

Hepatocellular Carcinoma Presenting Clinically as a Scapular Mass: A Case Report

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ABSTRACT

Hepatocellular Carcinoma (HCC) is an aggressive malignancy with a strong propensity for vascular invasion and distant metastasis, although presentation with isolated bone lesions remains uncommon. The diagnosis of metastatic HCC can be challenging in patients lacking underlying liver-related symptoms or known chronic liver disease. In this report, authors present an exceptionally rare case of a 70-year-old male presenting with right scapular pain and swelling as the primary manifestation of HCC with bone metastasis. Because appendicular skeletal involvement is rare-with fewer than 10 cases of scapular metastasis documented-and patients frequently lack abdominal symptoms, initial misdiagnosis is common. Given the highly vascular nature of HCC metastases, these lesions carry a significant risk of acute vascular complications. This case emphasises the importance of including HCC in the differential diagnosis of atypical osteolytic lesions. A multidisciplinary approach integrating advanced imaging, histopathology, and immunohistochemistry is essential for timely diagnosis and appropriate management.

Keywords: Bone neoplasms, Immunohistochemistry, Neoplasm, metastasis, Scapula

CASE REPORT

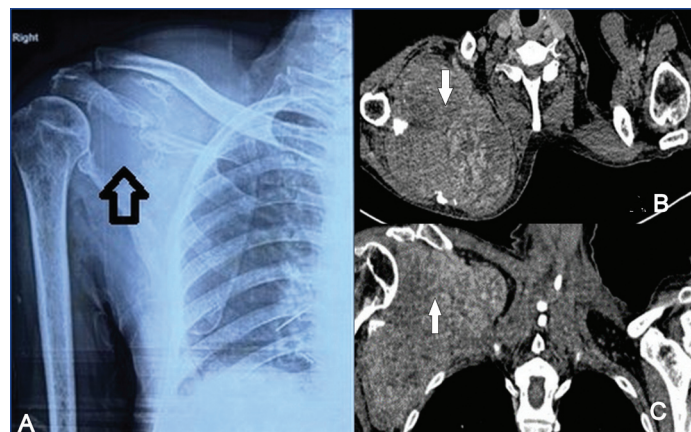
A 70-year-old male presented with pain and swelling over the right scapular region, which had progressively worsened over the preceding five months. Upon delving into his medical history, he disclosed a concerning development: the swelling was accompanied by a decline in motor and sensory function in his upper limb, hinting at possible brachial plexus involvement. Additionally, he reported sporadic fevers, appetite loss, and weight reduction, painting a picture of systemic distress.

He was a non-smoker, an occasional alcoholic, less than 4-5 ounces/week, and had no underlying hepatitis B or C. He denied any recent trauma, cough, haemoptysis, haematochezia, melena, haematuria, urinary hesitancy, abdominal or back pain, nausea/vomiting, or skin changes. No palpable masses were detected apart from the swelling in his scapula.

The patient's laboratory investigations revealed a haemoglobin concentration of 10.5 g/dL (reference range, 13.2-16.6 g/dL), consistent with anaemia. Serum creatinine was mildly elevated at 1.66 mg/dL (reference range, 0.74-1.35 mg/dL). Liver function tests showed an elevated Aspartate Aminotransferase (AST) level of 81 U/L (reference range, 8-48 U/L), while Alanine Aminotransferase (ALT) was within the normal range at 21 U/L (reference range, 7-55 U/L). Alkaline Phosphatase (ALP) was markedly elevated at 728.3 IU/L (reference range, 40-120 IU/L), and Gamma-Glutamyl Transferase (GGT) was elevated at 166 IU/L (reference range, 0-50 IU/L). Lactate Dehydrogenase (LDH) was also elevated at 405 IU/L (reference range, 140-280 IU/L).

A plain radiograph of the right shoulder AP (anteroposterior) view unveiled a formidable lytic expansile lesion, predominantly centered in the glenoid of the right scapula [Table/Fig-1a]. Notably, the lesion exhibited non-sclerotic margins with a broad transition zone, showcasing multifocal areas of cortical destruction and scapular spine lysis. A significant extra-osseous soft-tissue mass extended superiorly beyond the clavicle into the neck, displacing adjacent fat pads without obliterating them. Neighbouring humerus or clavicle. Computed tomography (CT) of the right shoulder revealed a lytic, expansile, destructive soft-tissue mass involving the right scapula [Table/Fig-1b,c].

