Case Report

Pancreaticobiliary malignancy masquerading as tuberculosis: A case of multifocal skeletal and hepatic metastases

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ABSTRACT

A 41-year-old female with remote treated pulmonary tuberculosis (TB) presented with 4 months of progressive back pain and dry cough. Magnetic resonance imaging of the dorso-lumbo-sacral spine revealed multifocal altered marrow signals in multiple vertebrae and both iliac bones, consistent with osseous metastases. Triphasic computed tomography of the abdomen demonstrated multiple peripherally enhancing hepatic nodules with inner cystic change (largest 35 × 31 mm), common bile duct widening to 6 mm with diffuse wall thickening, and bilateral pleural effusions with a left basal soft-tissue lesion. Pleural fluid analysis showed CA19-9 >1000 U/L, lactate dehydrogenase 856.2 U/L, adenosine deaminase 11.1 U/L, glucose 35 mg/dL, and total protein 4.1 g/dL, consistent with malignant exudative effusion. A prior history of TB and overlapping symptoms created diagnostic anchoring bias. The patient developed sepsis and succumbed before histopathological confirmation. This case underscores the critical importance of tumor marker profiling, multimodal imaging, and early oncologic referral in patients with multifocal skeletal and hepatic lesions, regardless of prior TB history.

Key words: CA19-9, Liver metastasis, Malignant pleural effusion, Pancreaticobiliary malignancy, Spinal metastases, Tuberculosis mimic, Vertebral metastasis

Chronic back pain is one of the most common presenting complaints in tertiary medical centers, yet its management may be complicated when co-occurring symptoms are misattributed to familiar diseases [1]. The combination of axial back pain, cough, and pleural effusion in a patient from a tuberculosis (TB)-endemic region may naturally direct clinical suspicion toward infectious etiologies, often at the cost of delayed oncologic evaluation [2]. Pancreaticobiliary and upper gastrointestinal malignancies are notoriously silent in early stages and may first declare themselves through metastatic disease in the liver, pleura, or axial skeleton [3,4].

Spinal metastases represent a significant, often underrecognized, complication of visceral cancers, occurring in up to 40% of cancer patients during their lifetime and frequently causing intractable back pain [5,6]. Their management has evolved considerably with the introduction of the Neurologic-Oncologic-Mechanical-Systemic (NOMS) framework and widespread adoption of separation surgery combined with stereotactic body radiotherapy (SBRT) [7,8].

Access this article online	
Received - 27 Apr 2026 Initial Review - 11 May 2026 Accepted - 08 June 2026	Quick Response code
DOI: 10.32677/ijcr.v12i7.8251	

This case, reported in accordance with the CARE guidelines [9,10], illustrates how biochemical and imaging clues can establish a near-definitive diagnostic picture and guide clinical reasoning in a complex patient.

CASE REPORT

A 41-year-old female presented with persistent back pain and a dry cough of 4 months' duration. The symptoms had acutely worsened over the preceding week and had not responded to conservative analgesics. She had a well-documented history of pulmonary TB that had been diagnosed and fully treated with a complete course of anti-tubercular therapy 10 years before the current admission. There had been no residual symptoms following that treatment, and she had no prior history of malignancy, diabetes mellitus, or other significant comorbidities. There was no family history of cancer.

On admission, the patient was conscious, oriented, and cooperative, though in mild distress owing to back pain. She was afebrile at the presentation. Mild pallor was noted on examination. Vital signs, including pulse rate, blood pressure, and oxygen saturation, were within acceptable limits at the time of admission. There was no

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peripheral lymphadenopathy, significant pedal edema, or icterus. Musculoskeletal examination revealed diffuse tenderness over the dorso-lumbar spine with restricted range of motion. Neurological examination of the lower limbs demonstrated no motor deficit, sensory loss, or bladder-bowel dysfunction at the time of presentation. Respiratory examination revealed reduced air entry at the left lung base with dullness to percussion, consistent with pleural effusion. Abdominal examination demonstrated mild hepatomegaly, with a smooth, non-tender liver edge palpable approximately 3 cm below the right costal margin. No ascites was clinically detectable at initial examination, and the spleen was not palpable.

