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Case report

Spontaneous Serial Fractures of Metatarsal Bones in Female Patient with Rheumatoid Arthritis on Long-Term Steroid Therapy

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A B S T R A C T

Low-dose oral steroid therapies are very effective in active rheumatoid arthritis (RA), reducing disease activity in acute crisis either while waiting for disease-modifying antirheumatic drugs (DMARDs) to take effect or if it was slow in response to DMARDs. However, long-term steroid therapies are associated with serious side effects, such as osteoporotic reduction of bone mass and frequent fractures. This paper reports a female patient who has suffered RA treated with low-dose oral steroid therapy in a long-term period. Suddenly, she developed severe pain and oedema of forefeet during home distance level walking, with no history of trauma. The diagnosis of spontaneous serial fractures of the 2nd to 4th metatarsal (MT) bone bilaterally was performed by feet radiography. Furthermore, in widening the diagnostic approaches the authors had performed diagnostic musculoskeletal ultrasound to exclude metatarsophalangeal joint effusion and exacerbation of RA. They also made a static analysis of feet on the electronic baropodometer system in order to register biomechanical changes in bipedal standing. One year after, the same diagnostic procedures were done, on which occasion the healing of fractures were verified, with better results in biomechanical static analysis of the feet but without complete regression of static disbalance. This could lead to further disturbances during level walking and daily activities. This paper reports a unique case of the RA patient on long-term low-dose steroid therapy with previously unreported sites of spontaneous metatarsal fractures of feet which causes further static disbalance; consequently the patient might experience problems in every-day life activities.

Key words: *serial metatarsal fractures, steroid therapy, rheumatoid arthritis, changes in static biomechanics*

Introduction

Low-dose oral steroid therapies are very effective in active rheumatoid arthritis (RA), reducing disease activity in flare either as bridging therapy when introducing disease-modifying antirheumatic drugs (DMARDs) or if there was a slow response to DMARDs[1]. Nevertheless, long-term steroid therapies are associated with serious side effects, such as an increase in bone resorption and reduction of bone formation with frequent fractures[2]. Long-term steroid treatments can lead to the development of osteoporosis with clinical manifestation of bone pain, pathological fractures of skeleton, especially in the spine and hip joint, causing deformations of the skeleton[1,2]. The purpose of this paper is to report a unique case of an RA patient on a long-term, low-dose steroid therapy with previously unreported sites of spontaneous metatarsal fractures of the feet occurred during level walking, without trauma. Diagnosis had to be proved by radiography, with widening the diagnostic tools such as musculoskeletal diagnostic ultrasound (excluding metatarsophalangeal joint effusion) and electronic baropodo-

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meter system (Diagnostic Support s.r.l.) for a static analysis of bipedal standing. The sites of fractures were quite unusual and, to the best authors' knowledge, no similar case has ever been documented in the literature.

Case Report

A 42-year old female patient has been treated due to RA since 2004. Four years she was on low-dose oral steroid therapy because of a slow response to DMARDs. Her Body Mass Index (BMI) was 31, indicating that she was overweight. During level walking she reported severe pain and oedema in both forefeet. There was no history of trauma and no exacerbation of RA. HAQ (Health Assessment Questionnaire) was 2. Physical examination showed marked bilateral sensibility and oedema in the forefeet. Feet radiography showed bilateral fractures of 2nd to 4th MT bones (Figure 1). Widening the diagnostic approaches, musculoskeletal diagnostic ultrasound was done. Metatarsophalangeal joint effusion as exacerbation of RA was excluded but ultrasound had shown interruption of the continuity of 2nd to 4th MT bones of both feet,

Fig. 1. X-ray of feet in A-P projection shows fractures of II-IV metatarsal bones on both feet.

