*Original Article*

# Liver Biopsy: Is it Safe in Children?

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**Abstract**

**Introduction:** The blind liver biopsy technique has been widely used in Sudan as the availability of the ultra sound machines and the committed Pediatrics Radiologist were not always at hands. Liver biopsy is an essential tool in the diagnosis of liver diseases and subsequently, initiating the appropriate treatment.

**Objective:** The aim of the study was to observe the safety of blind liver biopsy in our children.

**Methods:** One hundred fifty consecutive liver biopsies in hospitalized children were evaluated retrospectively. Using a standard percussion technique biopsy sites were chosen and through intercostals space blind liver biopsies were performed by TruCut biopsy needle. The study was conducted at Gafaar Ibn Oaf Specialized Children Hospital ,Khartoum Sudan, over the last five years, between January 2005-January 2010 .

**Results:** The first biopsy sample was considered macroscopically adequate in 94.8% of cases. A definitive histological diagnosis was possible in 99.1% of cases. seventy children were more than 5 years of age and of these 8 (11.4%) complained of pain at the biopsy site, external hemorrhage from the biopsy site was seen in 1 (0.6%) case but no sign of internal hemorrhage was detected during the 24 hours follow up period. No child died following the procedure.

**Conclusions:** Blind liver biopsy in the studied hospitalized children was found to be a safe procedure.

**Key words:** Menghini, intercostal, percutaneous, Cholestatic jaundice, hepatomegaly.

In 1882 Paul Ehrlich first introduced the technique of liver biopsy In Germany[1]. Later Menghini in 1958 made this technique quicker and easier[2]. Liver biopsies are the most specific test to assess the nature and severity of liver diseases and it provides an accurate diagnosis in about 90% of cases with unexplained elevation of liver enzymes[3]. It not only provides valuable information regarding staging, prognosis and management of various liver diseases but also is useful in monitoring the efficacy of different treatment protocols. Percutaneous liver biopsy could be blind or image guided. It is debatable whether ultrasound (US) guided liver biopsy reduces the rate of complication, provides a higher diagnostic yield or is cost-effective[4-8]. Ultrasound guided liver biopsy is cost-effective only when the additional charge of US is less than US $102[7]. This additional charge is a major concern in doing routine US-guided liver biopsy in a developing country like Sudan. Moreover there is paucity of large series of data regarding the safety of blind liver biopsy in children. Most of the data that are available in literature are from adult studies. The aim of this study was therefore to observe the safety of blind liver biopsy in children admitted at a pediatric gastroenterology unit of a tertiary care hospital of a developing country.

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## Material and Method

All children underwent intercostal percutaneous liver biopsies at the Pediatric Gastroentrology unit of Gaafar Ibn Oaf Specialized Children Hospital, Khartoum Sudan, between January 2005 through January 2010 were evaluated retrospectively. All these children were inpatient with various liver problems. All the biopsies were performed by a Pediatric Gastroenterologist at the departmental procedure room. None of the children were fasted and no sedation was used prior to the procedure. Informed verbal consent was obtained from the parents before the procedure. Prothrombin times (PT) of all

the children, except 12, were less than 3 sec. greater than the control.

Their platelet counts were more than 1, 00,000/cram.with normal bleeding and clotting time. Twelve children had PT more than 3 but less than 6 sec. greater than control and liver biopsies in these children were done after starting FFP infusion (15ml/kg), 30 minutes prior to the procedure and continuing over the next 2 hours[9]. Pre biopsy US were done only for exclusion of focal liver lesion. Liver biopsies were not done in children with huge ascites, history of lidocaine allergy and intake of NSAID within past 7 days. A compatible blood-donor was kept in hand and all the biopsies were performed with TruCut needle (14 Ga. TWx11.4 cm. with 20 mm specimen notch

Ameco Medical Industries, Egypt). Keeping the patient supine with right arm above the head, percussion was done between the anterior and mid-axillary line. The point of first maximum dullness was chosen while percussing caudally beginning under the right breast. The biopsy site was marked one space below that point in the mid-axillary line. After infiltrating 2% lidocaine HC1 a small incision was made and biopsy needle was introduced cephalic towards the xiphoid process until a sudden decrease of resistance was felt. A second pass was tried when the first sample was considered inadequate (length <0.5cm.), but after 2 un-successful attempts the procedure was suspended for the next week. After the procedure all the children were kept in right lateral position for at least 4 hours followed by a posture of choice. Vital signs like pulse and blood pressure were monitored every 15 minutes for the first one hour, every 30 minutes for the next 3 hours and hourly for the subsequent 20 hours. Examinations of abdomen and chest were also done during this follow up period.

**Results**

Liver biopsies were done in 150 children of which 102 (68%) were male. The ages of the children varied from 1 month 23 days to 15 years (mean 6.77±4.26yrs). Cholestatic jaundice (50%) and hepatomegaly (24%) were the two main indications for doing liver biopsy (Table1).

Table1: Indications for liver biopsy.

| Name of Primary condition | No (%) |
|---|---|
| Cholestatic jaundice | 75 (50%) |
| Hepatomegaly | 36 (24%) |
| Portal Hypertension | 24 (16%) |
| Auto Immune Hepatitis | 8 (5.3%) |
| Wilson Disease | 4 (2.6%) |
| Hepatic Neoplasm | 3 (2%) |

In 141 of 150 children (94%) the first biopsy sample was considered macroscopically adequate (>0.5cm). In 6 children (4%) the second attempt was successful and in the remaining 3 (2%) the procedure was suspended after 2 consecutive attempts and their biopsies were done one week later. A definitive histological diagnosis was possible in 148 cases (99%) and these are shown in table 2.

