluation of Narrow Corridor Walk Test in assessing the advanced walking ability in patients with stroke

Introduction: Neurological impairment leads to imbalance and mobility deficits and increased risk of in patients with stroke and fall related injury may lead to immobility, loss of independence, and decreased quality of life¹. In patients with stroke, ability to control balance in sitting and standing positions is an important skill of motor behaviour for achieving autonomy in everyday activities and postural performance of patients have been closely linked with the long term functional improvement². Walking speed and walking capacity are the significant for community integration of stroke survivors. Measurement of walking capacity in stroke survivors helps the clinicians to develop appropriate rehabilitation programmes and also monitor the patient's progression³. The role of cognition in postural control and gait is being increasingly recognized⁴. The Narrow Corridor Walking Test (NCWT) was originally developed to quantitatively assess the advanced balance ability of healthy older adults. The aim of this study is to evaluate the Narrow Corridor Walk Test in assessing the advanced walking ability in patients with stroke.

Methods: The sample size of 26 was required to achieve 80% power and a 0.05 significance level, People with age over 50 years old diagnosed with stroke at least 12 months before the study, ability to walk for 10 m independently with or without an assistive device with sufficient cognitive function were included in the study. NCWT was used to assess advanced balance ability in people with stroke. Each participant was required to perform three trials, and the mean was recorded. To determine the cut-off values Receiver operating characteristic (ROC) curves were used for differentiating the advanced balance ability of people with stroke and healthy older adults.

Results: The study results show that significant difference in sex between people with stroke and healthy older adults. People with stroke took a significantly longer time ($15:93 \pm 10:54$ s) and more steps ($18:6 \pm 5:62$) to complete the NCWT than the healthy older adults ($5:82 \pm 0:73$ s and $10:96 \pm 1:01$, respectively). The NCWT completion time and steps showed excellent interrater reliability, as reflected by the intraclass correlation coefficient. standardized experiment protocol with clear instructions and the well-trained raters who conducted the NCWT assessment are the key reasons for achieving excellent reliability. The Excellent ability to differentiate between people with stroke and healthy older adults in terms of advanced



balance ability was possible with assessing the NCWT completion time and NCWT steps. The optimal cut-off of NCWT completion time of 7.40 s and NCWT steps of 13.33 were determined as best to differentiate the advanced balance ability of people with stroke from that of healthy older adults

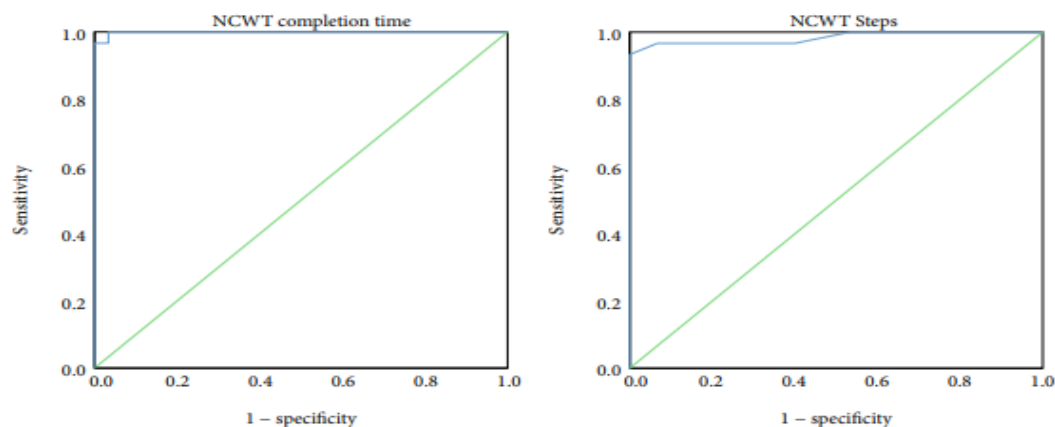


Figure 2 Receiver operating characteristic of the Narrow Corridor Walking Test

Conclusion: The study concludes that NCWT is a reliable and valid measurement to assess advanced balance ability during walking in people with stroke and only requires simple equipment which is easy to administer within 3-5 minutes to complete.

