

# TRANSJUGULAR LIVER BIOPSY: histological diagnosis success comparing the trucut to the modified aspiration Ross needle

Antonio Carlos MACIEL<sup>1</sup>, Edson MARCHIORI<sup>2</sup>,  
Sérgio Gabriel Silva de BARROS<sup>3</sup>, Carlos Thadeu S. CERSKI<sup>4</sup>,  
Dorvaldo Paulo TARASCONI<sup>1</sup> e Darcy de Oliveira ILHA<sup>5</sup>

**ABSTRACT – Background** – Transjugular liver biopsy is an alternative procedure for patients who present contraindications to standard percutaneous procedure. **Aim** – To compare the rate of histological diagnosis obtained on transjugular liver biopsy with an automated trucut needle and with a modified Ross needle. **Patients/Methods** – Eighty-five patients with suspicion of chronic liver diseases and presenting contraindications for percutaneous liver biopsy (coagulopathy, massive ascites, morbid obesity, or chronic renal problems) were submitted to 89 transjugular liver biopsies between March 1994 and April 2001 at “Hospital São José, Irmandade da Santa Casa de Misericórdia”, Porto Alegre, RS, Brazil. Thirty-five patients underwent 36 biopsies with an automated trucut needle, and 50 patients underwent 53 biopsies with a modified Ross needle. **Results** – Histological diagnosis was reached in 32/35 subjects submitted to transjugular liver biopsy with the trucut needle (91%) and in 35/50 (70%) submitted to biopsy with the modified Ross needle. Specimens obtained with the trucut needle were significantly larger and less fragmented than those obtained with the Ross needle. **Conclusion** – Transjugular liver biopsy with the automated trucut needle allowed a higher rate of histological diagnosis when compared to the modified Ross needle in patients with suspicion of chronic liver diseases.

**HEADINGS** – Biopsy, needle. Liver, pathology. Needles.

## INTRODUCTION AND LITERATURE REVIEW

Liver biopsy is an essential procedure for the diagnosis of chronic liver disorders<sup>(22)</sup>. Percutaneous liver biopsy is the standard technique, but it is contraindicated in patients presenting abnormal blood coagulation or massive ascites. Transjugular liver biopsy (TJLB) constitutes a well-established alternative in these cases<sup>(11, 13, 23)</sup> and is also useful for sampling liver tissue for several other purposes<sup>(5, 11, 22)</sup>.

TJLB was first introduced with a modified Ross needle to enable aspiration within the liver parenchyma. However, excessive fragmentation of liver specimens was observed even after the change to a reversed bevel needle and the addition of

an inner stylet<sup>(10, 13, 15, 23)</sup>. A modified version of the percutaneous Vim-Silverman side-cutting needle – the trucut needle – has been proposed for TJLB with the aim of providing larger and less fragmented specimens<sup>(7, 16, 25)</sup>. An automated trucut needle, the Quick-Core needle system has also been proposed, and its success rate of histological diagnosis seems to be higher than the modified aspiration Ross needle in patients with suspicion of chronic liver diseases<sup>(2, 9, 12, 18, 19, 20, 27)</sup>.

The objective of the present study was to assess the yield of histological diagnosis obtained on TJLB using an automated trucut needle and comparing it to a historical series obtained with a modified Ross aspiration needle and our institution published elsewhere<sup>(24)</sup>.

The present study was carried out at “Irmandade da Santa Casa de Misericórdia”, Porto Alegre and at the “Hospital de Clínicas”, Porto Alegre, RS, Brazil. <sup>1</sup> Radiology Service, “Irmandade da Santa Casa de Misericórdia”, Porto Alegre, RS; <sup>2</sup> Radiology Service, Federal University of Rio de Janeiro and Federal University “Fluminense”, Rio de Janeiro, RJ, <sup>3</sup> Gastroenterology Service, Federal University of Rio Grande do Sul; <sup>4</sup> Pathology Service, Federal University of Rio Grande do Sul; <sup>5</sup> “Irmandade da Santa Casa de Misericórdia”, Porto Alegre, RS, Brazil.

Address for correspondence: Dr. Antonio Carlos Maciel – Avenida Bagé, 1244/401 – 90460-080 – Porto Alegre, RS, Brazil. e-mail: maciel-ac@bol.com.br

## MATERIAL AND METHOD

The present study was carried out with adult patients submitted to TJLB due to suspicion of chronic liver diseases between March 1994 and April 2001. A total of 89 TJLB were performed in 85 patients during this period with two different needles without randomization. The modified Ross aspiration needle was initially used in 53 procedures in 50 patients with mean age of 34 years, with 29 being males. After 1996, the trucut needle was used in 36 biopsy attempts in 35 patients. Their mean age was 38.4 years and 20 were male.

