Conclusion: This study demonstrates, for the first time, that the combination of the serum levels of adipokines/inflammatory factors and the three main risk factors of OA could predict IPFP volume with high reproducibility, and superior performance with gender separation. By using the models for each gender and the pseudocodes for OA patients provided in this study, the next step will be to develop a predictive model for OA progressors.

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FRI0417 IDENTIFICATION OF THE MOST IMPORTANT FEATURES OF KNEE OSTEOARTHRITIS PROGRESSORS USING MACHINE LEARNING METHODS

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Background: Knee osteoarthritis (OA), a leading cause of disability worldwide, can be difficult to define as its development is often insidious and involves different subgroups. We still lack robust prediction models that are able to guide clinical decisions and stratify OA patients according to risk of disease progression.

Objectives: This study aimed at identifying the most important features of knee OA progressors. To this end, we used machine learning (ML) algorithms on a large set of subjects and features to develop advanced prediction models that provide high classification and prediction performance.

Methods: Participants, features and outcomes were from the Osteoarthritis Initiative. Features were from baseline (1107), including articular knee tissues (135) assessed by quantitative MRI. OA progressors were ascertained by four outcomes: cartilage volume loss in medial plateau at 48 and 96 months (Prop_CV_48M, 96M); Kellgren-Lawrence (KL) grade ≥ 2 ; and medial joint space narrowing (JSN) ≥ 1 at 48 months. Subjects' numbers were as follows: 1598 for the outcome Prop_CV_96M, 1044 for the Prop_CV_48M, and 1468 for each KL grade ≥ 2 at 48 months and JSN ≥ 1 at 48 months. Six feature selection models were used to identify the common features in each outcome. Six classification methods were applied to measure the accuracy of the selected features in classifying the subjects into progressors and non-progressors. Classification of the best features was done using auto-ML interface and the area under the curve (AUC). To prioritize the top features, Sparse Partial Least Square (sPLS) method was used.

Results: For the classification of the best common features in each outcome, Multi-Layer Perceptron (MLP) achieved the highest AUC in Prop_CV_96M, KL, and JSN (0.80, 0.88, 0.95), and Gradient Boosting Machine (GBM) for Prop_CV_48M (0.70). sPLS revealed that the baseline top five features to predict knee OA progressors are the joint space width (JSW), mean cartilage thickness of peripheral, medial, and central tibial plateau, and JSN.

Conclusion: This is the first time that such a comprehensive study was performed for identifying the best features and classification methods for knee OA progressors. Data revealed that early prediction of knee OA progression can be done with high accuracy and based on only a few features. This study identifies the baseline X-ray and MRI-based features as the most important for predicting knee OA progressors. These results could be used for the development of a tool enabling prediction of knee OA progressors.

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FRI0418 SELECTIVE PATELLAR RESURFACING IN TOTAL KNEE ARTHROPLASTY FOR THE OSTEOARTHRITIC KNEE: A PROSPECTIVE STUDY

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Background: No widely accepted view or criteria currently exist concerning whether or not patellar replacement (resurfacing) should accompany total knee arthroplasty for osteoarthritis of the knee.1)2)3)

Objectives: We recently devised our own criteria for application of patellar replacement and performed selective patellar replacement in accordance with this set of criteria. The clinical outcome was analyzed.

Methods: The study involved 1150 knees on which total knee arthroplasty was performed between 2005 and 2019 because of osteoarthritis of the knee. The mean age at operation was 73, and the mean postoperative follow-up period was 91 months. Our criteria for application of patellar replacement are given below. Criterion A pertains to evaluation of preoperative clinical symptoms related to the patellofemoral joint: (a) interview regarding presence/absence of pain around the patella, (b) cracking or pain heard or felt when standing up from a low chair, (c) pain when going upstairs/downstairs. Because it is difficult for individual patients to identify the origin of pain (patellofemoral joint or femorotibial joint), the examiner advised each patient about the location of the patellofemoral joint when checking for these symptoms. Criterion B pertains to intense narrowing or disappearance of the patellofemoral joint space on preoperative X-ray of the knee. Criterion C pertains to the intraoperatively assessed extent of patellar cartilage degeneration corresponding to class 4 of the Outerbridge classification. Patellar replacement was applied to cases satisfying at least one of these sets of criteria (A-a,-b,-c, B and C). Postoperatively, pain of the patellofemoral joint was evaluated again at the time of the last observation, using Criterion A-a,-b,-c.

