Solitary Necrotic Nodule of Liver with the Etiology of Parasite: A Report of Two Cases

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Abstract: Solitary necrotic nodule of liver (SNNL) is a rare, benign lesion with an uncertain etiology. There are no typical diagnostic clinical or radiological features. The two patients we described underwent liver resection because it was not possible to exclude a malignancy on preoperative imaging. The histopathological findings suggest the SNNL may be parasitic in origin and find parasitic worm in the nodules.

Key words: Solitary necrotic nodule (SNN); Parasite; Liver

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Case 1

A 60-year-old female came to our hospital for blood in the faeces of one month. Physical examination showed no obvious abnormality. The blood test was normal. An abdominal ultrasound displayed a nodular formation in the right lobe of the liver. The contrast-enhanced ultrasound exposed a peripheral enhancement in the arterial phase and low contrast enhancement in delay phase suggestive of metastasis (Fig. 1). Colorectal computed tomography (CT) with contrast suggestive of rectum carcinoma and a low contrast enhancement nodule in posterior segment of right lobe in delay phase (Fig. 2). She underwent open radical resection and anatomical VII segmentectomy of the liver. After surgery, there were five nodular mass in liver specimen, gray, materiality and tough. With hematoxylin-eosin staining the specimen, there were multiple granulomatous necrosis, with parasitic worm in it (Fig. 3), suggestive of parasitic necrotic nodules.

Case 2

A 41-year-old female came to our hospital for focal liver lesions of two weeks, who has a family history of hepatitis B. Physical examination showed right upper quadrant tenderness. An abdominal ultrasound showed a nodule in the right lobe of the liver (Fig. 4). The

enhanced MRI indicated a nodule in posterior segment of right lobe with no significant enhancement (Fig. 5). She underwent laparoscopic anatomical VII segmentectomy of the liver. During the procedure, two adjacent, rough, gray nodules were found in the posterior segment of the right lobe liver, near the top of the diaphragm. Hematoxylin-eosin staining the specimen reported a solitary necrotic nodule of liver, with parasitic worm in it (Fig. 6).

Figure 1 (A) Abdominal ultrasound show a nodule in posterior segment of right lobe, 8 × 7 mm. (B) Peripheral enhancement in the arterial phase of contrast-enhanced ultrasound. (C) Low contrast enhancement in portal venous phase of contrast-enhanced ultrasound. (D) Low contrast enhancement in delay phase of contrast-enhanced ultrasound.

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Figure 2 (A) Hepatic nodule is not visible in CT scan. (B) Hepatic nodule is not visible in CT scan arterial phase. (C) A nodule in posterior segment of right lobe, 6 × 7 mm, low contrast enhancement in delay phase of contrast-enhanced CT.

Figure 3 (A) Multiple granulomatous necrosis accompanied by a large number of inflammatory cells infiltration (H&E, ×40). (B) Multiple damaged parasitic worms in centre (H&E, ×400).

Figure 4 (A) nodule in posterior segment of right lobe, 24 × 16 mm, boundary is clear, echo is uneven.

Figure 5 Enhanced MRI suggestive of a nodule in posterior segment of right lobe, 24mm × 25mm, with no significant enhancement plain scan (A), arterial phase (B), venous phase (C)).

Figure 6 (A) The centre of the coagulative necrosis, with a fibrous capsule containing inflammatory cells (H&E, ×40). (B) Multiple damaged parasitic worms in centre (H&E, ×400).

The patient was discharged on postoperative day 4, without any complications. The patient remains

asymptomatic without signs of relapse of SNNL to date.

Discussion

Solitary necrotic nodule (SNN) is an uncommon hepatic lesion, pathologically characterized by central necrotic core encapsulated with a hyalinized fibrotic tissue containing elastic fibers and inflammatory cells [1-4]. SNNL is a rare benign lesion with an uncertain etiology. The etiology and pathogenesis of the lesion still remain ambiguous. However, it has been suggested by various researchers that it is related to infections like tuberculosis and syphilis, parasitic infestations, trauma and sclerosing haemangiomas [2,5]. Possibility of

SNNL arising from two or more different mechanisms simultaneously has also been suggested [6].

