Clinical Medicine

Needle Biopsy of the Liver
A Critique of Four Currently Available Methods

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There are currently four needle biopsy methods for obtaining tissue from patients with possible diffuse liver disease or cancer. These include percutaneous blind needle biopsy, a visually guided needle biopsy at laparoscopy, guided fine-needle biopsies with ultrasonography or computed tomography, and the transvenous liver biopsy. We and others have found the guided fine-needle biopsy technique to be safe, relatively cheap, and highly accurate in the diagnosis of liver cancer. Blind percutaneous biopsy should be reserved for patients with possible diffuse, noncancerous, liver disease. Guided biopsies at laparoscopy can be done if the other two methods fail to give a tissue diagnosis. The transvenous approach is useful in patients with a coagulation disorder.

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The pathologic interpretation of liver tissue obtained by needle biopsy has become increasingly important in diagnosing liver disease. Initially, tissue was obtained with the use of relatively large needles inserted blindly into the liver through a transthoracic or subcostal approach.[1] This technique has subsequently been modified, and needles are now 1.2 to 2.0 mm in diameter.[2,3] Although this blind approach has been accurate in diagnosing most diffuse liver diseases,[4-9] it has been a disappointment in the evaluation of primary and metastatic liver cancer.[8,10,11] Thus, over the past decade the use of guided needle biopsies has become increasingly popular.[12] Currently, there are four methods available for needle biopsy of the liver (Table 1): the percutaneous, blind transthoracic or subcostal approach; the guided biopsy under direct vision at the time of laparoscopy; the guided fine-needle biopsy or aspiration using modern radiographic techniques; and the transvenous or transjugular biopsy. We will evaluate these four methods, discuss their strengths and weaknesses, and propose guidelines for their appropriate use.

Percutaneous, Blind Needle Biopsy

Over the past 50 years, the standard method for obtaining liver tissue has been the percutaneous transthoracic or subcostal needle biopsy.[1] Various needles are available today; the most popular ones have a diameter of 1.2 to 1.6 mm. As currently done, the procedure is safe with a mortality rate less than 0.02%,[1] and it can be accomplished in an outpatient setting if a hospital support system is nearby.[13,14] Although numerous complications may occur, such as pain, hypotension, bile leakage, bacteremia, and unintentional biopsy of other abdominal organs, these are uncommon and rarely have serious sequelae.[1] The most feared complication is hemorrhage, but when the biopsy is done carefully with the smallest possible needle in patients without a coagulation disorder, the incidence is less than 1%.[13-15]

If a possibility of diffuse liver disease such as alcoholic hepatitis, acute or chronic viral hepatitis, or fatty liver is the reason for the biopsy, the results have been accurate.[4,7-9] The small core of tissue representing 1/50,000 of total liver mass is representative of the entire liver.[16] Moreover, intraobserver and interobserver variations among pathologists in interpreting the biopsy specimens have been low, and the interpretation of various possible histologic features of specimens is satisfactory.[6,17]

Diagnosing cirrhosis may be difficult using the percutaneous needle biopsy. Its diagnostic accuracy has varied from less than 50% to 96%.[18] This has been attributed to inadequate size of the specimen, tissue fragmentation, the biopsy needle glancing off hard fibrous tissue, and irregular spacing of macronodules.[18,19] Goldner took biopsy specimens from cirrhotic livers at autopsy using three different needles.[20] The specimens obtained using a TruCut needle with a diameter of 2.0 mm were more accurate for cirrhosis than those taken with the 1.6-mm Menghini and Klatskin needles. Abdi and co-workers did biopsies in 118 patients with suspected liver disease just before autopsy.[8] A Klatskin needle was used, and three separate passes were made. Cirrhosis was diagnosed in only 80% of the first biopsy specimens. Maharaj and associates likewise did biopsies in 75 patients three times using a TruCut needle.[11] Only 50% showed cirrhosis on all three biopsy specimens. Soloway and colleagues did multiple biopsies at the same time using a Vim-Silverman needle on 50 patients with chronic hepatitis.[6] Only three of seven with cirrhosis had features of the same in all biopsy specimens. Over a one- to three-year period, repeat biopsy specimens showed no signs of cirrhosis in six patients having it on the initial biopsy.

A common indication for needle biopsy of the liver has been a suggestion of primary or metastatic cancer. Review of the literature shows an overall sensitivity of about 70% to 75% with a range of 66% to 90%.[10,16] The accuracy of the blind needle biopsy in this setting has been increased by doing two biopsies rather than one[16] and by including cyto-

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ABBREVIATIONS USED IN TEXT
CT = computed tomography
FNB = fine-needle biopsy

logic techniques rather than histologic examination alone.[21,22] As might be expected, the biopsy success rate correlates with the amount of cancer in the liver. Conn and Yesner[10] found 21% of liver biopsy specimens to be "positive" if one to three metastatic nodules were present compared with 100% accuracy when the liver was at least 50% replaced by cancer. It is clear that a blind needle biopsy occasionally, if not often, misses liver cancer.

