Fluorescence optical imaging (FOI) aids differential diagnosis of rheumatic diseases and increases treatment response rate in RA through patient stratification.

M. Ferl1, S. Ohmdorf2, J. Berger1, A. Briel1, P. Weker1, Medical Faculty University Hospital Magdeburg, Berlin, Germany; 1Charité - University Medicine Berlin, Berlin, Germany; 2Xiralite GmbH, Berlin, Germany

Background: In recent years, indocyanine green (ICG)-enhanced FOI has become clinically available as a novel tool for the early detection of rheumatoid arthritis (RA), selection of the appropriate therapy, and for monitoring treatment responses. The high sensitivity of this method allows visualization of slight changes in the microcirculation of the hands as a sign of inflammation. Different rheumatic diseases present characteristic signal enhancement patterns, which may facilitate differential diagnosis. Signal enhancement in metacarpophalangeal (MCP) joints, for example, can frequently be seen in patients with rheumatoid arthritis (RA).

Objectives: To analyze data from a multicentric clinical study (OPERA, n = 3300) including patients with different rheumatic diseases. Patients were divided into groups using clinical parameters followed by FOI examination to test the hypothesis that this method can improve the diagnosis.

Methods: The retrospective study included 200 patients with RA (n = 200), divided into groups according to Steinbrocker’s (STBRI) staging system, patients that had degenerative osteoarthritis (OA, n = 100), and a control group without clinical symptoms (n = 40). RA patients were examined before and during treatment with biologicals, glucocorticoids (GC), or DMARDs. Clinical and laboratory assessments were made by analyses of DAS28, patient questionnaires, rheumatoid factor (RF), anti-citrullinated protein antibodies (ACPA), erythrocyte sedimentation rate (ESR), and x-rays. FOI signal intensity (SI) was defined by ratio of areas with SI in patients and controls. Image sequences were analyzed visually, and MCP joints were judged as positive if the early phase of ICG inflow, a higher SI in any MCP region was found in comparison to the control group.

Results: Serum factors typical for RA patients were analyzed in the different groups. In 23% of RA patients RF and/or ACPA were detected in the serum. Surprisingly, in the STBRI I group, only 35% of patients were tested as serum-positive for RF and/or ACPA. After FOI, the patients were subdivided into two groups with and without ICG enrichment in MCPs. In the MCP-positive group, the percentage of RF/ACPA-positive STBRI patients increased to 83%, with only 25% seropositive patients in the MCP-negative group. In STBRI IV cohorts, the proportion of RF/ACPA-positive patients was initially higher as in the STBRI group, but also increased after FOI analysis of MCP positivity. In the group treated with biologicals (STBRI IV), responders were identified both by clinical parameters and FOI. After treatment, 42% of all analyzed patients were found to respond to treatment. Compared to all patients, the MCP-positive group showed a significantly increased response rate at 71%, while all patients (100%) in the MCP-negative group were identified as non-responders (Figure 1).

Conclusion: The study indicates that FOI is highly effective for the diagnosis of RA, selection of the appropriate therapy, and for the monitoring of therapeutic success. Treatment response rate can be increased (from 42% to 71%) through patient stratification in terms of ICG enrichment in MCP.

Abstract

Fluorescence optical imaging (FOI) aids differential diagnosis of rheumatoid arthritis (RA) and increases treatment response rate through patient stratification.

Disclosure of Interests: None declared.

DOI: 10.1136/annrheumdis-2020-eular.4322