

# Rates of success and failure of biopsies of hollow abdominal organs: descriptive analysis

*Taxas de sucesso e insucesso em biópsias percutâneas ecoguiadas de lesões em órgãos abdominais não sólidos: análise descritiva*

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**Abstract Objective:** To evaluate the rates of success and failure of ultrasound-guided percutaneous biopsy of lesions in hollow abdominal organs, as well as the influence of contrast enhancement on those rates.

**Materials and Methods:** This was a retrospective, single-center study evaluating patients submitted to ultrasound-guided percutaneous biopsy of abdominal lesions in hollow organs between January 2017 and June 2018. Patient records were reviewed using a standardized data collection form.

**Results:** We included 49 procedures performed in 48 patients, of whom 18 (38%) had a prior diagnosis of cancer. Malignancy was suspected in 44 cases (90%). Among those 44 cases, the suspicion was of a new neoplasm in 28 (64%), of relapse in 11 (25%), and of a metastatic lesion in 5 (11%). The histopathological findings were sufficient to make the diagnosis in all 44 of those cases, 33 (75%) of which were found to be malignant. The diagnosis was consistent with the clinical suspicion in 33 (75%) of the cases in which there was a definitive histological result. There were no complications resulting from the procedure.

**Conclusion:** Ultrasound-guided percutaneous biopsy is a safe procedure that demonstrates high efficacy in providing a sufficient sample for the diagnosis. The main reason to perform such a biopsy is suspicion of a new neoplasm, followed by suspicion of a metastatic lesion. The histopathological results were concordant with the suspicion in the majority of the cases evaluated here.

**Keywords:** Biopsy, needle/methods; Abdominal neoplasms/pathology; Ultrasonography, interventional/methods; Contrast media/administration & dosage.

**Resumo Objetivo:** Avaliar as taxas de sucesso e insucesso das biópsias percutâneas ecoguiadas de lesões em órgãos abdominais não sólidos e a influência da realização de contraste nessa técnica.

**Materiais e Métodos:** Estudo retrospectivo que avaliou doentes submetidos a biópsias percutâneas ecoguiadas de lesões em órgãos abdominais não sólidos, entre janeiro de 2017 e junho de 2018. Os dados clínicos dos doentes foram revistos usando um método padronizado de colheita de dados.

**Resultados:** Foram incluídos 49 procedimentos realizados em 48 doentes, dos quais 18 (38%) tinham diagnóstico prévio de câncer. Em 44 (90%) suspeitava-se de malignidade: 28 (64%) de suspeita de diagnósticos de novo de neoplasia, 11 (25%) de recidiva neoplásica e 5 (11%) de lesões metastáticas. Os resultados histopatológicos permitiram fazer o diagnóstico em 44 casos (90%), sendo 33 (67%) malignos. O diagnóstico foi concordante com a suspeita clínica em 33 (75%) dos casos com resultado histológico definitivo. Não ocorreram complicações resultantes das biópsias.

**Conclusão:** A realização de biópsias ecoguiadas é segura e capaz de fornecer amostra suficiente para permitir o diagnóstico definitivo. O principal motivo para realizar biópsias ecoguiadas é a suspeita de neoplasia de novo, seguida da suspeita de metástases. Os resultados histopatológicos foram concordantes com a suspeita clínica na maioria dos casos.

**Unitermos:** Biópsia por agulha/métodos; Neoplasias abdominais/patologia; Ultrassonografia de intervenção/métodos; Meios de contraste/administração & dosagem.

## INTRODUCTION

Ultrasound-guided percutaneous biopsy was a great innovation in the field of medicine. It made biopsies faster, saving the patient from radiation exposure and from invasive procedures with greater risks<sup>(1)</sup>. Currently, ultrasound is the most useful imaging technique for guiding percuta-

neous and endoscopic biopsies<sup>(2)</sup>, being extensively used in daily clinical practice because it retrieves sufficient high-quality tissue to facilitate the pathologic diagnosis of focal and diffuse diseases<sup>(3)</sup>. In most cases of abdominal or pelvic lesions, is possible to use ultrasound guidance. It is often safer, quicker, and less expensive, as well

