needed to be re-structured. We removed the ART from the inpatient Electronic Medical Record i.e. Epic system so that only the ARP order remained. This would prevent repetitive testing and reduce healthcare costs through reduction by at least \$12.0 per positive ANA result and may also translate into reduced length of hospital stay. We were able to add Centromere Antibody (Ab) to the ANA profile sub serology to standardize it further as it is an important part of Scleroderma diagnosis.

References:

- [1] Range of antinuclear antibodies in "healthy" individuals. AU, Tan EM, et al. *Arthritis Rheum*. 1997; 40(9):1601

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AB1122 BENEFIT OF JOINT ULTRASONOGRAPHY IN RHEUMATOID CARE PATIENT SATISFACTION SURVEY WITH NPS® USING POCUS (POINT OF CARE ULTRASOUND)

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Background: The roles of rheumatologists include patient education and information provision, and there is a report that patient care led by nurses gives high satisfaction. In addition, it has been reported that rheumatologists will no longer provide sufficient care for rheumatism and nurses may make up for the shortage (1). In order for patients to deal with diseases for a long time, it is necessary to communicate with patients through team approach to healthcare including nurses specialized in rheumatology, and to make efforts to further improve patient satisfaction.

Objectives: The satisfaction of patients who had undergone joint ultrasound (MSKUS) by rheumatologist nurses who had been registered as sonographers by the Japan College of Rheumatology was evaluated using a net promoter score (NPS®) to investigate whether medical intervention by nurses improved patient satisfaction.

Methods: A questionnaire survey was performed in 103 RA patients who visited our department. The contents were 2 points, and (1) MSKUS's level of patient satisfaction and (2) MSKUS's level of recommendation to others were investigated. In (1), whether or not (1) the echo test was good, (2) whether the test was done with peace of mind, (3) whether the time of the test was appropriate, and (4) whether or not the disease status was better understood after the test, and (5) whether or not the patient wished to undergo the echo test periodically, were asked on a 5 point scale (high evaluation to low evaluation, 1 ~ 5). Regarding (2), the doctor said "Would you like to recommend the joint echo test to other patients? This question was evaluated using NPS®, which is said to have strong correlation with patient satisfaction, growth, and business performance in various industries.

Measurement method of NPS®

The customer with the 9 ~ 10 point score is classified as a "recommendation" the customer with the 7 ~ 8 point score is classified as a "neutral person" and the customer with the 0 ~ 6 point score is classified as a "critical person" The value of NPS® is the value that comes out after subtracting the percentage of a critical person (%) from the percentage of a recommended person (%).

Results: Questionnaires were administered to 103 RA patients and responses were obtained from all.

- (1) For the 5 items of patient satisfaction, 85% or more of the patients had high scores (1 and 2) for all the questions.
- (2) NPS® score was high at 67. The NPS® score was even higher in the group of patients without progression of joint destruction (Stage 1 and 2) at 79.

Conclusion: It was suggested that when the nurse who usually coaches explained the symptoms immediately using POCUS, the patient's satisfaction would be improved, and a sense of security would be provided for the test. In addition, NPS® is a unified questioning method and said to be highly correlated with customer satisfaction, and it was considered that POCUS leads to benefits in medical management.

References:

- [1] Fusama M et al. *Mod Rheumatol*. 2017 Sep;27(5):886-893.; Survey on attitudes regarding EULAR recommendations for the role of nurses involved in medical care of patients with chronic inflammatory arthritis in Japan.

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AB1123 PROGRESSION OF FINGER JOINT CARTILAGE DAMAGE EVALUATED BY ULTRASOUND IN PATIENTS WITH RHEUMATOID ARTHRITIS

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Background: Cartilage damage in rheumatoid arthritis (RA) has been evaluated by joint space narrowing (JSN) in X-ray, despite the fact that it is not a direct evaluation of cartilage. We have recently reported that direct evaluation of finger joint cartilage thickness evaluated by ultrasound (US) is valid and useful for patients with RA⁽¹⁾.

Objectives: In this study, we aimed to examine the progression of cartilage damage in RA patients.

Methods: Forty-six patients with RA who had completed the US evaluation of finger joint cartilage thickness at baseline and after 1 year were included in this study. The cartilage thickness of metacarpophalangeal (MCP) and proximal interphalangeal (PIP) joints of 2nd to 5th fingers were bilaterally visualized and measured at the middle portion of MCP and PIP joints from a longitudinal dorsal view, with approximately 90 degrees flexion. Cartilage thickness was measured from the base of the cartilage to the interface artefact at the cartilage surface by calculating the pixel counts on DICOM images.

Results: In patients, 78% were female, the median age was 68 years and the median disease duration of the patients was 6 years. The median DAS28-CRP at baseline was 2.6. The sum of total cartilage thickness from 16 joints per patient ranged from 3.1 to 9.1 mm (median 6.4 mm) at baseline, and it was significantly correlated with disease duration ($p=-0.423$, $p=0.003$). A significant decrease from the baseline in the cartilage thickness (median -1.6%) was observed after 1 year ($p=0.041$). Furthermore, patients with persistently moderate/high disease activity for 1 year by DAS28-CRP ($n=9$) showed a greater decrease in the cartilage thickness than the remaining patients with controlled disease activity ($n=37$) (median -5.9% versus -1.5%, respectively, $p=0.029$).

