

Sonographically guided fine-needle aspiration biopsies of adrenal masses in lung cancer patients, eleven-year experience

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Purpose. The aim of this retrospective study was to define the accuracy and safety of the ultrasonographically (US) guided fine-needle aspiration biopsy (FNAB) of the enlarged adrenals in the patients with lung cancer.

Patients and methods. In eleven-year period 64 patients with cytologically proven lung cancer underwent US-guided FNABs of adrenal masses. The accuracy of the method was assessed on the basis of cytology findings and the safety on the number of complications reported after the procedure.

Results. US-guided aspiration biopsy turned out to be accurate in 58/64 cases (91%), and very safe with only 4/64 (6%) minor complications. In 52/58 (90%) cases, the cytology sample was found to be malignant. In 6 cases (10%), isolated adrenal masses were adenomas.

Conclusions. We recommend US-guided FNAB as a safe and reliable diagnostic method that has many advantages over computer tomography (CT)-guided FNAB, such as safety, patient-friendliness, no X-rays and its reproducibility.

Key words: lung neoplasms – secondary – ultrasonography – pathology; adrenal gland neoplasms; biopsy, needle

Introduction

The adrenal glands are a common site for the metastatic spread of lung cancer.¹ The metastases in the adrenal glands are often detected at the time of setting the basic diagnosis. As

they are usually asymptomatic,² the only reliable method to confirm the metastases is diagnostic imaging. The majority of them are detected by chest and upper abdomen CT or by abdominal ultrasound (US) examination.

The improvement of US technology allows visualization of slightly enlarged adrenal glands, with the exception of the scans in obese and meteoristic persons. Any enlargement of the adrenal glands should be explained because benign changes could be detected in healthy individuals.^{3,4} In addition, there are many reports on high percentage of the benign cytology findings of fine-needle as-

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piration biopsies (FNABs) from the enlarged adrenal glands in lung cancer patients.^{5,6}

In the literature, the results of CT-guided aspiration biopsies⁷⁻⁹ are more often analysed than the results of US-guided ones.⁸⁻¹⁰ The purposes of these retrospective study were to obtain data on the accuracy and safety using US guided FNABs in the evaluation of enlarged adrenal glands in patients with lung cancer.

Patients and methods

In the 11-year period, from 1991 to 2001, we performed 64 US-guided biopsies of the enlarged adrenal glands in 64 patients with cytologically confirmed lung cancer. Forty-six of them were men and 18 were women, with the average age of 59 years, ranging from 42 to 82 year (SD \pm 9.6).

Lung cancer was cytologically confirmed (by bronchoscopy, transthoracic FNAB, or by sputum examination). The most frequent type was adenocarcinoma (28 patients), followed by epidermoid (16), microcellular (6) and macrocellular lung cancer (6) and not otherwise specified in 8 cases. In 40 patients the tumour was localized in the right lobe and in 24 patients in the left lobe.

Sonographic examination and US-guided FNABs had been performed with Toshiba SSA 240A ultrasound scanner before 1997 and a Toshiba SSA 340A afterwards (Tokyo, Japan). A convex probe with the radius of 25 or 50 mm was chosen for subcostal or transhepatic approach, whereas the probe of 15 mm was used for intercostal approach.

US-guided aspiration biopsies were performed by flexible "Chiba" needles with the length of 16 to 20 cm and 22 G (0.7 mm) thick. A metal probe adapter with a 5 cm long guide helps to maintain the needle aligned with the scan and allowed it to hit the target easier. In all cases, the radiologist carried out the whole process by himself, holding the

probe with his left hand while inserting the needle and aspirating with the right one (Figure 1).

Prior to biopsy, coagulation tests had been performed in order to check that the patient's platelets counts and prothrombin time (PT) were within normal values. Patients with platelet count of less than $100 \times 10^9/l$ and PT ratio of less than 0.60 had been excluded from the biopsy procedure.

In the patients in whom a bilateral enlargement of the adrenal glands was observed by US we anticipated the same aetiology of changes in both glands; therefore, FNAB was performed in one gland only.

Results

We performed 38 biopsies (60%) of the enlarged adrenal glands on the right side and 26 biopsies (40%) on the left side. The mean longest diameter of the enlarged glands was 5.6 ± 2.7 cm (range, 2.5-13.0 cm).

The material for cytology analysis was assessed as appropriate in 58/64 cases (91%), while in 6/64 cases (9%), it was inappropriate. Cytology examination confirmed a malignant process in 52/58 patients (90%) and a benign process in 6/58 (10%) patients. Of 52 malignant cases, 40 (77%) were diagnosed as definitely a metastatic process, and the remaining 12 were found to be malignant without further characterization.

The mean longest diameter of benign adrenal masses, which were all unilateral, was 4.2 ± 2.4 cm (range, 2.5-7.0 cm) and that of the malignant ones was 6.3 ± 2.8 cm (range, 3.5-13.0 cm). The mean longest diameter of unsuccessfully biopsied lesions (inappropriate cytology samples) was 5.7 ± 2.1 cm (range, 4.0-8.0 cm).

We carried out the majority of aspiration biopsies in the outpatient department; 50 patients (78%) were called in on the day of biopsy. Four patients complained of pains and of

sensitivity to palpation that developed immediately after the biopsy, persisted for some hours and faded away spontaneously. In these patients sonographic examination performed approximately two hours after the biopsy revealed no abnormalities.

