

Multimodal imaging of psoriatic arthritis triggered by Chikungunya fever

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ABSTRACT

Chikungunya fever (CF), caused by the Chikungunya virus (CHIKV), is an arboviral disease transmitted by infected *Aedes* mosquitoes found worldwide. Although CF may trigger chronic arthritis, there are still few reports of patients who have progressed to psoriatic arthritis (PsA). We describe the clinical and ultrasound (US) and magnetic resonance imaging (MRI) findings of the wrist and hands of a 49-year-old man who had peripheral PsA triggered by CHIKV. He had scaly, itchy scalp lesions three months after the diagnosis of CF. The patient had classic synovitis and tenosynovitis secondary to CF. The persistence of inflammatory disease with signs of enthesitis and dactylitis on magnetic resonance imaging (MRI) and US, family history and appearance of skin lesions on the scalp strongly suggest post-CF PsA. Viral infections can be a triggering factor for several diseases with chronic arthritis, such as PsA. Imaging exams are essential methods for both diagnosis and the monitoring of treatment.

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Received: 04 April 2021
Accepted: 11 May 2021
Published: 17 June 2021

Keywords: Arthritis, Chikungunya fever, Magnetic resonance imaging, Psoriatic, Ultrasonography

How to cite this article

Leidersnaider CL, Vaz JLP, Sztajnbok FR, Gonçalves MT, Mogami R. Multimodal imaging of psoriatic arthritis triggered by Chikungunya fever. Int J Case Rep Images 2021;12:101229Z01CL2021.

Article ID: 101229Z01CL2021

doi: 10.5348/101229Z01CL2021CR

INTRODUCTION

Chikungunya fever (CF) is a viral disease whose transmission occurs through vector females of *Aedes aegypti* and *Aedes albopictus* mosquitoes infected by the Chikungunya virus (CHIKV). There are reports of outbreaks in Europe, the Americas, Asia, Africa, and Oceania [1].

Approximately 60% of patients with CHIKV infection progress to chronic arthritis [2]. In these cases, joint limitations can persist for up to five years after infection [3] and are associated with permanent sequelae [4]. After an incubation period of three to seven days, patients may experience fever, skin rash, myalgia, and arthralgia. The disease becomes chronic when the arthralgias persist for more than three months. The literature shows that a small portion of patients with chronic CF and severe polyarticular forms develop rheumatoid arthritis (RA) [5] or other forms of arthritis, including psoriatic arthritis (PsA) [6].

Conventional radiology is still a first-line exam in the investigation of rheumatological diseases. However, the method is not as sensitive as MRI or US in showing early bone and soft tissue changes. Although US has limitations in bone evaluation, together with Doppler it can identify

early signs of enthesitis or organ-enthesitis involvement [7]. Conventional MRI, in turn, is useful for diagnosing bone complications such as marrow edema and erosions as well as soft tissue involvement [8].

The pattern of involvement of the hands and wrists by CF is very similar to that found in RA, and it is characterized by symmetrical and bilateral involvement of the metacarpophalangeal and proximal interphalangeal joints, tenosynovitis, subcutaneous edema, and bone changes, such as marrow edema and erosions [9].

Although there have been several reports of developing RA, to our knowledge, there are few descriptions of post-CF PsA. Mathew et al. [5] investigated 1396 individuals with CF and concluded that only 2.5% of patients developed PsA. Thus, our report is valuable due to the scarcity of cases, and it features an imaging presentation typical of peripheral spondyloarthritis secondary to arbovirus infection.

CASE REPORT

A 49-year-old man had a fever (101.30°F/38.5°C) for approximately ten days and exhibited persistent signs of polymyalgia and polyarthralgia. He used dipyrone and oral hydration to reduce the fever, and his musculoskeletal symptoms partially improved. Serologies for CHIKV were positive for IgM (51; normal value: 9). Subsequently, a skin rash appeared, and polyarthralgia associated with edema of the hands, wrists (Figure 1), elbows, knees, and feet worsened. Two months later, he was evaluated in an outpatient rheumatology clinic at a university hospital in Rio de Janeiro, Brazil. He continued to experience polyarthralgia and edema in the metacarpophalangeal and interphalangeal joints, especially of the left hand. Erythematous scaling and itchy skin lesions were also noted in the anterior medial region of the scalp on physical examination. At the time, the patient was not taking any known medication that could precipitate psoriasis. He also denied any preceding emotional stress (at least two months prior to the appearance of the skin lesion). The patient had never had any episode of psoriatic skin lesions. The patient was hypertensive, using enalapril 20 mg/day, and was an abstainer, nonsmoker, and physically active. He denied allergies and blood transfusions and had an up-to-date vaccination schedule. His father had PsA. One maternal aunt had multiple sclerosis, and another had ankylosing spondylitis.

