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Case report

Differences of spectral Doppler in psoriatic arthritis and onychomycosis



José Alexandre Mendonça ^{a,b,*}

^a Serviço de Reumatologia, Pontifícia Universidade Católica de Campinas, Campinas, SP, Brazil

^b Instituto de Pesquisa Clínica de Campinas, Campinas, SP, Brazil

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ABSTRACT

Objective: To evaluate the use of the spectral Doppler (SDoppler) to quantify inflammatory activity and to detect nail echotextural differences in patients with psoriatic arthritis and onychomycosis.

Methods: Two patients, one with psoriatic arthritis but with no joint pain nor nail clinical change and the other with onychomycosis and rheumatoid arthritis were included. The gray scale ultrasound study, showed changes in the regular presence of echotexture at the nail insertion, thickening of the nail bed and loss of trilaminar nail pattern. The spectral Doppler resistance index (RI), detects the inflammatory process in nail entheses.

Results: Seven distal interphalangeal (DIP) joints in both patients were evaluated in two planes, getting nine RI. In the patient with psoriatic arthritis the author found: loss of normal trilaminar nail plate aspect, and nail beds and DIP joint capsules preserved. The spectral Doppler showed RI < 1, with mean \pm SD = 0.50 ± 0.75 in the microcirculation at nail entheses, with characterization of a bone erosion in the third left DIP joint, with RI = 0.38 and 0.63 in transverse and longitudinal planes, respectively. The patient with onychomycosis showed the following changes: hypoechogenicity at nail insertion; loss of nail shape, and spectral Doppler in nail entheses with RI > 1, with mean \pm SD = 1.71 ± 0.98 .

Conclusion: The use of ultrasound can detect changes in the nail beds in these diseases. Future studies will further characterize these changes.

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As diferenças do Doppler espectral, na artrite psoriática e onicomicose

RESUMO

Objetivo: Utilizar o Doppler espectral (DE) para quantificar atividade inflamatória e detectar diferenças ecotexturais ungueais em pacientes com artrite psoriásica e onicomicose.

Métodos: Foram incluídos dois pacientes, um com artrite psoriásica, mas sem dores nas articulações e sem alterações clínicas ungueais; e outro paciente com onicomicose e artrite reumatoide. O exame de ultrassom, pela escala cinza, demonstrou alterações na presença

Palavras-chave:

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* Corresponding author.

E-mail: mendocaja@ig.com.br

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regular da ecotextura na inserção da unha, aumento da espessura do leito ungueal e perda do padrão trilaminar da unha. O Doppler espectral, através do índice de resistência (IR), detecta o processo inflamatório nas enteses ungueais.

Resultados: Sete articulações interfalângicas distais (IFD) nos dois pacientes foram avaliadas em dois planos, obtendo nove IR. O autor encontrou no paciente com artrite psoriásica: perda normal do padrão trilaminar da unha; leitos ungueais e cápsulas articulares das IFDs preservados. O Doppler espectral evidenciou $IR < 1$, com média \pm DP igual a $0,50 \pm 0,75$ em microcirculação nas enteses ungueais e caracterizou erosão óssea ativa em 3ª IFD esquerda, com IR igual a 0,38 e 0,63 em planos transversal e longitudinal, respectivamente. O paciente com onicomicose mostrou as seguintes alterações: hipocogenicidade na inserção ungueal; perda do formato da unha e o Doppler espectral nas enteses ungueais com $IR > 1$, com média \pm DP igual a $1,71 \pm 0,98$.

Conclusão: O uso do ultrassom pode detectar alterações nos leitos ungueais nessas doenças. Futuros estudos poderão melhor caracterizar essas mudanças.

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Introduction

Various pathological conditions are found in psoriatic arthritis (PsA), including inflammatory involvement of the tendon, at the joint and at the entheses; and even an important osteolysis can occur.¹ Ultrasound (US) studies with a high-frequency linear transducer constitute an important imaging method to characterize changes in the nail bed in patients with psoriasis (Ps) and PsA. This high-definition technology can detect sub-clinical inflammation in patients without joint involvement, i.e., structures unchanged by the gray scale (GS) exhibit an increased signal of power Doppler (PD), captured in microcirculation in the nail entheses, which show inflammatory activity.^{2,3}

Thus, the nail bed can be considered an interesting and important region to be studied, mainly in onychopathies.^{4,5}

New US equipment can assess low velocity flow in small vessels; pulsed Doppler, characterized by PD and by spectral Doppler (SDoppler), can assess neoangiogenesis.

