Correlation between clinimetric approach and German US7 score in rheumatoid arthritis patients treated with tocilizumab: a pilot study

Sirs,

Tocilizumab (TCZ) is a humanised monoclonal antibody against interleukin (IL)-6 receptor used in rheumatoid arthritis (RA) (1). The inhibition of acute phase reactant liver production is associated with rapid normalisation of C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR), often predating synovitis improvement (2, 3). Thus, ESR and CRP are not suitable to assess drug efficacy. Joint ultrasonographic (US) examination is commonly used to detect RA subclinical synovitis. However, US assessment of the whole articular sites may be time consuming. To overcome such limitation, a novel US score, the German US7 score, has been recently proposed as a rapid method to assess synovitis, tenosynovitis, power Doppler (PD) signal and erosions by grey scale (GS) in seven joints (4). It has been demonstrated that German US7 score correlates with RA clinical and laboratory parameters and treatment response (5). Since the strong effect of TCZ on acute phase reactants may underestimate disease activity, we investigated the utility of German US7 in detecting subclinical synovitis in TCZ-treated patients.

Sixteen RA patients diagnosed according to the EULAR/ACR 2010 classification criteria (6) and treated with TCZ for at least 3 months were enrolled. Disease activity was evaluated by disease activity score on 28 joints (DAS28) and quality of life by health assessment questionnaire (HAQ). German US7 score assessment was performed by two blinded investigators (Esaote myLab 70; linear probe 10–18 Mhz), as previously described (4). Accordingly, the following sites of the clinically dominant hand and foot were evaluated: wrist, 2nd and 3rd metacarpophalangeal and proximal interphalangeal, and 2nd and 5th metatarsophalangeal joints. Details of the score are provided in Table 1. Inter-observer agreement was very high (Cohen's κ=0.9).

The study was approved by the local ethics committee and all patients provided written informed consent. Spearman correlation coefficient (rho, ϱ) was assessed to evaluate correlation between clinic parameters, laboratory data and domains of German US7 score.

As shown in Table I, GSUS synovitis significantly correlated with DAS28-ESR (ϱ=0.557; p<0.05), DAS28-CRP (ϱ=0.721; p<0.019 and HAQ (ϱ=0.634; p<0.01). GSUS tenosynovitis correlated with DAS28-ESR and DAS28-CRP (ϱ=0.726; p<0.01 and ϱ=0.668; p<0.01, respectively). GSUS erosions correlated with DAS28-ESR (ϱ=0.535; p<0.05). When each DAS28 item was considered separately, tender and swollen joint number correlated with GSUS synovitis (ϱ=0.744; p<0.001 and ϱ=0.605; p<0.01, respectively), GSUS tenosynovitis (ϱ= 0.626; p<0,01 and ϱ=0.527 p<0.05, respectively) and PDUS synovitis (ϱ=0.488; p<0.05 and ϱ=0.577; p<0.05, respectively). No association between ESR and CRP and German US 7 score domains was observed. It has been demonstrated that the sole evaluation of acute phase reactants may underestimate the entity of joint activity in RA TCZ-treated patients (7). The present study, demonstrating a correlation between German US7 score and clinical and functional parameters of disease activity, suggests that such score may be usefully employed in clinical practice to assess subclinical disease activity in RA patients receiving TCZ. In this setting, the lack of correlation between US7 score and inflammatory markers may be a reflection of the detrimental effect of TZC on such parameters. Indeed, US evaluation of TCZ-treated patients that correlates with changing clinical parameters, is able to detect subclinical activity and represents a prognostic parameter for new erosion development (5, 8, 9). In addition, our data, showing a strong correlation between number of tender and swollen joints and presence of PD signal, further support PD usefulness as an independent diagnostic and prognostic tool in the evaluation of TCZ-treated patients (9).

In conclusion, despite limitations due to the low number of patients enrolled and cross-sectional design, this study supports the role of German US7 score as a simple, reproducible and time-effective tool to monitor clinical and functional response in RA patients receiving TCZ.