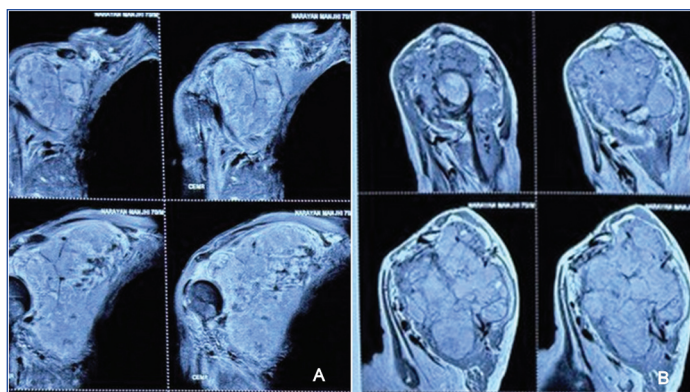
Further scrutiny through non-contrast MRI films of the right upper limb revealed a sizable, multilobulated solid intraosseous mass lesion, localised in the entirety of the medullary cavity of the right scapula. This presence caused considerable expansion and cortical destruction in areas, with a consequential large extra-osseous soft tissue component. Remarkably, the mass exhibited T2/SPAIR hyperintensity and displayed residual osseous fragments eccentrically located along the medial end of the scapular spine [Table/Fig-2].



[Table/Fig-1]: a) Anteroposterior (AP) radiograph showing a large destructive lesion of the scapula with significant soft-tissue components and a non-mineralised matrix, suggestive of an aggressive lesion; b,c) Axial and coronal reformatted images in the soft-tissue window showing a lytic, expansile, destructive soft-tissue mass involving the right scapula with a lobulated morphology.

The lesion extended laterally into the gleno-humeral joint due to the destruction of the articular surface of the glenoid. Medially, there was a concerning proximity to the infraclavicular part of the right brachial plexus. Given the patient's advanced age and the aggressive, destructive appearance of the bony lesion, the radiological differential diagnosis included metastasis, favoured by the patient's age, and myeloma, given the presence of red marrow islands within the scapula. Pleomorphic sarcoma was also considered because of the lesion's aggressive characteristics and the absence of a mineralised matrix.

The patient underwent a USG-guided biopsy of the solid mass via a posterior axillary approach. Under strict aseptic conditions and

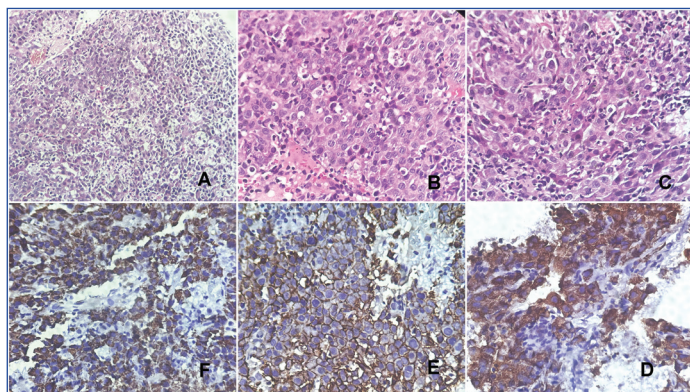


[Table/Fig-2]: A, B- Coronal and sagittal fat-sat images show a lobulated intramedullary scapular mass lesion with extension into the shoulder joint and an associated large extra-osseous soft tissue component.

adequate local anaesthesia (1% lignocaine), eight solid cores were extracted using a 16G*10cm Bard™ Mission semi-automatic biopsy gun employing a co-axial needle technique.

Histopathology showed the presence of diffuse sheets of highly pleomorphic cells with abundant well-defined eosinophilic cytoplasm, a central round vesicular nucleus with a high N:C ratio, and prominent nucleoli, suggestive of a poorly differentiated carcinoma [Table/Fig-3a-c]. Based on the radiological findings, a broad panel of IHC was done to identify the primary site of the presumed metastatic disease.

Individual organs were screened by ultrasonography, which pointed towards a liver primary with chronic liver disease features. Simultaneously, the IHC panel results also confirmed a HCC. The tumour cells were positive for Hep Par 1, Glypican 3, TTF 1 (focal), and CD 138 [Table/Fig-3d-f]. These findings were compatible with metastatic HCC. Tumour markers were advised and were elevated, with CA 19.9 at 51.81 U/mL (0- 37 U/mL) and Carcinoembryonic Antigen (CEA) at 4.42 ng/mL, confirming Hepatic origin (0-2.5 ng/mL for non-smokers).



[Table/Fig-3]: A) Tumour cells from the scapular mass arranged in sheets and a trabecular pattern (H&E, 100X); B-C) Tumour cells showing abundant eosinophilic cytoplasm, irregular round vesicular nuclei, and prominent nucleoli (H&E, 400X); D) Glypican-3 immunohistochemical staining showing diffuse cytoplasmic positivity in tumour cells (400X); E) CD138 immunohistochemical staining showing diffuse membranous positivity- positive in 40-50% HCC (400X); F) Hep Par-1 immunohistochemical staining showing diffuse cytoplasmic positivity in tumour cells (400X).

