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685
CLINICAL RECOGNITION OF SYMPTOMATIC MIDFOOT OSTEOARTHRITIS: FINDINGS FROM THE CLINICAL ASSESSMENT STUDY OF THE FOOT

M.J. Thomas †, E. Roddy †, T. Rathod †, A. Moore †, H.B. Menz †,‡, G. Peat †. †*Keele Univ., Staffordshire, United Kingdom;* ‡*La Trobe Univ., Melbourne, Australia*

Purpose: Osteoarthritis (OA) is a common yet poorly understood cause of disabling foot pain. In the absence of radiographic confirmation of OA, clinical diagnosis in primary care is inhibited by lack of evidence informing clinical examination. This study aimed to determine whether the presence of symptomatic midfoot OA (SMOA) can be clinically identified in older adults with midfoot pain presenting to primary care.
Methods: A diagnostic model using brief clinical assessments was developed using cross-sectional data from 274 adults aged ≥50 years who had self-reported midfoot pain in the last month and attended a research assessment clinic between 2010-2011. All clinical assessment data were collected by trained physiotherapy or podiatry assessors adhering to a standardised, quality-controlled protocol. Presence of radiographic midfoot OA in at least one of four scored joints (1st and 2nd cuneo-metatarsal joint, navicular-first cuneiform joint, and talo-navicular joint) was ascertained by a single reader using a validated atlas and scoring system, and who was blinded to the clinical assessment data. Radiographic OA was defined as a score of ≥2 for osteophytes or joint space narrowing on either weight-bearing dorso-plantar or lateral views. SMOA was defined as co-occuring radiographic OA and midfoot pain. One foot per participant was entered into the analysis. The selection of predictor variables was based on known associations with OA or mechanically-driven putative links to SMOA. Significant predictor variables ($p<0.25$ from likelihood ratio tests) from univariable analyses were simultaneously entered into a multivariable logistic regression model and backward elimination ($p=0.05$) was performed. The Hosmer-Lemeshow statistic assessed the calibration of the refitted model and the area under the curve (AUC) evaluated discrimination. Histograms visually summarised discrimination. Internal validation of the model was performed using 1000 bias-corrected bootstrap samples with replacement.
Results: 274 participants without inflammatory disease comprised 125 men and 149 women (mean age 65 yrs, SD 9). Of these 155 had midfoot pain and 119 had SMOA. 16 univariable analyses identified 9 significant predictors and no collinearity was observed. In addition to force-entered variables (age, gender, body mass index (BMI)), only two independent predictors of SMOA were retained in the multivariable analysis: (i) reduced ankle dorsiflexion with the knee flexed and (ii) absence of a midfoot exostosis. Based on the strength of univariable association, the Foot Posture Index, subtalar inversion and ankle dorsiflexion with the knee extended appeared too weak to contribute to the final model, whereas the removal of the Arch Index and foot length-corrected navicular height was due to the stronger influence of age explaining these relationships. The final fitted model was well calibrated ($p=0.79$) but discrimination was poor (AUC, 0.69; 95%CI: 0.62, 0.75). Bootstrapping revealed a small degree of overfitting. The use of categorical predictor variables in continuous form did not identify any other predictors, nor did it improve model performance.
Conclusions: Brief clinical assessments offer only marginal improvement to age, gender and BMI for identifying SMOA. Milder severity in a population sample, random and systematic error in the clinical assessment, and variable expression of SMOA disease manifestation may have contributed to poor diagnostic accuracy. A clinically defined SMOA phenotype based on modifiable joint loading characteristics may offer an alternative approach to facilitating the development of more targeted biomechanical interventions.