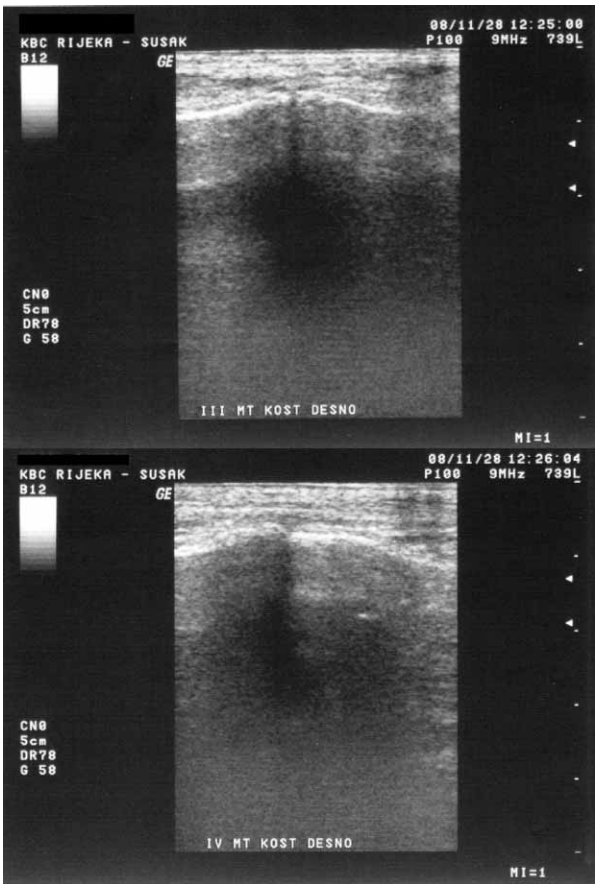

Fig. 2. Echo of metatarsal bones shows interruption of the continuity of II-IV metatarsal bones of both feet, periostal reaction and hypoechogenic callus.

periosteal reaction and hypoechogenic callus [4] (Figure 2). Furthermore, static feet deformities were present and static analysis on the electronic baropodometer system was performed (Diagnostic Support s.r.l.). The results have proved biomechanical disturbances with the points of maximum load on the posterior area of the feet (Figure 3). The patient walked sparing the anterior area of both

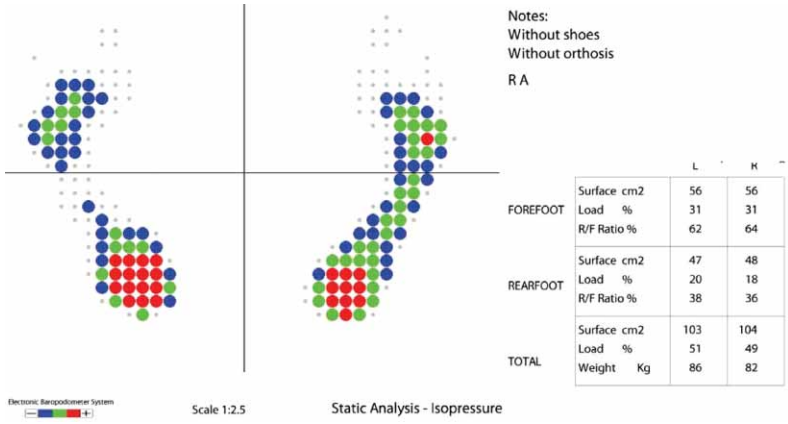

Fig. 3. Static analysis has proved the points of maximum load (shown in red) on the posterior area in both feet.

Fig. 4. Control X-ray of feet after one year in A-P projection shows partial resorption of periostal callus (healed fractures) which are seen by medial and lateral edge of medium 1/3 of diaphysis of 2. et 3. metatarsal bone and almost complete resorption of callus by the edge of 4. metatarsal bone on both feet.

feet because of pains in the metatarsal area. During 4 weeks she walked using underarm crutches that enabled disburdening her feet. After a one-year follow up the patient reduced her body weight to a certain degree, BMI was 28. The feet radiography demonstrated healed fractures (Figure 4). The control static analysis on the electronic baropodometer system was performed (Diagnostic Support s.r.l.) and demonstrated better distribution of body weight on both feet. The points of maximum load were present on the posterior area in both feet, but the areas of greater load were shown also on the anterior area of both feet so the bipedal standing weightbearing was better but not totally reestablished (Figure 5). HAQ is now 1.5.

Discussion

Skeleton fractures are frequent in long-term steroid therapy[3]. They are caused by steroid induced osteoporosis with increased bone resorption and reduced formation of bone mass. So far, the most frequent reports indicate fractures of the hip, vertebrae and wrist[4–6]. The fractures of MT bones usually occur after great exhaustion – the so called »stress fractures«[7–12] – or after verified injury[13–15]. The aim of this report is to indicate the probability of fractures occurring in those rare locations.

Long-term steroid therapy on the female patient with RA was the cause of MT bones fractures. Elevated BMI and static feet deformities have also contributed to the fractures, despite her young age. It is interesting that 1st and 5th MT bones were intact. They even distribute most of the weight bearing load during walking. The authors could not find any possible explanation in the literature.