Rheumatologic workup, including anti-cyclic citrullinated peptide antibody, was negative, effectively excluding inflammatory arthropathy as a contributor to the back pain. Plain radiography of the lumbosacral spine demonstrated reduced lumbar lordosis, minimal marginal osteophytes at L4 and L5, and sacralization of the L5 vertebra. Cervical spine radiography showed reduced cervical curvature, marginal osteophytes from C4 to C6, a reduced C5-C6 disc space, and no cervical rib. The pedicles and sacroiliac joints appeared radiographically normal throughout. Magnetic resonance imaging (MRI) of the dorso-lumbo-sacral spine revealed multifocal T1-hypointense, short tau inversion recovery (STIR)-hyperintense altered signal intensity lesions in multiple dorso-lumbo-sacral vertebrae and both iliac bones, reported as suggestive of metastatic marrow disease (Fig. 1). Multilevel degenerative disc disease was also noted as an incidental finding. Axial MRI sequences at D11-12, D12-L1, L3, L3-4, and L4-5 demonstrated vertebral body marrow replacement at each level, whereas MRI of the pelvis confirmed bilateral iliac bone marrow infiltration (Fig. 2). Multifocal altered signal intensity lesions were also incidentally identified in the liver, alongside bilateral pleural effusion that was more prominent on the left, and a soft-tissue signal at the left lung base, raising concern for consolidation or metastatic involvement. Triphasic contrast-enhanced computed tomography (CT) of the abdomen showed hepatomegaly with heterogeneous parenchyma and multiple focal lesions in both hepatic lobes, some demonstrating inner cystic components with mild peripheral enhancement, the largest measuring 35 × 31 mm, consistent with metastatic deposits (Fig. 3a). The gallbladder was hyperdistended with smooth walls and mixed-intensity, ill-defined luminal material. The common bile duct (CBD) was widened to 6 mm with diffuse wall thickening and enhancement. Mild ascites was present, predominantly in the pelvis. Bilateral mild pleural effusion and a left basal heterogeneous soft-tissue lesion were additionally documented (Fig. 3b). The pancreas was normal in size and attenuation with no ductal dilatation or discrete mass lesion.

Pleural fluid aspiration was performed for diagnostic clarification. The analysis revealed an adenosine deaminase (ADA) level of 11.1 U/L, which was well below the accepted diagnostic threshold of 40 U/L for tuberculous pleuritis, thereby helping to exclude TB as the cause of the effusion [2]. The pleural fluid glucose was 35 mg/dL, the lactate dehydrogenase (LDH) was 856.2 U/L, the total protein was 4.1 g/dL, and the CA19-9 was >1000 U/L. Together, this biochemical profile

