

# FREQUENCY OF PAIN ASSOCIATED WITH ULTRASOUND GUIDED PERCUTANEOUS LIVER BIOPSY

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## ABSTRACT

**Objectives:** To determine the frequency of pain associated with ultrasound guided percutaneous trucut needle liver biopsy.

**Methodology:** This prospective descriptive study was conducted in Radiology Department, Lady Reading Hospital Peshawar over a period of six months from April 2009 to October 2009. Cases were referred from wards as well as OPD. Patients of ages between 14 and 75 years (48.42±9.91), having diffuse or focal hepatic solid lesion (s) seen on ultrasound abdomen, were included and patients with pregnancy, moderate to marked ascites, abnormal PT and/or APTT even after correction, thrombocytopenia, coagulopathy and those using anticoagulants were excluded from the study. After informed written consent, procedure was done and data analyzed.

**Results:** Out of 52 procedures, pain occurred in 42 (80.8 %) cases. Mild to moderate pain occurred in 41 (78.8%) cases whereas severe pain was observed in 1 patient (1.9%). Frequency of pain was more in females (14/15=93.4%) than males (28/37=75.7%). Frequency of pain was more in subcostal (18/21=85.8%) than intercostal (24/31=77.4%) approach. 27 of 33 (81.8%) patients with focal solid hepatic lesion and 15 of 19 (78.9%) patients with diffuse hepatic disease reported pain.

**Conclusion:** Percutaneous ultrasound-guided liver biopsy is associated with low frequency of severe pain. This study shows that females report pain more frequently than males. The incidence of biopsy associated pain is more in patients who are addicted to narcotics.

**Key Words:** Liver biopsy, Image Guided, Post liver biopsy pain, complications.

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## INTRODUCTION

Liver biopsy refers to a small sample of tissue obtained from liver so that it can be histologically examined for abnormalities. The first ever percutaneous biopsy was performed by Paul Ehrlich in 1883 in Germany who got liver sample by aspiration<sup>1,2</sup>.

Percutaneous needle liver biopsy can be performed both blindly and under imaging

guidance. Various imaging modalities can be used to for percutaneous liver biopsy including ultrasound, Computed Tomography (CT), Magnetic Resonance Imaging (MRI) and fluoroscopy<sup>2-4</sup>.

Complications associated with percutaneous liver biopsy include pain, hemorrhage, pneumothorax, vasovagal reaction and acute cholecystitis due to haemobilia<sup>5,6</sup>.

Other rare complications include acute pancreatitis<sup>7</sup>, needle tract implantation after sonographically guided biopsy of hepatocellular carcinoma<sup>8</sup>, bile peritonitis, sepsis and abscess formation, hemothorax, arteriovenous fistula, anesthetic reaction, needle break, damage to other organs (Gallbladder, Kidney, and Colon) and death<sup>9</sup>.

Qian LX and Wang B observed three groups of patients for post liver biopsy pain. In non-ultrasound guided group (783 cases) severe pain occurred in 28(3.5%) cases. In partially ultrasound guided group (485 cases) severe pain occurred in 17(3.5%) cases. In ultrasound guided group (289) severe pain occurred in 3(1.03%)

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cases. The study shows that frequency of pain is relatively less with ultrasound guidance than with non-ultrasound and partial ultrasound guidance<sup>5</sup>.

verall it has been demonstrated that ultrasound guidance reduces the likelihood of complications during percutaneous needle biopsy of liver and is cost effective too<sup>9,10</sup>.

The purpose of my study is to determine the frequency of pain associated with ultrasound guided percutaneous trucut needle liver biopsies.

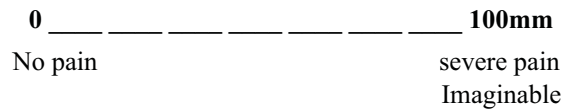
**METHODOLOGY**

This prospective descriptive study was conducted in Radiology Department, Lady Reading Hospital Peshawar over a period of six months from April 2009 to October 2009. Cases were referred from wards as well as OPD. Patients of either gender with ages ranging from 14 years to 75 years having diffuse liver disease or focal liver solid lesion were included and patients with moderate to marked ascites, pregnancy, abnormal PT and/or APTT even after correction, thrombocytopenia, coagulopathy and those using anticoagulants were excluded from the study. Study was conducted after approval from the ethical committee of the hospital. The risks and benefits of the procedure were explained and written consent of each patient was obtained before the procedure and data analyzed.

Procedure: The biopsy needle used in each case was 16 gauge (G) Dr. J trucut needle. Patients were put on the couch in the supine position. Liver was scanned using real-time ultrasound (Toshiba; model Nemio SSA-550 A with convex 3.5-5 MHz probe) to locate the lesion. Area on the skin was marked. Hands were washed and sterile gloves were worn before the procedure. Marked area on the skin was cleansed with Povidone-Iodine solution. It was anesthetized with local anesthetic (Lidocaine 1%), injected intradermally, subcutaneously and also into the parietal peritoneum. A small rent was made on the skin using the tip of the surgical blade. While introducing the needle patient was asked to hold his breath.