Guided Needle Biopsy at Laparoscopy

Guided needle biopsies of the liver may be done under direct vision using the technique of laparoscopy.[23] After local anesthesia and sedation, or general anesthesia, nitrous oxide or carbon dioxide is introduced into the patient's abdomen producing a pneumoperitoneum. The abdominal cavity and its contents can then be visualized through a telescope passed through a cannula in the anterior abdominal wall. A biopsy can be taken of suggestive areas on the liver surface under direct vision. The overall complication rate is less than 1% and mortality less than 0.03%.[23,24]

As noted above, the blind percutaneous needle biopsy is accurate in diagnosing diffuse liver disease. Picciotto and co-workers carried out three liver biopsies each on 60 patients with nonfocal liver disease.[25] The first was done by the percutaneous method, and the other two were done at laparoscopy. The results were the same in 57 of the 60 patients, the only variability being in the severity of chronic hepatitis in 3 patients. Czaja and associates did percutaneous blind and guided needle biopsies at laparoscopy in 36 cadavers.[9] There was no difference between the two in the diagnosis of diffuse liver disease. In a review of the literature, Nord[19] found laparoscopic biopsy to be more accurate than percutaneous needle biopsy with regard to cirrhosis.

It has been estimated that 90% of liver cancers are visible at laparoscopy[24]; thus, a guided needle biopsy should be accurate. Results show an accuracy of 80% to 95%, which is considerably higher than for the blind percutaneous biopsy technique.[23,24]

Jori and Peschile in 1972[26] compared the results of blind needle liver biopsy with laparoscopy in 48 patients with possible liver cancer. On blind biopsy, the results in 14 of 20 patients (70%) with primary liver cancer and in 5 of 16 (31%) with metastatic cancer were abnormal ("positive"). The guided needle biopsy at laparoscopy showed abnormalities in 19 of 20 (95%) with primary liver cancer and 14 of 16 (88%) with metastatic disease. In the cadaver study noted above, Czaja and colleagues found that of five patients with liver cancer, one was diagnosed with the blind percutaneous biopsy in contrast to four at laparoscopy (biopsy and visual inspection).[9] In 28 patients suspected of having liver cancer, Friedman and Wolff were able to establish a positive tissue diagnosis in 25 using guided biopsies at laparoscopy.[27] The liver could not be adequately visualized in the other three patients. The results of a prior blind percutaneous needle biopsy had been falsely normal in 6 of these 25 patients. Lightdale found that of 60 patients with documented liver cancer at laparoscopy, 23 had previously normal results on a blind liver biopsy.[24]

Brady and co-workers have recently compared the results of needle biopsy in patients with focal liver disease using either a computed tomography (CT) or laparoscopic-guided technique.[28] Of 12 patients with liver cancer randomly assigned to the CT group, biopsy specimens showed abnormalities in 9 (80%). Laparoscopic-guided biopsies showed abnormalities in six patients with cancer; the examination was inadequate in two others, one of whom later was shown to have metastatic liver disease. An additional 19 patients thought to have liver disease with a normal CT scan underwent laparoscopy. Four were found to have malignant lesions. The authors concluded that these two techniques of guided liver biopsies were equally satifactory in patients with focal liver lesions.

TABLE 1.—*Cost of Liver Needle Biopsy*

	Cost, $
Percutaneous needle biopsy	
Room and monitoring charge	400
Physician's fee	150
Pathology (hospital)*	200
Total	750
Guided needle biopsy at laparoscopy	
Room and monitoring charge	600
Physician's fee	800
Pathology (hospital)*	200
Total	1,600
Guided needle biopsy with ultrasonography	
Ultrasound procedure	160
Pathology (clinic)†	88
Total	248
Guided needle biopsy with computed tomography (CT)	
CT procedure	300
Pathology (clinic)†	88
Total	388
Transvenous needle biopsy (inpatients only)	
Biopsy procedure	500
Equipment charge	160
Pathology (hospital)*	200
Total	960

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Guided Fine-Needle Biopsy With Ultrasonography or Computed Tomography

Over the past ten years it has become increasingly clear that percutaneous fine-needle biopsy (FNB) of the liver with guidance by ultrasonography[29] or computed tomography[30] is both accurate and safe. With the use of these imaging techniques, thin-walled needles of 0.6 to 0.9 mm in diameter can be directed into focal liver lesions. The aspirated specimen contains cells mixed with blood and tissue fluid that can be sent for cytologic and histologic examination.[31]

The accuracy of this technique in various series for the diagnosis of liver cancer ranges from 80% to 99%,[32-51] much higher than with percutaneous blind needle biopsy. Although the aspirated material may be sent for cytologic or histologic evaluation, many authors[35-37,41,45,46,49,50] have found a higher yield for cancer when both are done on the same specimen. Four reports[29,38,40,52] have noted many examples of FNB results showing cancer in patients having had a prior percutaneous liver biopsy with normal findings. False-positive results are uncommon, having been reported in only 3 of the 21

articles surveyed. The incidence was 1/49,[36] 2/130,[45] and 1/92[51] patients.

