351
CAN CLINICAL FOOT AND ANKLE ASSESSMENTS IMPROVE THE PREDICTION OF PATIENT REPORTED OUTCOMES IN KNEE ARTHROPLASTY?

L.S. Gates †‡, C.J. Bowen †‡, N.K. Arden †§. † *Arthritis Res. UK Ctr. for Sport, Exercise and Osteoarthritis and NIHR Musculoskeletal BioMed. Res. Unit, Univ. of Oxford, Oxford, United Kingdom;* ‡ *Faculty of Hlth. Sci., Univ. of Southampton, Southampton, United Kingdom;* § *MRC Lifecourse Epidemiology Unit, Univ. of Southampton, Southampton, United Kingdom*

Purpose: Arthroplasty is considered to be a successful and cost-effective intervention for individuals with severe end stage knee osteoarthritis (OA), however not all patients are satisfied with surgery. Whilst a number of predictors for patient reported outcomes (PROMS) following arthroplasty have been established, including age, BMI, anxiety, depression, number of troublesome joints and musculoskeletal comorbidities, there are still other predictive factors to be identified. Despite the growing body of evidence for functional links between the foot, ankle and knee, there is little known about the role of the foot and ankle on clinical knee outcomes such as pain and function following knee arthroplasty. The aim of this study was to determine the influence of clinical foot and ankle assessments in the prediction of knee arthroplasty PROMS.
Methods: The Clinical Outcomes in Arthroplasty Study (COASt) is a prospective, dual-centre longitudinal cohort study of patients listed for hip and knee arthroplasties across two UK hospital sites (Southampton University Hospital NHS Foundation Trust and the Oxford University Hospital NHS Trust). A sub-cohort of 114 participants awaiting knee arthroplasty, with baseline foot and ankle data were prospectively followed up. The primary outcome was one year Oxford Knee Score (OKS) using an established patient acceptable symptom state (PASS) of $\geq$30 points, anchored on satisfaction. Potential predictor variables were disabling foot pain (Manchester Foot Pain and Disability Index) and ankle dorsiflexion. Covariates included age, gender, BMI, pre-operative index knee pain and function and depression (Hospital Anxiety & Depression Score). Regression modelling was used to identify predictors of outcome.
Results: Univariable analysis showed that participants with pre-operative disabling foot pain had reduced odds and participants with higher pre-operative OKS score had significantly increased odds of achieving an acceptable outcome. In multivariable logistic regression the odds of achieving an acceptable PASS score were significantly reduced if pre-operative disabling foot pain was present. No other variables significantly predicted outcome (table 1).
Conclusions: Patients with pre-operative foot pain are more likely to have poorer clinically important knee outcomes one year following arthroplasty. Ankle dorsiflexion did not predict post-operative outcomes in this subset. Findings suggest that at present the intention to treat knee OA with arthroplasty is made irrespective of foot pain. If the objective of treating with arthroplasty is to achieve a good a clinical outcome -based on pain reduction, function and satisfaction- then consideration should be given to reducing pre-operative foot pain.

Table 1. Logistic regression model to identify predictors of 1 year PASS score.

Predictor Variables	Post op OKS PASS score Univariable Odds Ratios (95% CI)	P-value	Post op OKS PASS score Multivariable Odds Ratios mutually adjusted (95% CI)	P-value
Disabling Foot pain (present)	0.29 (0.11, 0.77)	0.013*	0.19 (0.06, 0.61)	0.006*
Ankle dorsiflexion (degrees)	1.03 (0.98, 1.09)	0.294	1.01 (0.95, 1.07)	0.727
Age (years)	1.01 (0.97, 1.06)	0.553	1.01 (0.96, 1.06)	0.641
Gender (male)	0.89 (0.34, 2.30)	0.809	0.34 (0.10, 1.13)	0.079
BMI (Kg/m2)	0.94 (0.85, 1.04)	0.239	0.96 (0.85, 1.08)	0.461
Pre-op OKS	1.09 (1.01, 1.19)	0.031*	1.08 (0.98, 1.19)	0.134
Depression (present)	0.62 (0.20, 1.94)	0.406	1.19 (0.31, 4.55)	0.796

