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FOCAL NODULAR HYPERPLASIA OF THE LIVER IN AN ADOLESCENT FEMALE: A CASE REPORT

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Abstract

Focal Nodular Hyperplasia (FNH) is a benign hepatic lesion commonly found in young to middle-aged women and is often detected incidentally during imaging. This case report describes an adolescent female patient with an incidentally discovered FNH lesion, confirmed through ultrasound and contrast-enhanced computed tomography (CECT). The patient underwent surgical excision due to diagnostic uncertainty or symptoms, with histopathology confirming FNH. Compared to similar case reports, this case aligns with the low recurrence rate and excellent prognosis associated with FNH. The report emphasizes the role of imaging in diagnosis, the importance of histopathology, and the indications for surgery versus conservative management.

INTRODUCTION

Focal Nodular Hyperplasia (FNH) is a benign hepatic lesion commonly found in otherwise healthy individuals, particularly in young to middle-aged women. It is the second most common benign liver lesion after hepatic hemangioma, with an estimated prevalence of 0.3% in the general population and up to 3% in women undergoing imaging for unrelated conditions (1). FNH is characterized histologically by benign hepatocellular proliferation surrounding a central stellate scar with aberrant vascular architecture (2). Unlike hepatocellular adenomas, FNH has no malignant potential and rarely causes complications, making conservative management the preferred approach in most cases (3).

The exact etiology of FNH remains unclear, but it is believed to be a hyperplastic response to vascular abnormalities, specifically arterial malformations leading to localized hyperperfusion (4). This theory is supported by the frequent association of FNH with other vascular anomalies, such as hemangiomas and hereditary hemorrhagic telangiectasia (5). Unlike hepatic adenomas, FNH is not typically associated with oral contraceptive use, although some studies suggest a possible role in lesion growth (6).

Clinically, most cases of FNH are asymptomatic and detected incidentally during imaging studies performed for unrelated reasons. When symptomatic, patients may present with nonspecific complaints such as mild abdominal pain or discomfort (7). Diagnosis is primarily based on imaging, with ultrasound, contrast-enhanced computed tomography (CECT), and magnetic resonance imaging (MRI) playing crucial roles. Characteristic imaging features include a well-demarcated lesion with homogeneous enhancement in the arterial phase and a central scar with delayed enhancement on MRI (8,9). In ambiguous cases, liver biopsy may be required to differentiate FNH from other hepatic tumors, such as hepatocellular adenomas or metastatic lesions (10).

Management of FNH is typically conservative, given its benign nature and lack of malignant transformation risk. Surgery is reserved for symptomatic cases, uncertain diagnoses, or complications such as rapid growth or rupture, which are exceedingly rare (11). This case report highlights the diagnostic approach, imaging characteristics, and management of a patient with FNH requiring surgical intervention.

Case Presentation

An 18-year-old female patient presented with [intermittent episodes of bilious vomiting associated with abdominal pain for 20 days. Patient had no history of abdominal distension, constipation, fever or difficulty in micturition. There was no significant past medical history of liver disease, alcohol use, or hepatitis. The patient was clinically stable, and routine physical examination showed tenderness at right hypochondriac region with a palpable mass of length measuring approximately five centimetres (in the largest dimension) extending from epigastric region to the inferior border of the right last rib.

Laboratory tests, including Liver Function Tests (LFT) and Renal Function Tests (RFT), were within normal limits, indicating preserved hepatic and renal function.