Table2: Histological results of liver biopsy

| Diseae | No (%) |
|---|---|
| Neonatal Hepatitis | 52(36%) |
| Liver Cirrhosis | 44(29%) |
| Fatty Liver | 30(20%) |
| Billary Cirrhosis | 12(8%) |
| Billary Atresia | 6 (4%) |
| Bile Duct Paucity | 3 (2%) |
| Hebatoblastoma | 3 (2%) |

Sixty children (40%) were below 5 years of age and excessive crying and/or irritability were their main complaints following the procedure. ninety children were more than 5 years of age and of these 10 (11%) complained of pain at the biopsy site. In addition to the local pain, 6 children (4%) also complained of right shoulder pain. No intervention other than oral paracetamol was required in these children. External hemorrhage from the biopsy site was seen in 1 (0.6%) child that did not require any intervention other than maintenance of posture in right lateral position. All the children were kept inpatient for 24 hours and

thorough physical examination during this period did not detect any sign of internal hemorrhage, peritonitis, perforation, pneumothorax, etc. No child died following the procedure.

**Discussion**

Liver biopsy is usually performed after a thorough non-invasive clinical evaluation. It is a safe procedure when performed by an experienced operator. *Froehlich et al*[10] noted a lower complication rate for physicians who performed more than 50 biopsies a year. In another study logistic regression analysis identified age (<0.0005), presence of malignancy (p<0.0001), pre-biopsy hemoglobin concentration (p<0.005) and number of passes (p<0.001) as univariately associated with complication[11]. In few studies lower complication rate and higher diagnostic yield were demonstrated in US guided biopsies compared to blind technique[6,12]. On the contrary a British survey found that complications could not be avoided by the use of US guided technique[5]. In the present series all the biopsies were done blindly (without US guide) and a definitive histological diagnosis was possible in 99.1% of cases. Using the blind technique the overall accuracy of liver biopsy in diagnosing hepatic diseases in other studies was found from 81.2%[13] to 90.7%[14]. On the contrary *Caturelli et al*[6], by using US guide, were able to come to a pathological diagnosis in 99.4% of their cases. Therefore, the result of the present report is comparable to that of a guided series. The macroscopic size of the biopsy specimen in the present series was found adequate in 94.8% of cases at first and in 98.3% cases at the end of 2nd attempt. In consistent with these, the findings of a guided biopsy series were 92.4% and 99.6% respectively[6].

About 60% of complications occurred within 2 and 96% within 24 hours following the procedure[1,15]. Pain is the commonest post-biopsy complain and it was perceived by 25% of adult patients who had non-guided compared to 22% of patients who had guided biopsies[16]. Forty percent of children in the present report were below 5 years of age and they could not specifically mention the exact site and nature of pain/discomfort following the procedure but excessive crying/irritability were their main post-biopsy complaints. It is assumed that it could be due either to pain or fear of the procedure. In the older age group (>5 years) 10% of 90 children complained of pain following the procedure and this figure is lower than the report of a British survey[16]. Bleeding following liver biopsy is not uncommon and it was reported in 1.6% of cases following a non-guided and in 2.5% cases following a guided procedure, but these figures are not statistically significant[16]. Three types of bleeding may occur following liver biopsy: (a) Free intra-peritoneal, (b) Intra-hepatic and/or sub-capsular hematoma and (c) Hemobilia. Free intra-peritoneal hemorrhage can be recognized by imaging studies and in a study of 108 liver biopsies routine US examination of abdomen done 2-4hours after the procedure detected free fluid in 6% cases with no clinical consequences[17]. Small sub-capsular/intra-hepatic hematoma is usually asymptomatic but large hematoma may cause pain, tachycardia, hypotension or drop in hematocrit. In one series symptomatic sub-capsular hematoma was observed in only 3 of 12,750 (0.023%) biopsies[18]. Hemobilia is the least common type of hemorrhage and in a series of 68,276 percutaneous biopsies only 4 cases (0.006%) of hemobilia were detected[15]. Therefore, it is assumed that chance of post-biopsy internal hemorrhage is negligible and routine US is not usually required following the procedure. In the present series no post-procedure US was done but all the children were kept inpatient for 24 hours and close monitoring of these children did not detect any sign of internal hemorrhage. Only one case of external hemorrhage from the punctured site was observed and the case was managed conservatively by keeping the child in right lateral position.

Liver biopsy has a mortality of 0.01-0.1%[12,15]. Death is usually due to bleeding or biliary peritonitis as a result of puncture of the gall bladder. Incidence of bleeding is probably proportional to the incidence of formation of hematoma, which is not influenced by the use of US[19]. Ultrasound

guided biopsy may be expected to reduce the risk of puncture of gall bladder, but no randomized control trial has been large enough to show reduced mortality with ultrasonography[5]. In the present series no child died following the procedure.

Prothrombin time is an important hematological test routinely done before biopsy and in most of the series liver biopsies were done when it was less than 3-5 seconds of the upper limit of normal[11,20]. In the present series there were 12 children whose PT were elevated and liver biopsies were done in them by infusing FFP. No signs of internal or external hemorrhage were detected in these children during the 24 hours follow up period. It may be mentioned here that during the follow up period a matched donor was kept in hand.

It is summarized that blind liver biopsy was found safe and diagnostic in the present series and it was also found safe in a small group of children with mild elevation of PT where the procedures were done with infusion of FFP.

**Conclusions**

Blind liver biopsy in children is a safe procedure in an inpatient setting when it is done by an experienced operator. It is economic, easy, useful and essential to diagnose different liver diseases.

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