

## OUTPATIENT PERCUTANEOUS BLIND NEEDLE LIVER BIOPSY: SAFETY AND COST ANALYSIS

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To determine the safety, complication rate and cost saving of outpatient percutaneous blind needle liver biopsy in a single tertiary care center, we retrospectively reviewed the records of all 117 patients who had had outpatient percutaneous blind needle liver biopsy from March 1994 to September 1995. We reviewed data including demography, Child's classification, histopathology report and complications, and attempted to compare the cost involved with inpatient liver biopsy. Of the 117 records studied, two were incomplete. Of the 115 patients who had complete records, 43 (37.4%) had minor complications, 2 (1.7%) required overnight hospitalization for pain and hypotension, and the procedure failed in one patient (0.9%). There was no correlation between complications and Child's classification, or concomitant chronic renal failure. In comparison to inpatient liver biopsy, we calculated that the saving made is about 1800 Saudi Riyals (\$478.70) per operation, if performed on an outpatient basis. We conclude that outpatient percutaneous blind needle liver biopsy is safe, successful in more than 99% of cases, associated with no mortality, has negligible major complications requiring hospital admission, and results in considerable savings per biopsy. We therefore strongly recommend performing most liver biopsies on an outpatient basis, in the appropriate hospital setting, unless hospital admission is otherwise indicated. *Ann Saudi Med* 1997;17(5):503-505.

Percutaneous blind needle liver biopsy (PBNLB) has been performed for more than 100 years and is now a well-established diagnostic procedure. It was first performed by Paul Ehrlich in Germany in 1883, but the first large series were not reported until 1930 by Huard in France and Baron in United States.<sup>1</sup> The procedure was not widely accepted until 1958 when Menghini reported his "one-second" suction technique,<sup>2</sup> which shortened the duration of intrahepatic phase of the biopsy needle, thus limiting the complication rate. Since then, the procedure has traditionally been done on an inpatient basis, because of the fear of complications.<sup>3-5</sup> Several reports have, however, shown the safety of outpatient liver biopsy.<sup>6-14</sup>

We wanted to report our experience of outpatient PBNLB, correlate the complications to Child's classification and co-existing renal failure, and compare the cost of outpatient PBNLB to inpatient PBNLB, for the following reasons: 1) Chronic liver diseases are common in Saudi Arabia; 2) most, if not all, hepatologists, gastroenterologists, and internists perform liver biopsies on an inpatient basis in Saudi Arabia; and 3) there are no published reports on a large series of outpatient liver biopsies in Saudi Arabia.

### Patients and Methods

Between March 1, 1994, and September 30, 1995, 117 outpatient PBNLB were performed at King Fahad National Guard Hospital, (KFNGH) Riyadh, a tertiary referral hospital with a liver transplant program. Liver biopsies that were performed during the study period under ultrasound (US) guidance, through transjugular approach, or on an inpatient basis, were not included in the study. All biopsies were done for evaluation of chronic liver disease (elevated liver enzymes for more than six months). Informed consent was obtained from every patient. All biopsies were performed in the Endoscopy Unit recovery area, which is a short-stay facility. Exclusion criteria were one or more of the following: 1) hemoglobin <100 g/L, 2) platelet count <50x10<sup>9</sup> g/L, 3) international neutral reagent (INR) >2, and 4) US examination of upper abdomen that shows focal hepatic lesion, dilated intrahepatic ducts or moderate to massive ascites. For patients with INR of 1.5 to 2, the biopsy was done after intravenous injection of 10 mg of vitamin K, and infusion of 2 units of fresh frozen plasma. For patients with chronic renal failure and on regular hemodialysis, the biopsy was done after infusion of 20 µg of desmopressin acetate (DDAVP).

All biopsies were performed by a single hepatologist using disposable Jamshidi-Menghini soft tissue biopsy needle (15-gauge 70 mm x 1.9 mm, Baxter Health Care Corp.), after IV administration of 5-10 mg of diazepam. The point of maximal liver dullness was localized between

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the mid-axillary and anterior axillary line. After skin preparation, 5-10 mL of 2% xylocaine was used to infiltrate the dermis, subcutaneous tissue and the liver capsule. A 2-3-mm cutaneous incision was made with a size 11 scalpel. After penetrating the chest wall, the biopsy needle was then inserted under suction, while the patient held his/her breath in expiration, and the needle was directed perpendicular to the skin or in a cephalic orientation. The needle insertion in the liver was done in a quick maneuver; an in-and-out movement under suction was considered one pass. If no adequate tissue was retrieved in three passes this was considered a failure, and the biopsy was then obtained under US guidance. A bandage was applied to the biopsy site and the patient placed on his/her right side for 1-2 hours before being allowed to mobilize and have something to eat. During observation, the patient's pulse and blood pressure were monitored every 15 minutes for one hour, and every 30 minutes for two hours for any complaints. The physician was notified about any change in the patient's condition and observation parameters. If the patient was stable, he/she was allowed home three to four hours after the procedure with an attendant, after making sure that he/she could be brought back to the hospital with any related events.

The charts of patients were reviewed retrospectively by an independent investigator. Demographic data, Child's classification, liver histopathology report, complications, emergency room visits, hospital admissions, blood transfusion and surgical interventions were reviewed. Complications were classified as minor pain, which included mild pain (controlled by two tablets of Tylenol III—codeine 60 mg + acetaminophen 650 mg—orally), moderate pain (only controlled by meperidine 25-50 mg IV), mild hypotension (decrease in blood pressure of 10-20 mm Hg), and moderate hypotension (reduction in blood pressure of 21-30 mm Hg). Clinical peritonitis, emergency room visits, admissions to the hospital, blood transfusion or surgical intervention were all considered "major" complications. Compliance with subsequent clinic visits was checked.