An Ultrasound (USG) of the abdomen revealed a fairly defined iso-hypoechoic lesion in the left lobe of the liver with mild peripheral vascularity. (Figure 1)

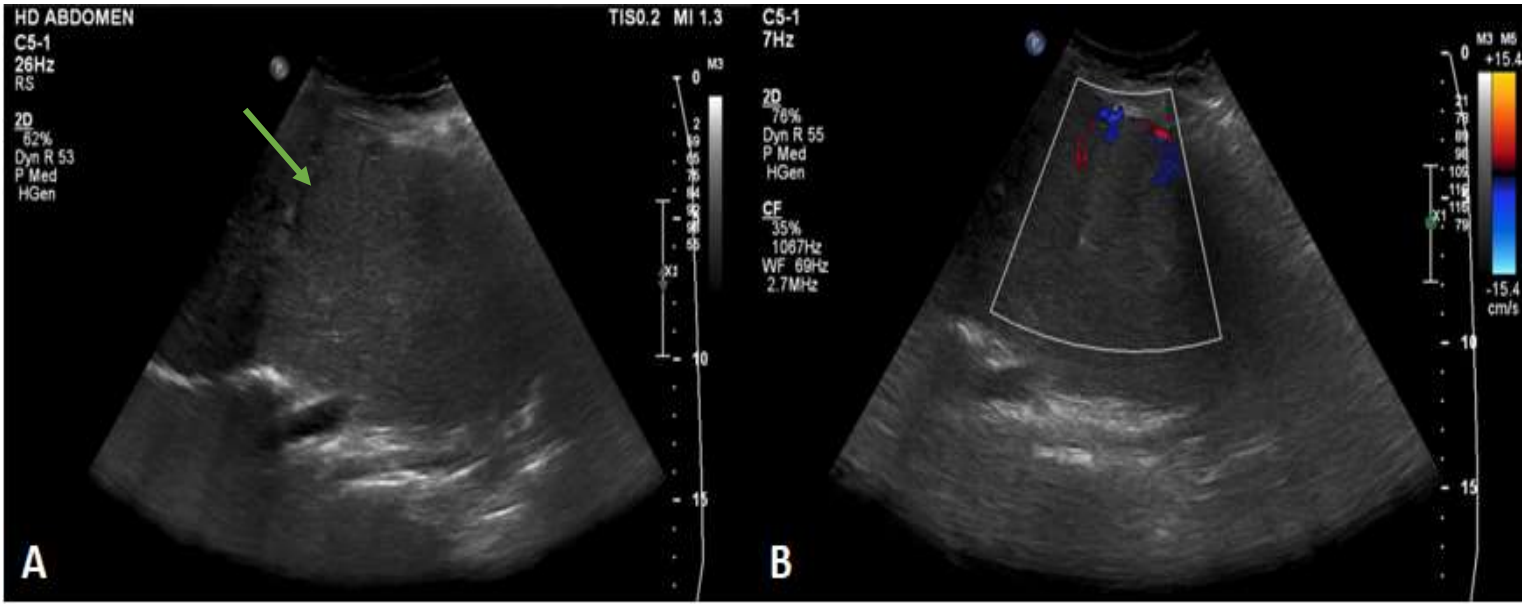

Figure 1: Ultrasound (USG) Of Abdomen (A-B): A fairly defined, solid, iso-hypoechoic lesion noted in the left lobe of liver (Green Arrow) which on Colour Doppler shows mild peripheral vascularity.

To further characterize the lesion, a Contrast-Enhanced Computed Tomography (CECT) scan of the abdomen was performed, which showed a large fairly defined exophytic and lobulated lesion seen involving Couinaud segments II and III of left lobe of liver of size measuring approximately 14 cm in the longest dimension. (Figure 2)

