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Interobserver Agreement of the TASC II Classification for Supra- and Infrainguinal Lesions

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Abstract *Objectives:* The Trans-Atlantic Inter-Society Document on Management of Peripheral Arterial Disease (TASC) gives treatment recommendations depending on the classification of aorto-iliacal or femoro-popliteal vascular pathologies. Therefore, the best treatment could only be offered if the right TASC classification was obtained. The purpose of this study was to assess the interobserver agreement of the evaluation of the TASC II classification for peripheral arterial occlusive disease (PAOD) in magnetic resonance angiography (MRA).
Patients and methods: Three hundred arterial segments of 149 patients with a magnetic MRA for PAOD were evaluated according to the TASC II classification. A resident and a consultant for radiology and vascular surgery both performed independent grading. A comparative assessment of the consensus agreement was quantified by the marginal probabilities calculated by generalised estimation equation models, as well as by using the weighted kappa coefficient (κ), classified according to Altman.
Results: In relation to the consensus, the overall agreement was good to excellent for the consultants of radiology and vascular surgery. The consultants obtained a statistically significant higher agreement than did the residents (Odds ratio (OR): 2.86, 95% confidence interval (CI): 2.21–3.69, $p < 0.001$). A significantly higher consensus agreement probability was observed for the surgeons compared with the radiologists (OR: 1.43, 95% CI: 1.11–1.84, $p = 0.006$) and for the femoro-popliteal regions compared with the aorto-iliacal regions (OR: 1.64, 95% CI: 1.12–2.14, $p = 0.012$).

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Conclusion: Although good results can be achieved in the assessment of vascular lesions according to the TASC II document, a simplification of this classification could increase its practicability in a daily clinical routine.

Peripheral arterial occlusive disease (PAOD) affects up to 10% of the Western population over 65 years of age and has an age-dependent prevalence of 3–6% when intermittent claudication is used as an indicator.[1,2] The clinical manifestations of PAOD can start at an asymptomatic stage and result in major tissue loss; these are classified according to Rutherford or Fontaine. Similarly, the therapeutic options range broadly from conservative treatment to endovascular or open surgical procedures. To determine the best therapeutic option, knowledge about the clinical stage and morphological changes in the vascular system are necessary. Nevertheless, remarkable disagreements between and among surgeons and interventional radiologists occur regarding the best therapy (surgery or angioplasty) for severe limb ischaemia.[3]

Different vascular imaging techniques such as colour Doppler ultrasound, magnetic resonance angiography (MRA), computed tomography angiography and digital subtraction angiography are available for the detection of vascular pathologies. MRA is more frequently used since it is non-invasive, uses no radiation, is not dependent on the investigator and does not need iodinated contrast.[4,5]

For a classification of the morphological changes in the vascular system, the most widespread and applied document is the Trans-Atlantic Inter-Society Document on Management of Peripheral Arterial Disease (TASC), first published in 2000 and revised in 2007.[6,7] In this document, depending on the amount and severity of the stenosis or occlusions of the arteries, vascular pathologies of the aorto-iliacal and femoro-popliteal region are divided into four grades each (TASC A–D). In the latest TASC document, recommendations 36 (aorto-iliacal) and 37 (femoro-popliteal) state that TASC A pathologies should be treated by endovascular therapy and TASC D lesions should be operated upon. Depending on the co-morbidities, TASC B lesions should also be treated by endovascular therapy and TASC C lesions by surgery.[7] This shows that it is important to assess vascular pathologies correctly to find the best treatment option for patients with a need for non-conservative treatment.

The aim of this study was to assess the interobserver agreement of evaluation of the TASC II classification for PAOD in MRA; this classification is the basis of daily treatment decisions and, thus, a high reliability of grading and interobserver agreement are needed.

Patients and methods

Patients

A total of 149 consecutive patients presenting with PAOD to our centre for vascular diseases were investigated by MRA and were included in our study. The median age was 68 years (range: 41–92 years); 99 patients were male (66%) and 50 patients were female (34%). In the study cohort, 14 patients had a Rutherford stage 2 (9.4%), 111 patients stage 3 (74.5%), 11 patients stage 4 (7.4%) and 14 patients stage 5 and 6 (9.4%) (Table 1).

MR angiography

A 1.5 T Magnetom superconducting magnet (Siemens, Erlangen, Germany), with a moving table and a whole-body spiral for the lower legs, femoro-popliteal and aorto-iliacal vascular territory, was used to perform all of the MRAs.

Image interpretation

All of the MRAs were independently rated by four observers: a consultant of radiology (CR), a consultant of vascular surgery (CS), a resident of radiology (RR) and a resident of vascular surgery (RS), according to the TASC II classification for aorto-iliacal and femoro-popliteal lesions. Both of the consultants already had clinical experience for more than 15 years, and both of the residents a clinical experience for less than 5 years. Each MRA consisted of two evaluable vascular regions, namely the aorto-iliacal region, and the femoro-popliteal region (left and right segments). All of the observers were blinded to the clinical history of the patients and to the findings of the other observers. The regions that could not be rated by the examiner were entitled non-diagnostic (ND).

In a second pass, CR and CS obtained a consensus (C) by reviewing the angiograms together, which was used as the 'gold standard'.

Analysis

Interobserver agreement for the morphological evaluation was quantified by using the weighted kappa coefficient (κ), according to Fleiss and Cohen.[8] The κ values were reported with 95% CI for an assessment of the reliability between the observers themselves and between the observers and the consensus.[9] The interobserver agreement was classified by

Table 1 Characteristics of the study population.

Characteristic	*n* (%)
Median age	68 years
Male/Female	99/50 (66%/34%)
Smoking	101 (68%)
Diabetes	55 (37%)
Hypertension	73 (49%)
Hyperlipidaemia	54 (36%)
Coronary artery disease	31 (21%)