The rheumatologists prescribed meloxicam 15 mg/day and prednisone 20 mg/day after discussing the case. The patient returned the following month with little clinical improvement, and methotrexate 15 mg and folic acid 5 mg were started after verification of the laboratory tests.

After starting the medication, he was followed up on an outpatient basis and remained asymptomatic. However, the patient stopped medication on his own, and after two years and four months he returned to the outpatient clinic with symptom recrudescence. After that,

the joint pain returned, but the psoriatic skin lesions did not. He was re-evaluated with US and MRI.

Written consent was obtained from the patient to be evaluated at the rheumatology outpatient clinic and the radiology department of a university hospital in the city of Rio de Janeiro, Brazil.

There were no changes in the patient's complete blood count: C-reactive protein 13 mg/L (normal index: up to 3 mg/L), fibrinogen 340 mg/dL (normal index: 200–400 mg/dL), and normal levels of transaminases and electrolytes (sodium and potassium). The nonreactive immunological tests included the following: antinuclear factor (ANA), antibodies against citrullinated peptides (ACPA), rheumatoid factor (RF), and cytoplasmic antineutrophil antibodies (ANCA). Serological tests for HIV and hepatitis B and C were nonreactive; CHIKV IgM and IgG were reactive; and HLA-B27 was negative.

The equipment used was a Toshiba US, model Aplio XG, with a 7–18 MHz multifrequency probe, in B mode and with power Doppler (pulse repetition frequency 750 Hz, low wall filter and gain adjusted just below the appearance of the artifacts).

The MRI scans were performed in a Siemens model Avanto, 1.5 T high-field scanner. The image acquisition protocol had the following sequences: protonic density (PD) with fat saturation in the axial, sagittal, and coronal planes and T1 pre- and post-contrast fat saturation in the axial plane.

The US and MRI scans showed signs of arthritis in the wrist and metacarpophalangeal joints of both hands. There was also tenosynovitis of all extensor compartments, digital flexor tenosynovitis (Figures 2 and 3), and signs of classical enthesitis due to thickening of the digital extensor entheses and functional enthesitis (Figures 4–6) due to peritendinous extensor thickenings. Vascular hyperflow was observed by power Doppler (Figure 4) at several sites of inflammation, paramagnetic contrast enhancement of the distended sheaths, and functional enthesitis sites. Focal bone edema was identified as an indirect sign of enthesitis at the base of the left third metacarpal associated with signs of inflammation of the extensor carpi radialis brevis.



Figure 1: 49-year-old man with chronic Chikungunya fever. Panoramic view of both hands with metacarpophalangeal and interphalangeal edema.

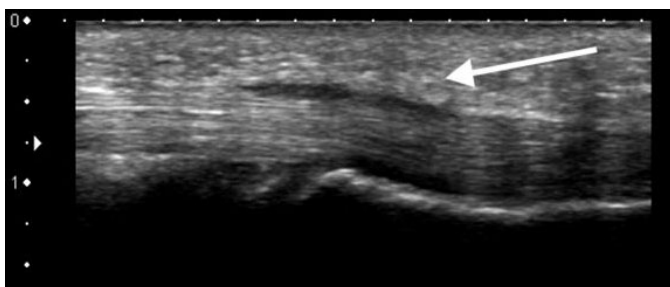


Figure 2: B-mode ultrasound in the sagittal plane of the second right digit. Note the flexor tendon sheath distention.