352
PREDICTIVE FACTORS FOR HIP AND/OR KNEE OSTEOARTHRITIS ACCORDING TO ACR CRITERIA AFTER FIVE YEARS FOLLOW-UP IN THE CHECK POPULATION

J. Damen †, R. van Rijn †, P.J. Emans ‡, W.K. Hilberdink †, J. Wesseling §, S. Bierma-Zeinstra †. † *Erasmus MC, Rotterdam, Netherlands;* ‡ *Univ. Maastricht, Maastricht, Netherlands;* § *Utrecht Univ., Utrecht, Netherlands*

Purpose: To assess whether participants with early symptomatic osteoarthritis (OA) symptoms not fulfilling ACR criteria at baseline progress towards ACR defined OA, and which determinants are associated with fulfilling the ACR criteria at 2 and/or 5-year follow-up.
Methods: The prospective CHECK cohort included 1,002 participants with early symptomatic OA. Primary outcome was onset of hip and/or knee OA according to either clinical or combined clinical and radiological ACR criteria at 2 and/or 5-year follow-up. Association of determinants was tested with multiple logistic or linear regression models. The results are presented as odds ratios (OR) with 95% confidence intervals (CI).
Results: Of all participants, 37% (n=218) with hip complaints were not classified as having hip OA at baseline according to the ACR criteria; of these, 40% developed hip OA according to the clinical or combined clinical/radiographic ACR criteria at 2 and/or 5-year follow-up, Only 8% (n= 69) of participants with knee complaints were not classified as having knee OA at baseline; of those, 55% developed knee OA according to the clinical ACR criteria or the clinical/radiographic ACR criteria at 2 and/or 5-year follow-up. The following determinants at baseline were associated with progression to hip OA at 2 and/or 5 years of follow up: morning stiffness (OR 2.39; 95% CI 1.14–4.98), painful internal rotation (OR 2.53; 95% CI 1.23–5.19), hip flexion < 115° (OR 2.33 95% CI 1.17-4.64) and ESR < 20 mm/h (OR 2.94; 95% CI 1.13–7.61). In the knee, no variables were associated with progression of fulfilling the ACR criteria at either 2 and/or 5-year follow-up.
Conclusions: Many persons aged $\geq$ 45–65 years with hip or knee complaints due to early symptomatic OA, but without ACR defined OA, fulfilled the clinical and/or radiographic ACR criteria at 2 and/or 5-year follow-up. In the hip, several separate ACR features are associated with progression to ACR defined hip OA in persons not fulfilling complete ACR criteria at baseline.

353
A BIG DATA APPROACH FOR SELECTION OF A LARGE OSTEOARTHRITIS COHORT

M.A. Grasso †, Y. Yesha ‡, N. Rishe §, V.B. Kraus ‖, A. Niskar ¶. † *Univ. of Maryland Sch. of Med., Baltimore, MD, USA;* ‡ *Univ. of Maryland Baltimore County, Baltimore, MD, USA;* § *Florida Intl. Univ., Miami, FL, USA;* ‖ *Duke Univ. Sch. of Med., Durham, NC, USA;* ¶ *Arthritis Fndn., Atlanta, GA, USA*

Purpose: The Arthritis Foundation initiated this demonstration project with the long-term goal of implementing an innovative big data approach to recruitment for osteoarthritis (OA) clinical trials. A major challenge in OA clinical trials is correctly classifying the OA phenotype for each patient. This abstract describes the first step in this project: to identify and validate a large cohort of OA patients. The data were obtained from the national clinical repository from the Veterans Health Administration (VHA). The VHA is an integrated health care system, consisting of roughly 150 hospitals, 800 community-based outpatient clinics, and 50,000 providers. A single electronic health record system is used to capture a diverse collection of clinical data, including demographics, diagnostic codes, outpatient visits, hospital admissions, physician orders, vital signs, laboratory testing, pharmacy data, health screening, progress notes, and radiology reports.
Methods: The data for our cohort were obtained from the VA Informatics and Computing Infrastructure (VINCI), which maintains the national VA clinical repository, and makes these data available to scientists within the VHA system. Institutional Review Board (IRB) approval was obtained through the University of Maryland School of Medicine and the Baltimore VA Medical Center. Funding and scientific resources were provided by the Arthritis Foundation (USA) with additional resources provided by the VHA.
Our inclusion criteria were based on clinical diagnostic guidelines from the American College of Rheumatology (ACR), but were simplified to allow us to complete the task with the data resources available. We