as having a higher diagnostic yield, in comparison with other image guidance modalities, including computed tomography (CT). In general, if the mass or target lesion can be seen with ultrasound, a biopsy will be performed under ultrasound rather than CT<sup>(1)</sup>. Contrast-enhanced ultrasound (CEUS) is the latest paradigm in this area. It improves the detection and characterization of multiple lesions<sup>(4,5)</sup>, as well as increasing the accuracy of percutaneous biopsies<sup>(6,7)</sup> and reducing the rate of complications<sup>(6,8-11)</sup>. Through the use of CEUS, it is possible to perform real-time evaluation of the perfusion of focal lesions in the arterial, portal, and delayed contrast phases, in order to characterize focal lesions with high diagnostic accuracy<sup>(5-7,12)</sup>. In comparison with conventional ultrasound-guided biopsy, CEUS-guided biopsy has been shown to increase diagnostic accuracy by 5% (from 93.3% to 98.3%) and to decrease the false-negative rate in those large undetermined abdominal lesions<sup>(6)</sup>.

The aim of this article is to evaluate the rates of success and failure of ultrasound-guided percutaneous biopsy of abdominal lesions in hollow organs. We also analyze the histopathological results and the influence of the use of CEUS.

## MATERIALS AND METHODS

This was a retrospective, descriptive, single-center study involving patients who underwent ultrasound-guided percutaneous core needle biopsy of lesions in the abdominal cavity, excluding lesions in solid organs (liver, spleen, kidney, or reproductive system), in the diagnostic and interventional ultrasound department of a tertiary care hospital between January 2017 and June 2018. Patients were identified through a review of medical records. The study was approved by the local research ethics committee before the collection of data.

We employed a standardized data collection form, including clinical and demographic characteristics of the patients, clinical suspicion, and pathological findings. Patients for whom the procedure documentation was incomplete were excluded.

### Statistical analysis

Categorical variables are expressed as absolute and relative frequencies, whereas continuous variables are expressed as means and standard deviations. All statistical analyses were performed with the SPSS Statistics software package, version 23.0 (IBM Corp., Armonk, NY, USA).

## RESULTS

A total of 838 ultrasound-guided biopsies were performed between January of 2017 and June of 2018. Of those, 49 (6%) were abdominal biopsies of hollow organs, performed in 48 patients (1 patient underwent two procedures), of whom 26 (54%) were women and 22 (46%) were men. The mean age was  $64 \pm 15.4$  years (range,

18–88 years). All 49 procedures were analyzed. Of the 48 patients included, 18 (38%) had a history of cancer, the most common type being hematologic neoplasms, which accounted for 7 cases (39%), followed by gynecological neoplasms, in 6 cases (33%), and colorectal cancer, in 3 (17%). Four patients (8%) had previously been diagnosed with more than one type of cancer.

Of the 49 biopsies evaluated, 24 (49%) were performed in cases of lymphadenopathy, 20 (41%) were performed in cases of unspecified abdominal masses, and 2 (4%) were performed for peritoneal sampling. The three remaining biopsies (6%) were obtained from the mesentery, a thickened area of the perirenal fascia, and a thickened area of the intestinal wall, respectively. The mean lesion size was  $3.5 \pm 2.4$  cm (range, 0.8–14.0 cm). As can be seen in Table 1, the lesion diameter was between 2 cm and 5 cm in 32 (65%) of the cases, whereas it was less than 2 cm in only 10 (21%).

In 18 cases (37%), there was no diagnostic hypothesis and CEUS was therefore performed prior to the biopsy. The contrast behavior was suggestive of malignancy in 11 samples (61%) and was inconclusive in 7 (39%). Among the latter lesions, the histopathology showed that five (71%) were malignant and two (29%) were benign.

Malignancy was suspected in 44 cases (90%). Among those 44 cases, the suspicion was of a new neoplasm in 28 (64%), of relapse in 11 (25%), and of a metastatic lesion in 5 (11%). The biopsy specimen was sufficient for diagnosis in 44 (90%) of the 49 procedures analyzed and was insufficient in 5 (Table 2). In those five cases, surgical biopsy was recommended. The histopathology revealed malignant lesions in 33 (67%) of the biopsies and benign lesions in 11 (23%). Of the 33 malignant lesions, 7 (21%) were primary, 15 (46%) were metastatic, and 11 (33%) were representative of recurrence, as depicted in Table 2. The diagnosis was consistent with the clinical suspicion in 33 cases (75%).