Conclusion: This study further supported the validity and usefulness of joint cartilage thickness evaluation by US in patients with RA.

References:

- [1] Ogura T, et al. *Arthritis Care Res* 2019 Oct 25.

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AB1124

USEFULNESS OF SUPERB MICRO-VASCULAR IMAGING(SMI) TO DETECT SILENT VASCULITIC DISEASE ACTIVITY IN 2 CASES OF TAKAYASU ARTERITIS

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Background: It is important to use vascular imaging modalities such as CT, MRI and PET-CT to evaluate disease activity of Takayasu arteritis (TAK). In particular, under treatment with tocilizumab (TCZ), residual vasculitic disease activity may remain even if serum CRP becomes negative. Contrast-enhanced CT, MRI and PET-CT can evaluate the morphology of blood vessel walls and the distribution of lesions and vasculitic activity, but it is invasive (radiation or contrast media exposure), and costly. Ultrasound is superior in terms of morphological evaluation, cost, convenience, and low invasiveness. In particular, Superb Micro-vascular Imaging(SMI) is one of the micro blood flow display methods that can be installed in the ultrasound diagnostic device Aplio series.

There are some case reports in which micro blood flow signals of the carotid artery walls were detected using SMI in Takayasu arteritis [1] [2]. Both reports indicate that SMI blood flow is a comparable indicator of disease activity as serum CRP.

Objectives: To report the usefulness of SMI in 2 TAK patients who had negative serum CRP but had residual disease activity, leading to appropriate adjustment of treatment.

Methods: Two TAK patients who had been newly diagnosed in our department from May 2015 to October 2018 and had received SMI to detect carotid artery wall blood flow signal were retrospectively analyzed.

Results: Case 1

A 32-year-old woman developed neck pain, headaches, fever and she had high serum levels of CRP (8.1 mg/dl) and elevated ESR (98 mm/h). Contrast-enhanced CT showed thickening of the carotid artery, left subclavian artery and thoracic aorta and SMI detected blood flow signal in carotid artery wall. Diagnosis of TAK was made. After 2-week treatment with 1 mg/kg/day of PSL, CRP became negative but the micro blood flow in carotid artery walls was detected by SMI. Therefore, subcutaneous TCZ (162 mg/week) was added in combination with PSL. One year later, micro blood flow disappeared and we could judge there was no vasculitis activity (Figure A).

	Before treatment starts	2 weeks after starting treatment	One year after starting treatment
treatment	-	PSL 1mg/kg/day ongoing	PSL 7mg/day ongoing TCZ 162mg/week ongoing
CRP(mg/dl)	+(8.1)	-(0.0)	-(0.0)
SMI signal	+	+	-

Figure 1. A. Clinical course of Case 1

Case 2

A 17-year-old woman developed proximal upper limb pain and fever with high serum CRP levels (7.1 mg/dl) and elevated ESR (>110 mm/h), and contrast-enhanced CT showed thickening of the carotid arteries and aortic arch. Two weeks after the start of PSL (1 mg/kg/day), CRP became negative at 0.3 mg/dl, but intramural blood flow detected by SMI remained. Then subcutaneous TCZ was

added. Two weeks later, CRP became negative, and the SMI blood flow also disappeared (Figure B).

	Before treatment starts	2 weeks after starting treatment	4 weeks after starting treatment
treatment	-	PSL 1mg/kg/day ongoing	PSL 50mg/day ongoing TCZ 162mg/week added
CRP(mg/dl)	+(7.1)	-(0.3)	-(0.0)
SMI signal	+	+	-

Figure 2. B. Clinical course of Case 2

Conclusion: Although SMI has the limitation that it cannot evaluate deep vascular lesions such as aorta, it is neither invasive nor costly and may be a good tool for evaluation of residual vasculitis activity of TAK.

References:

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AB1125

PERFORMANCE OF ULTRASOUNDS TO ASSESS EROSION PROGRESSION IN RHEUMATOID ARTHRITIS

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Background: Ultrasonography (US) can detect more erosions than radiography (RX) at the joint level in rheumatoid arthritis (RA), especially at an early stage of the disease.

Objectives: The aim of the study is to determine the ability of ultrasonography to detect erosion progression by the US Score for erosions (USSe), in early (less than 2 years disease duration (DD)) and late stage (more than 2 years DD) RA over two years of follow-up.

Methods: Patients fulfilling ACR 1987 and/or ACR/EULAR 2010 criteria for RA were prospectively included. Clinical and demographic informations were recorded at baseline and hands and feet RX were scored according to the Sharp erosion score (SHSe). Erosive RA on RX was defined by the presence of at least three eroded joints (1). US examinations were performed at baseline and during the two years of follow-up. Erosions were scored by US on six bilateral joints (MCP 2, 3, 5 and MTP 2, 3, 5) with a four grade-scale to calculate total USSe. Erosive RA on US was defined by presence of one erosion $\geq$ 2mm (2). Inter-examiner reproducibility was performed on 14 patients in order to calculate the smallest detectable change (SDC), which was 2.3. Ultrasonographic progression was defined as a change in USSe $>$ 2 (erosion change $>$ SDC).

Results: A total of 71 patients were included, 22 patients (31.0%) had early RA and 49 (69.0%) patients had late RA diseases. On RX, 30 (42.3%) patients were erosive at baseline with a mean SHSe at 29.4 (SD at 24.7).