The SDoppler system identifies the systolic and diastolic flow peak, generating a resistance index (RI). $RI < 1$ quantifies the inflammatory activity in joint structures, where tissue injury should not exist.⁶

Methods

Patients

Two male patients were included: one with PsA, 54 years old, presenting Ps for 36 years and with family history of this disease, without joint pain, PASI = 30.6; not taking any medication and with no nail abnormalities on clinical examination. The diagnosis of PsA was established according to CASPAR (Classification Criteria for Psoriatic Arthritis) classification criteria.⁷⁻⁹

The other patient, 66 years old, exhibited onychomycosis and a diagnosis of RA for 24 years, rheumatoid factor of 512 IU/mL and DAS28 = 3.59, taking anti-TNF for three years and methotrexate 15 mg per week. The diagnosis of onychomycosis was confirmed by the presence of septate and hyaline

hyphae in the nail mycological exam. Both patients were evaluated in a private rheumatology practice.

Ultrasonographic Evaluation

The US examination was performed by a rheumatologist with a six-year experience in the method.

The US system used was a MyLab GOLD XVG 25 (Esaote SpA, Genoa, Italy) device equipped with a 6.0 to 18.0 MHz high frequency linear transducer, pulse repetition frequency (PRF) of 700 Hz and PD with frequency equal to 6.6 and 8.0 MHz.

Sonographic findings of joints and nails can show the presence of effusion or synovial hypertrophy in the distal interphalangeal (DIP) joints; effusion around the digital extensor tendon with or without the presence of PD; echotextural change in the nail insertion; nail bed thickening (≤ 2.5 mm); loss of normal trilaminar aspect of the nail plate; bone erosion in the distal phalanx and changes in RI, assessed at two imaging planes: longitudinal and transverse. These major sites were chosen to detect echotextural tissue injury mainly on nails of patients with PsA.^{10,11}

This sonographic evaluation of DIP joints was adapted according to the indications of the European League Against Rheumatism (EULAR) guidelines for musculoskeletal US in rheumatology.¹²

The dorsal view of DIP joints was examined by sonography with the patient seated with his hands on the examination table, with the transducer perpendicularly to the joint. Both longitudinal and transverse views were explored by moving the probe laterally and medially. In addition to that, a significant amount of gel was used to avoid over-compression during the examination.

In certain situations, the assessment of SDoppler for RI can be altered or < 1 , in which the presence of inflammatory activity in many structures, such as synovial recess, nail entheses, peritendinous, and bone erosions, is evidenced.¹³⁻¹⁵

Results

Seven DIP joints, in both patients, were evaluated in two planes, getting nine RI. In the patient with PsA the author