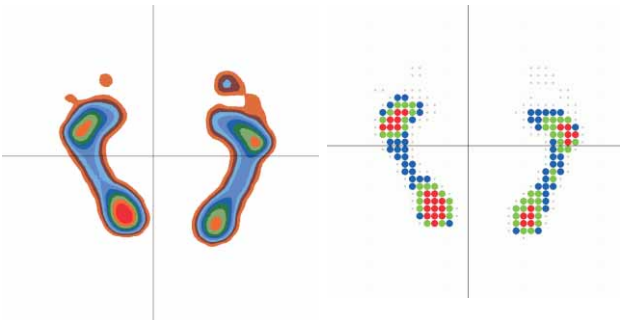

Fig. 5. The control static analysis after one year demonstrates equal distribution of body weight on both feet. The points of maximum load (shown in red) are present on the posterior area in both feet, though more pronounced on the left foot. The areas of greater load are shown also on the anterior area of both feet. The points of medium load (shown in green) are present on the anterior area of both feet but is more evident on the right one.

In patients on long-term steroid treatment with the presence of other provocative factors (elevated BMI, static feet deformities, physical inactivity) are necessary to predict the probability of MT bones fractures without anamnestic data of injury or exhaustion such as rare but possible, side effect of the steroid therapy.

Also, the combination of diagnostics applied in clinical observation has not been used in every day routine. The ultrasound of the feet had been done because of suspected exacerbation of RA and the presence of joint effusion[16–18]. The static deformity and abnormal walking guided us to conduct a static analysis on the electronic baropodometer system by means of which we proved biomechanical disturbances with the points of maximum load on the posterior area of the feet. The patient walked sparing the anterior area of both feet because of pain in metatarsal area. When the control feet radiography demonstrated healed fractures, control static analysis on the electronic baropodometer system was performed, in order to establish the presence of eventual consequences on foot biomechanics. We demonstrated better distribution of body weight on both feet. The bipedal standing weight bearing was better though not totally reestablished. In standing position the posterior feet area is more overloaded, which can lead to further disturbances during level walking and daily activities.

Conclusion

This paper reports a unique case of the RA patient on long-term low-dose steroid therapy with previously unreported sites of spontaneous metatarsal feet fractures, which causes further static disbalance so that the patient could experience problems in daily activities.

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SPONTANI VIŠESTRUKI PRIJELOMI METATARZALNIH KOSTIJU U BOLESNICE SA REUMATOIDNIM ARTRITISOM NA VIŠEGODIŠNJOJ KORTIKOSTEROIDNOJ TERAPIJI

SAŽETAK

Male doze kortikosteroida su vrlo efikasne u akutnoj fazi reumatoidnog artritisa (RA). Oni smanjuju aktivnost bolesti i koriste se kao terapija do početka djelovanja bolest modificirajućih antireumatika (BMAR) ili kod sporog odgovora na BMAR. Ipak, dugotrajna kortikosteroidna terapija ima ozbiljne nuspojave kao što su gubitak koštane mase i patološki prijelomi. Prikazali smo bolesnicu koja boluje od RA koja je liječena kortikosteroidnom terapijom. Klinička obrada je učinjena zbog otekline u prednjem dijelu oba stopala i boli prilikom hoda na kraćim relacijama. Nije bilo anamnestičkih podataka o ozljedi. Temeljem standardnih radiograma oba stopala postavljena je dijagnoza serijskih fraktura od druge do četvrte MT kosti na oba stopala. Potom je učinjen mišićno-koštani ultrazvuk koji je isključio izljeve u metatarzofalangealne zglobove i egzacerbaciju RA. Također je učinjena statička analiza stopala na elektroničkom baropodometru u cilju dokazivanja biomehaničkih poremećaja hoda. Nakon godinu dana učinjene su iste dijagnostičke pretrage. Potvrdili smo zacjeljenje prijeloma sa poboljšanim rezultatima biomehaničke statičke analize stopala, međutim nije došlo do potpune regresije statičkog disbalansa što bi moglo prouzročiti daljnje teškoće tijekom hoda i svakodnevnih aktivnosti. Prikazali smo jedinstven slučaj bolesnice sa RA na višegodišnjoj terapiji malim dozama kortikosteroida sa ranije nezabilježenim spontanim prijelomima metatarzalnih kostiju oba stopala koja su dovela do statičkog disbalansa te je vjerojatno da će bolesnica imati poteškoća u hodu i svakodnevnim aktivnostima.