Short-stay, out-of-hospital, radiologically guided liver biopsy

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ABSTRACT

Objective: To evaluate the safety, the quality and adequacy of specimens obtained and the cost benefits associated with performing liver biopsy out of hospital, on a short-stay basis, using radiological guidance.

Design and setting: A prospective study undertaken over a three-year period, from March 1998 to March 2001, in a private radiology practice.

Patients and procedures: 251 patients (159 men) with stable liver disease participated. Coagulation studies were performed within a two-week period before biopsy, which was carried out under the guidance of ultrasound (143 patients) or computed tomography (108 patients). A disposable, spring-loaded gun with an 18-gauge biopsy needle was used in each case. A repeat ultrasound or CT scan was performed after the procedure to monitor for complications such as haemorrhage.

Main outcome measures: Complications of liver biopsy; adequacy of specimens for histological examination; cost of out-of-hospital procedures compared with liver biopsies performed in the hospital setting.

Results: Two hundred and twenty nine patients (91.2%) were discharged 60 minutes after the biopsy. The only post-biopsy complication was pain, either at the biopsy site or in the right shoulder. Pain was severe in three patients and, for one of these patients, a subcapsular hepatic haematoma was found on ultrasound eight days after the biopsy. Sufficient material for histopathological examination was obtained from all patients. The cost of out-of-hospital biopsies was substantially less than the cost of hospital-based, day-stay procedures.

Conclusions: Short-stay, out-of-hospital, radiologically guided liver biopsy is safe for patients who have stable chronic liver disease and acceptable coagulation profiles.

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LIVER BIOPSY is frequently performed to establish the diagnosis and stage of disease in various hepatobiliary disorders. In view of its potential complications, such as haemorrhage and gallbladder puncture, the procedure is usually carried out in hospital on an outpatient basis, with the patient being observed for 6–8 hours after biopsy.

The mortality rate following liver biopsy is between 0.01% and 0.1%, with the main causes of death being intraperitoneal haemorrhage and biliary peritonitis secondary to puncture of the gallbladder.[1,2] The morbidity rate associated with liver biopsy has been more difficult to establish. The commonest complication is pain, which is reported to be mild in about 30% of patients, moderate in 3%, and severe in 1.5%.[3,4]

The guidelines for liver biopsy produced by the American Gastroenterological Association[5] and the British Society of Gastroenterology[6] recommend that patients be observed for 6–8 hours after biopsy, although most complications become apparent within the first two hours.[1] In rare instances, haemorrhage may be delayed for up to two weeks.[7] The guidelines are based on data for biopsies carried out in hospital, as there have been no previous reported studies assessing the safety of performing liver biopsies out of hospital. However, in a recent study of 491 liver biopsies in which patients stayed in a hospital cafeteria for one hour after the procedure before being discharged no serious complications developed.[8]

The cost of liver biopsies could be reduced if at least some were performed out of hospital. As no previous studies of the feasibility of out-of-hospital procedures had been reported, we undertook a prospective study to determine the safety, diagnostic accuracy and cost benefits of performing percutaneous liver biopsy out of hospital using radiological guidance.

METHODS

Participants

Over a three-year period, from March 1998 to March 2001, 251 patients who had stable liver disease, without signs of decompensation, were referred to a private radiology practice for liver biopsy and were studied prospectively. Ninety-two of the participants were women (median age, 44 years; range, 18–72 years) and 159 were men (median age, 46 years; range, 20–78 years). All patients were assessed and referred by a gastroenterologist. Patients with ascites and mass lesions in the liver were not considered suitable for the study in view of the potential increased risks.[2] For inclusion in the study, patients had to be cooperative and able to follow instructions. There were no exclusions among the 251 patients referred for liver biopsy during the study period. Patients were fully informed of the procedure and its potential complications.

Coagulation studies

For all patients, coagulation studies (platelet count, international normalised ratio [INR], activated partial

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thromboplastin time [APTT]) were performed within a two-week period before liver biopsy, as a previous study had shown that in patients with stable chronic hepatobiliary disease results are reproducible over this interval.[9] Results were considered acceptable if the platelet count was greater than 80×10^9/L, the INR was less than 1.4, and the APTT no more than four seconds above the control value. All patients were advised not to take non-steroidal anti-inflammatory agents, including aspirin, for two weeks before undergoing liver biopsy.