To confirm the source of metastasis, the patient underwent a triple-phase computed tomography of the thorax and abdomen using 80ml of non-ionic contrast medium (Omnipaque-300) in a Siemens Somatom Definition 256 slice CT scanner. Multiple variable-sized solid masses were seen in the liver parenchyma arising in a background of cirrhosis, with most of them studded in the right lobe. These masses demonstrated non-rim arterial phase hyperenhancement, non-peripheral washout, a delayed faintly enhancing rim, and tumour thrombus in the portal vein and IVC-right atrial junction-consistent with LIRADS 5(Definitely HCC)-Tumour in Vein (TIV), pointing towards HCC [Table/Fig-4a-f]. The patient was referred for multimodal palliative therapy with radiation and chemotherapy and is responding.



[Table/Fig-4]: A & B: Arterially enhancing mass lesion in segment VII/VIII of the right lobe (A) along with similarly enhancing soft tissue distending the portal vein (B). Background liver shows changes of chronic liver disease with nodular surface and volume redistribution as evident by enlarged caudate lobe; C- D- : Non-peripheral washout in portal venous phase with similar enhancement features in portal vein thrombus – suggestive of tumour thrombus; E & F- Delayed peripheral faint rim enhancement (E) with associated thrombus at cavo-atrial junction and a discrete solid mass in the right adrenal (F)- likely metastatic.

In present cases, the morphology and immunohistochemistry with the aid of radiology were the key data for getting the final diagnosis. The case report was prepared after taking informed consent from the patient.

DISCUSSION

The HCC, the most common primary liver cancer, originates from hepatocytes. It ranks seventh globally in incidence but second in mortality [1]. Risk factors include genetic predisposition and exposure, often in the context of liver cirrhosis. Incidence and causes vary by region, with HBV prevalent in Eastern Asia and Sub-Saharan Africa, and Non-Alcoholic Steatohepatitis (NASH)/ Non-Alcoholic Fatty Liver Disease (NAFLD) in Western nations. Developed countries tend to detect HCC earlier, while advanced stages are more common in developing regions [2]. The process of hepatocarcinogenesis follows a documented stepwise progression from a benign cell to HCC, marked by the gradual accumulation of genetic and epigenetic alterations [3].

The HCC, characterised by its aggressiveness, frequently progresses to extrahepatic metastasis, impacting approximately 14.0% to 36.7% of diagnosed individuals [4]. Advanced stages typically carry a grim prognosis, with a five-year survival rate of less than 20% [5]. Extra-hepatic spread is evident in 5% to 15% of initial HCC diagnoses, commonly affecting the lungs and regional lymph nodes, and is associated with an advanced, larger tumour, multifocal lesion, or infiltrative/vascular lesion [6]. Skeletal metastasis, although less common is predominantly seen in the axial skeleton, such as vertebrae, skull, ribs etc., and is recognised as a rare primary presentation of the disease [7]. Larger studies shed light on its rarity: Ozer M et al., found bone metastasis in only 3.1% of HCC patients [5], and a SEER database study from 2010 to 2014 reported 4.29% with bone involvement [8]. Bhatia R et al., in their examination of 1017 HCC patients, noted bone metastases in only 2% of cases [9]. Appendicular skeletal involvement is extremely rare, and to date, fewer than 10 cases of HCC presenting with a scapular mass have been reported in the literature [10-15]. Of these, five cases described scapular involvement as the initial presentation of HCC [10-12,14,15]. [Table/Fig-5] summarises these cases, highlighting their demographic characteristics and clinical presentation, and compares them with the present case. Bone metastasis indicates an advanced disease stage and portends a bleak prognosis, with a median survival duration ranging from 2 to 4.6 months [2]. The pathogenesis of bone metastasis includes three major steps: Dissemination: Advanced HCC cells undergo epithelial-mesenchymal transition, invading hepatic venules to enter systemic circulation, followed by Colonisation: Circulating tumour cells arrest in the high-flow red marrow, utilising tumour-derived exosomes and