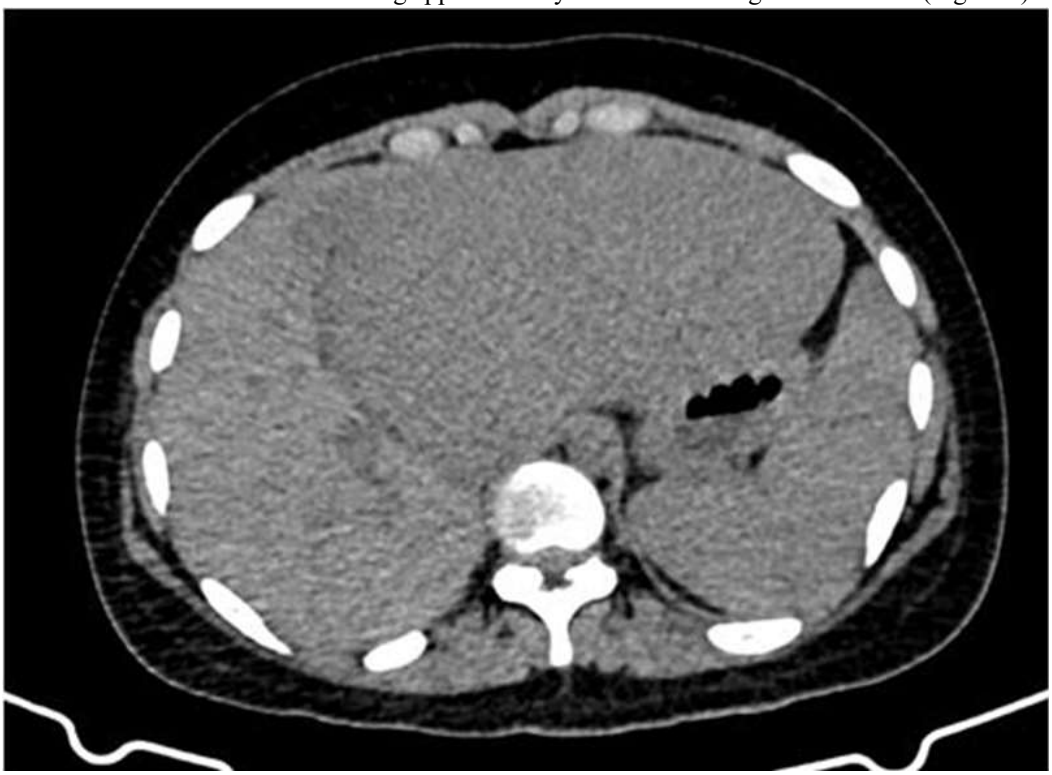

Figure 2: Axial section of Non-Contrast Computed Tomography (NCCT) of Abdomen shows a fairly defined, solid, homogenously isodense lesion with well circumscribed margins seen involving segments II and III of left lobe of liver.

Post contrast administration, the lesion showed heterogenous avid enhancement on arterial and porto-venous phase with few non-enhancing areas likely representing necrosis/scar. Delayed images show contrast washout of the lesion with mild enhancement of a central scar. Imaging findings were suggestive of Focal Nodular Hyperplasia. (Figure 3)

