PS109

HISTORY. A 66-year-old Caucasian female patient presented to the pain clinic Marburg with a 3-year history of seropositive rheumatoid arthritis (RA) principally manifested as symmetrical pain and swelling in small joints of the hands, wrists, elbows with increased rheumatoid factor (RF =27, Table1), anti-CCP-antibody (443 U/ml, norm:<10 U/ml), elevated CRP (50.1, norm<5.0mg/l) and elevated ESR (38/80 mm). ANA, and antibodies to U1-n-RNP, SS-A, SS-B, and Scl-70 were absent. Radiographic findings consistent with osteoarthritis were evident in hips, knees, hands and feet. Synovitis was evident in small joints of middle and ring fingers of both hands and in both wrists. She was diagnosed as seropositive RA and osteoarthritis (OA). Fibromyalgia (FM, 13 / 18 painful tender points) developed 3 years after the onset of RA. The first three years were characterized by multiple flares and 3 inpatient admissions despite treatment with MTX and corticosteroids (Prednisolone).

The patient was referred to the pain clinic in 2014 where she reported a pain intensity (0-100 VAS) of 40 for RA & OA and 70 for FM. Systolic hypertension (blood pressure 162/75 mm/Hg) was present, increasing to 191/73 mm/Hg during physical stress as measured in a standardized psychophysiological test. Disturbed sleep rhythm was characterized by 354 arousals with 33 transformations into awake state, as well as a diminished baroreflex sensitivity (BRS). The patient had difficulty bending down, lifting, carrying objects weighing >1kg, walking >10 meters, resulting in her having to rest on a couch >10 h/day. Pharmacological treatment included MTX (15mg), Cortisone (20mg), and Sulfasalazine (2000mg), which was added following a 6 month-episode of a high disease activity (DAS28 = 5.26) immediately before SET started.

Lab	11/2010 onset	8/2011 29 m before SET	7/2012 18 m before SET	8/2013 6 m before SET	1/2014 1 m before SET	7/2014 1m after SET	8/2015 15 m after SET	8/2016 27m after SET
CRP (< 5.0 mg/l)	22.0	37.4	49.2	23.4	50.1	8.17	16.1	14.7
RF (< 15 U/ml)	68	52	20.6	2s4.5	27	<15	<15	<15
RhF IgM (<40 U/ml)	na.	na.	na.	82	27	<23	<23	<23
RhF IgA (< 20 U/ml)	na.	na.	na.	27	49.1	5.7	5.6	3.9
Anti-CCP-antibody (< 7 U/ml)	433.4	na.	302.6	na.	113.18	23.2	na.	83.8

