

From Heart to Organs: CT and MRI Detection of Multisystemic Complications in Infective Endocarditis – A Case Report

A. Bouelhaz^{1*}, A. Najmi¹, O. Setti¹, S. Ben Elhend¹, B. Slioui¹, R. Roukhsi¹, S. Belasri¹, N. Hammoune¹, A. Mouhsine¹

¹Department of Radiology, Avicenne Military Hospital, University Hospital Center Mohamed VI, Marrakech, Morocco

DOI: <https://doi.org/10.36347/sjmcr.2025.v13i10.086>

| Received: 17.08.2025 | Accepted: 23.10.2025 | Published: 25.10.2025

*Corresponding author: A. Bouelhaz

Department of Radiology, Avicenne Military Hospital, University Hospital Center Mohamed VI, Marrakech, Morocco

Abstract

Case Report

Infective endocarditis (IE) is a life-threatening infection of the heart valves, frequently complicated by systemic emboli and multisystem involvement. We report the case of a 62-year-old male who developed IE secondary to post-traumatic osteoarthritis (PTOA) of the elbow, following surgical management of a complex fracture. The patient experienced cerebral septic emboli, splenic and renal infarcts, and early lumbar discitis. Cross-sectional imaging, including computed tomography (CT) and magnetic resonance imaging (MRI), was pivotal in detecting these complications, assessing the extent of tissue involvement, and guiding therapeutic decisions. This case underscores the essential role of imaging in identifying and characterizing the multisystem complications of endocarditis.

Keywords: Infective endocarditis, Post-traumatic osteoarthritis, Septic emboli, Computed Tomography, Magnetic Resonance Imaging.

Copyright © 2025 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

INTRODUCTION

Infective endocarditis (IE) is a life-threatening infection of the endocardial surface, most commonly involving the cardiac valves, and remains associated with significant morbidity and mortality despite advances in antimicrobial therapy and surgical management [1]. One of the most severe complications of IE is systemic embolization, which occurs in 20–50% of patients and can affect multiple organs, including the brain, spleen, kidneys, and musculoskeletal system [2,3]. These embolic events may remain clinically silent or present with neurological deficits, abdominal pain, or renal impairment, complicating timely diagnosis and management.

Although the majority of IE cases originate from common sources such as dental procedures, urinary tract infections, or intravascular devices, less frequent origins including pre-existing joint pathology can serve as the nidus for infection. In rare cases, post-traumatic osteoarthritis (PTOA) of the elbow may act as the initial focus, leading to multisystemic septic embolic complications [4].

Cross-sectional imaging, including computed tomography (CT) and magnetic resonance imaging (MRI), plays a pivotal role in detecting and

characterizing both local and systemic complications of IE. CT is particularly valuable for identifying visceral infarctions and acute hemorrhagic events, whereas MRI provides superior soft tissue contrast for evaluating cerebral lesions, cardiac involvement, and musculoskeletal changes [5].

The aim of this study is to report a case of infective endocarditis originating from post-traumatic elbow osteoarthritis, complicated by cerebral and visceral septic emboli, highlighting the crucial role of CT and MRI in diagnosis, assessment, and management of these potentially life-threatening complications.

CASE REPORT

Mr. M, a 62-year-old male patient, with a past medical history of hepatitis B since 2018, presented with a history of complex elbow fracture of the right arm, previously treated surgically, which evolved into post-traumatic stiffness. Three months prior, he underwent arthrolysis of the elbow and is currently under follow-up for infective endocarditis. The clinical course was further complicated by cerebral and visceral septic emboli.

Clinical Findings:

On physical examination, the patient exhibited limited range of motion of the right elbow, with mild

swelling and tenderness. No acute signs of systemic infection were noted at the time of imaging, but neurological deficits consistent with prior embolic events were observed.

Imaging Bindings :

Echocardiography :

Transthoracic echocardiography revealed severe mitral regurgitation due to mitral valve prolapse, with two vegetations: one on the atrial surface of the posterior mitral leaflet (7 mm) and another on the subvalvular apparatus (6 mm). The left ventricle was of borderline size, non-hypertrophied, with preserved

systolic function (LVEF 65%). The left atrium was dilated. The right chambers were normal in size and function. A small pericardial effusion was present.