Furthermore, many patients with SNN show the tendency to be accompanied by primary cancer of other organs [7,8]. Many studies have emphasized that these lesions may be erroneously diagnosed as metastatic deposits, both clinically and radiologically [5, 6]. In a retrospective study including 22 cases, SNNL was frequently found in patients with liver metastases, Deniz et al. speculated that at least some of these lesions may represent ‘burnt out’ tumours [9]. Undoubtedly, some patients experience spontaneous regression of liver tumours or have an excellent response to chemotherapy, this may explain some lesions that are reported as SNNL. The first case we described had rectum carcinoma, so we highly suspect that her liver nodule was metastatic at the beginning.

The most plausible etiology is that these lesions are the result of an immune response to infection, particularly a parasitic infection. In case of parasitic origin, degenerated larva can be seen in the necrotic center as in our cases [10]. Some specific larvae, *Clonorchis sinensis* [5], filarial nematode [11], *Capillaria hepatica* [12], and hydatid cyst [9] had been detected in SNN. However, the larval structure is usually over degraded, so it is difficult to identify the exact species. In recent years, changes in dietary lead to more parasitic infection, which mainly affects the gastrointestinal tract and biliary tract. Moreover, other organs infections have been found due to the advances of imaging modalities. The liver, as the main organ of the digestive system, is often infected with parasites. Many foodborne parasites can cause liver infections. Tsui et al. discovered *clonorchis sinensis* in two of seven patients with SNNL [5]. More recently, a case described by Koea et al. was attributed to *capillaria hepatica* infection [13]. There are still some rare parasitic infections, such as pinworm, etc. There is a case of SNN with etiology of pinworm which is one of subspecies of nematodes. Liver pinworm infection was extremely rare [14]. Rarely, Pinworm is found outside of the gastrointestinal tract in the peritoneum, fallopian tubes and liver [14-16]. It is suggested that a breach in intestinal continuity permits translocation of the parasite out of the intestine. The patient of our first case had rectum carcinoma, maybe the carcinoma gave an opportunity for pinworm transferring to liver.

We were familiar with liver hydatid disease, liver schistosomiasis previously. However, the nodules did not meet the typical imaging feature of liver hydatid disease or liver schistosomiasis in the two cases we described. Since we suspected the liver nodules were metastatic cancer initially without considering to be parasitic nodules, so we ruled out to check the patients'

stool to find worm ova which is the simplest and most accurate diagnostic method. Parasitic worm in pathological specimen was detected ultimately.

SNNL imaging features is challenging and requires a combination of trans-abdominal US, multiphase CT scanning and an MRI scanning generally. Unfortunately, no single radiological technique can confidently diagnose SNNL [17]. With regard to CT imaging, Yoon et al. concluded that it was difficult, if not impossible, to differentiate SNNL from hepatic metastases using this modality alone [18]. At present, MRI is believed to be specific for its diagnosis. In most cases, there was no internal enhancement in arterial phase, portal vein phase and delayed phase, and some edge enhancement was observed, which was more obvious in delayed phase images [8,12]. The combination of clinical and imaging examination is conducive to the accurate diagnosis of preoperative SNNL. However, clinical data and imaging features of many cases are not typical, and may suggest the possibility of other diseases. This eventually led to misdiagnosis and unnecessary hepatectomy, like our second case.

Conclusion

Since imaging diagnosis is often controversial, maybe we can make a diagnosis from the etiology. Parasite is an important etiology of SNNL, more and more SNNL caused by parasites have been diagnosed. So stool microbial examination will be helpful in patients with an ambiguous diagnosis, and should be normalized, in order to minimize unnecessary hepatectomy.

Conflicts of interest

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