Evidence based nursing has showed a better improvement in psychiatric symptoms in patients who are suffering with acute post stroke depression

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Association of Early white matter connectivity and plasticity in post stroke aphasia recovery

Introduction: Functional brain reorganization coincides with behavioural improvement in patients with aphasia after stroke¹. Impaired ability to recognize and apply language symbols termed as post stroke aphasia which affect the efficacy of rehabilitation therapies which leads to severe dysfunction and poor prognosis after stroke². Aphasia recovery is mostly focused on left hemisphere lesion related factors, but the integrity of the brain tissue spared by the stroke may contribute to neural plasticity and influence treatment response independently of left hemisphere damage. However, a relevant radiological marker of brain health is white matter hyper intensities (WHM)³, a little evidence was found on structural reorganization of white matter tracts supporting language, especially not in the first months after stroke. Various diffusion-derived measures of both white matter pathways have been related to concurrently measured language impairments after stroke, mostly in the chronic phase¹. Majority of previous research has focused on damaged left hemisphere pathways, while neglecting the potential protective value of their right hemisphere counterparts for language recovery, so current study was conducted to evaluate the association of early white matter connectivity and plasticity in post stroke aphasia recovery.

Methods: A longitudinal study was conducted in 32 patients and patients with acute diffusion MRI and at least one behavioural follow-up moment were included in the study. Follow up was made for patients with a stroke lesion in the left hemisphere and a confirmed language deficit from the acute phase post stroke to the chronic phase with an extra measurement in the subacute phase. ScreeLing has been validated and is specifically designed to assess language functioning on three linguistic domains: semantics, phonology and syntax. Each domain is assessed with four tasks that each contain six test items. Sub scores assessing phonological and semantic processing were considered to assess dual-stream processing.

Results: The study results show that Concurrent regressions in the acute phase (Table 2, Figure 3) indicated that the Fiber Bundle Capacity (FBC) of the left dorsal arcuate fasciculus (AF) significantly contributed to the phonological model, but not the semantic model. The FBC of the right dorsal AF did neither significantly contribute to the phonological model, nor to the semantic model. On the other hand, the FBC of the left and right ventral inferior fronto-



occipital fasciculus (IFOF) significantly contributed to the semantic model, but not to the phonological model.

A significant interaction effect between FBC and language component indicated that the relationship between the left AF and phonology was significantly stronger than the relationship between the left AF 20 and semantics was found in a model for the left AF. Acute FBC measures to the prediction of later language outcomes over and above the initial language scores, suggesting no added value of the diffusion measures for language prediction.

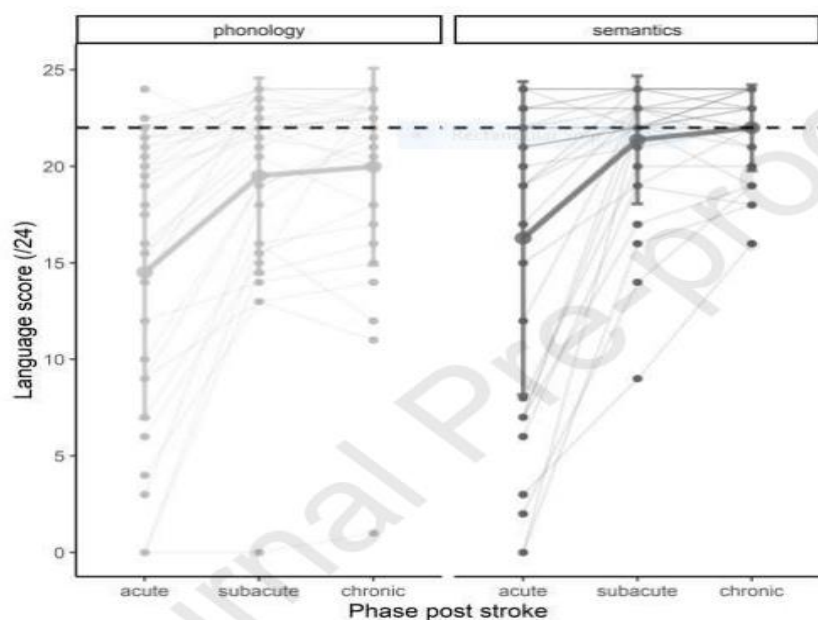


Figure 1 Language recovery over time

Conclusion: The current study provides the connectivity decreases in the bilateral AF, possibly related to post stroke white matter neurodegeneration. The new insights regarding the brain-behaviour correlations in accordance with dual-stream models of language processing, but driven by lesion size in the left hemisphere was analysed in this study.

