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Case Report

Malignant Transformation of Hepatocellular Adenoma: Case Report

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ABSTRACT

Background:

Hepatocellular adenomas (HCA) are rare benign liver tumors associated with metabolic risk factors and carry a risk of malignant transformation. We present a case of a 50-year-old woman with a liver lesion initially diagnosed as a hepatocellular adenoma that showed progressive growth on follow-up imaging. Contrast-enhanced MRI (Magnetic Resonance Imaging) and CT (Computed Tomography) showed enlargement of the lesion in segments S6–S7. Initial biopsy findings were consistent with hepatocellular adenoma. Because of continued tumor growth, right liver resection was performed. Histopathological examination revealed foci of well-differentiated hepatocellular carcinoma arising within a dysplastic adenoma with areas of necrosis. This case highlights the diagnostic challenges in distinguishing hepatocellular adenoma from early hepatocellular carcinoma, particularly in patients with metabolic risk factors and progressive tumor enlargement. It emphasizes the importance of careful imaging surveillance and timely surgical management.

Keywords: Hepatobiliary Tumors; Hepatocellular Adenoma; Hepatocellular Carcinoma; Liver Pathology

Introduction

Hepatocellular adenomas (HCA) are benign solid liver tumors most often detected incidentally during imaging studies [1]. They occur predominantly in women and are associated with hormonal exposure, metabolic syndrome, obesity, and certain genetic conditions [2,3]. Although generally benign, HCA may be complicated by hemorrhage or malignant transformation into hepatocellular carcinoma (HCC) [3]. Differentiating HCA from early HCC remains a diagnostic challenge in liver imaging, particularly in lesions showing progressive growth [4]. Recent studies report malignant transformation in approximately 4% of women and up to 47% of men with HCA [5].

We present a case of a 50-year-old woman with a hepatic adenoma that showed progressive enlargement. Postoperative histopathological examination revealed foci of well-differentiated hepatocellular carcinoma arising within a dysplastic adenoma.

Case Presentation

The patient, a 50-year-old woman, presented with intermittent pain in the right upper quadrant. Her medical history included obesity (body mass index 40.65), impaired glucose tolerance, and metabolically associated fatty liver disease with mild steatosis. She had been under observation for 3 years for a liver lesion. The initial non-contrast abdominal CT scan repotred a hypodense lesion at the border of S6–S7 segment measuring 1.9×1.8 cm (Figure 1).

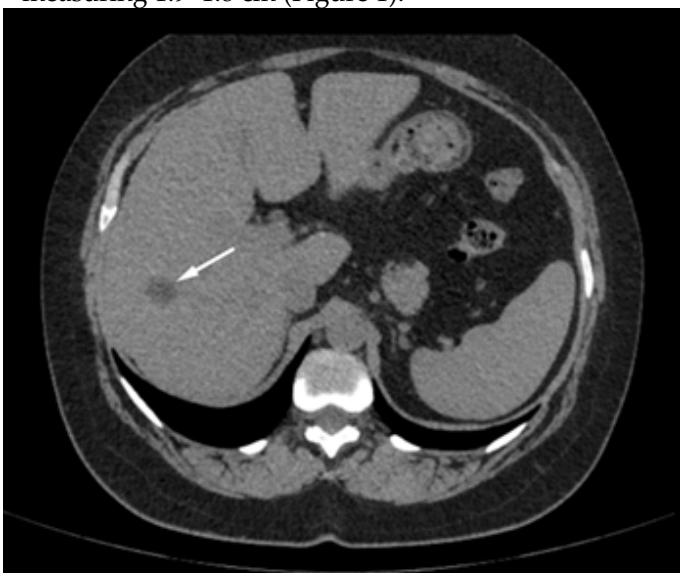

Figure 1: Non-contrast abdominal CT demonstrates a hypodense lesion in hepatic segments 6–7 (white arrow).

Around 20 months after initial detection, next follow-up contrast-enhanced CT revealed significant growth of the lesion to 4.5×5.0 cm, with heterogeneous and progressive contrast enhancement but no obvious washout pattern. Considering enlargement of lesion, a core needle biopsy was performed, revealing interlobular fibrosis with hepatocellular hyperplasia and dystrophy. These findings were interpreted as consistent with hepatocellular adenoma.

Around 16 months after biopsy, contrast-enhanced MRI demonstrated further growth to 7.5×6.0 cm with changes in enhancement as nodules showing arterial-phase hyperenhancement followed by venous-phase washout (Figure 2).

