

## CASE REPORT

# Diagnostic Dilemma of Reactive Arthritis Aided by Multimodality Imaging using MRI, CECT and 18F-FDG PET/CT Scans

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## ABSTRACT

Reactive arthritis can be an elusive diagnosis especially in the elderly. A 77-year-old lady, presented with recent history of hip pain. She had been treated for urinary tract infection caused by *Chlamydia sp.* and had associated weight loss. She was also investigated for possible tuberculosis and occult malignancy. CT scan abdomen/pelvis and MRI revealed peri-articular muscle inflammation. Biopsy of her hip joint failed to find the causative factor. Whole-body 18F-FDG PET/CT scan revealed increased FDG uptake at bilateral hip and shoulder joints. She recovered after an intensive course of antibiotics. Thus, she was diagnosed with reactive arthritis. Reactive arthritis is usually a diagnosis of exclusion made by a high index of suspicion and positive serology test. Molecular imaging can be an alternative investigation for joint pains in the elderly, which enables excellent anatomical and functional information to exclude more sinister conditions such as malignancy.

**Keywords:** Geriatric pain, Chlamydia arthritis, Hybrid imaging

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(MRI) scans, with the aim of detecting degenerative changes or evidence of complications such as abscess formation. Nevertheless, it is potentially beneficial to consider positron emission tomography / computed tomography (PET/CT) as it can offer new clinical insights to aid in the diagnosis of reactive arthritis.

## INTRODUCTION

Chronic aches and pains affecting the elderly are commonly treated with self-medication or silently endured, often causing reduction in the quality of life. Changes in body shape, hormonal imbalance and loss of tensile strength of ligaments play an important role in the pathophysiology of pain in the elderly. Common causes of joint pain include osteoarthritis, rheumatoid arthritis and drug induced arthritis. Reactive arthritis caused by infection is an uncommon entity, particularly in patients who are immunocompetent and do not have history of chronic corticosteroid abuse. The diagnosis is usually made due to a high index of suspicion based on clinical findings. The role of diagnostic imaging is often limited to structural imaging using contrast-enhanced computed tomography (CECT) and magnetic resonance imaging

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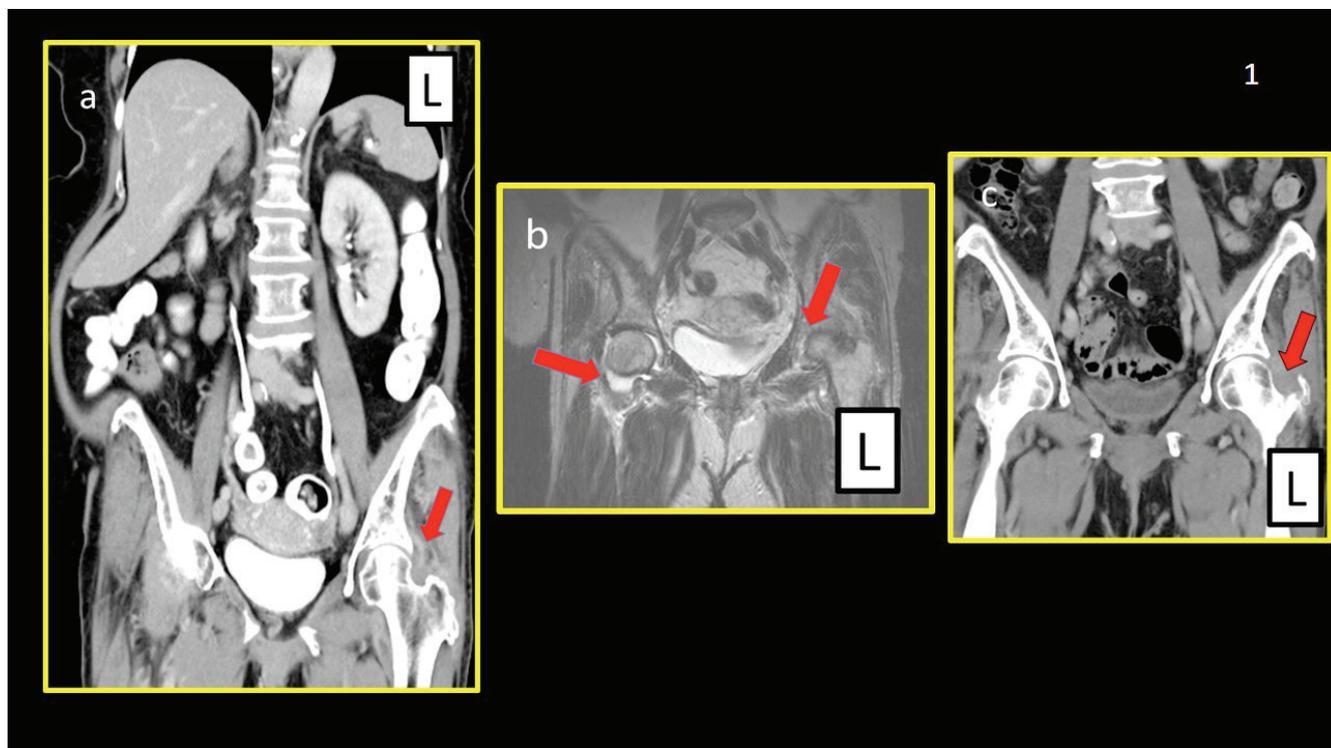
We report a case of an active 77-year-old lady, who presented with recent history of crippling left hip pain. Previously, she had been independent and was able to perform activities of daily living (ADL) by herself. The recent hip pain, however, caused her to become wheelchair bound. On further history taking, it was noted that she had had underlying ischaemic heart disease and Type 2 diabetes mellitus which were well controlled. Her hip pain was associated with a recent history of low grade fever. There was no history of preceding trauma. It was also noted that she had been recently treated for urinary tract infection using Amoxicillin and Clavulanic Acid 500 mg bd per oral for a duration of 2