Case/authors	Age/sex	Underlying disease/risk factors	Clinical presentation and scapular findings	Management/outcome
John AR et al., 2023 [10]	72/M	Chronic hepatitis B, liver cirrhosis; social alcohol use	Right shoulder pain for 2 months. An 8×6×8 cm expansile lytic lesion involving the neck and glenoid process of the right scapula was identified. Biopsy confirmed metastatic HCC.	Primary hepatic mass identified in segment VII. Managed with palliative targeted therapy.
Kim KH et al., 2017 [11]	69/M	Had suffered from HCC due to chronic hepatitis B for 4 years and had undergone transcatheter arterial chemoembolisation 4 times	Presented with acute right upper-chest intramuscular haematoma. Imaging showed an exophytic metastatic mass involving the right scapula with extensive bony destruction and active bleeding.	Emergency transcatheter arterial embolisation using a microcoil via the right subclavian artery. Discharged in stable condition on day 14.
Kumar A et al., 2019 [12]	60/M	Advanced HCC with multi-organ involvement	Rapidly progressive, painful 10×10 cm soft-tissue mass over the left scapular region for 1 month, mimicking a primary soft-tissue sarcoma. The lesion infiltrated the subscapularis and latissimus dorsi.	Core-needle biopsy confirmed metastatic HCC. Metastases were also identified in liver segment VIII, bilateral lungs, T11 vertebra, and pubic ramus.
Wenlong W et al., 2022 [13]	75/M	Chronic hepatitis B; previous partial hepatectomy for HCC in 2014 and recurrence in 2017	Metastatic involvement of the left scapula developed in 2020. Subsequently developed extensive necrotic and purulent ulcers measuring 30×30 cm involving the left axillary and scapular regions following microwave ablation and radiotherapy.	Multiple debridements, partial removal of the scapular stump/sequesterum, and wound reconstruction with muscle flap and skin graft.
Yu C et al., 2024 [14]	59/M	HCC surgery 4 years back	Large mass on right shoulder with pain and tenderness on palpation, scapula was disorganised and partially indistinct (radiologically)	Needle biopsy was done which was consistent with diagnosis of metastatic cancer
Ananthkumar S et., 2017 [15]	46/M	Chronic hepatitis C; chronic alcohol abuse	Presented with an 8.5×7 cm lytic soft-tissue mass involving the right scapula, causing shoulder pain. FNAC of the scapular lesion confirmed metastatic HCC.	Palliative systemic targeted therapy (Sorafenib)
Present case 2026	70/M	Occasional alcohol use; no other known HCC risk factors	Presented with a scapular mass with brachial plexus involvement. Biopsy of the scapular lesion confirmed metastatic HCC.	Referred for palliative chemoradiotherapy.

[Table/Fig-5]: Summary of reported cases of hepatocellular carcinoma presenting with scapular involvement, including demographic characteristics, clinical presentation, and management.

vascular endothelial growth factor to remodel the local extracellular matrix into a receptive, immunosuppressive niche, and Osteolysis: Colonised hepatoma cells secrete factors like parathyroid hormone-related protein (PTHrP) that disrupt the RANKL/Osteoprotegerin (OPG) balance, aggressively activating osteoclasts to drive severe osteolytic bone destruction and fuel further tumour proliferation [2]. Diagnosing HCC is challenging, often requiring multiple imaging techniques [7] such as CT/MRI, PET-CT, and Bone Scintigraphy (BS). Advances in diagnostics have improved overall survival, but there's a recent increase in extrahepatic metastases, with many patients diagnosed at advanced stages [2]. Bone metastases from HCC are irreversible and untreatable, leading to fractures, intense pain, reduced quality of life, and poor prognosis.

The LIRADS algorithm provides a stepwise approach towards describing and reporting the relevant imaging findings. It takes into consideration the arterial phase hyperenhancement (due to increased non-triadial arteries), non-peripheral washout appearance (due to paucity of portal radicles), and a delayed peripheral enhancement (due to the presence of a capsule in established HCC) to diagnose the liver mass as LR-5 [16].

While osteolytic, hypervascular lesions should raise suspicion for HCC in imaging, it's crucial to acknowledge that bone metastases from renal cell carcinoma, thyroid gland cancer, parotid gland cancer, and pheochromocytoma can also exhibit similar imaging characteristics [7]. Histopathological examination of tissue sections stained with haematoxylin and eosin confirms metastatic HCC, revealing morphological features such as focal trabecular patterns and acinar features, despite being poorly differentiated as in this case. The presence of positivity for Hep Par 1 further supports the diagnosis of HCC.

Given the improved prognosis for HCC patients, early detection of bone metastases has become increasingly vital. Radiologists play a key role in this, as timely identification allows for prompt symptom relief through radiation therapy [7]. Guidelines recommend initiating systemic palliative therapy, such as sorafenib, for advanced HCC, alongside concurrent treatments to manage pain, maintain functionality, and preserve bone health. Multidisciplinary teams are essential for comprehensive patient care, offering diverse therapeutic approaches. External radiotherapy proves effective in alleviating

pain in 60%-80% of localised lesions, with complete response rates ranging from 15% to 58% [6].

CONCLUSION(S)

This case highlights an unusual presentation of hepatocellular carcinoma as a scapular metastatic mass. It underscores the importance of a comprehensive diagnostic workup, including radiological evaluation, histopathology, and immunohistochemistry, to distinguish metastatic visceral malignancies from primary and other secondary skeletal tumours. Early recognition of such atypical presentations through a multidisciplinary approach can facilitate timely diagnosis and appropriate management.

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