



# Localized Metastatic Recurrence of HCC following Distal Extremity Trauma: Bone Scintigraphy and Anatomicopathological Correlation

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## Abstract

Hepatocellular carcinoma (HCC) is the most common type of liver cancer, with a poor median survival when left untreated. Extrahepatic metastases involving musculoskeletal tissues typically present with concomitant nonosseous metastases at the time of diagnosis. A 61-year-old male on 1-year remission, following transarterial chemoembolization of a 2.3-cm hepatic HCC 1 year before, presented with a 2-month history of left wrist pain and swelling after falling on an outstretched hand. Computed tomographic scan revealed diffuse osteolytic lesions localized in left hand and distal forearm, associated with equivocal diffuse activity on bone scan. Subsequent surgical debridement revealed metastatic hepatocellular carcinoma.

## Keywords

- ▶ distal metastases
- ▶ posttraumatic
- ▶ HCC
- ▶ osseous

## Introduction

Hepatocellular carcinoma (HCC) is the most common type of primary liver malignancy,<sup>1</sup> and a major leading cause of cancer deaths in the United States<sup>2</sup>; it is associated with cirrhotic liver disease, hepatitis C virus infection, and alcohol abuse.<sup>3</sup> The majority of patients present with advanced disease at the time of diagnosis, and thus accurate staging is essential for treatment management planning.<sup>4</sup>

The prevalence of metastatic disease in patients with HCC is approximately 18%, with extrahepatic disease most commonly manifesting in lung tissue, portal vasculature, and locoregional lymph nodes.<sup>5</sup> While relatively less common, bone metastases may present in patients with advanced disease, particularly in concomitance with nonosseous metastatic disease at the time of diagnosis,<sup>3</sup> and are associated with a very poor prognosis.

Diagnostic evaluation of HCC commonly includes contrast-enhanced computed tomography (CT) or magnetic resonance imaging of the abdomen. Additional imaging following diagnosis may include CT chest and/or bone scintigraphy, although their yield has found to be relative lower<sup>6,7</sup> and their use is not recommended on a routine basis.

We present a case of metastatic osseous recurrence in a distal upper extremity in a patient undergoing evaluation for persistent inflammation and pain, following trauma, with bone scintigraphy and CT.