Computed Tomography (CT) of the elbow and thoraco-abdomino-pelvic région :

Elbow: Persistent complex intra-articular fracture involving the radial head, cubital glenoid, olecranon, and humeral condyles, with partially corticated fracture margins, small intra-articular bone fragments, mild joint effusion, soft tissue edema, and early radio-ulnar ankylosis. Presence of intra-articular air and multiple calcified hematomas. (Figure 1)

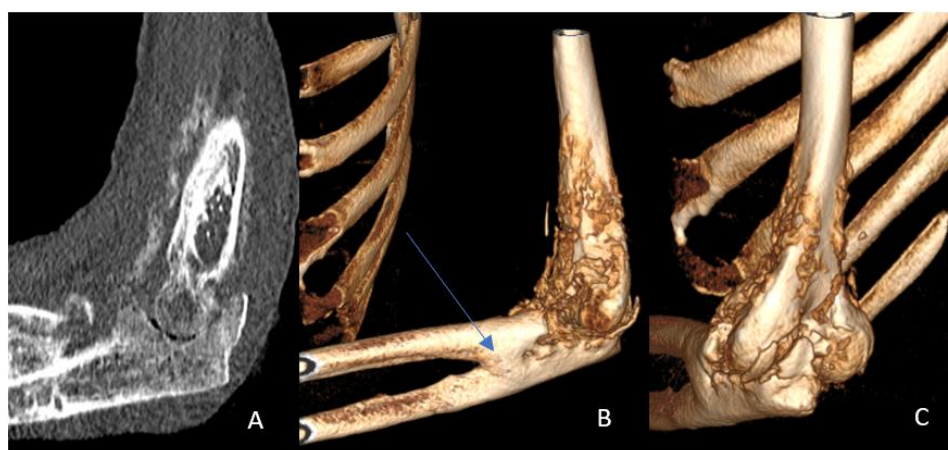


Figure 1 : Sagittal bone CT (A) and 3D MPR CT (B, C) demonstrating a complex intra-articular fracture of the radial head, olecranon, and humeral condyles, with partially corticated margins, intra-articular fragments, early radioulnar ankylosis (blue arrow), intra-articular air, and calcified hematomas.

Thoracic: Two subpleural micronodules (right Fowler and postero-basal left) of uncertain significance, apical and lingular atelectasis, absence of significant

mediastinal or hilar lymphadenopathy and small-volume pleural effusion. (Figure 2)



Figure 2: Axial CT scan of the chest (mediastinal window) demonstrating a small-volume pleural effusion (blue arrow)

Abdominal/Pelvic: Spleen normal in size (FS = 9.2 cm) with a superior polar hypodense triangular lesion, 17 × 26 mm, poorly defined, non-enhancing, compatible with a splenic infarct. (Figure 3) Right

kidney with a mid-cortical hypodense lesion, 12 × 20 × 39 mm, non-enhancing, consistent with a renal infarct. (Figure 4) Simple left renal mid-cortical exophytic cyst measuring 45 × 44 mm. Mild mesenteric fat stranding

and minimal peritoneal effusion.

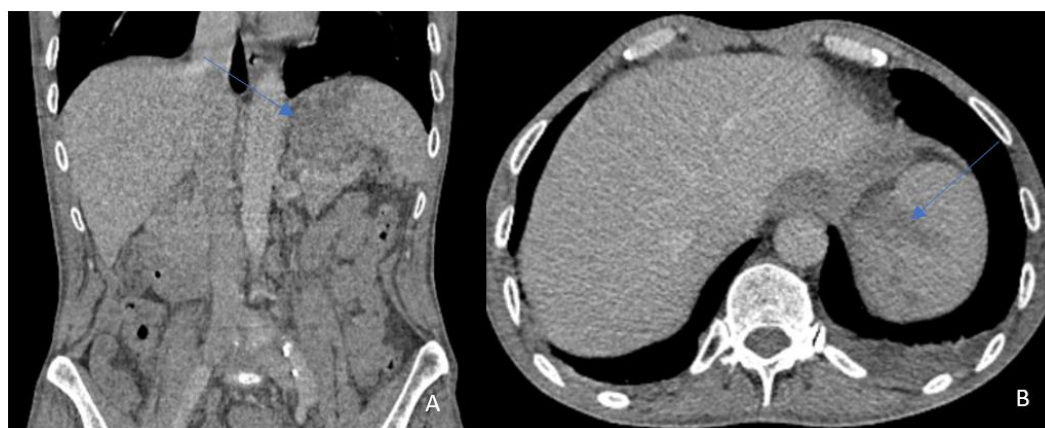


Figure 3: Coronal (A) and axial (B) contrast-enhanced abdominal CT showing a hypodense, triangular lesion in the superior pole of the spleen, consistent with a splenic infarct (blue arrow)

