ИЗМЕНЕННАЯ МОЗОЛИСТАЯ МОРФОЛОГИЯ ПРИ ПОСТИНСУЛЬТНОМ КОГНИТИВНОМ НАРУШЕНИИ

Dr. Ghazanfer Ali
Ассистент Кафедра Патофизиология Самаркандский государственный медицинский университет

Аннотация: Второй наиболее распространенной причиной смерти и снижения когнитивных функций является инсульт. Хотя основные мозговые механизмы постинсультного когнитивного нарушения (PSCI), среди выживших после инсульта, все еще в основном неизвестны. Изменения в морфологии мозолистого тела (CC) могут перекрывать спектр PSCI, поскольку CC необходим как для сегрегации полушарий, так и для межполушарной интеграции. Целью этого исследования было изучение морфологических изменений в CC и их диагностической полезности у пациентов с PSCI.

Ключевые слова: мозолистого тела, когнитивных функций, инсульт, постинсультное когнитивное нарушение, межполушарная интеграция, дисфункция, расстройства внимания, проблемы с памятью, языковые проблемы , зрительно-пространственные аномалии.

ALTERED CALLOSAL MORPHOLOGY IN POST-STROKE COGNITIVE IMPAIRMENT

Dr. Ghazanfer Ali
Teaching assistant, candidate of medical sciences
Department of Pathophysiology Samarkand State Medical University

Abstract: The second most common cause of death and cognitive decline is stroke. Although the underlying brain mechanisms of post-stroke cognitive impairment (PSCI), one of the most prevalent sequelae among stroke survivors, are still mostly unknown. Changes in the morphology of the corpus callosum (CC) may overlap with the spectrum of PSCI, because CC is essential for both hemisphere segregation and interhemispheric integration. The purpose of this study was to examine the morphological alterations in the CC and their diagnostic utility in patients with PSCI. Neurobehavioral, clinical, and structural MRI data were

gathered from 4 demographically matched healthy controls and 50 PSCI patients. PSCI patients showed notable decreases in genu thickness, circularity, and CC area; these alterations were highly correlated with overall cognitive performance. Subgroup analysis showed that lesions in the posterior circulation considerably reduced CC circularity, whereas lesions in the anterior circulation significantly reduced both CC area and circularity. With corresponding area under the curve values of 0.748 and 0.746, receiver operating characteristic evaluations revealed that the CC's midbody regions had a strong diagnostic value. According to additional validation investigations, the transcallosal fibers in these CC subregions are associated with the frontoparietal system, dorsal attention, and premotor functions. Accordingly, CC morphology could be used as an imaging marker for PSCI diagnosis and prognosis.