started with an initial cohort of people with a diagnosis of OA (ICD 9 code 715) who were treated within the VHA system between January 1, 2000 and December 31, 2014. We further classified the cohort, focusing on OA of the knee and hip. For knee OA, we included people with a diagnosis of OA (ICD 9 code 715), who were at least 50 years old, and who had been treated at least once for knee pain (ICD 9 code 719.46). For hip OA, we included people with a diagnosis of OA (ICD 9 code 715), who never had an erythrocyte sedimentation rate of 20 or above, and who had been treated at least once for hip pain (ICD 9 code 719.45). We validated the cohort through a manual review of 40 charts, with half of the charts randomly selected from the identified OA cohort, and half of the charts randomly selected from among those excluded from the cohort.

Results: A total of 12,064,025 clinical records were available for this research. The OA identified cohort included 1,147,535 patients, of which 1,073,169 (94%) were male. The median age was 56 (interquartile range 51–68). There were 755,010 (66%) Caucasian, 177,745 (16%) African American, 51,826 (4%) Hispanic, 4,822 (<1%) Asian, and 158,132 (14%) of unknown race/ethnicity. Within the cohort, 11,976 had a history of a lower joint replacement (1%). Our manual review of the cohort included 20 true positives, 13 true negatives, 7 false negatives, and no false positives, resulting in a sensitivity of 74% and specificity of 100%.

Between the years 2000 and 2014, the cohort accounted for 5,980,233 primary care visits, 884,882 rheumatology clinic visits, and 4,649,522 emergency medical visits within the VHA system. The top five ICD 9 codes for all clinic and emergency medical visits were hypertension (719,558 visits), hyperlipidemia (372,900 visits), diabetes (348,787 visits), lower back pain (222,397 visits), and joint pain (211,739 visits). Most patients in the cohort received prescriptions for NSAIDs (919,469, 79%), acetaminophen (874,721, 76%), and opiates (829,063, 72%). Less than half of the cohort received prescriptions for neuropathic pain medication (478,462, 42%), tramadol (431,338, 38%), and muscle relaxants (355,325, 31%). Over-the-counter use of acetaminophen and NSAIDs was not ascertainable.

Conclusions: This demonstration project illustrates the feasibility of using a big data approach to select a large cohort of OA patients. This approach could improve our understanding of OA and holds promise for understanding OA subphenotypes, development of personalized treatment strategies for OA and facilitation of OA clinical trials. The next steps include combining clinical analytics with available genomic data as well as further validating this work with other datasets that include more females and other demographic diversity.

354

LONG TERM TYPE 1 DIABETES IS ASSOCIATED WITH HAND PAIN BUT NOT WITH STRUCTURAL HAND OSTEOARTHRITIS FEATURES – THE DIALONG HAND STUDY

K. Magnusson †, N.G. Juel ‡, J.I. Brox ‡,§, K. Holte ||, K.B. Hagen †,§, I.K. Haugen ¶, T. Julsrud Berg §,||. † *Dept. of Rheumatology, Diakonhjemmet Hosp., Natl. Advisory Unit on Rehabilitation in Rheumatology, Oslo, Norway;* ‡ *Dept. of Physical Med. and Rehabilitation, Oslo Univ. Hosp., Oslo, Norway;* § *Univ. of Oslo, Oslo, Norway;* || *Dept. of Endocrinology, Oslo Univ. Hosp., Oslo, Norway;* ¶ *Dept. of Rheumatology, Diakonhjemmet Hosp., Oslo, Norway*

Purpose: Previous studies have shown an association between diabetes and hand osteoarthritis (OA). However, these studies have not discriminated between type 1 and type 2 diabetes. This makes it challenging to isolate the independent effect of hyperglycaemia per se on the development of hand OA. Type 1 diabetes is a purer model disease of hyperglycaemia than type 2 diabetes. Our aim was therefore to explore whether having long term type 1 diabetes is associated with a higher prevalence of radiographic hand OA, erosive hand OA and increased hand pain, -dysfunction and -stiffness.