The current study provides the connectivity decreases in the bilateral AF, possibly related to post stroke white matter neurodegeneration



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Biatrial Myxoma in a Young Male Presenting with Cerebrovascular Accident: A Case Report

Introduction: Myxomas are the most common type of cardiac tumours which are very rare in occurrence, mostly being noncancerous as they do not invade other tissues¹. The incidence is 0.5-1.0 cases per million inhabitants per year. Myxomas occur in all age groups and in both sexes, more often in women between the third and sixth decades of life. Even these are histologically benign, in few cases become lethal due to impaired cardiac dynamics and thromboembolic potential². Typically, these tumours presents with a variety of obstructive, embolic and constitutional symptoms involving left atrium affecting mostly middle aged females³. In Patients with Cardiac Myxoma diagnosis is based on medical history, clinical examination, blood test results, and radiographic or echocardiographic findings⁴. Various studies show that left atrial myxomas increase the risk of an embolizing event. But there is no evidence explaining whether multiple myxomas may increase the likelihood of experiencing cardiovascular and/or neurological events¹. The aim of this study is to present a rare case of Biatrial Myxoma with Cerebrovascular Accident.

A 23-year-old male who had attended the hospital with chief complaints of onset right-sided weakness for one hour, as he was in work and his co-workers noticed the slurred speech in mid conversation. Physical examination reveals that patients was anxious appearing, profound aphasic speech, right facial weakness was observed, no blink, asymmetric palatal elevation and tongue movement. Patient Right arm and leg are toneless, not able to move against gravity but slight flexion of the right arm to pain. Needs assistance to move left arm and leg against gravity and able to feel pain bilaterally.



Laboratory investigations include CT scan reveals that Left Middle Cerebral Artery M1 segment occlusion/thrombus formation with attenuated distal branches. Multifocal regions of acute to subacute ischemia within the left middle cerebral artery territory was noted in MRI scan. Echocardiogram reveals the large mass in left atrium and a small mass in the right atrium. The attachment point of left atrial mass is unclear and right atrial mass is attached to the septum as shown in figure 4.

As patient was diagnosed with Biatrial Myxoma, Cardiothoracic surgery was considered and evaluated for possible intervention. The patient was moved to a partner cardiac centre at a neighbouring hospital for resection of the atrial mass. After transfer, his right-sided weakness resolved significantly, with persistent symptoms of Broca's aphasia. Once neurologic symptoms stabilized, for resection of the mass the patient underwent cardiothoracic surgery on cardiopulmonary bypass.

During the operation, a large 4x6 cm mass in the left atrium (Image A), and a small 1x2 cm mass in the right atrium (Image B) were removed and sent for pathology for confirmation. The patient had a fast recovery following the surgery, and subsequently was admitted to inpatient cardiac rehab where he undergone extensive physical, speech and occupational therapy. The patient had a swift recovery, and was discharged home within the week. The patient was discharged with list of medicines that include metoprolol 25 mg, simvastatin 20mg, aspirin 81 mg and patient was instructed to continue outpatient cardiac rehabilitation. Appointments were made for the patient with cardiology, cardiothoracic surgery, and neurology in the outpatient clinics as follow-up.

Image A:



Size: 4x6 cm

Image B:



Size: 1 x 2 cm

Figure:4 Right and Left atrial mass



Conclusion: The study concludes that Cardiac evaluations for young adults presenting with cardiovascular and/or neurologic symptoms may be crucial to diagnosis, treatment and potential prevention of subsequent systemic embolic events.

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