Biopsy procedure

The procedure was performed with an automated gun (Temno biopsy needle T18/09, Bauer Medical International, Dominican Republic) under ultrasound control (143 patients) or computed tomography (CT) guidance (108 patients). (The method of imaging was chosen by the referring gastroenterologist.) An 18-gauge biopsy needle was used in each case. With the ultrasound biopsies, the procedure was carried out under direct guidance with visualisation of the needle. With CT-guided biopsies, a short, non-contrast spiral run of the liver was first performed to assess the best position for the biopsy. A repeat scan was then undertaken with a metal marker in position, the biopsy being performed at the site chosen on the previous series with the marker. This was done to minimise the amount of time the needle spent within the liver.

The site of biopsy was chosen according to the size of the liver and the position of the vessels and gallbladder. In 245 patients, biopsy was performed in the right lobe using an intercostal approach after injection of lignocaine 1%. In the other six patients, who had small livers, biopsy was made into the left lobe, using an anterior approach. To minimise complications, 5 mL of lignocaine 1% was injected with a 3-cm, 25-gauge needle under imaging control along the length of the tract.[8] A small amount of lignocaine was also injected deep to the liver capsule. To prevent movement of the liver during biopsy, patients were instructed to hold their breath during the procedure.

No intravenous sedative or analgesic was used. In each case, two passes were made in order to reduce sampling error (which is more common in macronodular cirrhosis)[6] and to obtain adequate tissue for histopathology. If haemochromatosis was suspected, a third pass was done to obtain tissue for measuring hepatic iron concentration. All biopsies were performed by one of us (M W). Following each biopsy, further ultrasound or CT scans were performed on all patients to monitor for complications.

Outcome measures

Post-biopsy complications. Patients were observed for 60 minutes after biopsy and then reviewed. If they were asymptomatic or had only mild pain, they were discharged. But, if the patient was in considerable pain or felt faint or sweaty, pulse and blood pressure measurements were taken and the imaging procedure was repeated to examine the liver capsule and hepatorenal pouch for any bleeding.

All patients were advised to stay with family or a friend and not to undertake any heavy physical activity in the following 24 hours. The presence of pain was assessed at the time of biopsy, as well as at follow-up after 1–2 weeks with the referring gastroenterologist, and was graded by both patient and observer. Patients were asked to grade any pain felt on a scale from 1 (no pain) to 5 (the severest pain ever experienced), and the scores were condensed down to three grades (mild, moderate or severe). The gastroenterologist's grading of pain at the time of biopsy was based on analgesic requirement.

Adequacy of specimens. We compared the quality and adequacy of tissue samples obtained under ultrasound guidance with those taken under CT control.

Cost of out-of-hospital procedure compared with in-hospital cost. Our estimate of the cost of performing liver biopsies out of hospital was based on the Australian Medicare Benefits Schedule (effective 1 November 2000). Local anaesthetic, antiseptics, dressings, needles and analgesia were absorbed as normal practice overheads.

The cost of liver biopsy, without radiological guidance, carried out on a day-stay basis in hospital, was calculated using the TRENDSTAR clinical costing system (iSOFT Company). Our estimate was based on day-only patients admitted to Liverpool Hospital between July 2000 and March 2001, using DRG H63B.

Indications for biopsy and histological diagnoses for 251 patients undergoing out-of-hospital liver biopsy

Indications for liver biopsy	Number of patients
Abnormal LFTs*	89
Hepatitis C	73
Suspected haemochromatosis	52
Hepatitis B	22
Hepatitis B and C	3
Miscellaneous (methotrexate, alcohol, suspected PBC, PSC, AICAH)**	12
Histological diagnosis	
Chronic hepatitis	112
Cirrhosis	46
Steatohepatitis	33
Haemochromatosis	24
Fatty liver	22
Granulomatous hepatitis	2
Miscellaneous (PBC, drug-induced, cholestasis, methotrexate)	11
Normal	1

AICAH = autoimmune chronic active hepatitis.
LFT = liver function test.
PBC = primary biliary cirrhosis.
PSC = primary sclerosing cholangitis.
*Persistent LFT abnormalities for which history, serological testing and imaging failed to establish cause.
**Methotrexate used in treatment of psoriasis, suspected PBC, PSC and AICAH.