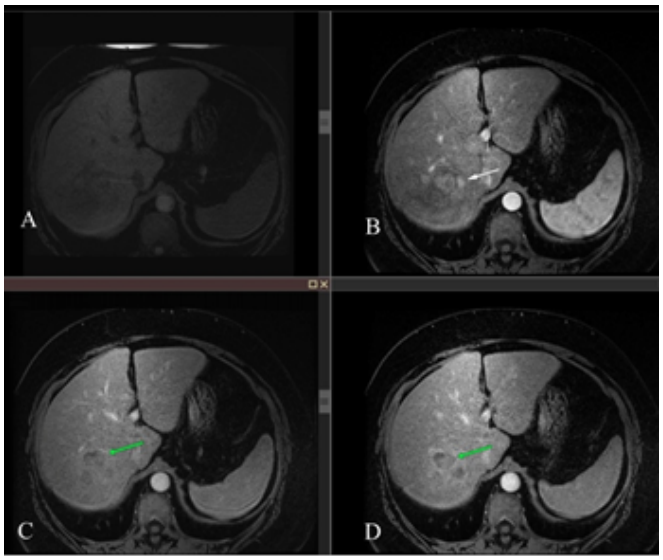

Figure 2: Contrast-enhanced abdominal MRI (A-non contrast, B-arterial, C-venous, D-delayed) demonstrates hypervascular nodules within the lesion, showing arterial-phase enhancement (white arrow) with subsequent venous-phase washout (green arrow).

A pre-operative CT performed 15 days before surgical intervention confirmed the lesion dimensions at 7.3×6.6 cm, with persistent hypervascular nodularity and washout (Figure 3).

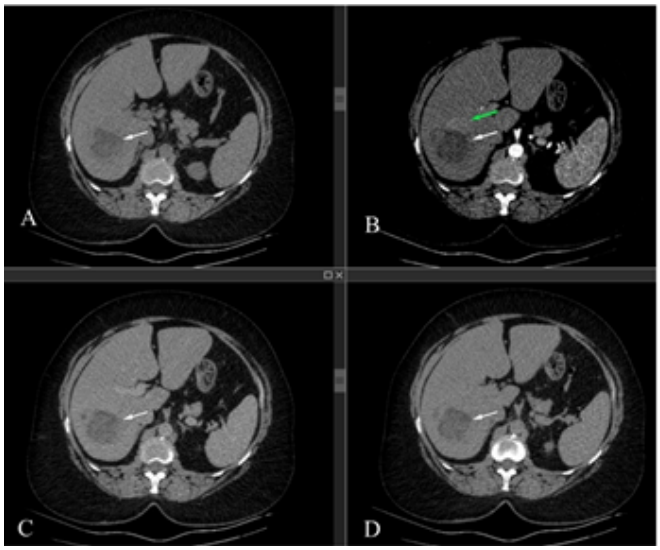

Figure 3: The last contrast-enhanced abdominal CT (A-non contrast, B-arterial, C-venous, D-delayed)

shows interval enlargement of the lesion in hepatic segments 6–7 (white arrow). A previously non-visualized hypervascular focus is noted on arterial phase (green arrow).

Over the total observation period of approximately 40 months, the lesion demonstrated enlargement from 1.9×1.8 cm to 7.3×6.6 cm, with evolving enhancement characteristics. Due to the negative interval dynamics, the decision was made to hospitalize the patient to determine the need for surgical treatment. The patient's general condition was satisfactory, physical examination revealed no abnormalities, and tests for tumor markers as well as hepatitis B and C markers were negative. Radical surgical treatment was performed in the form of a right lateral liver resection. Intraoperatively, a solitary lesion was identified within the parenchyma in segments S6–S7, and due to involvement of two segments, a non-anatomical resection was carried out.

The resected specimen consisted of a liver fragment containing a poorly demarcated gray-yellow lesion. Histological examination of the specimen demonstrated a nodular lesion composed of relatively monomorphic hepatocytes with disruption of the normal trabecular architecture. The tumor cells formed trabecular structures with mild nuclear atypia and eosinophilic cytoplasm; some hepatocytes contained large lipid vacuoles. The stroma showed areas of necrosis, focal fibrosis, yellow-brown pigment deposition, and scattered lymphocytic infiltration. In several microscopic fields, gland-like structures with more pronounced cellular polymorphism were observed. The surgical resection margin was identified and showed no evidence of tumor involvement. Background liver parenchyma demonstrated moderate steatosis involving approximately 40–45% of hepatocytes and fibrosis corresponding to Ishak stage 2–3.