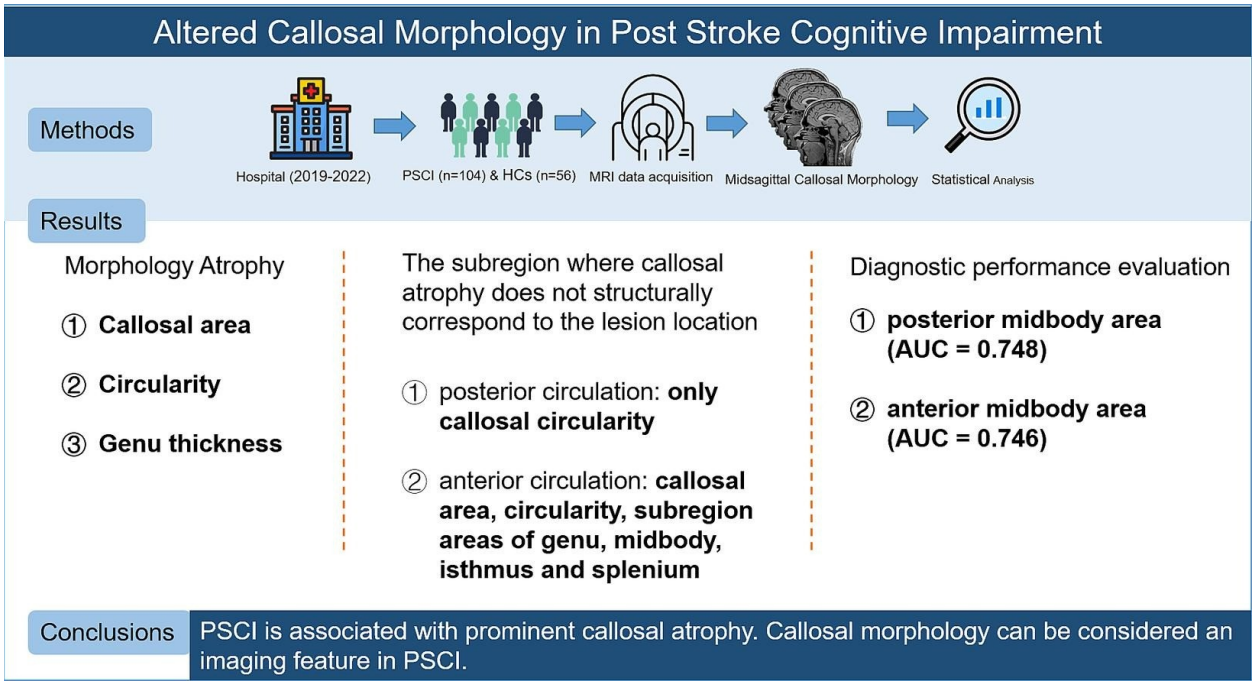
Introduction

Globally, stroke ranks as the second most common cause of death and cognitive decline [1]. The prevalence of post-stroke cognitive impairment (PSCI), which is defined as cognitive dysfunction after a stroke, ranges from 20% to 80% [1,4]. The executive dysfunction, attention disorders, memory issues, language challenges, and visuospatial abnormalities are examples of common cognitive dysfunctions [6]. These disabilities have a major negative influence on patients' quality of life and place a heavy financial strain on their families. The neuroanatomical mechanisms underpinning PSCI are still not well understood, despite these worries. An essential part of interhemispheric integration and segregation is the corpus callosum (CC), the biggest bundle of commissural fibers in the brain that connects the left and right hemispheres. CC atrophy has been shown to occur in Alzheimer's disease (AD) and moderate cognitive impairment, with the degree of atrophy indicating subsequent cognitive decline [4,5,6,7]. Similar to this, stroke frequently results in brain atrophy, with ventricular enlargement and CC atrophy being the most common symptoms [1,5,8]. The main method used to investigate post-stroke alterations in the CC is diffusion MRI, which offers data on transcallosal fibers and white matter integrity. These investigations have examined the theoretical theory of post-stroke homotopic diaschisis. These results provide fresh information about the deterioration of post-stroke CC tractography, but straightforward and useful clinical indicators for PSCI diagnosis and prediction are still lacking.

An easy method for evaluating CC morphology is to use anatomical MRI. Prior research has produced quick and reliable methods to divide the CC and measure its size, circularity, length, and thickness—all of which have been suggested as p It is still unclear how PSCI-related changes in CC morphology, especially those based

on distinct anatomical subdivisions, have occurred. A biomarker for tracking cognitive status in AD may be CC morphology, according to earlier research (Adamson et al., 2018), there is also evidence that the microstructural integrity of the CC is disrupted by cerebral small vessel disease.

Investigating structural alterations in the CC in PSCI patients and their relationship to cognitive dysfunction is the goal of this study. Our specific objectives were to: (1) determine the degree of CC atrophy and its relationship to cognitive function in PSCI patients; (2) investigate the influence of stroke lesion site on CC atrophy; and (3) assess the diagnostic utility of callosalossible biomarkers for AD (Ardekani and Alzheimer, 2022; Ardekani et al., 2014). Our specific objectives were to: (1) determine the degree of CC atrophy and its relationship to cognitive function in patients with PSCI; (2) investigate the influence of stroke lesion site on CC atrophy; and (3) assess the diagnostic utility of alterations in callosal morphology. We predicted that substantial CC atrophy linked to cognitive deterioration would be seen in PSCI patients.



Methods and materials

50 PSCI patients were admitted to Pakistan Hospital between April 2019 and December 2022. 4 community members who were demographically matched as health controls (HCs) were gathered during the same period. The Ethical Medicine Society at Pakistan Hospital approved this study, and informed consent forms were signed by each participant.

Discussion

This study specifically examined the impact of PSCI on the CC's morphology. We computed morphological parameters, including the area, thickness, and circularity of the midsagittal CC, using anatomical MRI and discovered that individuals with PSCI had substantial regional atrophy of the CC. Additional investigation based on the location of stroke lesions (anterior versus posterior circulation) showed that more CC subregions are affected by strokes in the anterior circulation.

In conclusion

The findings of our investigation show that the CC in PSCI patients exhibits morphological alterations, such as a reduction in thickness at the genu and a decrease in area and circularity. The PSCI patients' global cognition and these alterations are significantly positively correlated. This implies that one of the imaging characteristics of PSCI is changes in CC morphology, which makes it easier to identify people who are at a high risk of developing vascular dementia.

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