Because the needles used are of small caliber and can be guided away from adjacent organs or vascular structures, FNB is safe. In 1971 Lundquist reported only one serious complication in 2,611 aspirations.[53] In numerous reports since that time,[32-51] few if any serious complications were found even when hemangiomas were accidentally punctured.[39,44,45] The overall complication rate is 0% to 2.4%, with a death being extremely rare.[48]

In the future, guided needle biopsies may be done using the Biopty-Cut Biopsy Needle (C.R. Bard Inc). With this method a core of tissue is obtained, rather than aspirated cells. Experience with the use of this instrument for liver biopsy is currently limited in the United States.

Transvenous Liver Biopsy

The above methods of liver biopsy may be contraindicated in some patients with liver disease because of a coagulation disorder. In this setting, the transvenous liver biopsy method may be helpful. After a catheter is introduced and guided through an internal jugular vein and subsequently through the vena cava system into a hepatic vein, a biopsy needle is inserted through the catheter and then into the hepatic tissue using a suction technique.[54,55] In a recent review from France,[54] tissue was obtained in 1,000 of 1,033 attempts (96.8%). If there was no hepatic fibrosis, the tissue specimen obtained was adequate for diagnosis in 191 of 193 cases (98.9%); if there was fibrosis or cirrhosis, however, the tissue was adequate in only 518 of 807 cases (64%). Rosch and co-workers obtained adequate specimens in 39 of 44 attempts.[55] This method of liver biopsy appears to be safe and workable when done by experienced operators.

Discussion

Currently, as discussed above, physicians can choose between four methods of obtaining tissue by needle biopsy in the diagnosis of diffuse or focal liver disease. Each can be considered well established and not experimental. As noted in Table 1, the cost differs for each procedure.

If diffuse liver disease is suggested, such as acute or chronic hepatitis, steatosis, or cirrhosis, the blind percutaneous liver biopsy should be done. More tissue is required for diagnosis than can be obtained with FNB, and there is no advantage to a guided needle biopsy at laparoscopy.[9,25] If the results of a blind percutaneous biopsy are normal and yet cirrhosis is suspected, the next procedure may be laparoscopy.[19]

Patients with possible liver cancer should have FNB under either ultrasonographic or CT guidance. This technique is quick, safe, can be done in an outpatient setting, and compares favorably in cost with the other two methods. Multiple aspirations can be done and the specimens sent for both cytologic and histologic examination. The degree of accuracy for focal liver cancer is higher with FNB than with the percutaneous blind biopsy, approaching 90% in most studies.[32-51] We would reserve laparoscopy for patients in whom FNB and percutaneous blind biopsies have failed and yet the suspicion of liver cancer remains high, or for situations where it is important to know if cancer has spread to other parts of the abdomen or peritoneum. Finally, in patients with a coagulation disorder, the transvenous method can be used.[54,55]

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Simple Treatment for Chronic Female Infections

ABOUT A THIRD OF WOMEN who come to see me have seen an average of four physicians previously and have had therapy for a chronic yeast infection. The trouble is, they do not have an infection at all; they have a mucositis due to some sort of irritating substance. I will just make one generalization: If a substance is colored, if it has a fragrance, or if it is alkaline, it is bad news for the vaginal mucous membrane. And, I think, as a general rule, you can treat these patients symptomatically with acidification and drying.

I have my patients—when they bathe or shower—wash the soap film off the vulvar and vaginal skin surfaces carefully, and dry themselves off thoroughly with a soft cotton towel. Then I have them use a hair dryer to dry off the vulva, the intertriginous area, so that they are dry, and then have them powder themselves with cornstarch or baby powder. I think cornstarch is preferable because it does not have a fragrance. And, again, if it has a fragrance, there is a potential for it to be an allergen.

Having the patient use a hair dryer and cornstarch, a washing routine, and acidification with boric acid means that you may never find out what the nature of the problem was, but I guarantee that you will make these patients more comfortable.

There are some potential irritants that you should be taking specific histories about. Opulent soaps are the absolute chief offender. What I recommend is white Dove soap. Another thing that I want to just remind you about is colored toilet paper. The first question for women with persistent urethritis is: What color is the toilet paper in your bathroom? If it is blue, have them change it. And again you will be amazed, and I think you will be gratified, with how some of these seemingly unsolvable mysteries can be solved by considering fairly mundane things: perfumes, spermicides, spermicidal jellies, chlorinated pools, feminine hygiene sprays, deodorant tampons.

I think it is important to discuss candidly with your patients issues like their masturbation habits or whether they have anal intercourse. A substantial proportion of women with recurrent nonspecific bacterial vaginosis who stop having anal intercourse do not have bacterial vaginosis anymore.

—JOHN H. GROSSMAN III, MD

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