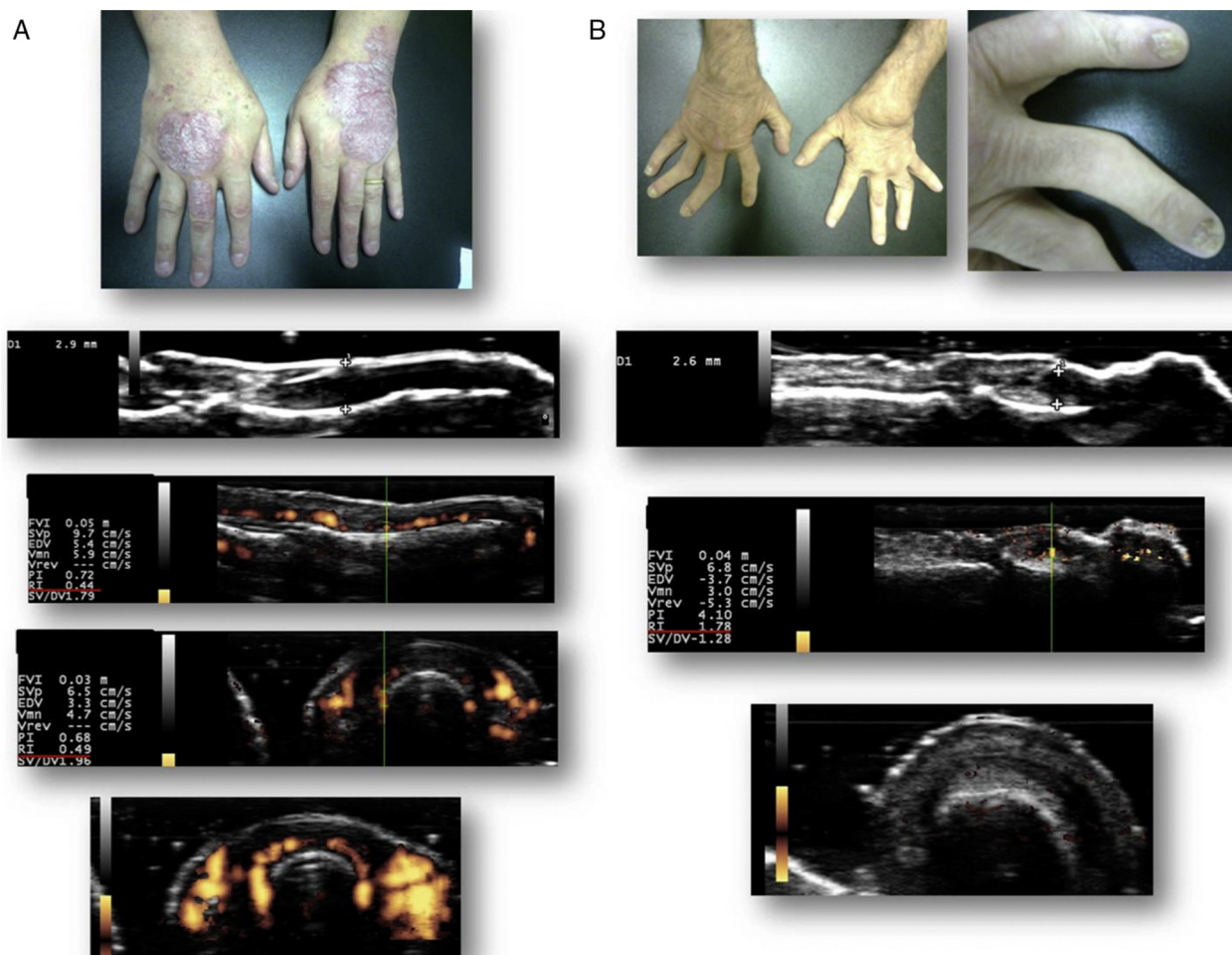


Figure 1 – A, Patient with psoriatic arthritis, with no nail abnormalities in the clinical examination. B, Patient with onychomycosis and rheumatoid arthritis. Both figures depict the evaluation, at nail entheses, through the resistance index (RI) and spectral Doppler (SDoppler), and echotextural changes through grayscale (GS) analysis (longitudinal and transverse planes).

found: DIP joint capsules preserved; loss of normal trilaminar aspect of the nail; nail bed thickening (mean \pm SD = 2.6 mm \pm 0.24); SDoppler at nail entheses showing decreased RI in the microcirculation (mean \pm SD = 0.50 \pm 0.75 for RI); and invasion of cortical bone in the third left DIP joint, characterizing bone erosion and inflammatory activity, with RI = 0.38 and 0.63 in transverse and longitudinal views, respectively.

The patient with onychomycosis and RA exhibited the following changes: hypoechogenicity at nail insertion; loss of trilaminar nail aspect; a normal nail bed thickness (mean \pm SD = 2.2 mm \pm 0.40); DIP joint capsules preserved; SDoppler at nail insertion with RI >1 (mean \pm SD = 1.71 \pm 0.98 for RI) (Figs. 1A and B).

Discussion

GS can show changes in nail shape, loss of trilaminar nail aspect and also echogenic changes in the nail bed in PsA and onychomycosis.

PD can show an amplitude of the Doppler signal, but the quantification of this signal is shown by SDoppler, characterized by the presence of RI, which detects the flow of small vessels and can confirm the presence of inflammation in places like nail entheses in patients with PsA.

This clinical case shows that different US findings may occur in patients with PsA and onychomycosis. The author believes that high-resolution US may be important in assessing the abnormalities of nail lesions. SDoppler can be considered a good tool to detect sub-clinical inflammatory lesions, in cases of nail enthesitis in PsA. Future studies may confirm such echotextural changes.

Conflicts of interest

The author declares no conflicts of interest.

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