weeks. As her symptoms did not improve, she was then given intravenous Ciprofloxacin 200mg 12 hourly for two weeks. Her urine culture and sensitivity results as well as blood serology tests were positive for *Chlamydia pneumoniae* infection. In view of recent history of significant weight loss, she was also investigated for tuberculosis and occult malignancy. Mantoux test and sputum culture for acid fast bacilli, however, were negative for tuberculosis.

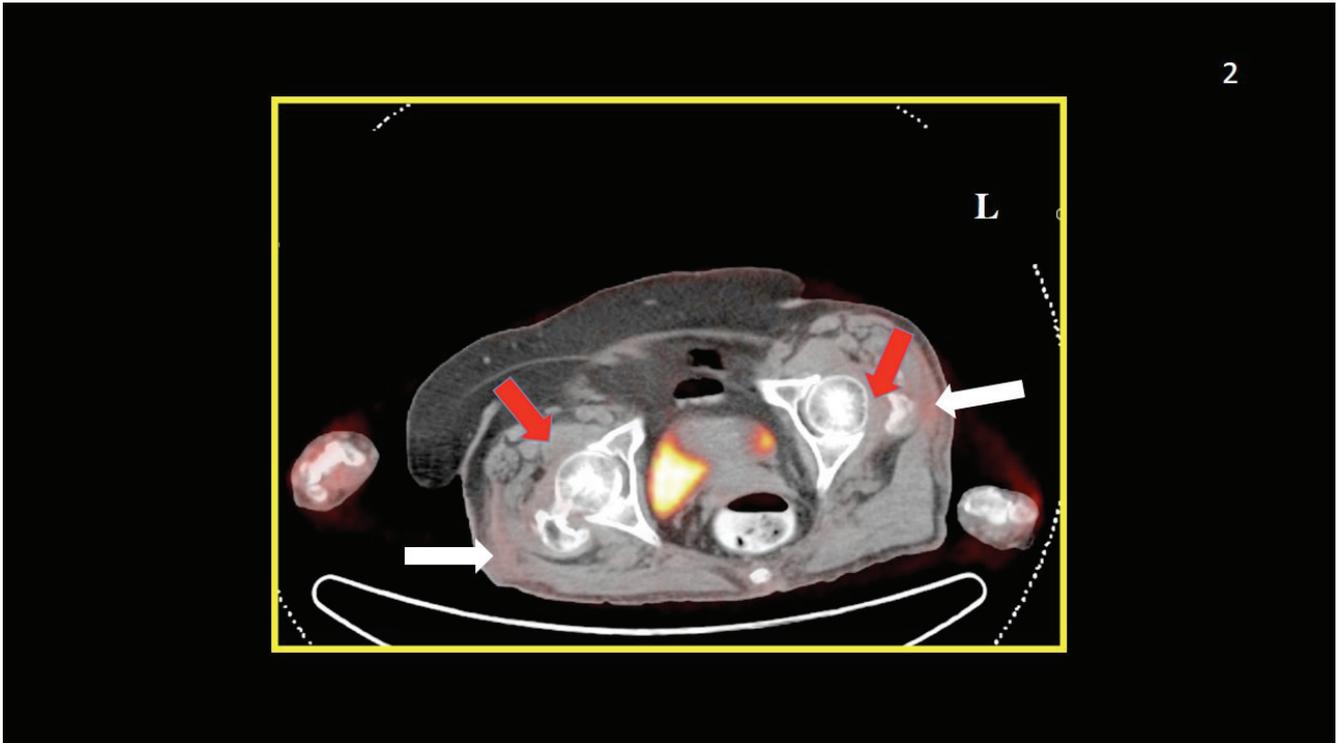
Contrast-enhanced computed tomography (CECT) in coronal view (Fig. 1a) and coronal T2-weighted image of Magnetic Resonance Imaging (MRI) scan (Fig. 1b), reviewed during the acute episode of hip pain demonstrated bilateral hip joints effusion and swelling of the peri-articular soft tissue. These findings on the recent MRI were confirmed to be new changes as evidenced by making a comparison with a previous MRI scan done several months ago. The former MRI scan had been performed to assess an incidentally detected ovarian cyst during her previous hospital check-up. Incidentally, the former MRI scan had shown normal hip joints configuration. The recent CECT scan of the abdomen and pelvis also revealed iliopsoas tendinopathy, peri-articular muscle inflammation and minimal hip joint effusion (Fig. 1a). Several weeks later, the joint pain migrated to involve bilateral shoulder and elbow joints. Subsequently, these changes resolved in the post-treatment CECT scan (Fig.1c).