RESULTS

The indications for liver biopsy in the study participants are shown in the Box. The time taken to perform a biopsy was 15–30 minutes. Patients were kept under observation until they were feeling well. The maximum period between completion of the procedure and time of discharge was 2 hours 45 minutes; however, 229 patients (91.2%) were discharged at 60 minutes.

Post-biopsy complications

The only post-biopsy complication was pain, either at the biopsy site or in the right shoulder. The degree of pain experienced by patients was similar for both ultrasound- and CT-guided biopsies. Pain was severe in three patients (1.2%), moderate in six patients (2.4%) and mild in 54 patients (21.5%), with the remaining 188 patients (74.9%) experiencing no pain or discomfort. None of the patients required hospitalisation after the procedure. However, one of the patients with severe pain developed a subcapsular haematoma that was diagnosed on ultrasound eight days after biopsy. Immediately following the biopsy this patient was well, and, as with all patients, was advised not to undertake any strenuous activity over the following 24 hours. This advice was ignored and the patient travelled about 150 kilometres by car to her home.

Adequacy of specimens

Sufficient material was obtained for histopathological examination (see Box for diagnoses) and biochemical analysis (where indicated) from all patients, irrespective of whether ultrasound or CT guidance was used.

Comparative costs of procedure

Our cost estimate for ultrasound-guided biopsy performed out of hospital was $203 ($116 for liver biopsy plus $87 for abdominal ultrasonography); the estimate for CT-guided biopsy was $535 ($116 for the liver biopsy plus $419 for the CT scan).

For liver biopsies performed in hospital on a day-stay basis, without radiological guidance, we estimated the average cost to be $1032 (*source:* Clinical Information, Liverpool Hospital, South Western Sydney Area Health Service). (We did not obtain costing information for biopsies done under radiological guidance, but the cost would certainly have been significantly higher.)

DISCUSSION

The only complication experienced by patients in our study was pain, which was readily controlled with oral analgesia. The incidence and severity of pain was similar to that previously reported.[3,4] Our results compare favourably with studies showing that hospitalisation as a result of complications (eg, haemorrhage, severe abdominal pain, pneumothorax) occurs in up to 3.2% of patients undergoing outpatient liver biopsy.[10,11] Most patients were able to be discharged 60 minutes after the biopsy. Apart from the one patient found to have a subcapsular haematoma eight days post-biopsy, no major complications arose and none of the patients required immediate admission to hospital after the procedure.

All tissue samples taken were adequate, and we found no difference in the quality of samples obtained, nor in the pain experienced by the patient, whether biopsy was performed under ultrasound or CT control. However, the cost savings were substantial when the biopsy was performed under ultrasound control, and the cost of either of the out-of-hospital procedures was significantly less than in-hospital procedures.

The third pass performed in our study for patients with suspected haemochromatosis would not be necessary in future procedures, as hepatic iron concentration can now be measured from smaller biopsy fragments.

We believe our study confirms that short-stay, out-of-hospital, radiologically guided liver biopsy is safe and effective for patients with chronic liver disease who have acceptable coagulation profiles. Furthermore, our results challenge the concept that liver biopsy patients need to be monitored for at least six hours after the procedure.

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COMPETING INTERESTS

None declared.

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Correction

Re: "What people say about their general practitioners' treatment of anxiety and depression", by Andrews G, Carter GL, in the 16 July Supplement on the SPHERE National Depression Project (*Med J Aust* 2001; 175: S48–S51). On page S49, column 1, the last sentence under the heading "Assessment" should be replaced by " 'Perceived health need' was based on questions derived from the work by Meadows et al.[1] These questions were asked principally of people who had not sought treatment. Similar concepts were used by the UK Survey of Psychiatric Morbidity questions."

The authors apologise for this omission and would like to draw readers' attention to another article by Meadows et al[2] for a more complete discussion of the development of the perceived need for care questionnaire.

1. Meadows G, Harvey C, Fossey E, Burgess P. The assessment of perceived need. In: Andrews G, Henderson S, editors. Unmet need in psychiatry. Cambridge: Cambridge University Press, 2000.
2. Meadows G, Harvey C, Fossey E, Burgess P. Assessing perceived need for mental health care in a community survey: development of the perceived need for care questionnaire (PNCQ). *Soc Psychiatry Psychiatr Epidemiol* 2000; 35: 427-435. ❑