Discussion

In view of the accuracy and safety, the literature recommends more CT than US-guided FNABs of the enlarged adrenal glands.^{7,9,11} No comparative studies have been done. The studies report 80-83% primary and 90-93% secondary accuracy of CT-guided FNABs.^{7,12,13} In our study, the sample was appropriate for the



Figure 1. The puncture technique. A metal probe adapter with a 5 cm long guide helps to maintain the needle aligned with the scan and allowed it to hit the target easier. The radiologist holds the probe with his left hand while inserting the needle and aspirating with the right one.



Figure 2. Right adrenal metastasis FNAB, measuring 3.5 x 2.5 cm in the patient with right upper lobe lung cancer. The tip of the needle (black arrowhead) is clearly visible in the lesion.

cytology analysis in 58 cases, which means 91% primary accuracy of the method.

In 6 of our patients, cytology confirmed a benign enlargement of the adrenal gland (adenoma or hyperplasia). In these patients during follow-up period of, no metastatic spread into the adrenal glands was observed. Due to the small group conclusions referred on these data are not reliable.

CT-guided FNAB is considered to be safe;^{7,11,12} the most frequent complications are pneumothorax¹³ and bleeding.⁷ No distinct correlation was made between the needle thickness and localization of the lesion, although Price¹¹ reported that no complications occurred by transhepatic approach CT-guided FNABs of the right adrenals.

Most of our patients had the biopsy performed as outpatients. After the procedure, they were observed for 2 hours. Only 14 patients (22%) underwent the FNAB as inpatients. Four of all patients complained of periodic pains at the puncture site. A key to the success of the procedure is to perform it as quickly as possible. US-guided aspiration biopsies are more flexible and adjustable if performed by a single person holding the probe with his left hand while inserting the needle and aspirating with the right one

(Figure 1). It also offers several approaches that could be chosen with regard to the anatomy. This allows better coordination, easier to hit the mass, and shortens the procedure. The needle is thus remained inside the body for only one or two breath holds (less than 1 minute), kept still and thus does not cause any additional impairments that cannot be avoided in CT-guided aspiration biopsies.

CT-guided aspiration biopsy is specifically recommended for small adrenal masses.¹⁰ In our series, 13 biopsies were successfully performed on the glands that were smaller than 4 x 2.5 cm - the size that is considered as the limit of the anatomically normal adrenal glands (Figure 2).

In summary, the results of our study confirm that sonographically guided FNABs of the adrenal glands are just as safe and reliable as the CT-guided ones. Nevertheless, US-guided aspiration biopsy has some advantages over the CT-guided one. We believe that CT-guided aspiration biopsy should be performed only if US-guided aspiration biopsy is not safe anymore, e.g. low visibility, non-cooperative patient, or really small size of the lesion.

References

1. Salvatierra A, Baamonde C, Llamas JM, Cruz F, Lopez-Pujol J. Extrathoracic staging of bronchogenic carcinoma. *Chest* 1990; **97**: 1052-8.
2. Bernardino ME. Management of the asymptomatic patient with a unilateral adrenal mass. *Radiology* 1988; **166**: 121-23.
3. Kokko JP, Brown TC, Berman MM. Adrenal adenoma and hypertension. *Lancet* 1967; **1**: 486-90.
4. Glazer HS, Weyman PJ, Sagel SS, McClennan BL. Nonfunctioning adrenal masses: incidental discovery on computed tomography. *AJR Am J Roentgenol* 1982; **139**: 81-5.
5. Oliver TW. Isolated adrenal masses in nonsmall-cell bronchogenic carcinoma. *Radiology* 1984; **153**: 217-8.
6. Gillams A, Roberts CM, Shaw P, Spiro SG, Goldstraw P. The value of CT scanning and percutaneous fine needle aspiration of adrenal masses in biopsy-proven lung cancer. *Clin Radiol* 1992; **46**: 18-22.
7. Bernardino ME, Walther MM, Phillips VM, Graham SD Jr, Sewell CW, Gedgudas-McClees K, et al. CT-guided Adrenal Biopsy: Accuracy, safety and indications. *AJR Am J Roentgenol* 1985; **144**: 67-9.
8. Silverman SG, Mueller PR, Pinkney LP, Koenker RM, Seltzer SE. Predictive value of image-guided adrenal biopsy: analysis of results of 101 biopsies. *Radiology* 1993; **187**: 715-8.
9. Porte HL, Ernst OJ, Delebecq T, Metois D, Lemaitre LG, Wurtz AJ. Is computed tomography guided biopsy still necessary for the diagnosis of adrenal masses in patients with resectable non-small-cell lung cancer? *EJ Cardio-thoracic Surg* 1999; **15**: 597-601.
10. Montali G, Solbiati L, Bossi MC, De Pra I, Di Donna A, Ravetto C. Sonographically guided fine-needle aspiration biopsy of adrenal masses. *AJR Am J Roentgenol* 1984; **143**: 1081-4.
11. Price RB, Bernardino ME, Berkman WA, Sones PJ, Torres WE. Biopsy of the right adrenal gland by the transhepatic approach. *Radiology* 1983; **148**: 566.
12. Heaston DK. Narrow gauge needle aspiration of solid adrenal masses. *AJR Am J Roentgenol* 1982; **138**: 1143-8.
13. Pagani JJ. Normal adrenal glands in small cell lung carcinoma: CT guided biopsy. *AJR Am J Roentgenol* 1983; **140**: 949-51.