Patients of both groups were adults with suspicion of chronic liver diseases and associated complications and needed histological diagnosis for further management. They had at least one of the following contraindications to percutaneous liver biopsy: coagulopathy (prothrombin time less than 60% of control, platelet count less than 60000/mm<sup>3</sup>), massive ascites (tense abdominal wall with ultrasonography confirmed ascites and non responsive to diuretics), anemia associated to chronic renal failure (hematocrit lower than 29%) in individuals on hemodialysis receiving heparin on a every other day schedule and morbid obesity (body weight greater than 20% of ideal body weight)<sup>(24)</sup>.

All patients underwent an 8-hour fast before the procedure and clinical observation at the recovery room of the hospital for 12 hours after the procedure. All subjects signed an informed consent form approved by the Research Ethics Committee of the hospital.

All biopsy specimens were analyzed by the same pathologist (CTSC). Indications for TJLB are described in Table 1.

The procedure was carried out with the patient under conscious sedation, with hemodynamic and electrocardiographic monitoring

and percutaneous oximetry. The patient was placed in the Trendelenburg position, and local anesthesia was injected in the cervical region using 1% lidocaine. The catheter was inserted into the right internal jugular vein (IJV) just above the clavicle during Valsalva maneuver – in two cases, the left IJV was used. Guides, catheters, and the needle were advanced into the IJV using the Seldinger technique under fluoroscopic control; ultrasonography was frequently used to locate and puncture IJV. All biopsies were obtained from the right lobe, with the needle oriented towards the anterior, lateral, and posterior surfaces of the liver. After each biopsy, contrast material was injected into the right hepatic vein (RHV) to assess possible complications. Intravenous fentanyl citrate (50 to 200 micrograms) was used for sedation. Two patients were submitted to general anesthesia because of anxiety, and one refused to undergo sedation and/or anesthesia and did well.

Statistical analyses were carried out by means of Pearson's chi-square test with Yates' correction and the Student *t* test. Significance was established at  $P \leq 0.05$ .

## RESULTS

Among the 35 patients submitted to the automated trucut needle system, specimens were obtained in 34 and histological diagnosis was made in 32 (91%) (Table 2). Among the 50 patients who underwent biopsy with the modified Ross needle, liver tissue was obtained in 44, with fragmentation in 8 and histological diagnosis in 35 (70%). As can be seen, the success rate of histological diagnosis obtained on TJLB with the trucut needle was significantly higher than with the modified Ross needle ( $P = 0.035$ , chi-square test).

**TABLE 1** – Indications for transjugular liver biopsy (n = 85)

Indications	Modified Ross needle patients – n (%)	Automated trucut needle patients – n (%)
Isolated coagulopathy <sup>a</sup>	14 (28)	7 (20)
Coagulopathy and ascites	17 (34)	5 (14.2)
Coagulopathy, ascites, and obesity	1 (2)	-
Coagulopathy and obesity	1 (2)	1 (2.9)
Coagulopathy, ascites, and anemia	-	1 (2.9)
Coagulopathy, CRF and chronic anemia <sup>b</sup>	-	7 (20)
Chronic anemia and CRF <sup>b</sup>	17 (34)	12 (34.3)
Chronic anemia, CRF and ascites <sup>b</sup>	-	2 (5.7)
<b>Total</b>	<b>50 (100)</b>	<b>35 (100)</b>

<sup>a</sup> Coagulopathy was defined as minimum prothrombin time <60% or >3 seconds in relation to controls, kaolin partial thromboplastin time >5 seconds in relation to controls, or platelet count <60,000/mm<sup>3</sup>

<sup>b</sup> Chronic anemia associated to chronic renal failure (CRF) on hemodialysis and regular use of heparin

**TABLE 2** – Histological diagnosis obtained by the trucut or Ross needle (n = 85)

	Modified Ross needle – n (50)	Automated trucut needle – n (35)
Cirrhosis	5	6
Chronic hepatitis	6	15
Minimal hepatitis	11	3
Submassive hepatic necrosis	-	1
Hemochromatosis	1	-
Reactive hepatopathy	-	1
Steatosis	2	-
Steatohepatitis	3	-
Cholestasis	1	1
Tuberculosis	-	1
Findings compatible with biliary stenosis without neoplastic infiltration	-	1
Fibrous enlargement with portal-to-portal fibrous septa	-	1
Normal	6	2
<b>Total diagnosis obtained</b>	<b>35 (70%)</b>	<b>32 (91.4%)</b>

Reasons for failure included inability to catheterize the IJV in two patients, inability to catheterize the RHV in three patients, and inability to pass the needle through the catheter placed in the RHV in one patient. In five patients (six procedures), liver tissue was not obtained, and in nine patients (10 procedures), the specimen obtained was too small to allow diagnosis. One patient developed a large cervical hematoma immediately after the first cervical puncture, in the carotid artery, and the procedure had to be interrupted.