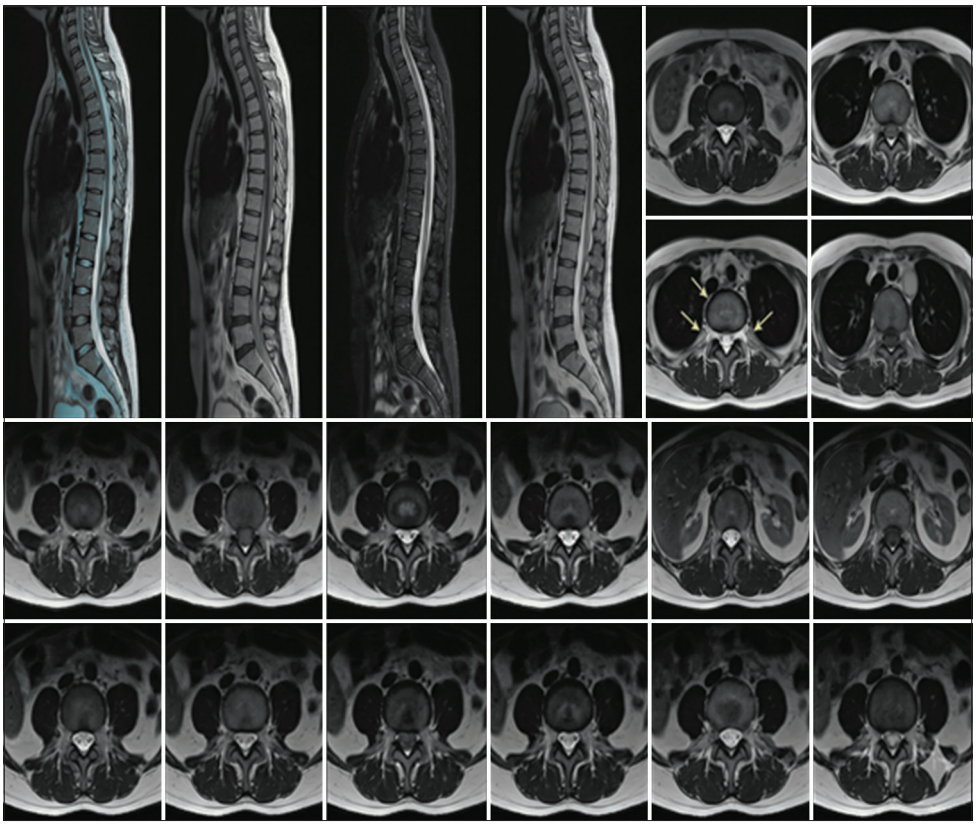

Figure 1: Sagittal magnetic resonance imaging dorso-lumbo-sacral spine (D1-L5): Multifocal T1-hypointense/short tau inversion recovery-hyperintense vertebral marrow lesions consistent with metastatic infiltration (arrows)

