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LETTER

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Doppler sonographic evaluation of infliximab therapy for rheumatoid arthritis

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To the Editor:

In a previous issue of *Modern Rheumatology*,[1] we demonstrated the usefulness of sonographic evaluation for determining the therapeutic effect of infliximab in six patients with rheumatoid arthritis (RA). Both color flow signals and resistance index (RI) (vascular resistance) in the knee joints of patients demonstrated significant improvements on Doppler sonography ($P < 0.05$ each) after three injections at the 6-week evaluation of infliximab treatment. The present study of 12 RA patients (including the previously reported six patients) treated using infliximab confirms the previous results. Furthermore, more significant indications of improvement were obtained in several clinico-sonographic findings compared with the previous study. All 12 RA patients satisfied the American College of Rheumatology (ACR) revised 1987 criteria for RA[2] and received pharmacotherapy in accordance with the official Japanese guidelines for infliximab treatment of RA.[3] Patients were injected with infliximab on days 0, 14, and 42 at a dose of 3 mg/kg per injection. Clinical and sonographic evaluations were performed before and after three injections, as per the previous study.[1] Methods for B-mode and Doppler sonographic examination and evaluation methods for synovial effusion and proliferation in B-mode, color flow signals, RI, and pulsatility index (PI) values from Doppler sonography, and clinical evaluation of ACR-20 and ACR-50 responses to infliximab were described in the previous report.[1]

Clinical findings for the 12 patients and sonographic findings from the 24 knee joints before and after three injections of infliximab are presented in Table 1. Clinical responses of the 12 patients to infliximab therapy after 6 weeks differed from those of the previous six patients, at 75% (9/12) from 67% (4/6) for ACR-20, and 50% (6/12) from 33% (2/6) for ACR-50. Significant improvements were observed sonographically for grade of synovial effusion ($P = 0.0046$), grade of synovial proliferation ($P = 0.039$), grade of color flow signal ($P = 0.0006$), and RI ($P = 0.025$), but PI remained unimproved. Numbers of tender joints ($P < 0.0001$) and C-reactive protein (CRP) levels ($P = 0.0003$) were also significantly improved. Compared with the previous results, indications of improvements in synovial effusion (from not significant to $P < 0.01$), synovial proliferation (from not significant to $P < 0.05$), color flow signals (from $P < 0.05$ to $P < 0.001$), numbers of tender joints (from $P < 0.05$ to $P < 0.0001$), and CRP levels (from $P < 0.05$ to $P < 0.001$) were strengthened. The greater difference in improvement indications of synovial effusion and synovial proliferation between the present and the previous results might be due to enrolling relatively more numbers of patients in the present study who had greater articular activity and similar disease activity as compared to those in the previous study.

In addition, comparing grades of color flow signals and RI values in 24 knee joints revealed a significant reverse correlation ($r = -0.702$, $P = 0.0008$; data not shown), as reported in the previous study.[4] These results indicate that B-mode and Doppler sonography provide useful indices for evaluating and monitoring synovitis in RA. In conclusion, color flow signals and RI of synovial membrane from Doppler sonography of the knee joints in patients with RA are useful for evaluating the therapeutic effects of rapidly acting biological agents, such as infliximab.

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Table 1. Clinical and sonographic evaluation of 12 patients with rheumatoid arthritis treated using infliximab

Infliximab injection	Patients (n = 12)		Sonographic evaluation of knee joints (n = 24)				
	Tender joints	CRP level (mg/dl)	B-mode		Power Doppler	Spectral Doppler	
			Grade of synovial effusion	Grade of synovial proliferation	Grade of color flow signals	RI	PI
Before	7.00 ± 1.28****	3.87 ± 1.67***	1.50 ± 0.52**	1.66 ± 0.49*	1.54 ± 0.40***	0.80 ± 0.12*	1.70 ± 0.46 n.s.
After 3 injections (at 6 weeks)	2.91 ± 1.38	1.13 ± 1.16	0.83 ± 0.72	1.33 ± 0.49	1.08 ± 0.19	0.86 ± 0.10	1.93 ± 0.58

Values are mean ± SD
CRP, C-reactive protein; RI, resistance index; PI, pulsatility index
* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$; **** $P < 0.0001$; n.s., not significant

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