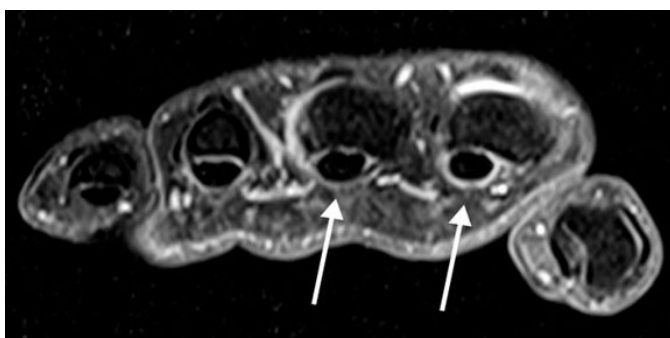


Figure 3: MRI T1 pre-contrast with fat saturation in the axial plane of right hand. Note the metacarpophalangeal synovitis and flexor tenosynovitis of the second and third digits (arrows).

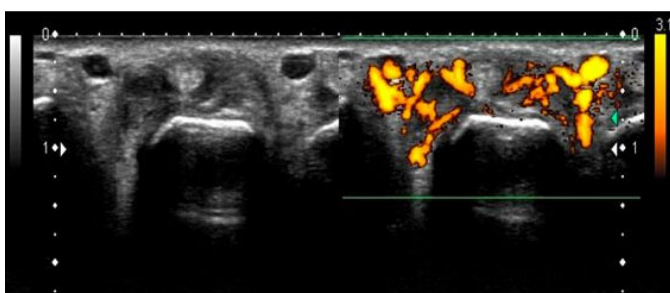


Figure 4: B-mode and power Doppler ultrasound of the left fourth digit in the axial plane. Note the extensive peritendinous extensor thickening with vascular hyperflow at the level of the metacarpophalangeal joint, indicating functional enthesitis. Note: This image had already been presented at the 2017 European Congress of Radiology in electronic poster (EPOS) mode, (<https://dx.doi.org/10.1594/ecr2017/C-0384>). According to the congressional ethics committee, the authors have the right to use it.

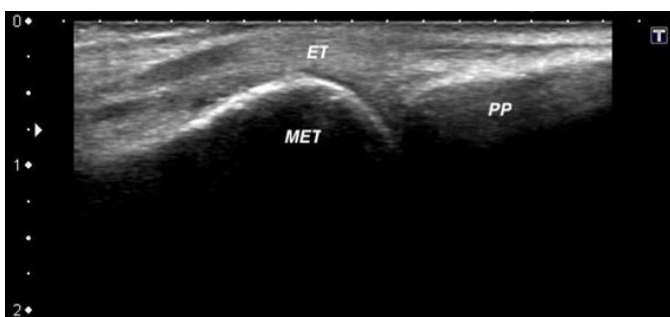


Figure 5: B-mode ultrasound in the sagittal plane of the left fourth digit at the metacarpophalangeal level. Note the soft tissue peritendinous extensor thickening, indicating functional enthesitis.

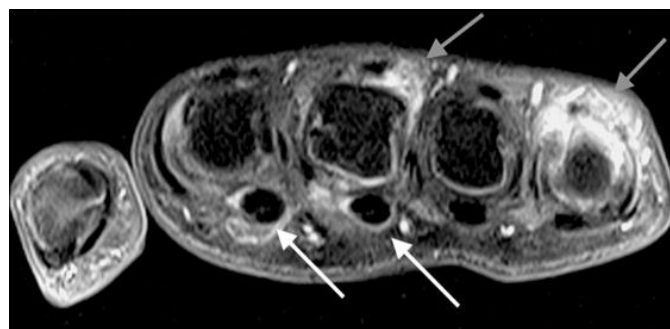


Figure 6: MRI of the left-hand shows T1 post-contrast with fat saturation. Note the enhancement of the flexor sheaths of the second and third digits (white arrows) and of the extensor peritendinous soft tissue of the third and fifth digits (gray arrows).

DISCUSSION

The authors present an unusual complication of CF suggested by clinical and imaging findings. US and MRI were also essential during the treatment follow-up.