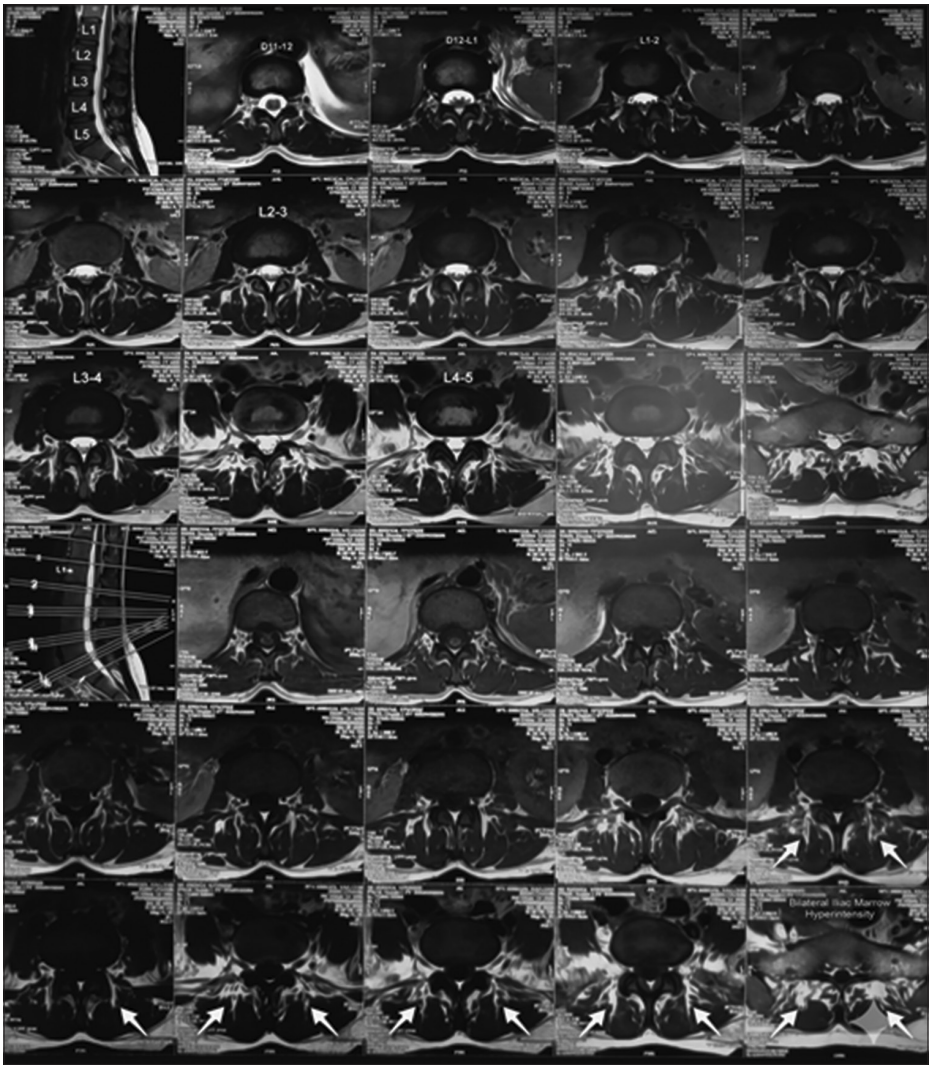

Figure 2: Axial magnetic resonance imaging (MRI) at D11-12, D12-L1, L2-3, L3-4, L4-5, and MRI pelvis: Bilateral iliac bone marrow involvement (arrows)

