Short Report

**Nurr1 Haplotypes are Associated with Femoropopliteal Restenosis/Re-occlusion after Percutaneous Transluminal Angioplasty**

M. Božić-Mijovski, M. Bedenčič, M. Stegnar, V. Salapura, M.K. Ježovnik, M. Kozak, A. Blinc

Department of Vascular Diseases, University Medical Centre, Zaloska 7, 1525 Ljubljana, Slovenia
Clinical Institute of Radiology, University Medical Centre, Ljubljana, Slovenia

**A R T I C L E I N F O**

Article info

Accepted 2 December 2011
Received 31 August 2011
Available online 9 January 2012

Keywords:
Peripheral arterial disease
Percutaneous transluminal angioplasty
Polymorphism
Risk factors

**A B S T R A C T**

Restenosis/re-occlusion remains a frequent complication in the first year after percutaneous transluminal angioplasty (PTA). In this study, association of nuclear receptor related 1 protein (Nurr1) haplotypes to the restenosis/re-occlusion rate after femoropopliteal PTA was investigated. Patients (n = 142) with disabling claudication or critical limb ischaemia, who had undergone technically successful femoropopliteal PTA, were prospectively followed up by vascular ultrasound imaging 12 months after the procedure. Nurr1 haplotypes 2 and 3 were associated significantly with the restenosis/re-occlusion rate (adjusted odds ratio 1.6, 95% confidence interval (CI) 1.1–2.3 and 2.0, 1.3–2.8, respectively) on univariate analysis.

DNA was extracted from blood samples and *Nurr1* single-nucleotide polymorphisms SNP A (rs1466408), *Nurr1* SNP B (rs13428968) and *Nurr1* SNP C (rs12803) were determined by real-time polymerase chain reaction with appropriate primers and TaqMan® probes. Nurr1 haplotypes were reconstructed as described earlier.

The presence of rare alleles of *Nurr1* SNP B and SNP C was significantly associated with restenosis/re-occlusion rate compared with patients carrying the common alleles (hazard ratio of 1.54, 95% confidence interval (CI) 1.17–4.37, respectively); Fig. 1.

Haplotype 1–4 frequencies were: 49.4%, 23.3%, 19.7% and 6.6%, respectively. Haplotypes 2 and 3 significantly increased the restenosis/re-occlusion rate (relative risks adjusted for sex, age and Fontaine classification calculated by Cox regression were 1.6 (95% CI 1.1–2.3) and 2.0 (95% CI 1.3–2.8), respectively).

**Discussion**

In our study restenosis/re-occlusion occurred in 85/142 (60%) patients during the 12-month follow-up period after PTA, which is comparable to the published data, and there was a significant association between *Nurr1* haplotypes 2 and 3 and the restenosis/re-occlusion rate, on univariate analysis. *Nurr1* haplotypes have so far been associated with coronary in-stent restenosis risk in patients undergoing percutaneous coronary intervention. We were not able to confirm an increased risk of...
restenosis/re-occlusion in patients with haplotype 4 in contrast to the findings of Bonta et al., probably due to the small number of patients with this haplotype (<7%). However, our results indicate that more detailed assessment of the role of Nurr1 variants in restenosis after PTA, in larger studies, is warranted.

**Conflict of Interest**
None.

**Funding**
The study was supported by the Slovenian Research Agency (Grant No. P3-0308).

---

**References**


