Gait abnormalities in early rheumatoid arthritis with temporomandibular joint involvement

Sirs,

A relationship between temporomandibular disorders and alterations of posture and gait has been suggested by some investigations (1-3). In order to study the relationship between temporomandibular disorders and gait alterations we performed gait analysis on treadmill walking with the dual task procedure in a group of 30 patients (9 men and 21 women; mean age: 38.54 years, consecutively enrolled) suffering from temporomandibular disorders in early rheumatoid arthritis without signs of involvement of other joints appreciated by clinical examination and ultrasound imaging (rheumatoid factor was detected by latex test in all patients; the typical clinical picture of rheumatoid arthritis became evident in every patient during the follow-up). A control group of 30 healthy subjects (11 men and 19 women, mean age 40.71 years, without diseases involving the other joints and without pathologic changes of temporomandibular joint observed by ultrasound imaging) was also examined. We used the dual task procedure, which is based on the simultaneous performance of two different tasks demanding attention (4-6), to detect subtle gait alterations which could not be observed when the subject's attention is completely directed to the control of walking.

Gait analysis was performed in all patients and healthy subjects with a photogrammetric system. Reflecting markers were applied on the greater trochanter, lateral epicondyle of the femur, lateral malleolus and fifth metatarsal head on both sides. Data were acquired by using a five camera ELITE$_{plus}$ System (BTS, Milan, Italy) with a sample frequency of 100 Hz. The dual task procedure included a motor task, *i.e.* the "gait", and a secondary task, *i.e.* a cognitive performance consisting of listing alternatively the Italian alphabet starting from a specific letter indicated random by the operator. Gait analysis included the assessment of the spatio-temporal parameters of gait and of the coordination patterns of the lower limbs: angular speed and position of the different segments of the lower limbs were recorded and the Continuous Relative Phase (CRP) was calculated, concerning the coordination patterns thigh-leg, leg-foot and thigh-foot according to the method described by Haddad *et al*. (7). Changes of CRP shape during gait cycle were evaluated by the cross relation coefficient *r*; the amplitude of the changes was evaluated by Root Mean Square Difference (RMSD) (7-10).

Spatio-temporal parameters during treadmill walking did not show significant differences between healthy subjects and patients both in the single task (treadmill walking without the cognitive task) and in the dual task. No significant difference of the coordination pattern thigh-leg and thigh-foot was observed in patients and in healthy subjects, between the right and the left side, both in the single and in the dual task. Leg-foot coordination pattern of patients showed an asymmetric behaviour in stance phase of gait both in cross relation coefficient and in RMSD only during the dual task (Fig. 1). Cross relation coefficient of patients showed a significant change of leg-foot coordination pattern also during swing phase. No significant difference of the coordination pattern leg-foot was instead observed in healthy subjects.

The observed alteration of the coordination pattern may be due to posture and balance disturbances in patients with temporomandibular joint arthritis. Our results could be useful to explain the clinical concept of a relationship between temporomandibular disorders and postural abnormalities inducing gait alterations. It is noteworthy that gait alterations could influence the functional impairment provoked by the rheumatoid arthritis. A careful clinical evaluation and, above all, the use of ultrasound examination in every patient with temporomandibular disorders may be useful to detect early rheumatoid arthritis and to start an adequate protocol of clinical and laboratory controls and an effective treatment.

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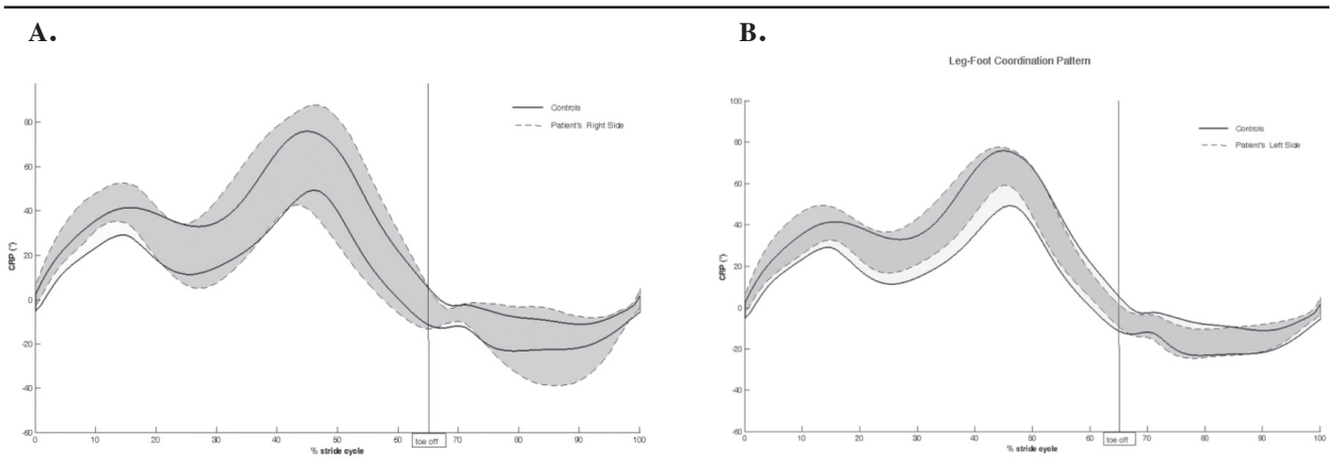

Fig. 1. Leg-foot coordination pattern (CRP standard deviation) of patients (dotted line) *vs*. healthy subjects (solid line) during treadmill walking in DT of right side (**A**) and of left side (**B**).