All specimens obtained with the automated trucut needle were large enough to allow measurement – specimen length ranged from 0.2 to 2.0 cm (mean = 1.2 cm). With the modified Ross needle, 41 out of the 44 specimens

obtained allowed measurement – specimen length ranged from 0.1 to 1.4 cm (mean = 0.58 cm). The difference in the mean lengths was statistically significant ( $P < 0.001$ , Student's *t* test). The number of portal triads obtained with the trucut needle was also significantly higher: it varied from 1 to 12 (mean = 3.5) with the modified Ross needle, and from 1 to 21 (mean = 8.8) with the automated trucut needle ( $P < 0.001$ , Student's *t* test).

Complications observed during the biopsies were similar with both devices (Table 3), except for the perforation of the right renal vein in one case using the modified Ross needle, which resulted in a large retroperitoneal hematoma and required surgical correction. The patient recovered well.

**TABLE 3** – Complications of transjugular liver biopsy

Complication	Modified Ross needle – n (%)	Automated trucut needle – n (%)
Cervical hematoma		
Small	2 (20)	
Large	1 (10)	-
Bleeding in the cervical vessel	2 (20)	-
Extra systoles	-	2 (25)
Capsular perforation	4 (40)	3 (37.5)
Vein perforation	1 (10)	-
Collection of contrast medium in the liver parenchyma	-	1 (12.5)
Hematoma in the liver parenchyma	-	2 (25)
<b>Total</b>	<b>10</b>	<b>8</b>

## DISCUSSION

Liver biopsy is the method of choice for the diagnosis, investigation, and staging of chronic liver disorders, playing an important role in treatment decisions and efficacy<sup>(20)</sup>.

Several techniques are available for the performance of liver biopsy<sup>(1, 22)</sup>. Percutaneous liver biopsy is the gold standard, but whenever a contraindication exists, such as coagulation disorders and massive ascites, TJLB is considered and has been shown to be safe and effective in either adults or children<sup>(2, 3, 8, 17, 21, 25)</sup>.

Many aspects of TJLB have evolved since its initial description, especially in terms of adequate size of specimens for histological diagnosis<sup>(7, 10, 11, 14, 16)</sup>. The most common reason for failure in establishing a histological diagnosis by means of TJLB is fragmentation or small size of the specimens, especially in patients with fibrosis or cirrhosis, when aspiration needles are used.

BERNARDINO<sup>(4)</sup> have pointed to the advantages of the automated trucut needle system, such as the fact that it usually yields larger and more uniform samples, due to the standardized movement of the needle. However, few studies have compared the success rate of histological diagnosis obtained in procedures using the trucut needle and the aspiration technique<sup>(2, 9, 27)</sup>.

De HOYOS et al.<sup>(12)</sup> had 94.2% of their biopsies in patients with cirrhosis or fibrosis performed with the trucut needle with no fragmentation of specimens. SADA et al.<sup>(27)</sup> compared the Colapinto aspiration needle to the trucut needle and observed that the aspiration needle yielded smaller and more fragmented specimens. Although those authors did not specifically mention the length of specimens, they reported that those obtained with the trucut needle were significantly larger. In the recent series of 410 TJLB, SMITH et al.<sup>(28)</sup>, using the Quick-Core liver access and biopsy kit, had fragmentation in 32 samples (7.8%), and all but one of these samples were diagnostic.

Few authors have reported the number of portal triads available in the specimen, which is crucial for diagnosis. In a review carried out by McAFEE et al.<sup>(25)</sup>, an average of 3.5 triads ( $\pm 3.5$  SD) is reported, but the type of needle employed is not specified. KARDACHE et al.<sup>(20)</sup> reported eight or more portal triads. BRUZZI et al.<sup>(6)</sup> obtained 10.4 portal triads with the trucut models (range - 6 to 20). In the present series, a mean of 3.5 portal triads was obtained with the modified Ross needle (range - 1 to 12)<sup>(24)</sup>, and 8.8 with the automated trucut needle (range - 1 to 21) ( $P < 0.001$ , Student's *t* test).