Methods: In total 95 persons with long term type 1 diabetes were recruited from the Dialong study in 2014 (mean (SD) disease duration 51 (4.8) years, mean (SD) age 60 (3.7) years and n=46 (48%) women). Close relatives and friends with similar age and sex distribution (mean (SD) age 62 (8.2), n=35 (58.3%) women) were recruited as healthy controls (n=60). Participants with known inflammatory rheumatic disease as well as potential controls with known diabetes or a HbA1c > 6.5% were excluded. Participants attended the Oslo University Hospital for fasting blood tests and conventional radiographs of the hands. The bilateral first carpometacarpal, scaphotrapezotrapezoidal, 1st–5th metacarpophalangeal joints, thumb interphalangeal, 2nd–5th proximal interphalangeal joints and 2nd–5th distal interphalangeal joints were scored for radiographic OA according to a modified Kellgren-Lawrence scale and for central erosions according to the OARSI atlas by one experience reader (IKH). Hand OA was defined as involvement of ≥1 hand joint with Kellgren-Lawrence grade (KLG) ≥2), whereas central erosion in the same joint was required for erosive OA. Self-reported hand pain (0–20 scale), physical function (0–36 Scale) and stiffness (0–4 scale) were assessed using the AUSCAN index. We performed regression analyses of diabetes (yes/no) and HbA1c as continuous independent variables and the presence of radiographic OA and erosive OA (logistic regression), hand pain and dysfunction (linear regression) as well as stiffness (ordinal regression) as dependent variables. Analyses were adjusted for age, sex, educational level and waist circumference.

Results: Mean (SD) HbA1c level was 7.4 (0.8) % in persons with diabetes and 5.4 (0.3) % in persons without. Radiographic hand OA was found in n=68 (72%) of persons with diabetes and n=47 (78%) of persons without, whereas erosive hand OA was less common (n=14 (15%) and n=6 (10%), respectively). Having diabetes or having higher HbA1c-level were not associated with present radiographic hand OA or present erosive hand OA in adjusted analyses (Table). However, having diabetes and a higher HbA1c level were strongly associated with more AUSCAN hand pain, hand dysfunction and hand stiffness (difference above the Minimal Clinically Important Improvement of 1.49 for AUSCAN pain and 1.25 for AUSCAN physical function (Table)). Statistically significant interactions between the presence of diabetes/higher HbA1c levels and age as well as sex were found for AUSCAN. In stratified analyses, stronger associations were observed between diabetes status/HbA1c levels and hand pain, physical function and hand stiffness in women and in younger persons whereas weaker associations were observed in men and elderly (data not shown).

Conclusions: Long-term type 1 diabetes duration is associated with increased hand pain, reduced physical function and hand stiffness, but not with the presence of radiographic or erosive hand OA. Potential explanatory mechanisms for the association between type 1 diabetes and hand pain, -function and -stiffness should be further explored.

Associations between type 1 diabetes and radiographic hand OA, hand pain, function and stiffness.

	≥1 joint with KLG≥2* OR (95% CI)	≥1 joint with erosive OA* OR (95% CI)	AUSCAN pain˙ B (95% CI)	AUSCAN physical function˙ B (95% CI)	AUSCAN stiffness“ B (95% CI)
Diabetes					
No	1.00 (Ref.)	1.00 (Ref.)	0.00	0.00	0.00
Yes	0.94 (0.40–2.27)	1.83 (0.61–5.54)	1.71 (0.84–2.59)	3.09 (1.60–4.58)	1.22 (0.72–1.73)
HbA1c (per 1% increase)	0.91 (0.64–1.29)	1.01 (0.68–1.50)	0.87 (0.19–1.54)	1.23 (0.43–2.03)	0.60 (0.17–1.03)

Logistic*, linear˙ and ordinal“ regression analyses adjusted for age, sex, educational level and waist circumference. AUSCAN; Australian-Canadian Hand Index, KLG; Kellgren-Lawrence Grade, CI; confidence intervals, OA; osteoarthritis.