DUPLEX SCANNING OF ARTERIES OF LOWER EXTREMITIES IN NONINVASIVE DIAGNOSTICS OF PERIPHERAL ARTERIES DISEASE

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Peripheral arterial disease (PAD) is the leading cause of morbidity and mortality worldwide and has a significant financial burden on health care [1]. PAD affects 10–15% of the population and about 20% of people over 60 years old. Worldwide, the incidence of PAD has increased from 164 million in 2000 to 202 million in 2010 [4]. Color duplex scanning (DS) is a highly informative method for diagnosing steno-occlusive lesions of lower limb arteries. The article presents the results of determining the sensitivity and specificity, limitations and advantages of DS in diagnosis of PAD.

Purpose

The aim of the study was to determine the diagnostic efficacy of color duplex scanning in the detection of atherosclerosis.

Materials and methods

Color duplex scanning of the arteries of the lower extremities was performed on 60 patients with PAD aged 45-90 years (120 lower extremities, 1,800 segments) on ultrasonic system Aplio500 (Toshiba) with transducer 5,5–7 MHz (linear), 3-5 MHz (convex). DS is necessary to assess the anatomy and hemodynamic function of the vascular system and combines the use of B-mode, PW and CW Doppler. The iliac, femoral, popliteal, tibial arteries were studied. Patients were examined after the 10 minute rest. Segments with a ratio of peak systolic velocities of more than 2 m/s corresponded to a decrease in diameter of more than 50%. Was calculated the sensitivity and specificity with the calculation of 95% confidence interval (CI). The diagnostic sensitivity and diagnostic specificity of DS were evaluated on basis of a comparison of the information content of the DS and MSCT conclusions. Calculations of prognostic significance and diagnostic significance were performed using a 2x2 contingency table.

Results

The diagnostic efficiency of the DS method in detecting atherosclerosis of the lower limb arteries was: 61, 4 % - 90, 1% (CI 95%). In determining the diagnosis of PAD, average sensitivity values of 57, 2 % (52, 3 -60, 6%, CI 95%) were obtained. The predictive value of a positive result ranged from 11,6 to 14,8 and the predictive value of a negative result ranged from

87,2 to 96,4%. The values of the kappa coefficient reached values of more than 0,8 for all segments of the arterial bed.

Eiberg J.P. et al. were examined 2535 segments (in 15 segments of 169 lower extremities) with DS [5]. DS was shown 88% sensitivity, 79% specificity and 95% accuracy compared to angiography. In a study conducted in 100 individuals, a higher sensitivity (95% and 92%) and specificity (99% and 97%) were noted in the diagnosis of arterial occlusion and stenosis, respectively, compared with angiography. Other study conducted in 51 patients (100 lower extremities) compared DS with angiography to detect occlusion and stenosis. Occlusion detection had a sensitivity of 95% and a specificity of 99%, while stenosis detection had a sensitivity of 92% and a specificity of 97%. The study time for each patient was 30-45 minutes [5]. Ultrasound is considered the gold standard and an important tool for diagnosing of PAD. However, the use of DS strongly depends on the operator [1, 2, 3]. 5–20% of patients cannot perform DS due to ulceration, pain, edema, severely calcified arteries, and obesity. DS can take a long time (1-2 hours), requires expensive equipment and a trained vessel specialist with knowledge of anatomy of vascular system. These factors may limit the use of ultrasound for routine examination and early diagnosis of PAD.

References

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