## Results

Of the 117 charts reviewed, two were excluded because they were incomplete (none had complications). The 115 patients who had complete records were made up of 80 males (69.6%) and 35 females (30.4%), with a mean age of 40.13 (range 16-70) years. Biopsy results revealed chronic hepatitis in 69 patients (60%), cirrhosis in 45 (39%), and granuloma in 1 (1%). Table 1 shows the pathologic findings. Of the 45 cirrhotics, 36 were Child A and B, while 9 were Child C patients. Ten patients of the chronic hepatitis group also had concomitant chronic renal

TABLE 1. Pathologic diagnosis.

Diagnosis	No. of patients (%)	No. of complications (%)
HCV	68 (54.4)	27 (39.7)
HBV	34 (27.2)	12 (35.3)
Steatohepatitis	8 (6.4)	2 (25)
Autoimmune	7 (5.6)	2 (28.5)
Schistosomiasis	4 (3.2)	1 (25)
Wilson's disease	3 (2.4)	1 (33.3)
Hemochromatosis	1 (0.8)	0
Granuloma	1 (0.8)	0

Some of the patients have more than one cause of chronic liver disease.

failure, and so the biopsies were done after 20 mg of DDAVP infusion, while six patients of the Child C group had their biopsy performed after vitamin K and FFP administration because of prolonged INR.

Minor complications included mild pain in 13 patients (11.3%), moderate pain in 22 (19.1%), and mild hypotension in 8 (7%). All of these were managed conservatively during the observation period, and did not prevent discharge after a slightly longer observation period of up to six hours. No Emergency Room visits were recorded for any patients after discharge. Only two patients (1.7%) needed an overnight admission because of persistent pain and moderate hypotension, which were managed by IV, fluids and painkillers. The two patients had no peritonitis, decrease in hemoglobin or ultrasound evidence of hepatic subcapsular hematoma and were discharged home the next morning in good health. All patients were seen in the subsequent follow-up clinic visit two to six weeks after the procedure. There were no deaths related to the procedure.

There was no difference in complication rate in relation to the pathologic diagnosis (see Table 1). Five of nine Child C patients (55.6%) had minor complications, compared to 36 of the 106 Child A and B patients (34.0%) ( $P>0.05$ ). The two patients who had major complication were from the Child A and B cirrhosis group. Among the ten patients with chronic renal failure, two (20%) developed mild pain ( $P>0.05$ ) (Table 2). One patient (0.8%) had failure of the procedure after three passes and the biopsy was successfully performed under US guidance. The failure of the PBNLB in this cirrhotic patient was related to a very atrophied right lobe of the liver.

The cost of one day's admission to our institution is 2400SR (\$638.30), while the cost of a six-hour stay is 600SR (\$159.60) in our Endoscopy Unit recovery area. The fact that the cost of the procedure itself is the same for both inpatient and outpatient means that a saving of 1800SR (\$478.70) per patient was made, which was more than 200,000SR (\$53,192) over the study period.

TABLE 2. Correlation of complication to Child's classification and to chronic renal failure.

	Chronic hepatitis + Child A and B chrrihotics	Child C cirrhotics	CRF
No. of patients	106	9	10
Minor complication	36 (34%)	5 (55.6%)	2 (20%)
Major complication	1 (1%)	1 (11%)	0
Mortality	0	0	0

P-value=not significant.

### Discussion

The indications for liver biopsy are growing, and not only include diagnosis but also assessment of response to therapy. Inpatient liver biopsies impose a heavy burden on hospital resources, particularly at a time of shrinking health care resources.

There are no significant differences in complications following liver biopsy between inpatients and outpatients, with rates ranging from 0.9% to 3.7% in different reports.<sup>6-14</sup> This variability is probably related to differences in the definition of complications, the needle used, severity of the underlying illness, patient selection, and the experience of the physician performing the procedures.

We aim by this study to report outpatient liver biopsy experience in Saudi Arabia. We did not include a control group of inpatient liver biopsies, as the two groups of patients in our center are not comparable in terms of severity of liver disease and patient selection. Furthermore, this was studied by Perrault et al.<sup>9</sup> and showed no significant difference in terms of complication between inpatient and outpatient.

Our experience at KFNGH with outpatient PBNLB has been excellent. More than 98% of patients who had the biopsy done were discharged after a short observation period, 37.4% had minor complications, which were easily managed. In addition, no emergency-room-related visits or mortality were documented after discharge, and all patients were seen at their subsequent follow-up visit.

We encountered two patients who required hospitalization because of pain and hypotension, which was considered a major complication according to our criteria. Our complication rate was similar to that of other reports.<sup>1-11</sup> However, in these two patients, there was no decrease in hemoglobin, no clinical evidence of peritonitis and no ultrasound evidence of subcapsular hematoma. It is possible that anxiety, sympathetic overdrive secondary to pain, and probably intravenous sedation were the main contributing factors to hospitalization.

We found that post-liver biopsy complications have no relation to the Child's classification, pathologic diagnosis or the presence of renal failure, however, our patients

constitute a small selected group of patients and therefore this may not be representative of the true picture. The importance of the prophylactic measures with vitamin K, FFP, or DDAVP in the specified subsets of patients is difficult to assess due to the small number of patients and the lack of a control group. However, we feel these measures are necessary in order to perform this invasive procedure safely in high-risk patients.

The failure rate in our study was (0.8%), which indicates that blind liver biopsy is highly successful (over 99%), if performed by an experienced physician.

Finally, since we and others have shown the safety of outpatient PBNLB, and the savings achieved in comparison to inpatient liver biopsy, it is recommended that most patients should have this procedure performed on an outpatient basis in the appropriate hospital setting, particularly in this era of shrinking health care resources.

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