Transjugular liver biopsy – experience in fifty patients

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Objective: We evaluated the safety, adequacy, clinical impact and cost of transjugular liver biopsies performed at our institution. Methods: Eighty-four biopsies performed in 50 consecutive patients with coagulopathy (INR >1.4; n=20), thrombocytopenia (platelet count <75,000/cmm; n=17), ascites (n=10), or coagulopathy and thrombocytopenia (n=3) from April 1999 to July 2002 were analyzed. Biopsy was performed under local anesthesia with fluoroscopic guidance, using the Quick Core biopsy needle. Results: Ninety-two needle passes were made to obtain 84 samples. Biopsy was technically unsuccessful in two patients because of hepatic vein ostial block; however, the procedure established the diagnosis of blockage of hepatic vein ostia in these patients. Biopsy specimen was adequate for histological examination in 45 patients. The median number of biopsies performed with 18- and 19-gauge needles was 14 and 8, respectively. The biopsy provided diagnostic information in 23 of 50 (46%) patients, and helped in staging or providing prognostic information in 37 (74%) patients. There were no major complications. Minor complications included transient hepatic vein-to-portal vein fistula in 2, transient hepatic vein-biliary fistula in one, local hematoma in 5, and post-procedure fever in 5 patients. The approximate cost of the needle and accessories was Rs. 2000 per patient. Conclusions: Transjugular liver biopsy was safe, provided adequate tissue in 90% of patients, and helped frequently in diagnosis and in staging or prognostication of disease. [Indian J Gastroenterol 2003;22:173-175]

Key words: Ascites, coagulation disturbance, hepatomegaly, jaundice, liver histology, transvenous liver biopsy

Percutaneous liver biopsy is unsafe in patients with liver disease complicated by coagulopathy, thrombocytopenia or ascites. The transjugular route has been used to obtain liver biopsy specimens in such patients. Experience with this technique in India is limited. We report data on the safety, adequacy, clinical impact and cost of transjugular liver biopsies performed at our hospital.

Methods

We retrospectively analyzed the data of 50 patients (aged 4 to 56 [mean 31.6, SD 12] years; 31 men) who had undergone transjugular liver biopsy between April 1999 and July 2002. Informed consent had been obtained from all patients prior to the biopsy, which was performed under fluoroscopic guidance and monitoring with pulse oximetry. Monitoring of non-invasive blood pressure and ECG rhythm was used in high-risk patients. Of the 50 patients, one each had ischemic heart disease and valvular heart disease. The procedure was performed under sedation with midazolam in adults or general anesthesia using ketamine in children (age <12 years).

Procedure

With the patient in supine position with the head turned to the left side, the right internal jugular vein was punctured using the standard Seldinger technique, with a 14-gauge Angiocath (B Braun, Curt-Ponda, Goa). The needle stylet was removed and 0.035-inch Radiofocus guidewire (Terumo, Japan) was introduced. The tract was dilated using a No. 7 vascular dilator (Boston Scientific, Medi-Tech Division, Watertown, USA). The wire was removed and an Amplatz superstiff wire (Boston Scientific, Medi-Tech Division) was guided in the inferior vena cava. The vascular dilator was removed and over the wire, and a Baltin’s sheath (Cook, Bloomington, USA) was introduced into the right hepatic vein. The sheath was not wedged peripherally in the vein to reduce the risk of capsular perforation. Then, 1000 U heparin (1000 units in children) was injected into the vein, and a diagnostic venogram was done to confirm the position of the needle. A sheathed transjugular liver biopsy needle (Quick Core; Wilson Cook, USA: 18G or 19G, 60 cm length, 20 mm throw length) was introduced through the Baltin’s sheath into the right hepatic vein and was advanced until resistance was felt. The needle was sheathed (6Fr angiography catheter; Boston Scientific, Medi-Tech Division) to prevent it from piercing the Baltin’s sheath. The needle was then triggered keeping an eye on its distance from the lateral and inferior margins of the liver. The needle was then pulled out and the tissue specimen inspected.

Thereafter, a check venogram was done to look for capsular perforation or portal or biliary fistula. If no complication was noted, the sheath was pulled out and compression applied at the site of puncture in the neck. The patient was kept in hospital for 24 hours after the procedure, and monitored for changes in vital param-
eters and abdominal girth, evidence of tenderness or guarding of the abdomen, or any complications at the puncture site.

The biopsy specimen was measured using a measuring scale and was sent in Bouin's fluid for routine H & E examination, over a dry filter paper for copper iron estimation, and in normal saline for special stains. The needles were re-used after ethylene oxide sterilization. The needle was discarded if no liver tissue was obtained after two attempts or there was difficulty in firing the needle.

Indications

The indications for performing transjugular biopsy included: coagulopathy (INR > 1.4; n=20), thrombocytopenia (platelet count < 75,000/mL; 17), ascites (10), or coagulopathy and thrombocytopenia (3). In one adult with a collapsed jugular vein and one child who underwent the procedure under general anesthesia, ultrasound guidance was used to localize the internal jugular vein.

The indications for performing liver biopsy included: portal hypertension (differentiation of non-cirrhotic portal fibrosis and cirrhosis) 14, chronic liver disease (possible liver cirrhosis) 14, possible Wilson’s disease (for copper determination in liver tissue) 9; for staging of chronic hepatitis 4; ascites of unknown etiology 2; cholestatic liver disease 2; and pyrexia of unknown origin, abnormal transaminase levels, iron overload, suspected storage disorder, and hyperammonemia of unknown origin 1 each.