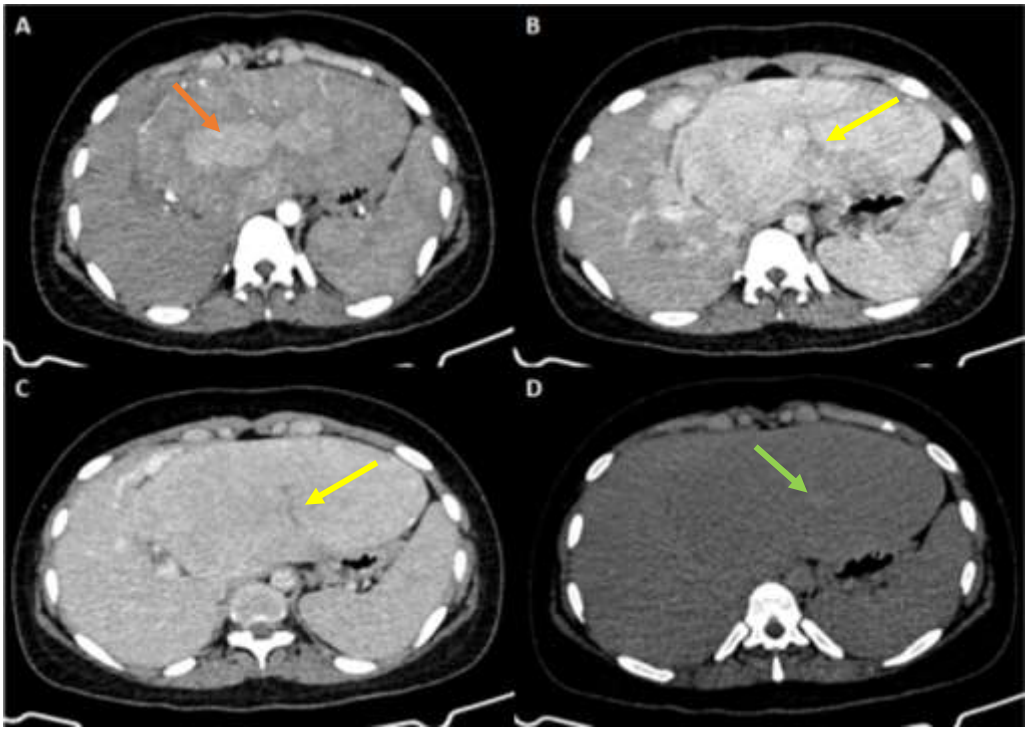

Figure 3: Axial section of Contrast-Enhanced Computed Tomography (CECT) of Abdomen (A-D): On Arterial phase (A) shows central hyperenhancement [Orange Arrow] with surrounding areas of the lesion showing mild enhancement relative to the adjacent hepatic parenchyma. On Porto-Venous Phase (B-C) shows intense heterogenous enhancement with few areas of non-enhancement (likely necrosis / scar) [Yellow Arrow]. On Delayed Phase (D) shows contrast washout with mild enhancement of the scar [Green Arrow] with no evidence of capsular enhancement.

left lobe of liver which was isointense on T1-weighted images and hyperintense on T2-weighted images with a central scar which was hypointense on T1-weighted images and hyperintense on T2-weighted images which is indicative of Focal Nodular Hyperplasia. (Figure 4)

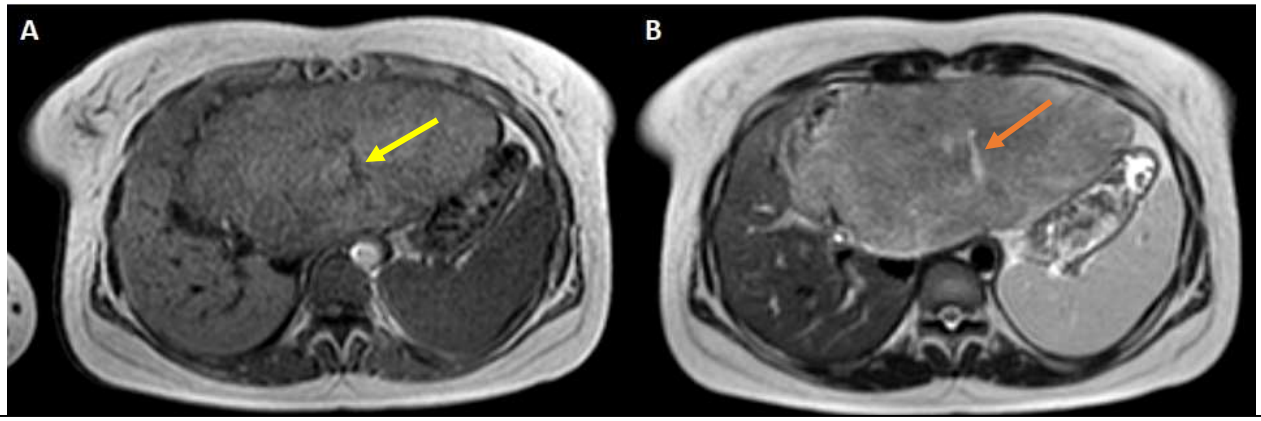

Figure 4: Axial section of Non-Contrast Magnetic Resonance Imaging (MRI) of Abdomen (A-B): Axial T1-weighted MRI image (A) demonstrates a well-defined, isointense lesion in the left hepatic lobe (segments II and III) with a lobulated contour with an internal central hypointense scar (Yellow Arrow). Axial T2-weighted MRI image (B) reveals mild heterogeneous hyperintensity of the lesion with a centrally located, hyperintense scar (Orange Arrow) —an imaging hallmark of **Focal Nodular Hyperplasia (FNH)**

