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Technical Note

Artificial Paravertebral Widening for Percutaneous CT-Guided Adrenal Biopsy

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Abstract: A percutaneous adrenal biopsy under CT guidance is described. The biopsy was performed after injection of physiologic saline solution into the paravertebral space, creating a wider pathway for needle insertion. This technique has been previously reported for biopsy of thoracic lesions, but in our case it was used for biopsy of a relatively inaccessible adrenal lesion. This artificial window that is formed by displacing the pleura laterally allows a direct and potentially safer access route to the retroperitoneum, avoiding puncture of pleura, diaphragm, and abdominal structures.
Index Terms: Biopsy and biopsies—Computed tomography, techniques—Adrenal gland, neoplasms.

Adrenal biopsy under CT guidance is an established and accurate technique for the diagnosis of lesions of the adrenal glands (1,2). Various modifications of this technique have been used to define the best access route, such as direct anterior or posterior puncture, left or right decubitus position, or even transhepatic, transgastric, transpancreatic, and transsplenic access (2,3). Puncture with gantry angulation has been also used for adrenal (4,5) or various abdominal masses (6). We describe fine needle aspiration of an adrenal mass by creating artificial widening of the paravertebral space in a case where other access routes were considered unsafe.

CASE REPORT

A 65-year-old man with lung cancer was referred to the Radiology Department for biopsy of a 1.5 cm left adrenal mass. Scanning in supine, prone, as well as left and right decubitus positions demonstrated that the left adrenal was not accessible and it was shielded posteriorly by the lung and the kidney, laterally by the spleen and the aorta, and ventrally by the liver and abdominal vessels (Fig. 1). With use of the prone position, under local anesthesia, the tip of a 20G Chiba needle (Cook, Bloomington, IN, U.S.A.) was inserted in the left paravertebral space just between the left transverse process of the adjacent lumbar vertebra and the parietal pleura. Forty-five milliliters of physiologic saline solution was then injected via the needle by hand. The postinjection CT scan showed a 2 cm widening of the paravertebral space with partial lateral displacement of the posterior costophrenic sulcus (Fig. 2). After subsequent injection of 15 ml of the same solution, the needle was further introduced to the adrenal gland, and aspiration of tissue material was successfully performed (Fig. 3). During the procedure, the patient did not experience any pain or discomfort, and there was no evidence of any postprocedural complications. The cytological specimen revealed adrenal cortical cells consistent with an adrenal cortical adenoma. The patient subsequently underwent a surgical resection of the lung cancer.

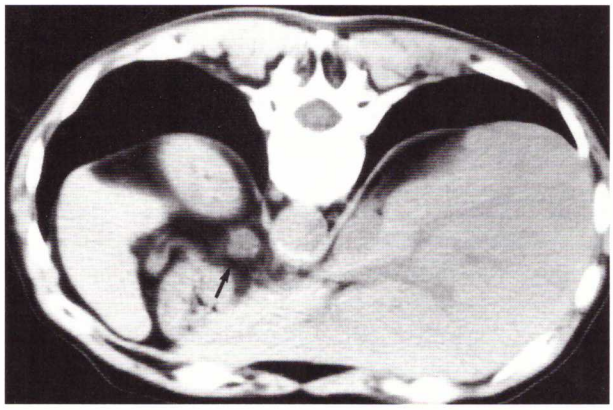

FIG. 1. CT scan in prone position. An enlarged left adrenal gland is visualized (arrow), surrounded by lung, kidney, stomach, liver, and abdominal vessels.

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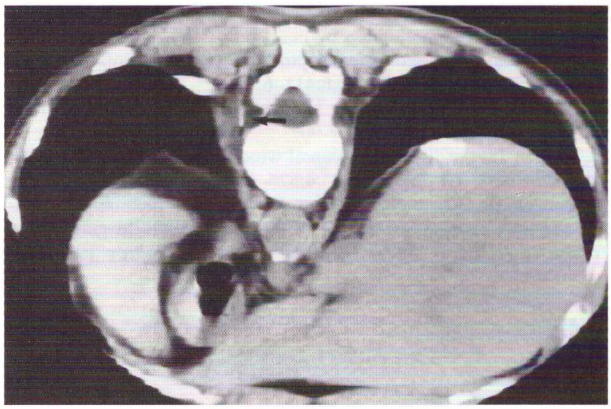

FIG. 2. The tip of a 20G needle entered the left paravertebral space (arrow), which appears widened after the injection of 45 ml of saline solution. The lung is now partially dislodged.

