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THESIS

Transcranial sonography: an accurate and reliable diagnostic test for Parkinson's disease

A ultrassonografia transcraniana como método diagnóstico complementar eficaz e confiável na doença de Parkinson

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ABSTRACT

Background: Transcranial sonography (TCS) provides two-dimensional sonographic images of the brain parenchyma through the intact skull. **Objective:** To determine the accuracy and reliability of TCS and of a novel methodology for echogenicity quantification in post hoc analysis of TCS images for the diagnosis of Parkinson's disease (PD). **Method:** 227 participants had standardized TCS examination. Gray scale mean (GSM) of mesencephalic structures was determined from stored images. **Results:** 10.6% had no bone windows. The groups included 77 PD patients and 126 controls. Substantia nigra (SN) area diagnostic accuracy was 88.0% (85.7% sensibility, 89.7% specificity). For SN > 0.23 cm², area under the ROC curve = 0.925, Youden index = 0.75, likelihood ratios 8.32 positive and 0.159 negative. The mesencephalic area did not discriminate the groups. Ventricular diameters correlated positively with age and were higher in PD ($p = 0.005$). Hyperechogenic foci in lentiform nucleus were scarce (2.5%). Reliability and reproducibility of measurements were substantial. GSM showed superior values in Parkinsonians, with good reproducibility. The two methodologies together identified all of the patients, yielding a 100% sensibility. **Conclusion:** TCS is a reliable and accurate diagnostic tool for PD. The digital image analysis proposed here further enhances its sensibility. TCS has good diagnostic value besides its safety, convenience and low cost.

Keywords: transcranial sonography, Parkinson's disease, substantia nigra, diagnostic accuracy, reproducibility.