SINGLE CASE STUDY

TREATMENT DESIGN

CLINICAL OUTCOME

clinical pain

cortisone was reduced

Blood pressure became normotensive

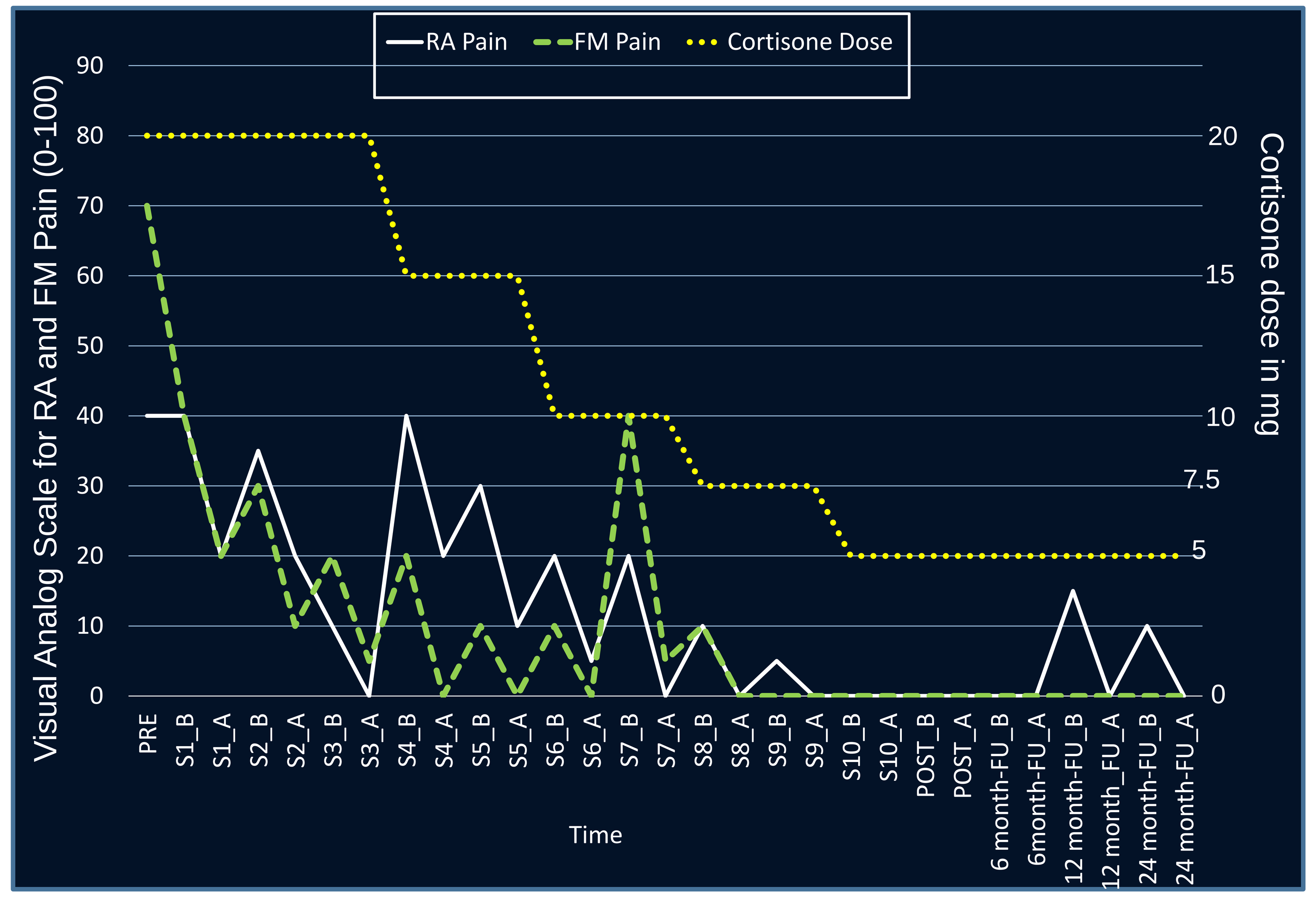
Sleep rhythm

BRS

Disease Activity Score

Tender points

IMMUNOLOGICAL CHANGES



DISCUSSION. It is generally accepted that stimulation of carotid sinus and cardiopulmonary baroreceptor afferents, which are activated by dynamic changes of blood pressure and respiratory rate, reduce pain. Baroreceptors provide signals to the brain stem and the dorsal medial nucleus tractus solitarius (dmNTS). The dmNTS is responsible for inhibition of both pain, anxiety, sleep quality, and blood pressure. In healthy individuals an elevation in resting arterial blood pressure leads to a reduction in acute pain sensitivity. Studies show that in persistent pain conditions the interaction between blood pressure and pain sensitivity is impaired. Diminished baroreceptor sensitivity, which is influenced by classical and operant conditioning, may provoke pain chronicity. The permanent stress-related increase of blood pressure leads to a lack of dynamic changes of the pressure in the carotid sinus. In effect, the carotid baroreceptors “learn” not to react anymore. The NTS no longer receives inhibitory signals and, therefore does not inhibit pain and anxiety.

Diminished NTS activation leads to the development of pain chronicity in the subgroup of patients who develop hypertension in prolonged stress situations. In addition, diminished BRS and NTS activation effects the immune system. Norepinephrine (NE), through stimulation of the β_2-adrenoreceptor-cAMP-protein Kinase A pathway, inhibit the production of type 1/proinflammentory cytokines, such as interleukin (IL-12), tumor necrosis factor-α, and interferon-γ by antigen presenting cells and T-helper 1 (Th1) cells. Through this mechanism, endogenous catecholamines may cause a selective suppression of Th1 responses.

CONCLUSION. This single case suggests that SET, by restoring BRS and NTS activation, is synergistic with pharmacotherapy in reducing inflammation and/or pain in RA, OA, and fibromyalgia.

References

Antinociception and cardiovascular responses produced by electrical stimulation in the nucleus tractus solitarius, nucleus reticularis ventralis, and the caudal medulla

Central effects of baroreceptor activation in humans: attenuation of skeletal reflexes and pain perception.