It is interesting to note that her C-reactive protein (CRP) and Erythrocyte Sedimentation Rate (ESR) results were constantly elevated during the acute phase of her joint pains. Her rheumatoid antigen and connective tissue disorder screening titres were, however, not elevated; making the diagnosis of rheumatoid arthritis unlikely. Serum uric acid was also within normal limits i.e. 269  $\mu\text{mol/L}$  (normal range is 180-420  $\mu\text{mol/L}$ ) which excluded gouty arthritis. Biopsy of the muscles of her hip joint was unremarkable. Apart from the presence of some macrophages and lymphocytes that indicated an inflammatory response, there was neither an evidence of malignant cells to indicate paraneoplastic arthritis nor caseating granulomatous necrosis to indicate tuberculosis of the joints.

Finally, she was referred for positron emission tomography/ computed tomography (PET/ CT) scan to rule out occult malignancy or an indeterminate source of infection. Whole-body PET/CT scan revealed multiple joint erosions and effusions. There were no significant osteophytes or subchondral sclerosis or cysts detected to indicate possibility of osteoarthritis. There was abnormally elevated 18F-fluorodeoxyglucose (18F-FDG) uptake noted in a bilateral and symmetrical distribution in the entheses of the ligaments involving multiple joints; such as the shoulder and hip joints as well as the interphalangeal joints of the fingers. The maximum standardized uptake value ( $\text{SUV}_{\text{max}}$ ) ranged from 3.0 to



**Fig. 1:** (a) Coronal multiplanar image of CECT abdomen and pelvis scan revealed tendinopathy, peri-articular muscle inflammation (red arrow) and minimal joint effusion. (b) Subsequent MRI scan in coronal view T2-weighted sequence demonstrated effusions at bilateral hip joints (white arrows). (c) Bilateral hip joint effusions resolved in post-treatment CECT scan.



**Fig. 2:** Hybrid molecular imaging using positron emission tomography/ computed tomography (PET/ CT) scan, revealed avid uptake of 18-fluorodeoxyglucose (FDG) in bilateral hip joints (red arrow) and pelvic muscles (white arrows) indicating bilateral symmetrical arthritis and myositis.