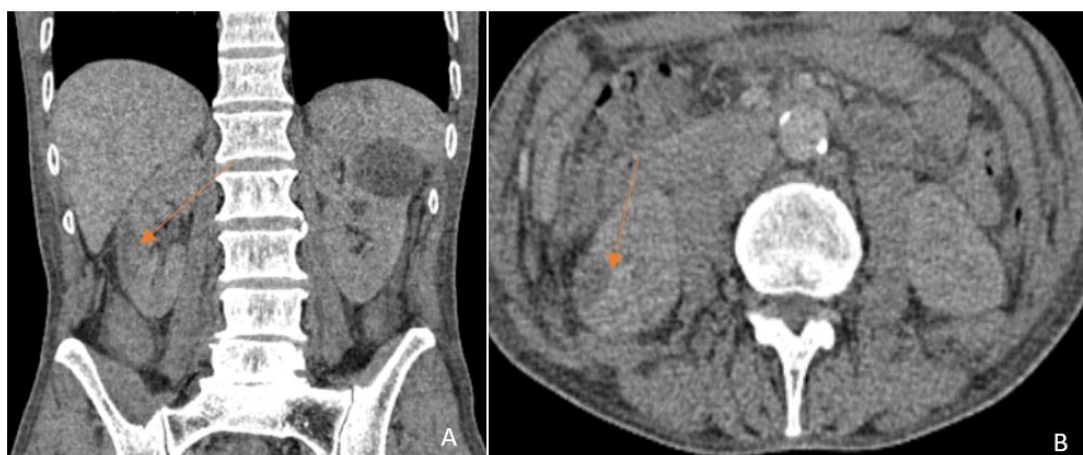


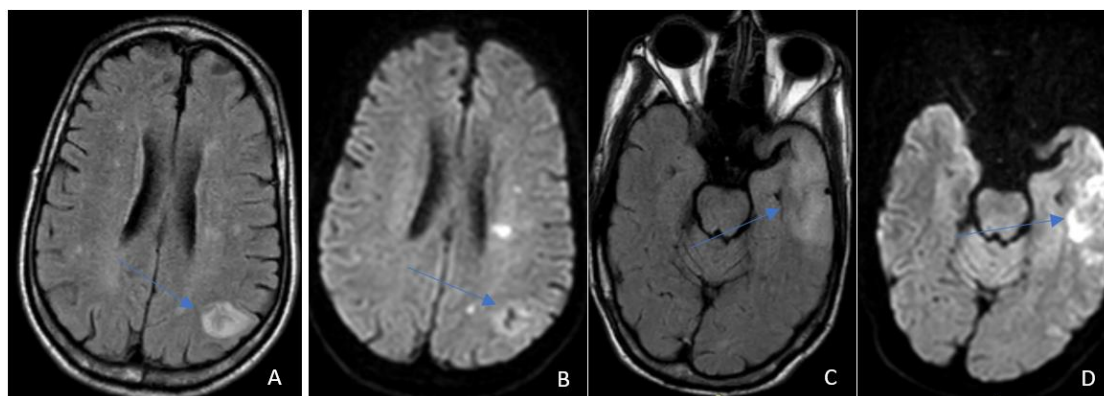
Figure 4 : Coronal (A) and axial (B) contrast-enhanced abdominal CT scans showing a hypodense mid-cortical lesion in the right kidney, compatible with a renal infarct (orange arrow)

Intervertebral disc L4-L5 showing mild hypodensity suggesting early discitis, to be correlated with lumbar MRI.

Magnetic Resonance Imaging (MRI) of the brain:

Supratentorial: Multiple cortical-subcortical and deep white matter lesions in the parietal and frontal lobes bilaterally and left temporal lobe, hyperintense on

FLAIR and T2, with diffusion restriction and T2* signal voids indicating hemorrhagic components (especially left parietal). (Figure 5) Punctiform and patchy periventricular white matter hyperintensities consistent with chronic microangiopathy (Fazekas grade 2). No signs of demyelinating, malformative, or infiltrative pathology.