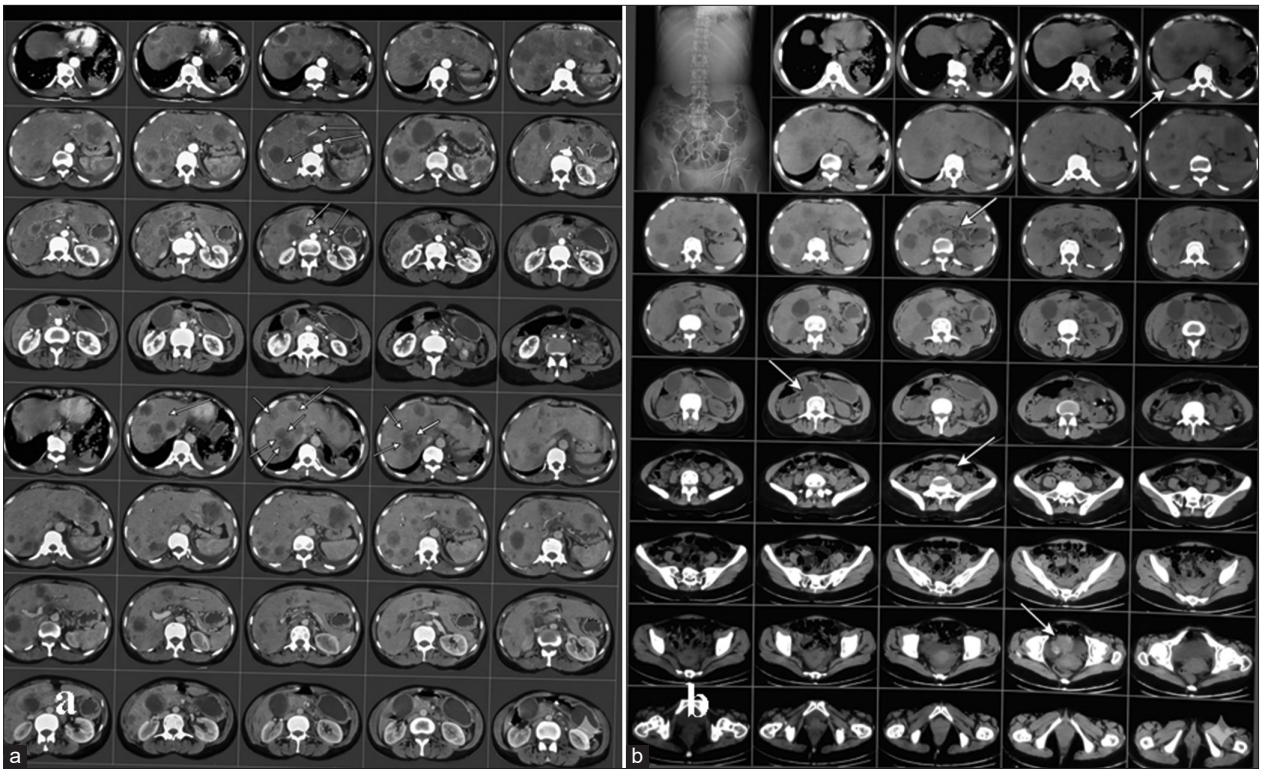

Figure 3: (a) Triphasic computed tomography (CT) abdomen: Multiple peripherally enhancing hepatic nodules with inner cystic change bilaterally; largest 35×31 mm (arrows) (b) CT abdomen/chest: Common bile duct widening to 6 mm with diffuse wall thickening, bilateral pleural effusion, and left basal soft-tissue lesion (arrows)

satisfied Light's criteria for an exudative effusion [6]. The markedly elevated LDH, low glucose, and CA19-9 exceeding 1000 U/L collectively indicated a malignant pleural process of pancreaticobiliary origin [11-14]. A summary of all investigations and results is provided in Table 1.

Echocardiography demonstrated preserved left ventricular systolic function with an ejection fraction of 71%, Grade I left ventricular diastolic dysfunction, normal right ventricular systolic function with TAPSE 2.1 cm, mild mitral and tricuspid regurgitation, mild pulmonary arterial hypertension with an estimated pulmonary artery systolic pressure of 45 mmHg, and a small pericardial effusion with normal inferior vena cava respiratory collapse. These findings excluded primary cardiac disease as a driver of the pleural effusion and provided important baseline cardiopulmonary data.

The patient was referred to a tertiary oncology center for CT-guided liver biopsy and formal oncological evaluation in view of the compelling imaging and biochemical findings. However, before this procedure could be performed, she developed features of severe sepsis. Her C-reactive protein rose to 96 mg/L and procalcitonin to 10 ng/mL. She demonstrated declining sensorium and progressive hemodynamic instability, necessitating transfer to the intensive care unit (ICU). Vasopressor support with noradrenaline was commenced, and she was intubated and placed on mechanical ventilation. Broad-spectrum antimicrobial therapy with ceftazidime–avibactam in combination with aztreonam was initiated for suspected carbapenem-resistant or metallo-beta-lactamase-producing Gram-negative sepsis, in accordance with institutional protocols and the epidemiological profile of the unit. Despite maximal supportive care over the subsequent days, the patient deteriorated progressively and died without histopathological confirmation of the primary malignancy. The clinical timeline is summarized below, spanning 10 years from the prior TB diagnosis to the terminal admission: She had experienced 4 months of progressive back pain and cough before admission; plain radiographs and MRI were completed within the first 5 days; CT abdomen, echocardiography, and pleural fluid analysis were completed by day 7; oncologic referral was planned on day 7 to 9; sepsis and ICU admission occurred on day 9 to 12; and death occurred on approximately day 16 of the admission [15]. The clinical timeline of the whole disease is depicted in Fig. 4.

DISCUSSION

This case illustrates a clinically important diagnostic pitfall: Advanced metastatic malignancy presenting in a patient with remote treated TB. The prior TB history, respiratory symptoms, and pleural effusion created anchoring bias toward an infectious diagnosis, a well-documented cognitive error that is magnified in TB -endemic settings such as the Indian subcontinent [2,9,10]. However, pleural fluid biochemistry and tumor markers provided unambiguous evidence against this assumption. A pleural fluid ADA of 11.1 U/L is well below the 40 U/L threshold for tuberculous pleuritis, supporting exclusion of TB with high sensitivity [2]. The LDH of 856.2 U/L and protein of 4.1 g/dL satisfied Light's criteria for exudate [6], whereas the low glucose of 35 mg/dL and CA19-9 >1000 U/L together constitute a near-specific signature for malignant pleural effusion from a pancreaticobiliary primary [11-14]. Verma *et al*. demonstrated that a serum LDH to pleural fluid ADA ratio >20 reliably discriminates malignant from