## Case Report

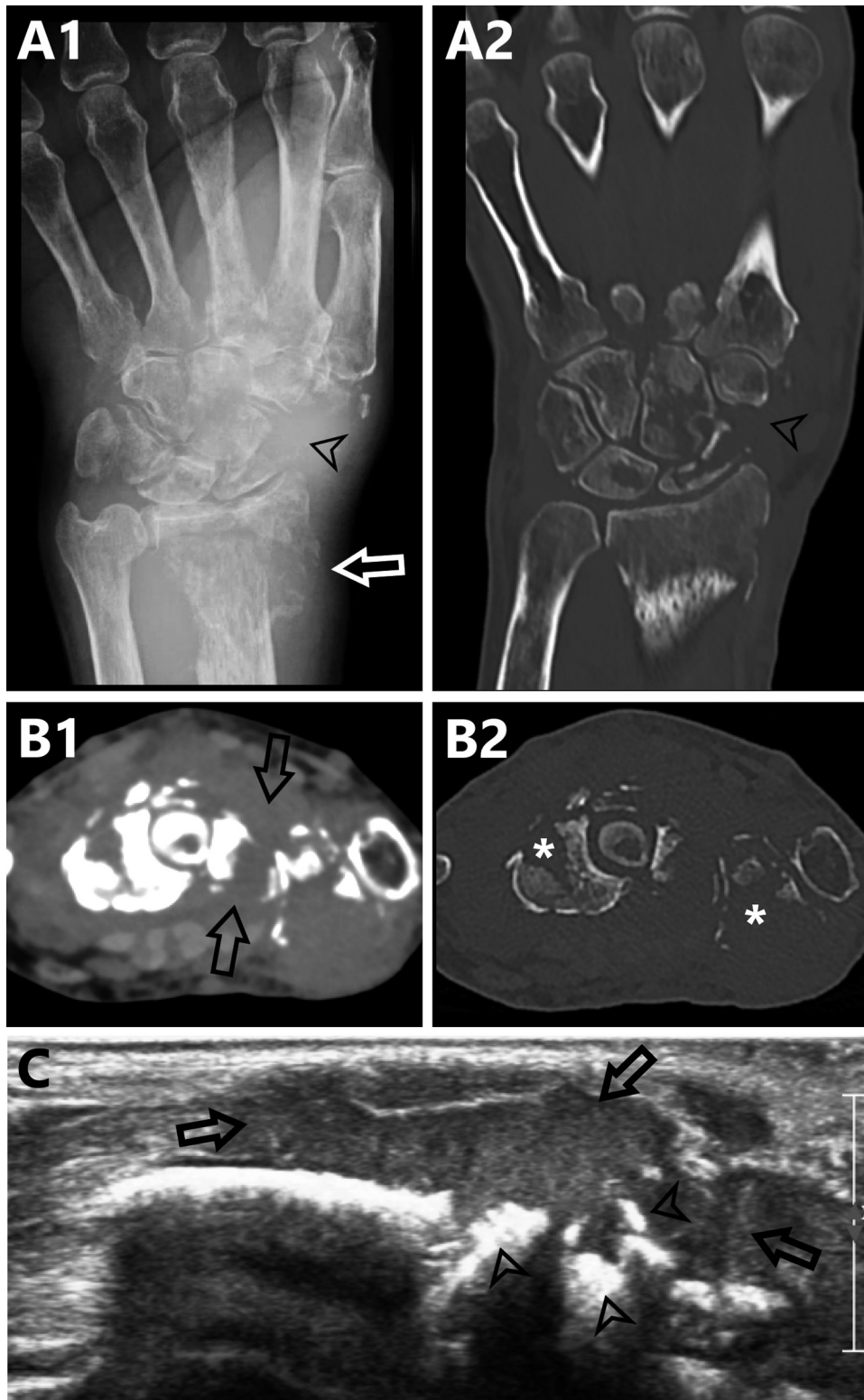
A 61-year-old man with 1-year clinical remission of HCC, following partial segmentectomy and transarterial chemoembolization, presented with a 2-month history of

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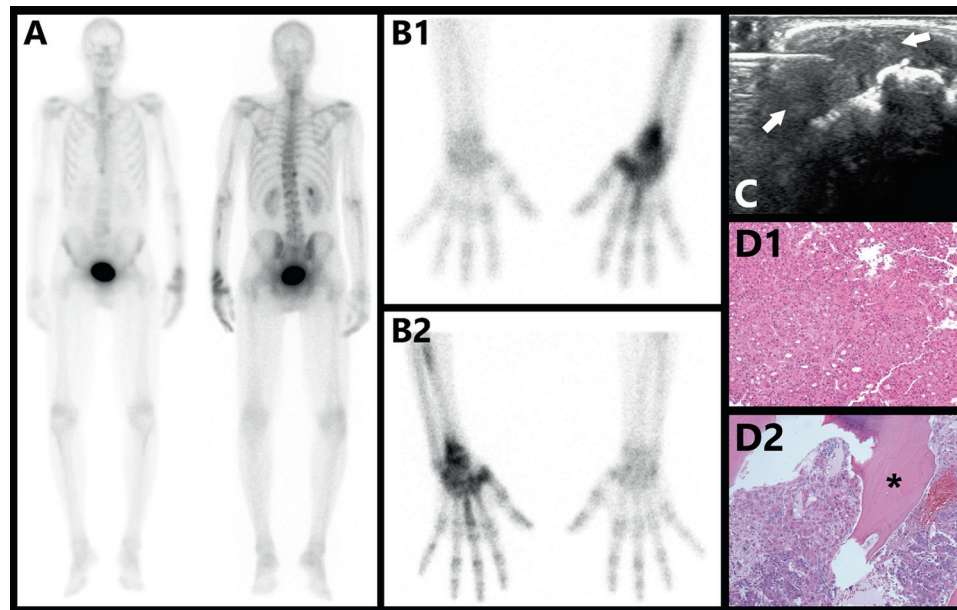
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**Fig. 1** (A1) Plain anteroposterior radiograph and (A2) coronal computed tomographic (CT) view of the left wrist showing soft tissue edema and comminuted displaced fracture of the distal end of the radius (A1, white arrow) with erosion of the carpus and third metacarpal base (A1–A2, arrowheads). Axial CT images in (B1) soft-tissue and (B2) bone windowing showing associated synovial thickening (B1, black arrows) and osseous erosion (B2, asterisks). Ultrasound image in long-axis at the third metacarpal bone showing a hypoechoic polylobulated mass (C, arrows) with adjacent comminuted bone fracture (C, arrowheads).