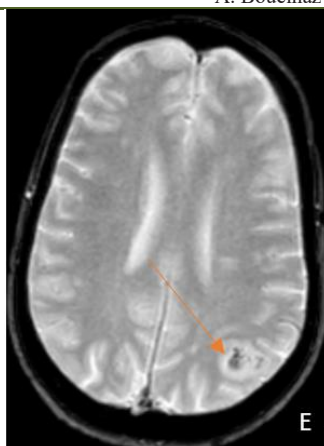


Figure 5: Axial brain MRI: FLAIR (A, C), diffusion-weighted imaging (B, D), and T2* gradient echo sequences (E) showing multiple cortical-subcortical and deep white matter lesions in the bilateral parietal and frontal lobes, and the left temporal lobe. Lesions appear hyperintense on FLAIR and T2, with diffusion restriction (blue arrow) and T2* signal voids indicating hemorrhagic components, particularly in the left parietal region (orange arrow).

TOF sequences: No major vascular abnormalities except a thin right vertebral artery (left dominant) and normal posterior communicating arteries. (Figure 6)

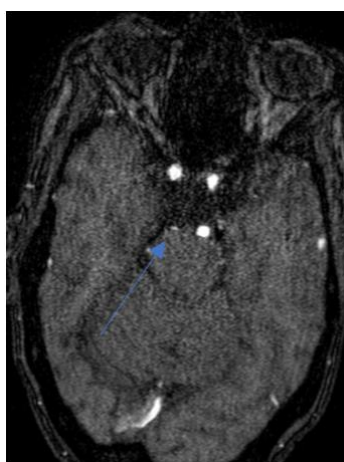


Figure 6: Axial time-of-flight (TOF) MR angiography showing a thin right vertebral artery (blue arrow) and a dominant left vertebral artery

Infratentorial: No abnormalities in brainstem, cerebellum, or cerebellopontine angles.

Lumbar MRI: Early signs of discitis at the L3-L4 intervertebral disc, without significant vertebral body erosion. (Figure 7)



Figure 7: Sagittal lumbar MRI showing a hypointense T1 signal indicating early discitis at L3-L4 (blue arrow), without vertebral body erosion

Taken together, these multimodal imaging findings demonstrated a constellation of septic embolic complications, including cerebral ischemic lesions with hemorrhagic transformation, splenic and renal infarcts, and early discitis, occurring in the context of infective endocarditis. In addition, persistent post-traumatic changes of the elbow with intra-articular fragments, early ankylosis, and associated soft tissue alterations were clearly depicted.

DISCUSSION

Infective endocarditis (IE) is a life-threatening infection of the endocardial surface of the heart, most often involving the cardiac valves. It remains associated with significant morbidity and mortality, despite advances in antimicrobial therapy and surgical management [6]. Embolic events represent one of the most severe complications of IE, occurring in 20–50% of patients, and can affect multiple organs, particularly the central nervous system, spleen, kidneys, and musculoskeletal system [7,8].

In the present case, IE occurred in a patient with a history of complex post-traumatic elbow fracture, treated surgically and complicated by stiffness and secondary osteoarticular changes. Osteoarticular infections have been reported as possible sources of bacteremia leading to IE, although they remain relatively uncommon compared to more frequent origins such as dental, urinary, or intravenous catheter-related infections [9].

Echocardiography (TTE/TEE) is the cornerstone for initial diagnosis of valvular vegetations and perivalvular extension. However, imaging in cross-section (CT and MRI) has dramatically changed the detection and characterization of extracardiac complications and provides essential complementary information [10].

Multidetector CT has become a valuable tool in detecting paravalvular complications such as abscesses, pseudoaneurysms, prosthetic valve dehiscence, and fistulae. It offers excellent spatial resolution, allowing precise anatomical definition and pre-surgical planning [11,12]. Whole-body CT angiography is also highly effective in identifying systemic septic emboli, including cerebral, splenic, renal, and pulmonary infarcts [13]. In musculoskeletal complications, CT can demonstrate bone erosions, cortical breaches, and adjacent collections, especially in osteoarticular infections [14].

MRI provides superior soft-tissue contrast and functional assessment, particularly in the brain where it is the most sensitive technique for detecting ischemic infarcts, microbleeds, and cerebral abscesses linked to septic embolization [15]. Cardiac MRI can characterize myocardial involvement and perivalvular extension, while musculoskeletal MRI is the gold standard for detecting septic arthritis, osteomyelitis, or early

osteoarthritic complications secondary to infection. It enables visualization of marrow edema, synovial enhancement, and surrounding soft-tissue changes, which may serve as the primary source of bacteremia [16].

Imaging modalities allow not only the detection but also the staging of complications, thereby influencing both surgical timing and antibiotic therapy. Whole-body approaches combining CT and MRI can uncover clinically silent embolic events, which are common in IE and carry prognostic significance [17]. Moreover, hybrid imaging (PET/CT, PET/MRI) is increasingly used for detecting low-grade inflammatory activity and prosthetic valve infections when standard imaging is inconclusive [18].