Table 1: Summary of investigations and results

Investigation	Result
Anti-CCP	Negative
X-ray lumbosacral spine	Reduced lumbar lordosis; marginal osteophytes at L4-L5; sacralization of L5 vertebra
X-ray cervical spine	Reduced cervical curvature; marginal osteophytes C4-C6; reduced disc space C5-C6; no cervical rib
MRI dorso-lumbo-sacral spine (Figures 1 and 2)	Multifocal T1-hypointense/STIR-hyperintense vertebral and iliac marrow lesions – consistent with metastatic infiltration; multilevel degenerative disc disease.
CT abdomen – hepatic findings [Figure 3]	Multiple peripherally enhancing nodules with inner cystic change bilaterally (largest 35×31 mm).
CT abdomen – biliary findings [Figure 4]	CBD widened to 6 mm; diffuse CBD wall thickening; hyperdistended gallbladder with mixed luminal contents.
CT abdomen – other	Mild ascites; bilateral pleural effusion; left basal soft-tissue lesion; normal pancreas.
Pleural fluid ADA	11.1 U/L (TB threshold≥40 U/L – effectively excluded)
Pleural fluid glucose	35 mg/dL (low – consistent with malignant exudate)
Pleural fluid LDH	856.2 U/L (markedly elevated; fulfills Light's exudate criteria)
Pleural fluid total protein	4.1 g/dL
Pleural fluid CA19-9	>1000 U/L (strongly suggestive of pancreaticobiliary malignancy)
Echocardiography	LVEF 71%; Grade I LV diastolic dysfunction; mild MR/TR; PASP 45 mmHg; small pericardial effusion; TAPSE 2.1 cm; normal IVC respiratory collapse.
CRP/Procalcitonin (sepsis phase)	96 mg/L/10 ng/mL

CBD: Common bile duct, TB: Tuberculosis, CRP: C-reactive protein, ADA: Adenosine deaminase, LDH: Lactate dehydrogenase, LVEF: Left ventricular ejection fraction, IVC: Inferior vena cava, CT: Computed tomography, MRI: Magnetic resonance imaging, CCP: Cyclic citrullinated peptide

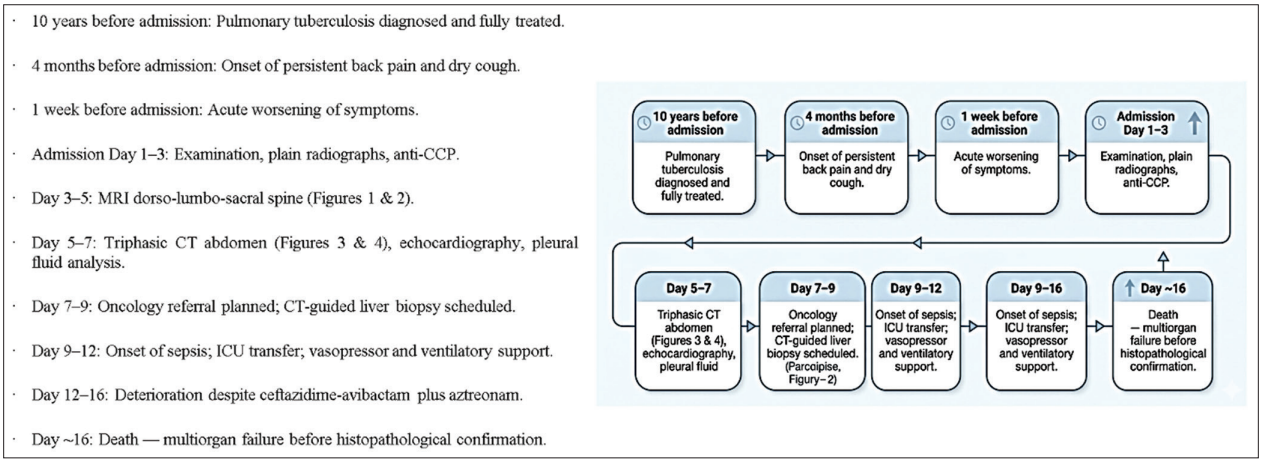

Figure 4: Clinical timeline of the patient

tuberculous pleural effusion, a criterion clearly met in this patient [11].