Of the 18 lesions that were evaluated with CEUS (Table 3), all were suspected of malignancy on ultrasound,

**Table 1**— Characteristics of lesions used for ultrasound-guided percutaneous biopsies.

Characteristic	N = 49
Origin of the biopsy specimen, n (%)	
Lymph node	24 (49)
Unspecified abdominal mass	20 (41)
Peritoneum	2 (4)
Perirenal fascia	1 (2)
Mesentery	1 (2)
Intestinal wall	1 (2)
Lesion size, n (%)	
< 2.0 cm	10 (21)
2.0–5.0 cm	32 (65)
5.1–10.0 cm	6 (12)
> 10.0 cm	1 (2)

**Table 2**—Histopathologic results of lesions used for ultrasound-guided percutaneous biopsies.

Result	N = 49
Benign	11 (23)
Malignant	33 (67)
Primary lesion	7 (21)
Metastasis	15 (46)
Recurrence	11 (33)
Insufficient specimen	5 (10)

**Table 3**—Distribution of lesions that performed and not performed CEUS and their initial suspicion and histological results.

CEUS	Suspicion	Histopathological result
Performed (n = 18)	Benign (n = 0)	Benign (n = 2)
	Malignant (n = 18)	Malignant (n = 16)
Not performed (n = 31)	Benign (n = 5)	Benign (n = 4)
	Malignant (n = 26)	Malignant (n = 22)

histological confirmation of malignancy being obtained in 16 (89%). Of the remaining 31 lesions, 26 (84%) were suspected of being malignant, and histological confirmation was obtained in 22 (85%) of those. Patients were followed for a period of two weeks, during which time no complications were reported.

## DISCUSSION

Abdominal masses include various benign and malignant pathological lesions. Such lesions can be solid or cystic and which can differ depending on patient age and gender, as well as on their location and organ or tissue of origin<sup>(13)</sup>.

The results of the present study demonstrate that ultrasound-guided percutaneous biopsy of lesions in hollow abdominal organs is an effective procedure with an accuracy of nearly 90%. The great majority of the samples were obtained from patients with lymphadenopathy or unspecified abdominal masses, although some were obtained from the intestinal wall and peritoneum. Suspicion of a new neoplasm was the main reason for performing biopsy among the patients evaluated in our study.

The use of CEUS plays an important role in the evaluation of suspicious lesions because it helps physicians determine whether a biopsy is necessary, identify the most viable area within the lesion, and choose the best lesion to biopsy<sup>(6)</sup>. The diagnostic performance of CEUS has been shown to be better than that of conventional ultrasound<sup>(4,6,7,12)</sup>. However, in our study, there were no records of lesions excluded for biopsy after CEUS had been performed, which could account for the fact that there was no significant difference between the CEUS and non-CEUS groups in terms of diagnostic performance (89% versus 85%). In the sample as a whole, the diagnosis was

consistent with the clinical suspicion in the vast majority of cases. In our experience, ultrasound-guided percutaneous biopsy is a safe procedure, and there were no reported complications in the present study.

Ultrasound has a number of advantages<sup>(1)</sup>: real-time imaging guidance; speed of use; the ability to compress the abdomen, thus increasing the proximity to the target; lower cost in comparison with CT and magnetic resonance imaging; rapid confirmation of complications; higher success rates; portability; and the fact that it does not expose the patient and medical staff to radiation. In comparison with contrast-enhanced CT and contrast-enhanced magnetic resonance imaging, CEUS has the advantage of exerting no harmful effects on the kidneys or thyroid<sup>(4,14)</sup>.

This study has some limitations. The retrospective design introduces the possibility of certain biases. For example, we were able to evaluate only those patients for whom the necessary information was available in the medical report.

## CONCLUSION

Ultrasound-guided percutaneous biopsy is a safe, efficient, minimally invasive, accurate method of diagnosing undetermined lesions in hollow abdominal organs. The present study demonstrated that the most common indication for ultrasound-guided percutaneous biopsy was the suspicion of a new neoplasm, in which performing CEUS might be helpful. It was possible to obtain a good specimen for histopathological evaluation in over 90% of the cases, and the result of the biopsy was in agreement with the clinical suspicion in 75%.

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