Final histopathological diagnosis demonstrated foci of well-differentiated hepatocellular carcinoma (G1), including trabecular and steatohepatitic subtypes, arising within a dysplastic hepatocellular adenoma (ICD-O code M8170/3), with extensive areas of necrosis. The surrounding liver parenchyma showed moderately expressed steatosis involving approximately 40–45% of hepatocytes with mixed macro- and medium-droplet fatty change, as well as fibrosis corresponding to Ishak stage 2–3. The liver resection margin was negative for tumor involvement (R0).

Based on these new findings, the patient was diagnosed with hepatocellular carcinoma T1bN0M0 G1, Stage IB, BCLC-A.

This case, characterized by the identification of well-differentiated malignant foci within a previously benign lesion (in this case, an adenoma), corresponds to malignant transformation of the adenoma and demonstrates the classic "nodule-in-nodule" pattern during progression from hepatocellular adenoma to hepatocellular carcinoma.

Discussion

HCA is a tumor arising from monoclonal benign proliferation of hepatocytes [6,7]. Risk factors for HCA include long-term use of OCs (Oral Contraceptives), obesity and metabolic syndrome, androgen intake, and genetic disorders such as MODY-3 (Maturity-Onset Diabetes of the Young) and glycogen storage disease. HCA occurs most frequently in women using oral contraceptives, with an incidence of 3–4 per 100,000, which is significantly higher than in women not taking these medications (0.13–1.0 per 100,000) [8]. Our patient had no history of OC use; however, she had metabolic syndrome and marked obesity, which were likely associated with the development and progression of HCA. Elevated levels of adipokines circulating in obesity stimulate the release of interleukin IL-6 by adipocytes, and IL-6 has been identified as a risk factor for malignant transformation [9]. An additional risk factor for malignancy in this patient was the lesion size exceeding 5 cm.

The molecular–morphological subtype of hepatocellular adenoma was not specified in the available histopathological report, which represents a limitation of this case. Hepatocellular adenomas are classified into molecular subtypes with distinct biological behavior and risks of malignant transformation. β-catenin–activated adenomas, characterized by CTNNB1 mutations and activation of the Wnt/β-catenin signaling pathway, have the highest malignant potential, whereas inflammatory adenomas, frequently associated with obesity and metabolic syndrome, may also carry an increased risk, particularly when β-catenin activation coexists [9].

The role of dynamic surveillance in the management of hepatocellular adenomas.

Modern clinical guidelines emphasize that the management of indeterminate focal liver lesions is a dynamic process that relies on high-quality multiphase imaging and long-term follow-up. The American College of Gastroenterology guidelines explicitly state that focal liver lesions of unclear etiology require multiphasic contrast-enhanced imaging, preferably MRI or CT with late arterial, portal venous, and delayed phases. For women with hepatocellular adenomas larger than 5 cm, contrast-enhanced imaging

surveillance is recommended every 6 months for two years, followed by annual monitoring [10].

In our case report, an initially benign HCA detected on CT and confirmed by biopsy was subsequently monitored with multiparametric MRI, which improved the detection and characterization of heterogeneous structural changes and contrast enhancement patterns suggestive of malignant transformation, specifically hepatocellular carcinoma (HCC).

The role of the radiologist in managing patients with HCA.

The radiologist plays a key role not only in the initial assessment of a focal liver lesion but also in detecting interval growth, increasing heterogeneity, or the emergence of new features suggestive of HCC-like transformation. Whenever possible, follow-up imaging should be performed on the same scanner, using consistent acquisition parameters and, ideally, interpreted by the same radiologist to ensure optimal comparability. Such sequential radiologic evaluation enables timely transition from conservative surveillance to surgical management when malignant transformation is suspected, as demonstrated in our case report.

Conclusion

This clinical case demonstrates a potential malignant transformation of hepatocellular adenoma, particularly in patients with metabolic risk factors and progressive tumor enlargement. Despite the initial benign histology, the gradual growth and changes in imaging characteristics required surgical intervention, which ultimately led to the identification of a highly differentiated hepatocellular carcinoma arising against the background of a dysplastic adenoma. This case underscores the importance of careful follow-up through dynamic surveillance, including imaging, molecular subtype determination, and timely surgical intervention in high-risk patients.

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