Thus, imaging extends beyond diagnosis of vegetations: it is central in mapping the full spectrum of IE complications, detecting extracardiac sources such as septic osteoarthritis, and ensuring a multidisciplinary approach to management.

CONCLUSION

Infective endocarditis remains a life-threatening condition, particularly when associated with atypical sources such as osteoarthritis. Early recognition of cardiac and extracardiac complications is crucial for improving patient outcomes. Imaging plays a pivotal role, with CT and MRI enabling comprehensive evaluation: CT provides excellent detection of embolic and structural complications, while MRI excels in identifying subtle ischemic, inflammatory, and parenchymal changes. Integrating advanced imaging into diagnostic pathways optimizes management, guides therapy, and underscores its indispensable value in the multidisciplinary care of infective endocarditis.

Conflicts of Interest: The authors declare no conflicts of interest.

Contributions of the Authors: All authors contributed to the conduct of this work. They have read and approved the final version of the manuscript.

REFERENCES

1. Cahill TJ, Prendergast BD. Infective endocarditis. *Lancet*. 2016 ;387(10021):882–893.
2. Thuny F, *et al.*, Risk of embolism and death in infective endocarditis: Prognostic value of echocardiography. *Circulation*. 2005 ;112(1):69–75.
3. Habib G, *et al.*, 2015 ESC Guidelines for the management of infective endocarditis. *Eur Heart J*. 2015 ;36:3075–3128.
4. Lamas CC, Eykyn SJ. Bacteremia and endocarditis in osteoarticular infections. *Clin Microbiol Infect*. 2003 ;9(8):755–764.
5. Siontis KC, *et al.*, Role of CT and MRI in the

- diagnosis and management of infective endocarditis and its complications. *Eur Heart J Cardiovasc Imaging*. 2013 ;14:1055–1064.
6. Habib G, Lancellotti P, Iung B. Imaging in infective endocarditis. *Curr Opin Cardiol*. 2020 ;35(5):471–479.
 7. Thuny F, Avierinos JF, Tribouilloy C, *et al.*, Impact of cerebrovascular complications on mortality and neurologic outcome during infective endocarditis: a prospective multicentre study. *Eur Heart J*. 2007 ;28(9):1155–1161.
 8. García-Cabrera E, *et al.*, Neurological complications of infective endocarditis: risk factors, outcome, and impact of cardiac surgery: a multicenter observational study. *Circulation*. 2013 ;127(23):2272–2284.
 9. Goulenok T, *et al.*, Osteoarticular infections in patients with infective endocarditis: diagnostic and prognostic features. *Eur J Clin Microbiol Infect Dis*. 2013 ;32:139–147.
 10. Habib G, *et al.*, 2015 ESC Guidelines for the management of infective endocarditis. *Eur Heart J*. 2015 ;36(44):3075–3128.
 11. Feuchtnner GM, Stolzmann P, Dichtl W, *et al.*, Multislice computed tomography in infective endocarditis: comparison with transesophageal echocardiography and intraoperative findings. *J Am Coll Cardiol*. 2009 ;53(5):436–444.
 12. Gahide G, *et al.*, Multidetector computed tomography in infective endocarditis: a pictorial essay. *Insights Imaging*. 2014 ;5(6):559–570.
 13. Champey J, Pavese P, Bouvaist H, *et al.*, Systematic whole-body imaging in infective endocarditis: clinical impact and prognostic value. *Eur Heart J Cardiovasc Imaging*. 2019 ;20(6):684–691.
 14. Guerado E, *et al.*, Bone and joint infections : From microbiology to imaging and surgical treatment. *Int J Mol Sci*. 2019 ;20(3):634.
 15. Duval X, *et al.*, Effect of early cerebral magnetic resonance imaging on clinical decisions in infective endocarditis: a prospective study. *Ann Intern Med*. 2010;152(8):497–504.
 16. Ledermann HP, *et al.*, Bone infections : MR imaging findings in different clinical settings. *Radiographics*. 2002 ;22(5):1137–1157.
 17. García-Cabrera E, *et al.*, Neurological complications of infective endocarditis: risk factors, outcome, and impact of cardiac surgery. *Circulation*. 2013 ;127(23):2272–2284.
 18. Mahmood M, *et al.*, Role of FDG PET/CT in the diagnosis of infective endocarditis: a systematic review and meta-analysis. *J Nucl Cardiol*. 2019 ;26(3):922–935.