Needle was proceeded along the tract towards the lesion under continuous ultrasound guidance. Once the needle tip reached the desired place, the piston was fired and then slowly withdrawn outside. The tissue was collected in a formalin bottle. Three passes were made in each case. At the end of the procedure the puncture site was covered with ray-band. Sample bottles were labeled and handed over to the patient or his attendant for histopathology.

After the procedure, patients were observed for a period of 2 hours for pain (using Visual analog scale). Visual analog scale (VAS) Refers to a100mm horizontal line on a paper used by the patient to put a mark over this line representing pain experienced by him. Mark 0 means no pain, mark 100 means severe pain imaginable. Mark anywhere between these two extremes is taken as mild to moderate pain. Before starting the procedure, the patients will be taught how to use this scale to grade the intensity of pain. The intensity of pain will be indicated by the distance in millimeters from the left end. Patients will be asked to grade the pain intensity immediately after the biopsy.



Variables like age, sex and pain were noted and analyzed in the form of tables and graphs using SPSS version 16. Mean and SD were calculated for age. Qualitative data like pain was expressed as frequency and percentages. Since this was a descriptive study, inferential tests (tests of significance) were not applicable.

**RESULTS**

During the study period, 52 ultrasound guided percutaneous liver biopsies were performed. Patients ages were in the range of 14-69 years with a mean age of 48.42 ± 9.91 years (Table 1). 37 (71.2%) patients were males and 15 (28.8%) were females. Inter-costal and Sub-costal approaches were used in 31 (59.6%) and 21 (40.4%) cases respectively. 33 (63.5%) patients had focal solid mass or masses in the liver and 19 (36.5%) had diffuse liver disease.

Pain occurred in 42 (80.8%) patients. Incidence of mild to moderate and severe pain is shown in Figure 1. 24 patients (46.2%) reported pain immediately after the procedure. The percentage of patients complaining of pain increased to a maximum of 42(80.8%) at 30 minutes interval and gradually decreased thereafter. No pain existed after 2 hours of post biopsy observation.

The age wise, sex wise, approach wise and hepatic lesion wise distribution of pain are depicted in Tables 2, 3, 4 and 5 respectively.

**Table 1: Age wise Distribution of the Patients (n=52)**

Age category (Years)	No. of Patients	Percentage
14-25	2	3.8
26-35	2	3.8
36-45	11	21.2
46-55	29	55.8
56-65	6	11.5
66-75	2	3.8

**Table 2: Age wise Distribution of Pain (n=52)**

Age	Pain			Total
	No	Mild/Moderate	Severe	
14-25	1	1	-	2
	50.0%	50.0%	-	100.0%
26-35	1	1	-	2
	50.0%	50.0%	-	100.0%
36-45	4	7	-	11
	36.4%	63.6%	-	100.0%
46-55	3	25	1	29
	10.3%	86.2%	3.4%	100.0%
56-65	1	5	-	6
	16.7%	83.3%	-	100.0%
66-74	-	2	-	2
	-	100.0%	-	100.0%
Total	10	41	1	52
	19.2%	78.8%	1.9%	100.0%

Three male patients had history of narcotic addiction (one intravenous drug abuser and two addicted to cannabis). All three reported pain after biopsy.

Severe pain occurred in 1 out of 52 patients (1.9%), who was a female, had focal solid mass in liver and biopsy was taken using intercostal approach.

**DISCUSSION**

Liver biopsy has a central role in the evaluation of patients with suspected liver disease. The first percutaneous liver intervention was performed by Paul Ehrlich who got liver biopsy by aspiration in 1883<sup>2</sup>. It was performed blindly.

Thereafter the procedure was modified to make it more yielding and safer.

Over the last several years, ultrasound has become increasingly popular for doing guided percutaneous liver biopsy<sup>11</sup>.

Pain is the commonest complication of the ultrasound guided percutaneous liver biopsy with a reported incidence of upto 84%, including slight discomfort<sup>12</sup>.

It may be categorized as mild to moderate or severe using Visual Analog Scale. Severe pain has an incidence of 1.03%<sup>5</sup>. In one study, incidence of severe pain was reported to be as high as 20%<sup>13</sup>.