Results: Patellar replacement was applied to 110 knees in accordance with the criteria mentioned above. There were 82 knees satisfying at least one of the Criterion sets A-a,-b,-c, 39 knees satisfying Criterion B and 70 knees satisfying Criterion C. (Some knees satisfied 2 or 3 of Criteria A, B and C). When the pain originating from patellofemoral joint (Criterion A) was clinically assessed at the time of last observation, pain was not seen in any knee of the replacement group and the non-replacement group.

Conclusion: Whether or not patellar replacement is needed should be determined on the basis of the symptoms or findings related to the patellofemoral joint, and we see no necessity of patellar replacement in cases free of such symptoms/findings. When surgery was performed in accordance with the criteria on patellar replacement as devised by us, the clinical outcome of the operated patellofemoral joint was favorable, although the follow-up period was not long. Although further follow-up is needed, the results obtained indicate that selective patellar replacement yields favorable outcome if applied to cases judged indicated with appropriate criteria.

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FRI0419 LOW DOSE OF GLUCOCORTICOIDS FOR PAIN CONTROL IN THE ESTROGEN-DEPENDENT PRIMARY POLYARTICULAR OSTEOARTHRITIS

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Background: Low doses of glucocorticoids (GCs) can be useful in the management of osteoarthritis when it is related to hypoestrogenic states (estrogen-dependent primary polyarticular osteoarthritis [EDPOA]), that usually can appear after the menopause. Deflazacort is a GC that has similar anti-inflammatory effects than other steroids, but with fewer side effects.

Objectives: To describe the average dose of GCs that best controlled articular pain, based on tender joint count in patients with EDPOA.

Methods: The diagnosis of EDPOA was made in postmenopausal patients with polyarticular compromised (six or more joints affected), morning stiffness less

than 30 minutes, erythrocyte sedimentation rate less than 45mm/hour and imaging studies with changes related to osteoarthritis (radiography, magnetic resonance imaging or bone scintigraphy). Patients with autoimmune diseases such as rheumatoid arthritis, lupus or Sjögren syndrome were excluded.

The clinical records of patients diagnosed with EDPOA and treated between January 2015 and June 2019 at the Valle del Lili foundation Hospital were reviewed. The patients treated with deflazacort GC were included. Pain was assessed by the treating rheumatologist using the visual analog scale (VAS, possible score 0-10). Tender joints were those with VAS > 5. The count of compromised joints was compared with inflammatory findings on bone scintigraphy (Figure 1).

Figure 1. Comparison between number of joints with inflammatory findings on bone scintigraphy and number of swollen joints in physical evaluation

The number of tender joints was recorded at the start of treatment, which was a dose of 6mg/day of deflazacort for two months. Subsequently, the dose was reduced depending on the improvement of pain (items: intensity of pain and number of tender joints) until achieving a stabilization along the time with an improvement of 75% of the items evaluated. The number of painful joints was recorded again two months after the stabilization on pain control was achieved.

Quantitative variables were described with medians and interquartile ranges because the absence of normal distribution of the sample size. To assess the presence of a significant decrease on the number of tender joints the Wilcoxon range test was used, a value of $p < 0.001$ was considered statistically significant. The data were analyzed with Stata v.15.