The triphasic CT abdomen displayed features highly characteristic of metastatic adenocarcinoma. Multiple peripherally enhancing hepatic nodules with inner cystic change represent the well-recognized pattern of mucin-secreting adenocarcinoma metastases, in which central necrosis leads to cystic transformation (Fig. 3a) [3]. Liver metastases are present in 20 to 75% of pancreatic cancer patients at diagnosis, often without a visible primary mass, as CT sensitivity for detecting the primary pancreatic tumor is only approximately 77% [3]. The diffuse CBD wall thickening with widening to 6 mm and the hyperdistended gallbladder suggest biliary obstruction or periductal infiltration from an occult biliary or pancreatic head primary (Fig. 3b) [3].

The multifocal T1-hypointense, STIR-hyperintense vertebral and iliac bone marrow lesions spanning the dorsal, lumbar, and sacral spine (Figs. 1 and 2) represent the radiological hallmark of hematogenous skeletal dissemination, distinguishable from degenerative disc disease by their vertebral body rather than disc-space predominance [5,6]. Pancreatic cancer metastasis to the spine is rare, occurring in fewer than 5% of cases, yet a systematic review by Bhatt *et al*. found that back pain was the presenting complaint in 64% of such patients, with a mean overall survival of only 28 weeks after spinal metastasis was identified [4]. Kim *et al*. reported median survival of 6.1 months in surgically managed and 2.5 months in non-surgically managed patients with spinal pancreatic cancer metastases [6]. The coexistence of degenerative disc disease with superimposed metastatic marrow lesions in this patient created a dual pathology scenario that risked obscuring the dominant malignant process.

Although surgical intervention was not feasible in this patient, modern management of spinal metastases is guided by the NOMS framework, incorporating Neurologic, Oncologic, Mechanical, and Systemic criteria – to stratify patients into candidates for surgery, radiotherapy, or combined modality treatment [7,8]. Separation surgery, which creates a circumferential margin between tumor and spinal cord to enable safe delivery of adjuvant SBRT, is now the most commonly performed palliative spinal procedure [8]. In the setting of multifocal vertebral involvement, concurrent hepatic metastases, and malignant pleural effusion as demonstrated in this case, palliative radiotherapy to the most symptomatic spinal segments, combined with systemic chemotherapy, had the patient been fit enough, would have represented the realistic therapeutic goal [4,6,7].

The terminal course highlights the catastrophic intersection of advanced malignancy and sepsis. Cancer patients are disproportionately vulnerable to severe infection due to immune suppression, nutritional depletion, and frequent healthcare contact [15]. A procalcitonin of 10 ng/mL is highly indicative of severe bacterial sepsis and is associated with high short-term ICU mortality [15]. Most importantly, this case underscores the principle that CT-guided tissue biopsy must be expedited as the highest clinical priority when radiological and biochemical findings collectively constitute a near-diagnostic signature of advanced malignancy, as they clearly did here. Biopsy referral should have proceeded simultaneously with CT reporting, and early goals-of-care discussions along with palliative planning are ethically obligatory in patients with advanced malignancy whose clinical trajectory makes ICU survival improbable [9,10].

CONCLUSION

This case shows that multifocal skeletal and hepatic lesions with malignant pleural effusion in a patient with prior TB should prompt urgent evaluation for pancreaticobiliary malignancy. Low pleural ADA, CA19-9 >1000 U/L, elevated LDH, multifocal vertebral marrow lesions, and cystic hepatic metastases form a strong radiological and biochemical signature of advanced disease. Prior tuberculosis should not anchor clinical reasoning when objective findings point elsewhere. Early tissue diagnosis, oncologic referral, and palliative planning are essential.

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Funding: Nil; Conflicts of interest: Nil.

How to cite this article: Gupta CP, Ray G, Basu S. Pancreaticobiliary malignancy masquerading as tuberculosis: A case of multifocal skeletal and hepatic metastases. Indian J Case Reports. 2026;12(7):422-427.