

Sensitivity of transcutaneous oxygen tension pressure and arterial duplex ultrasonography in detection of ischaemia in patients with diabetic foot

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Background and aims: Peripheral arterial disease (PAD) is a substantial factor relating to the outcome of a diabetic foot ulcer (DFU). Early indication of angiography (AG) is an important and an objective non-invasive assessment of perfusion that may include transcutaneous oxygen tension pressure measurement (TcPO₂) and arterial duplex ultrasonography (DUS). In accordance with the international guidelines, TcPO₂<30mmHg is defined as a critical limb ischaemia with very low probability of healing. However, the 40mmHg threshold can also be used for ischaemia detection. The aim was to compare prospectively the concordance of DUS and TcPO₂ (for both ≤ 30 and ≤ 40 mmHg TcPO₂ thresholds) in detection of suspected PAD and to check sensitivity of each method to angiographically verified arterial stenosis. **Methods:** 66 consecutive patients with DFU and clinical suspicion of PAD (mean age 67.9±11.0 years, 19% females, 89% of type 2 diabetes, mean duration of diabetes 17.6±14.5 years, mean glycated haemoglobin 91±36 mmol/mol) treated at our foot clinic between February 2010 and December 2012 were included into the study. Both TcPO₂ and DUS were measured in the beginning of the follow-up. Criteria indicating ischaemia were defined as total occlusion or more than 50% stenosis (monophasic flow graph) of at least one of the lower limb arteries for DUS and as TcPO₂ ≤ 30 or ≤ 40 mmHg threshold, respectively. The primary outcome was to compare prospectively the concordance of DUS and TcPO₂ in detection of suspected PAD. In a subgroup of patients with AG, the sensitivity of each method to angiographically verified stenosis was checked. **Results:** 58/66 (87.9%) patients completed the follow-up. PAD was detected in 35/58 (60.3%) individuals by DUS, in 44/58 (75.8%) by TcPO₂ ≤ 30 mmHg and in 48/58 (82.7%) by TcPO₂ ≤ 40 mmHg. Regarding the primary outcome, 15/58 (25.8%) discordant pairs were found between DUS and TcPO₂ ≤ 30 mmHg with significant difference ($p=0,035$), while 17/58 (29.3%) discordant pairs were found between DUS and TcPO₂ ≤ 40 mmHg ($p=0,002$). In a subgroup of 32 subjects AG was performed. Regarding the secondary endpoint, sensitivity of each diagnostic method to angiographically verified stenosis was 90.0% (95%CI 73.5-97.9) for DUS while 93.3% (95%CI 77.9-99.2) for TcPO₂ ≤ 30 mmHg and 96.7% (95%CI 82.8-99.9) for TcPO₂ ≤ 40 mmHg, respectively.

Conclusion: Our study demonstrated significant difference in discordance between DUS and TcPO₂ (for both ≤ 30 and ≤ 40 mmHg thresholds) in diagnostics of suspected PAD. The results suggest that more patients with DFU and PAD are better identified by TcPO₂ than DUS. Checking sensitivity of each diagnostic method to angiographically verified stenosis, the sensitivity of TcPO₂ is higher than sensitivity of DUS. TcPO₂ ≤ 40 mmHg has higher sensitivity in comparison to the ≤ 30 mmHg threshold. Therefore, use of 40mmHg TcPO₂ threshold in the management of revascularisation could be useful in clinical practice. *Supported by: grant MO 0901-8-8140.*