Results: Twenty-eight patients with EDPOA were included, with a median of age of 50 years (IQR 44-51), 56 years (IQR 52-66) and 61 years (IQR 54-69) at the time of menopause, onset of symptoms and the diagnosis of EDPOA respectively. A median of 18 tender joints (IQR 10-27) was obtained from the physical examination of the records reviewed. The dose of deflazacort that achieved stabilization on the improvement of the pain along the time was 21mg/week (IQR 12-21); after 8 weeks of treatment the number of tender joints was 2 (IQR 1-4), which implies a reduction of 14 (IQR 8-20; $p < 0.0001$) on the tender joint count (Figure 2).

Figure 2. Number of tender joints before and after eight weeks of treatment achieving with a stable pain control in patients with EDPOA treated with deflazacort with a media dose of 3mgr/day.

Conclusion: In this case series a media dose of deflazacort of 21mg per week (3mg/day) was useful to significantly reduce the number of tender joints in patients with EDPOA.

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FRI0420

ASSOCIATION BETWEEN RED BLOOD CELLS DISTRIBUTION WIDTH AND CARDIOVASCULAR RISK IN OSTEOARTHRITIS

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Background: Osteoarthritis (OA) is the most common joint disease that results in patient's morbidity and disabilities. There is strong evidence that OA is a significant risk factor for cardiovascular disease (CVD). Red cell distribution width (RDW) blood test is a measure of the variation in red blood cell volume and size. Elevated RDW has recently been found to correlate with CVD risk in patients with and without heart disease and autoimmune diseases. RDW may be a marker for factors driving CVS risk.

Objectives: To investigate whether RDW can serve as a potential parameter for indicating cardiovascular risk in OA patients.

Methods: A subsample of 819 OA patients was extracted from 2003-2006 National Health & Nutrition Examination Survey in a cross-sectional study. 63.7% of them were females. Their mean age was 66.4 ± 14.1 yrs. Demographic, medical data, inflammatory markers & lipid panel were obtained. Only patients with Haemoglobin > 12 mg/dl were included. Functional limitations were assessed using a physical function questionnaire.

Results: Elevated levels of RDW were associated with CVD risk factors in OA patients. 532 (65.8%) OA patients had functional limitations, while 78 (9.5%) and 63 (7.6%) known to have heart attacks or stroke ever. Mean RDW was 12.9 ± 1.1 fL. There was a positive significant correlation between RDW & CVD risk factors including body mass index ($r = 0.17$, $p < 0.001$), C-reactive protein ($r = 0.29$, $p < 0.001$), serum uric acid ($r = 0.12$, $p < 0.001$), and functional limitation ($r = 0.16$, $p < 0.001$). No significant association between RDW & lipid panel was found. In multiple regression analysis controlling for age, sex as covariates, body mass index ($\beta = 0.02$, 95%CI: 0.01, 0.03, $p = 0.002$), C-reactive protein ($\beta = 0.35$, 95%CI: 0.26, 0.45, $p < 0.001$), and functional limitation ($\beta = 0.18$, 95%CI: 0.13, 0.35, $p = 0.03$).

Conclusion: In addition to known CVD risk in OA patients, elevated RDW levels should prompt physicians to aggressively screen and treat their patients for modifiable CVS risk factors, in addition to OA.

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FRI0421

RATES OF PROGRESSION DIFFER BETWEEN STRUCTURAL PHENOTYPES OF KNEE OSTEOARTHRITIS: A SECONDARY ANALYSIS FROM THE FNIH COHORT

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Background: Imaging plays an important role in determining structural disease severity and potential suitability of patients recruited to disease-modifying osteoarthritis drug (DMOAD) trials. It has been suggested that there may be three main structural phenotypes in OA, i.e., inflammation, meniscus/cartilage and subchondral bone. These may progress differently and may represent distinct tissue targets for DMOAD approaches.

Objectives: To stratify the Foundation for National Institutes of Health Osteoarthritis Biomarkers Consortium (FNIH) cohort, a well-defined subsample of the larger Osteoarthritis Initiative (OAI) study, into distinct structural phenotypes