persistent left-hand swelling with worsening pain in the wrist after falling twice on an outstretched left hand. Anteroposterior plain radiograph and coronal CT of the left wrist

(► Fig. 1—A1 and A2, respectively) showed soft tissue edema and comminuted displaced fracture of the distal end of the radius (► Fig. 1 A1, white arrow) with erosion of the carpus



**Fig. 2** (A) Whole body bone scan showing diffusely increased osseous activity in the left wrist. Close-up dorsal (B1) and palmar (B2) views of the hands better characterizing distribution of activity in the bones of the left distal upper extremity. (C) Ultrasound-guided biopsy (C) showing a hypoechoic polylobulated mass (arrows). (D) Histopathologic comparison of the primary hepatocellular carcinoma 2 years prior (D1—hematoxylin and eosin, original magnification  $\times 20$ ), and more recent left wrist mass infiltrating lamellar bone (asterisk) of the third metacarpal (D2) (hematoxylin and eosin, original magnification  $\times 10$ ).

and third metacarpal base ( $\rightarrow$ Fig. 1 A2, arrowheads). The lesions were also characterized on CT images that showed synovial thickening ( $\rightarrow$ Fig. 1 B1, black arrows) and osseous erosion ( $\rightarrow$ Fig. 1 B2, asterisk). Ultrasound imaging showed a soft tissue mass in the left wrist ( $\rightarrow$ Fig. 1C—long-axis) involving the third metacarpal with hypoechoic polylobulated features ( $\rightarrow$ Fig. 1C, arrows) associated with adjacent to the areas of comminuted fracture ( $\rightarrow$ Fig. 1C, arrow heads). Differential diagnosis from two independent musculoskeletal radiologists included inflammatory arthritis, osteolysis syndrome, osteoarthritis, or metastatic disease.

Subsequently, the patient was evaluated with whole body bone scintigraphy ( $\rightarrow$ Fig. 2) for suspected metastatic involvement, which showed increased activity involving osseous tissues in the left wrist, in a distribution reminiscent of reflex sympathetic dystrophy ( $\rightarrow$ Fig. 2A). Close-up dorsal ( $\rightarrow$ Fig. 2 B1) and palmar ( $\rightarrow$ Fig. 2 B2) static views of the hands better characterized the distribution of activity involving the small bones of the left distal upper extremity. Subsequent evaluation with CT chest, abdomen, and pelvis also revealed numerous pulmonary nodules suspicious for metastatic disease. The patient subsequently underwent ultrasound-guided biopsy ( $\rightarrow$ Fig. 2C) and surgical debridement of the left wrist which revealed metastatic moderate to poorly-differentiated HCC infiltrating lamellar tissue (asterisk) of the third metacarpal bone ( $\rightarrow$ Fig. 2 D1—primary 2 years prior;  $\rightarrow$ Fig. 2 D2—left wrist biopsy).

## Discussion

In this rare presentation of metastatic osseous recurrence of HCC, scintigraphic bone findings were not specific for malignancy, and despite correlation with CT findings, the clinical

picture was indeterminate until histopathologic evaluation was performed. Localized aggressive osseous metastatic disease involving a distal extremity is an exceedingly rare presentation of HCC recurrence, and the authors found no literature describing similar presentations. It is unclear whether trauma contributed to the development of metastatic disease, or whether this was a coincidental finding. However, prior authors have described distal osseous metastatic disease following trauma in other malignancies, such as lung cancer,<sup>8,9</sup> with some suggesting that increased vascularity following trauma may create a more ideal environment for metastatic proliferation. Other authors have also suggested that the inflammatory response associated with physical trauma may lead to growth and proliferation of dormant micrometastases.<sup>9</sup>

## Conflict of Interest

None of the authors have conflicts of interest to disclose nor have received any type of financing related to this manuscript.

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