Results

In our 50 patients, 92 passes were made and 84 specimens were obtained. The median number of passes per patient was 2 (range 1-4). In 35 patients more than one biopsy piece (2 biopsies - 34 patients, 3 biopsies - 1 patient) were obtained, either for special stains like reticulin, orcinol, Masson's trichrome, PAS with diastase, Prussian blue, or for liver copper or iron estimation, and H & E staining if the biopsy was thought to be small. Biopsy was deemed adequate if the pathologist found the tissue adequate to make a diagnosis. Liver tissue was obtained in 48 of 50 patients (96% success rate).

No patient underwent repeat biopsy. The two patients in whom biopsy was technically unsuccessful had block of the hepatic vein ostia and both had presented with ascites of unknown origin. In the 48 patients in whom liver tissue was obtained, biopsy was inadequate for histological analysis in 3 patients; in two of them, the tissue was fragmented. All three had suspected cirrhosis. Thus the liver biopsy was adequate in 90% (45/50) of patients in whom it was attempted.

The mean (SD) time spent for the procedure was 42 (35; range 30 to 120) minutes. Of 84 specimens, 65 were sent for H & E staining, 9 for liver copper estimation, one for liver iron, and 9 for special stains. The mean (SD) length of liver tissue obtained was 7 (4) mm (range 2-15 mm). The median (range) number of biopsies performed using 18-gauge needle was 14 (13-16) and with 19-gauge needle was 8 (6-12). In all, 8 biopsy needles were utilized for 50 patients.

The cost of the procedure was calculated assuming that an 19G needle (cost Rs. 12,000) could be used on an average in eight patients and that the accessories (total cost Rs. 10,000; Angiocath Rs. 100, Amplatz superstiff wire Rs. 4,000, Balkin's sheath Rs. 4,900, Radifocus guidewire Rs. 900, and vascular dilator Rs. 100) could be re-used 20 times. The approximate cost of these consumable items thus was Rs. 2000 per patient. The costs of anesthesia, hospitalization and ultrasonography would vary from hospital to hospital.

The liver biopsy provided diagnostic information in 21 patients. In two patients in whom biopsy could not be obtained, the procedure provided a diagnosis of Budd-Chiari syndrome. Thus, the procedure had a clinical impact in 23 of 50 (46%) patients. The pre- and post-biopsy diagnoses in these patients have been tabulated (Table). The biopsy helped in staging or prognostication of liver disease in 37 (74%) patients.

No major complication was encountered. All patients complained of mild discomfort at the local site. Two patients developed transient fistula between hepatic vein and portal vein; these closed spontaneously in a few minutes. One patient had a hepatico-biliary fistula, which closed within five minutes. Five patients had a local hematoma and five patients had fever after the procedure. In 3 of these 5 patients, a new needle had been used and therefore the fever appeared unrelated to needle re-use. There was no death related to the procedure.

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<th>Table: Pre- and post-biopsy diagnosis with impact on management</th>
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<td>Pre-biopsy diagnosis</td>
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Discussion

Transjugular liver biopsy is useful in situations where percutaneous liver biopsy is unsafe. Less common indications include failed percutaneous biopsy, massive obesity, small cirrhotic livers, and peliosis hepatis.

Transjugular catheterization in human subjects was first described in 1973. Aspiration technique of transvenous liver biopsy has a lower yield than the Trucut technique. The latter's automated mechanism produces non-fragmented tissue specimens.

One of the advantages of transjugular liver biopsy is that it allows several cores of liver tissue to be obtained during the same procedure without multiple skin punctures. Moreover, in diffuse liver disease, tissue specimens can be obtained from different sites through the same hepatic vein. The route can also be used for delineating the hepatic venous systems and for pressure measurements.

We had a technical success rate of 96% and adequate tissue was obtained in 90% of patients; these rates are comparable to those in other studies. Even in the two patients in whom biopsy was technically unsuccessful, a diagnosis of Budd-Chiari syndrome was established. Inadequate tissue was obtained in three patients with suspected cirrhosis; Papathodoridis et al. reported no difference in the yield in patients with cirrhosis and no cirrhosis. The procedure had a clinical impact in 45% of patients; this was similar to the clinical impact rate of 35% in a study from the Royal Free Hospital in United Kingdom.

No major complications were seen in our series, as was the case in some previous studies; however, major complications have been reported with this procedure in some series. We did not have capsular perforations; this may be because the needle was fired with the sheath in the central position and not in a peripheral, wedged position. Ultrasonography-guided puncture of the jugular vein, which was used in two of our patients, may help avoid inadvertent carotid artery puncture.

Transjugular liver biopsy can be performed in any institution that has an image intensifier and an experienced interventional radiologist. Re-use of biopsy needle and other material can help reduce the costs. Transjugular biopsy may save the money spent on blood products that may be required for performing percutaneous liver biopsy in some high-risk patients.

In conclusion, transjugular liver biopsy is a safe procedure with low rates of complications when performed by an experienced interventional radiologist. With attention to technical detail, adequate specimens can be obtained in most patients and the procedure has significant clinical impact by providing information that is useful in determining the diagnosis or prognosis of liver disease.

References


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