The patient underwent [Left Lateral Sectionectomy/En-bloc resection of the lesion at left lobe of liver]. Intraoperative findings confirmed a large well-demarcated lesion in the left lobe of the liver, with congestion seen involving the external surface of liver however there was no evidence of invasion into surrounding structures. (Figure 5) The surgery was completed without complications, and hemostasis was achieved successfully. The excised specimen was sent for histopathological examination.

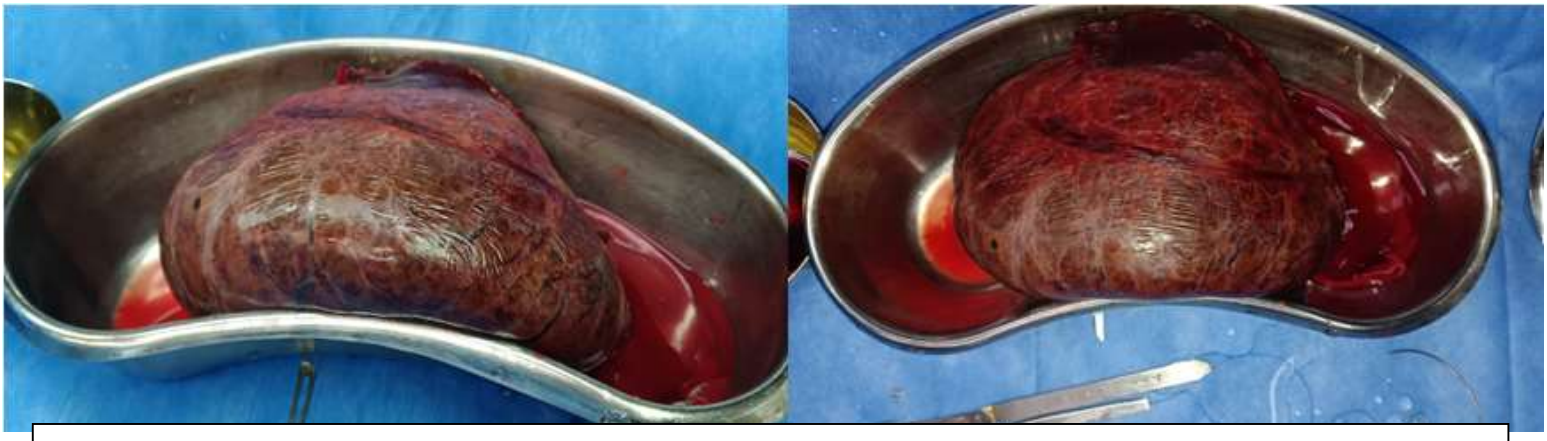

Figure 5: Post-Operative Liver Specimen Following Left Lateral Sectionectomy: The gross specimen represents a left lateral sectionectomy, including hepatic segments II and III, excised en bloc. The liver specimen is notably enlarged, with a well-defined mass measuring approximately 20 cm in greatest dimension. The external surface of the liver appears congested and tense, with dilated veins visible on the capsule

The histopathology report showed presence of nodular hyperplasia of hepatocytes and fibrous septa. There was no mention of atypia, necrosis, or malignancy. The final report was confirmative for Focal Nodular Hyperplasia. (Figure 6)