**Table 3: Sex wise Distribution of Pain (n=52)**

Pain	Sex		Total
	Male	Female	
No	9	1	10
	24.3%	6.7%	19.2%
Mild/Moderate	28	13	41
	75.7%	86.7%	78.8%
Severe	-	1	1
	-	6.7%	1.9%
Total	37	15	52
	100.0%	100.0%	100.0%

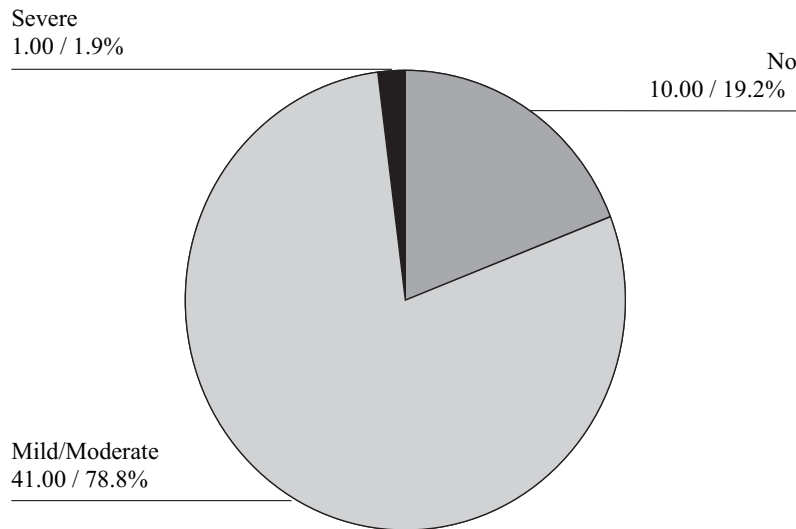
**Table 4: Approach wise Distribution of Pain (n=52)**

Pain	Approach		Total
	Inter Costal	Sub-costal	
No	7	3	10
	22.6%	14.3%	19.2%
Mild/Moderate	24	17	41
	77.4%	81.0%	78.8%
Severe	-	1	1
	-	4.8%	1.9%
Total	31	21	52
	100.0%	100.0%	100.0%

**Table 5: Hepatic Lesion wise distribution of Pain (n=52)**

Pain	Hepatic Lesion		Total
	Focal Solid Mass	Diffuse	
No	6	4	10
	18.2%	21.1%	19.2%
Mild/Moderate	26	15	41
	78.8%	78.9%	78.8%
Severe	1	-	1
	3.0%	-	1.9%
Total	33	19	52
	100.0%	100.0%	100.0%

**Figure 1: Frequency of Pain in 52 Patients**



In the present study, pain occurred in 42 patients (80.8%) . 41(78.8%) cases were found to be of mild to moderate intensity. 1 patient (1.9%) suffered from severe pain. The overall frequency of pain in my study supports the one reported in the previous literature<sup>12</sup>.

Incidence of pain for subcostal approach (85.7%) is more than intercostal one (77.4%) in the current study. Previous studies conducted by Riley TR<sup>14</sup> and Tan et al<sup>15</sup> show that incidence of biopsy associated pain is not influenced by type of biopsy approach. Thus slight higher incidence of pain for subcostal approach in my study is suggested to be an incidental finding.

Incidence of pain may be influenced by history of addiction to narcotics<sup>9,12</sup>. In the recent study 3 male patients revealed history of addiction to narcotics (one intravenous drug abuser and two addicted to cannabis). All three reported pain after biopsy. No obvious explanation for this observation exists in the available literature.

Another factor which may influence the incidence of pain is gender. Females have been found to report pain after biopsy more frequently than males. The frequency of pain in females (93.3%) is more than in males (75.7%) in my study supporting the observation made in a study conducted by Eisenberg et al<sup>16</sup>. The exact cause of this phenomenon is not clear in the existing literature. The single case of severe pain in the

current study was reported by a female. This was correlated with intrahepatic hemorrhage revealed on post biopsy ultrasound examination.

In a study conducted by Papini et al, it was found that the incidence of moderate to severe pain was less in those in whom biopsy was performed under ultrasound guidance (11.2%) than with blind needle biopsy (25%)<sup>17</sup>. In another study by Qian LX and Wang B, severe pain had a frequency of 3.5% and 1.03% in blind liver biopsies and ultrasound guided biopsies respectively<sup>5</sup>. Less incidence of pain in ultrasound guided biopsy than the blind technique was also reported in studies conducted by Lindor et al<sup>18</sup> and Farrell et al<sup>19</sup>.

The current study also reveals that liver biopsy can produce pain for an extended period of time. More than half of the patients complaining of pain (24 out of 42 patients) reported pain immediately after the procedure. The number gradually increased to a total of 42 within next 30 minutes. In majority cases of this study as well as in other studies<sup>13,19,20</sup>, the reported pain was mild to moderate.

This study also shows that local anesthetic used at the biopsy site fails to produce sufficient immediate and late analgesia. More than ½ of the patients in the recent study and 36%-47% of the patients in the Farrell et al group<sup>19</sup> suffered from pain at the end of procedure, still under the effect

of local anesthetics and as the effects of local anesthetic wore off, number of patients in pain increased. Conscious sedation with midazolam during and immediately after the procedure has been reported to reduce pain<sup>21</sup>.

## CONCLUSION

Percutaneous ultrasound-guided liver biopsy is associated with low frequency of severe pain. This study shows that females report pain more frequently than males. The incidence of biopsy associated pain is more in patients who are addicted to narcotics.

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#### **CONTRIBUTORS**

MA conceived the idea and planned the study. MA & AR did the data collection and analyzed the study. All the authors contributed significantly to the research that resulted in the submitted manuscript.