According to the Classification Criteria for Psoriatic Arthritis (CASPAR) [10], to confirm the diagnosis of PsA, it is necessary to have an inflammatory joint disease and at least a three-point score in the other categories. The patient had a five-point score due to scalp psoriasis (two points), family history (one point), negative RF (one point), and dactylitis (one point). As reported in other literature cases, these signs and symptoms appeared immediately after CF infection, and the disease regressed with methotrexate therapy [5].

The patient's age and gender profiles disagree with the literature, which describes a predominance in women over 45 years old who are at risk for musculoskeletal complications in CF [11]. Among the usual manifestations of CF, the presentation of only fever, polymyalgia, polyarthralgia, and skin rash and the high levels of C-reactive protein are in accordance with the literature [12].

The US and MRI scans showed several signs of involvement, with characteristics of spondyloarthritis: dactylitis due to flexor tenosynovitis, classic enthesitis in distal extensor insertions, functional enthesitis due to peritendinous extensor thickening adjacent to the metacarpophalangeal and interphalangeal joints, and metacarpal marrow edema adjacent to the insertion of an extensor tendon.

After the 2015–2016 CF outbreak in Rio de Janeiro, Brazil, our group [9, 13] reported wrist/hand and ankle ultrasound changes. The authors highlighted bilateral synovitis and tenosynovitis as relevant findings for the diagnosis of musculoskeletal complications. However, in this case report, the existence of several signs of very intense enthesitis and flexor tenosynovitis in the imaging exams raised the suspicion of some other disease associated with CF.

There are two types of entheses according to function and location: fibrous and fibrocartilage. The most common fibrocartilage is found in the apophyses and epiphyses of long bones, short bones of the hands and feet, and several ligaments in the spine. Fibrous entheses are found in the metaphyses and diaphyses of long bones. Fibrocartilaginous entheses are those affected in spondyloarthropathies and altered in the US and MRI exams of the reported case [14, 15].

Functional enthesis is another essential concept to understanding our imaging findings. In specific locations where the tendon deflects or rubs against a bone surface, there are sesamoid (tendinous) and periosteal fibrocartilages. This patient had intense digital peritendinous extensor inflammatory thickenings, which are explained by these functional enthesis impairments [16, 17].

Dactylitis is one of the main features of psoriatic arthritis and is present in 40% of cases. The main finding is digital flexor tenosynovitis, that is, distention of the fibrous sheaths, which also existed in the reported case [18].

Clinical recognition of early-stage PsA is challenging when the disease affects only the peripheral joints. Despite the efficiency of CASPAR in identifying patients with less than one year of symptom onset (early psoriatic arthritis) [19], peripheral PsA remains a challenge for rheumatologists [20]. In our case, imaging helped detect the enthesal manifestations of the disease, suggesting alternative diagnoses in CF patients.

CONCLUSION

With the resurgence of CF epidemics worldwide, managing chronic arthritis has become an enormous challenge for rheumatologists. It is essential to follow these chronic cases and to identify the progression to other forms of arthritis, such as PsA. Imaging exams have become indispensable for the diagnosis and management of these complications.

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Caio Leal Leidersnaider – Conception of the work, Design of the work, Analysis of data, Drafting the work, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

João Luiz Pereira Vaz – Acquisition of data, Drafting the work, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Flávio Roberto Sztajnbok – Acquisition of data, Interpretation of data, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Marcelo Torres Gonçalves – Acquisition of data, Interpretation of data, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Roberto Mogami – Analysis of data, Interpretation of data, Revising the work critically for important intellectual content, Final approval of the version to be published, Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

Guarantor of Submission

The corresponding author is the guarantor of submission.

Source of Support

None.

Consent Statement

Written informed consent was obtained from the patient for publication of this article.

Conflict of Interest

Authors declare no conflict of interest.

Data Availability

All relevant data are within the paper and its Supporting Information files.

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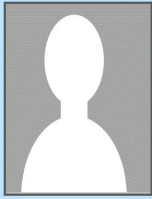
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Article citation: Leidersnaider CL, Vaz JLP, Sztajnbok FR, Gonçalves MT, Mogami R. Multimodal imaging of psoriatic arthritis triggered by Chikungunya fever. *Int J Case Rep Images* 2021;12:101229Z01CL2021.



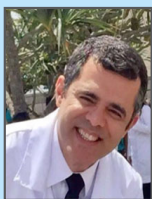
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