When we reanalyze our data using the "adequate criteria" (more than 1.0 cm in length or more than 10 portal triads per specimen) established by the Consensus Conference of the "Sociedade Brasileira de Patologia e Hepatologia"<sup>(14)</sup> we found that 71% with the trucut were adequate while only 18% was found with the modified aspiration Ross needle.

In the present study, the IJV was successfully punctured in 97.3% of the patients, in agreement with previous studies that report success rates varying from 75% to 95%<sup>(17)</sup>. In one of our patients, after several unfruitful attempts to puncture the right IJV, ultrasonography revealed thrombosis of this vein secondary to the long-term presence of a hemodialysis catheter in the past. The procedure was then performed successfully via the left IJV. The use of ultrasonography had already been suggested in a similar situation<sup>(3, 13, 28)</sup>.

We were unable to catheterize the RHV in four cases (5.2%). This has been described in cirrhotic patients as a result of reduced liver size, since these patients may present with a sharp angle between the hepatic vein and the inferior vena cava<sup>(21)</sup>. This problem can also occur in the presence of ascites, which determines an upper dislocation of the liver<sup>(10)</sup>. As previously reported<sup>(26)</sup>, this difficulty was solved with the use of a more rigid guide wire.

There is much discrepancy concerning the incidence of complications in TJLB. As stated by ZWIEBEL et al.<sup>(30)</sup>, discordance may result from the application of different criteria to define complications. Also, the rate of complications may be associated with the experience of the professional performing the procedure<sup>(29)</sup>. Finally, the clinical status of patients submitted to TJLB is usually worse than that of patients submitted to other forms of biopsy<sup>(7, 21, 23)</sup>; this may have an impact on the incidence of complications. In our study, overall complications occurred in 19% and 22% of the biopsies performed with the trucut and the modified Ross needle, respectively, but the most serious complication consisted of the perforation of the right renal vein (Ross needle) but the patient recovered well after abdominal surgery.

## CONCLUSIONS

Although percutaneous liver biopsy is likely to remain as the standard method for liver biopsies, TJLB with the trucut needle may become the method of choice for patients who present contraindications for the standard percutaneous technique, in agreement with LEBREC et al.<sup>(21, 22)</sup>. The rate of successful histological diagnosis was quite satisfactory with the trucut needle (91%) than that achieved with the use of modified Ross needle.

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Maciel AC, Marchiori E, Barros SGS, Cerski CTS, Tarasconi DP, Ilha DO. Biopsia hepática transjugular: comparação do sucesso diagnóstico histológico entre as agulhas trucut e a aspirativa modificada de Ross. *Arq Gastroenterol* 2003;40(2):80-84.

**Resumo – Racional** – A biopsia hepática transjugular é um procedimento alternativo para pacientes que apresentam contra-indicações ao procedimento padrão (percutâneo). **Objetivo** – Comparar o índice de diagnóstico obtido por meio da biopsia hepática transjugular utilizando uma agulha automatizada trucut e uma agulha Ross modificada. **Métodos** – Oitenta e cinco pacientes com suspeita de doenças hepáticas crônicas e apresentando contra-indicações para biopsia hepática percutânea (coagulopatia, ascite maciça, obesidade mórbida ou problemas renais crônicos) foram submetidos a 89 biopsias hepáticas transjugulares entre março de 1994 e abril de 2001 no Hospital São José, Irmandade da Santa Casa de Misericórdia de Porto Alegre, RS, Brasil. Trinta e cinco pacientes foram submetidos a 36 biopsias com uma agulha trucut automatizada, e 50 a 53 biopsias com uma agulha Ross modificada. **Resultados** – Diagnóstico histológico foi obtido em 32/35 pacientes submetidos a biopsia hepática transjugular com a agulha trucut (91%) e em 35/50 (70%) dos com a agulha Ross modificada. Os espécimes obtidos com a agulha trucut eram significativamente maiores e menos fragmentados do que aqueles obtidos com a agulha Ross. **Conclusão** – A biopsia hepática transjugular com a agulha trucut automatizada apresentou maior índice de diagnóstico histológico quando comparada com a agulha Ross modificada em pacientes com suspeita de doença hepática crônica.

**DESCRITORES** – Biopsia por agulha. Fígado, patologia. Agulhas.

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