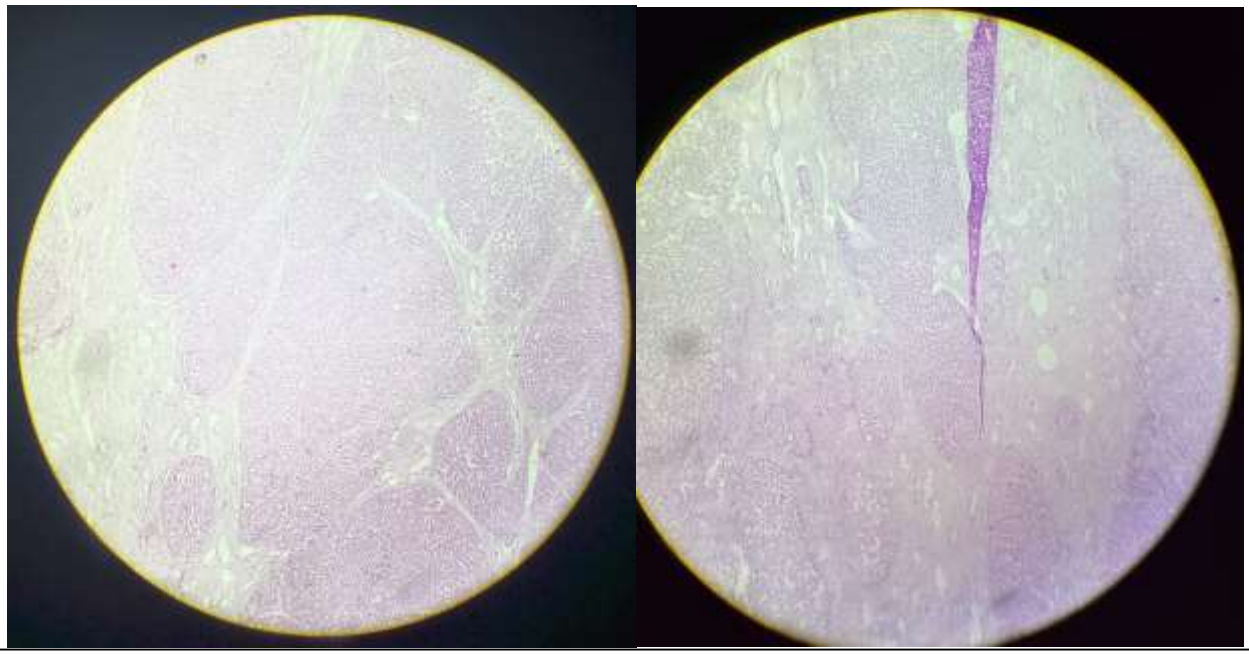

Figure 6: Histopathological Examination Of Post-Operative Liver Specimen: The lesion is composed of well-differentiated hepatocytes arranged in a nodular pattern separated by fibrous septa. The fibrous bands contain prominent bile ductular proliferation**,** inflammatory infiltrates, and thick-walled blood vessels, which are characteristic of FNH.

condition with follow-up recommendations, including periodic imaging to monitor for any recurrence or new hepatic lesions. Given the benign nature of FNH, no additional treatment was required, and the patient was reassured regarding the excellent long-term prognosis.

DISCUSSION

Focal Nodular Hyperplasia (FNH) is a benign liver lesion, predominantly found in young to middle-aged women. The estimated prevalence of FNH in the general population ranges from 0.3% to 3%, with a strong female predilection (1,2). In this case, the patient had an incidentally detected hepatic lesion, similar to what is commonly reported in the literature, where FNH is often asymptomatic and discovered during imaging for unrelated conditions (3).

Comparing this with similar cases, a study by Vilgrain et al. reported that up to 80% of FNH cases are diagnosed incidentally during imaging for non-hepatic complaints (1). Another study by Cherqui et al. found that only 20% of patients present with symptoms, mainly right upper quadrant pain or nonspecific discomfort (4). Our patient's presentation aligns with these findings, emphasizing the mostly silent nature of FNH.