Table I. Demographic, clinical and ultrasonographic parameters of patient cohort.

Patient number	16
Gender (F/M)	15/1
Age (years)	60.25 ± 8.61
Disease duration (months)	117.69 ± 101.75
Duration of TCZ therapy (months)	23.81 ± 16.59
Patients receiving TCZ monotherapy/ TCZ + DMARDs	4/12
Methylprednisolone (mg/day)	2 ± 1.92
DAS28-ESR	3.55 ± 1.28
DAS28-CRP	3.56 ± 1.02
ESR (mm/1st hour)	12.25 ± 15.11
CRP (mg/dl)	0.29 ± 0.34
HAQ	1.08 ± 0.64
GSUS synovitis*	4.1 ± 2.2 (0-21)
PDUS synovitis*	0.84 ± 1.29 (0-21)
GSUS tenosynovitis#	0.75 ± 1.24 (0-7)
PDUS tenosynovitis*	0.19 ± 0.54 (0-21)
GSUS erosions#	1.28 ± 1.59 (0-7)

All values are indicated as mean ± standard deviation (SD) except gender and patient number.
*Semi-quantitatively scored from 0 to 3 with global score ranging from 0 to 21 for each item.
#Scored for absence (0) or presence (1) with global score ranging from 0 to 7.

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References

1. GENOVESE MC, RUBBERT-ROTH A, SMOLEN JS *et al.*: Longterm safety and efficacy of tocilizumab in patients with rheumatoid arthritis: a cumulative analysis of up to 4.6 years of exposure. *J Rheumatol* 2013; 40: 768-80.
2. NISHIMOTO N, TAKAGI N: Assessment of the validity of the 28-joint disease activity score using erythrocyte sedimentation rate (DAS28-ESR) as a disease activity index of rheumatoid arthritis in the efficacy evaluation of 24-week treatment with tocilizumab: subanalysis of the SATORI study. *Mod Rheumatol* 2010; 20: 539-47.
3. NISHIMOTO N, YOSHIZAKI K, MAEDA K *et al.*: Toxicity, pharmacokinetics, and dose-finding study of repetitive treatment with the humanized anti-interleukin 6 receptor antibody MRA in rheumatoid arthritis. Phase I/II clinical study. *J Rheumatol* 2003; 30: 1426-35.
4. BACKHAUS M, OHRNDORF S, KELLNER H *et al.*: Evaluation of a novel 7-joint ultrasound score in daily rheumatologic practice: a pilot project. *Arthritis Rheum* 2009; 61: 1194-201.
5. BACKHAUS TM, OHRNDORF S, KELLNER H *et al.*: The US7 score is sensitive to change in a large cohort of patients with rheumatoid arthritis over 12 months of therapy. *Ann Rheum Dis* 2013; 72: 1163-9.
6. ALETAHA D, NEOGI T, SILMAN AJ *et al.*: 2010 Rheumatoid arthritis classification criteria: an American College of Rheumatology/European League Against Rheumatism collaborative initiative. *Arthritis Rheum* 2010; 62: 2569-81.
7. SMOLEN JS, ALETAHA D: Interleukin-6 receptor inhibition with tocilizumab and attainment of disease remission in rheumatoid arthritis: the role of acute-phase reactants. *Arthritis Rheum* 2011; 63: 43-52.
8. EPIS O, FILIPPUCCI E, DELLE SEDIE A, DE MATTHAEIS A, BRUSCHI E: Clinical and ultrasound evaluation of the response to tocilizumab treatment in patients with rheumatoid arthritis: a case series. *Rheumatol Int* 2014; 34: 737-42.
9. HAMA M, UEHARA T, TAKASE K *et al.*: Power Doppler ultrasonography is useful for assessing disease activity and predicting joint destruction in rheumatoid arthritis patients receiving tocilizumab-preliminary data. *Rheumatol Int* 2012; 32: 1327-33.