DISCUSSION

Adrenal biopsies, especially on the left side, are considered technically difficult (7), and several techniques have been proposed and utilized, especially focused on the patient's position (2,3). The most popular approach is the posterior one, with the patient prone, although it carries a higher risk of pneumothorax due to possible transgression of the posterior costophrenic sulcus. To overcome this problem, cephalic angulation of the needle using the triangulation method has been used (6). Another technique has been proposed by Hussain et al. (4,5), employing CT gantry angulation of both the patient and the CT gantry with very good results. To avoid the risk of pneumothorax, a posterior approach may be performed with the patient placed in an ipsilateral decubitus position. Other alternative routes including the transhepatic, transgastric, and transsplenic approaches have been proposed for adrenal biopsies under CT guidance (3). The most common complications after percutaneous adrenal biopsy are pneumothorax and hemorrhage (2,3). Pancreatitis is reported in cases of anterior transpancreatic approach and some rare, isolated complications like adrenal abscess (8) or needle tract metastasis (9). Regardless of the access route, a total complication rate of 2.8–8.4% has been reported (2,3).

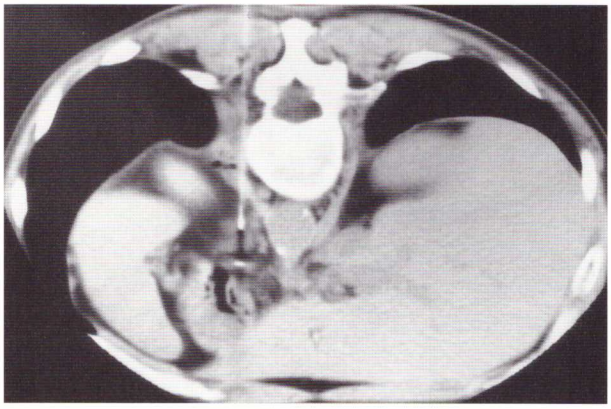

FIG. 3. After subsequent injection of 15 ml of saline solution, the needle was inserted through the dilated extrapleural space down to the adrenal mass.

In our case, the adrenal biopsy was performed via the posterior approach with the patient placed in the prone position. After injection of ~60 ml of physiologic saline solution into the paravertebral space, an artificial lateral displacement of the parietal pleura was achieved, creating a safe pathway to the left adrenal lesion without transgression of the posterior costophrenic sulcus.

Gas insufflation or CO_2 injection has been previously used to create an extrapleural window for mediastinal interventions, with poor results due to gas dissection along tissue planes and insufficient displacement of the pleura (10,11).

In a fairly recent report, Carlson et al. (12) described an injection of saline-xylocaine solution to distend the iliacus muscle to create a safe pathway for deep pelvic biopsies. Langen et al. (13) have described retroperitoneal biopsies in cadavers by creating a wider and direct access route after paravertebral injection of fluids or CO_2. Günther (14) reported a method for artificial widening of the mediastinum by injecting saline solution to gain access for extrapleural biopsies of mediastinal masses; this later method was adopted in larger series, with excellent results in regard to the low complication rate (15,16). Reasons for failure in cases of mediastinal biopsies, such as unsuccessful dilatation of the paravertebral soft tissue, slipping of the needle, obstruction of the pathway, injury of the spinal nerve, pain, or bleeding, were not encountered in our case.

In conclusion, we describe a potentially safer technique for adrenal biopsy, previously performed for mediastinal lesions, providing an access route for otherwise unapproachable lesions, without transgression through pleura or solid intraabdominal organs, which might result in complications.

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