686
PREDICTIVE VALUE OF MRI-DEFINED SYNOVITIS, BONE MARROW LESIONS AND CENTRAL EROSIONS ON PAIN AND PHYSICAL FUNCTION IN HAND OSTEOARTHRITIS

I.K. Haugen, I. Karlsen Eeg, B. Slatkowsky-Christensen, S. Sesseng, T.K. Kvien. *Diakonhjemmet Hosp., Oslo, Norway*

Purpose: A previous study in hand osteoarthritis (OA) suggested that Magnetic Resonance Imaging (MRI)-defined synovitis, bone marrow lesions (BML) and central erosions (bone attrition) are associated with pain upon palpation. The predictive value of these MRI features is unknown due to lack of longitudinal hand OA studies, in which MRI is obtained. Hence, our aim was to examine whether synovitis, BMLs and central erosions can predict clinical deterioration and poor clinical outcome 5 years later in patients with hand OA.
Methods: We included 70 (63 women) participants from the Oslo hand OA cohort with mean (SD) age of 67.9 (5.3) years and BMI of 26.4 (3.8) kg/m2.). At baseline (2008-09) and follow-up (2013), all participants completed the Australian/Canadian (AUSCAN) pain (0-20 scale) and physical function subscales (0-36 scale, higher scores represent worse health) and 59 participants underwent grip strength measurement of the dominant hand (Jamar dynamometer). MRIs of the distal and proximal interphalangeal joints in the dominant hand were obtained at baseline. MRI sequences included T1-weighted pre-and post-Gadolonium (Gd) images in coronal, axial and sagittal planes and Short Tau Inversion Recovery images in coronal and axial planes ($n=9$ without Gd contrast). One reader (IKH) scored the MRIs according to the Oslo hand OA MRI score, and we calculated sum scores for synovitis (range 0-24), BMLs (range 0-48) and central erosions (range 0-16). The associations between MRI sum scores and change of AUSCAN subscales and grip strength were examined by linear regression analyses. We also examined the associations between MRI sum scores and symptoms above the patient acceptable symptom state (PASS) (>8.2 for AUSCAN pain and >16.1 for AUSCAN physical function) at follow-up with logistic regression analyses. All analyses were adjusted for age, sex, BMI and follow-up time.
Results: At baseline the participants reported considerable pain and physical disability (Table). Synovitis was frequently present, whereas BMLs and central erosions were less common. The median (range) for sum scores were 8 (0-14), 0.5 (0-14) and 1 (0-12), respectively. During follow-up (mean (SD) 4.7 (0.3) years), there were small changes of AUSCAN pain, physical function and grip strength (Table). We found that MRI findings in the interphalangeal joints could not predict changes in pain and physical function or future symptoms above the PASS score (Table).
Conclusions: In a cohort of patients with established hand OA, we observed small changes in symptoms and grip strength over a 5-year period. MRI-determined synovitis, BMLs and central erosions could not predict symptom changes or future poor clinical outcome. Future

Table: Associations between baseline MRI sum scores and changes of pain and physical function.

	AUSCAN pain	AUSCAN physical function	Grip strength
Descriptives			
Mean (SD) at baseline	8.0 (3.9)	15.4 (7.9)	21.2 (8.2)
Median (IQR) change	0 (-2, 2)	0 (-2, 3)	-2 (-5, 1)
n (%) above PASS (baseline)	39 (56%)	31 (44%)	NA
n (%) above PASS (follow-up)	37 (53%)	34 (49%)	NA
Associations between MRI sum scores and changes in pain and physical function, B (95% CI)			
Synovitis	0.01 (-0.29, 0.32)	0.004 (-0.40, 0.41)	-0.06 (-0.47, 0.34)
Bone marrow lesions	-0.26 (-0.55, 0.03)	0.01 (-0.34, 0.36)	0.05 (-0.35, 0.46)
Central erosions	-0.38 (-0.71, -0.04)	-0.05 (-0.46, 0.36)	0.58 (0.12, 1.04)
Associations between MRI sum scores and symptoms above PASS, Odds ratio (95% CI)			
Synovitis	1.03 (0.85, 1.24)	1.14 (0.94, 1.37)	NA
Bone marrow lesions	0.92 (0.78, 1.08)	0.96 (0.82, 1.12)	NA
Central erosions	0.95 (0.79, 1.14)	0.99 (0.82, 1.20)	NA

PASS=patient acceptable symptom state