**Fig. 3:** Coronal fused PET/CT image revealed avid 18F-FDG uptake in the shoulder joints bilaterally (worse on the left) and effusions at bilateral hip joints (white arrows), in keeping with reactive arthritis changes.

6.0 (Fig. 2 and Fig.3). There was no abnormal 18F-FDG uptake in the wrist joints. There was also no other foci of abnormal 18F-FDG uptake seen elsewhere in her body. Subsequently, she was treated with oral Itraconazole 200 mg daily for one week, followed by oral Ciprofloxacin 500 mg daily for one month and her symptoms finally resolved. Therefore, it was concluded that she had reactive arthritis secondary to Chlamydia infection.

## DISCUSSION

Arthritis in the elderly is usually due to either rheumatoid arthritis or osteoarthritis. Elderly-onset rheumatoid arthritis (EORA), is rheumatoid arthritis that usually presents at 60 years of age or later, having predominantly shoulder girdle involvement (1). However, in elderly onset systemic arthritis, one needs to also consider other differential diagnoses which include osteoarthritis, crystal-induced arthritis such as gout, and paraneoplastic arthritis. Furthermore, infective pathogens can sometimes be identified as a causative agent in recent onset arthritis in elderly patients. Our patient was detected to have Chlamydia-induced urinary tract infection, which could have induced reactive arthritis in her. Post-infective reactive arthritis caused by Chlamydia is usually asymptomatic in women. Nevertheless, it has been reported to cause asymmetric oligo-arthritis that involves predominantly the lower extremities (2). Diagnosis is usually made by exclusion, with a high index of clinical suspicion and positive serology.

Our patient did not have symptoms of early morning stiffness, which improved later in the day; nor symptoms of conjunctivitis or urethritis. Her serology titres were also negative which made the diagnosis of EORA unlikely. Her uric acid level was also within normal limits which excluded possibility of gouty arthritis. She had elevated *Chlamydia pneumoniae*-specific IgM and IgG antibodies titres which proved that she had a recent systemic infection.

PET/CT findings favoured the diagnosis of active arthritis involving multiple joints. It has been noted that intracellular pathogen infections such as Chlamydia *sp.* infection can interfere with both inflammation and cell glucose metabolism, thus lead to elevated radiotracer uptake in 18F-FDG PET/CT examination (3). Therefore, supported with the information of recently diagnosed Chlamydia-induced urinary tract infection, she was concluded to have reactive arthritis. Chlamydia-associated joint disease treated with antibiotics normally demonstrate 50% recovery by 15 weeks (3) and similarly; our patient demonstrated remarkable response after a course of antibiotics, and she could then resume her activities of daily living without needing assistance. Structural imaging using plain radiography and computed tomography have certain disadvantages,

such as only picking up the changes of complications caused by arthritis such as joint erosions and reduced joint spaces. MRI too is frequently unable to detect early inflammatory changes caused by immune response mounted during the active phase of reactive arthritis. Nuclear medicine imaging using white blood cell scans often underestimate the area that is affected by infection and has poor image resolution. Therefore, PET/CT has an incremental benefit in improved image resolution and added functional information to localize the sites involved in reactive arthritis.

PET/CT scans are able to diagnose reactive arthritis at an early stage by detection of enthesitis as evidenced by significantly elevated 18F-FDG uptake in the entheses of painful joints compared to uptake in joints not affected by arthritis (4). Furthermore, the absence of 18F-FDG uptake in the wrist joints has high specificity to preclude the diagnosis of rheumatoid arthritis (5). Therefore, PET/CT is useful to improve the accuracy of detecting reactive arthritis and aids in the diagnostic confidence, hence enables the correct treatment to be instituted. Thus, it should be considered as an alternative imaging modality when the cause of joint pain is indeterminate as it can non-invasively improve the specificity of making the diagnosis of reactive arthritis.

## CONCLUSIONS

Reactive arthritis can be a difficult diagnosis to make, especially in the elderly. In indeterminate cases, positron emission tomography/ computed tomography (PET/CT) scans can be utilized to obtain excellent anatomical and functional information that can detect elevated uptake at the entheses of joints, hence exclude more sinister conditions such as malignancy as well as aid in improving the diagnostic confidence.

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