Imaging is the gold standard for diagnosing FNH, with ultrasound (USG), contrast-enhanced computed tomography (CECT), and magnetic resonance imaging (MRI) playing critical roles (5). A systematic review of 112 FNH cases by Nguyen et al. noted that while hepatomegaly was rare, some patients reported mild abdominal pain or nausea due to mass effect (6). However, in our case, the patient had no significant hepatic enlargement or systemic symptoms, which is in line with the usual clinical course of FNH. In our case, ultrasound revealed a well-defined, iso-hypoechoic lesion with mild peripheral vascularity, findings that are consistent with previously reported cases (7-9).

A study by Grazioli et al. found that FNH lesions commonly show homogeneous hyperenhancement in the arterial phase of CECT and a characteristic central stellate scar on MRI (3). In a comparison of FNH and hepatocellular adenoma (HCA), Jeong et al. found that FNH typically retains hepatobiliary contrast on delayed imaging, whereas HCA shows washout (7). Our case showed similar USG and likely CECT findings, further confirming the FNH diagnosis.

A meta-analysis of 422 patients with FNH reported that the presence of a central scar on MRI is a distinguishing feature, seen in up to 70% of cases, making MRI the most specific imaging modality (10). Although our case lacked MRI data, the available USG and CECT findings were characteristic of FNH, reducing the need for biopsy.

FNH must be differentiated from other hepatic lesions, primarily hepatic adenomas, hemangiomas, and hepatocellular carcinoma (HCC).

- Hepatic Adenoma (HCA): Typically occurs in women on oral contraceptives and shows heterogeneous arterial enhancement without a central scar (11,12).
- Hepatic Hemangioma: Has peripheral nodular enhancement with centripetal filling, distinguishing it from FNH (13).
- HCC: Shows early arterial enhancement with rapid washout in the portal venous phase, unlike FNH (14).

In a study by Kim et al., only 3.4% of FNH cases required biopsy due to diagnostic uncertainty (6). Similarly, our case did not require a biopsy, as CECT findings were sufficient for diagnosis.

The majority of FNH cases require no treatment. Surgery is reserved for symptomatic cases, diagnostic uncertainty, or lesions causing compression symptoms (15-17). In our case, the patient underwent surgical excision, suggesting either persistent symptoms or diagnostic uncertainty. A review by Mathieu et al. on 201 FNH patients found that only 5% required surgery, while the rest were managed conservatively (8). A large multicenter study by Vilgrain et al. recommended avoiding unnecessary surgery, as FNH does not undergo malignant transformation (11). This suggests that our case was among the few where surgical intervention was justified, likely due to symptoms or diagnostic ambiguity.

Histopathology remains the gold standard for confirming FNH. Typical features include:

- Nodular hyperplasia of hepatocytes
- Fibrous septa with abnormal vasculature
- A central stellate scar (17)

Our patient's histology findings were consistent with classic FNH, confirming the preoperative imaging diagnosis. This aligns with reports from Nguyen et al., where histological examination confirmed typical FNH features in 98% of cases (5).

Patients undergoing surgical resection of FNH typically recover without complications, as FNH does not recur (18). Our case followed a similar uneventful post-operative course, with no reported complications or recurrence. A longitudinal study of 187 patients with resected FNH by Jeong et al. found a 0% recurrence rate over a 5-year follow-up (7). This is in contrast to HCA, where recurrence occurs in 20% of cases, reinforcing the benign nature of FNH.

CONCLUSION

This case of Focal Nodular Hyperplasia (FNH) highlights the importance of imaging in diagnosing benign liver lesions, the role of histopathology in confirming uncertain cases, and the considerations for surgical versus conservative management. FNH is often asymptomatic and detected incidentally, with characteristic imaging findings that usually eliminate the need for biopsy. This case reinforces the need for a multidisciplinary approach in the evaluation of hepatic lesions, balancing the benefits of conservative management against the necessity for surgical intervention in select cases. With increasing availability of advanced imaging techniques, the ability to differentiate FNH from other hepatic lesions continues to improve, helping avoid unnecessary surgeries. Future research should focus on non-invasive diagnostic markers and the long-term behavior of FNH, particularly in patients with multiple or large lesions.

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