

**Title:**

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**CLINICAL IMPACT OF ENDOSCOPIC ULTRASOUND IN THE STUDY OF ADRENAL GLAND:  
CYTOMEGALOVIRUS INFECTION MIMICKING A NEOPLASIC HYPERCAPTATION IN PET**

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**CASE REPORT**

A 71-year-old woman with stage IV follicular lymphoma in complete remission since 2006. In March 2019, chemotherapy treatment was initiated due to a relapse with pulmonary involvement. At three months, the patient presented bad general condition and fever. A positron emission tomography (PET) showed abnormal metabolic activity in the left adrenal gland (AG) suggestive of lymphoma recurrence (Fig.1). Tuberculosis and human immunodeficiency virus (HIV) infection were ruled out. Endoscopic ultrasonography-guided fine needle aspiration (EUS-FNA) was performed. A hypoechoic, heterogeneous nodular lesion, with well-defined margins, about 27x16mm of maximum diameters was reported (Fig.2). Cytopathology confirmed isolated epithelial cells without cytological atypia, focus of adrenal adenoma, and

cytomegalic inclusions with positive immunohistochemical expression for cytomegalovirus (CMV) (Fig.3). A clinical improvement was observed after treatment with ganciclovir.

## DISCUSSION

The most frequent causes of solid unilateral lesions in AG in patients without HIV infection are benign lesions such as adenomas, primary malignancy tumors and metastases of lung neoplasia<sup>(1,2)</sup>. AG infections secondary to CMV typically occur HIV-infected patients and with bilateral involvement. The presence of an adenoma in left AG could have caused a false-positive in initial PET, but after ganciclovir treatment, no abnormal metabolic activity was detected in control PET. To our knowledge, this is the first case reported in the literature of unilateral CMV infection of AG in a non-HIV infected that have been diagnosed by EUS-FNA<sup>(1-3)</sup>. Given that PET scan hypercaptation is not always diagnostic of malignancy, it is mandatory to obtain pathological samples, of which EUS-FNA has proven the best technique<sup>(3)</sup>.

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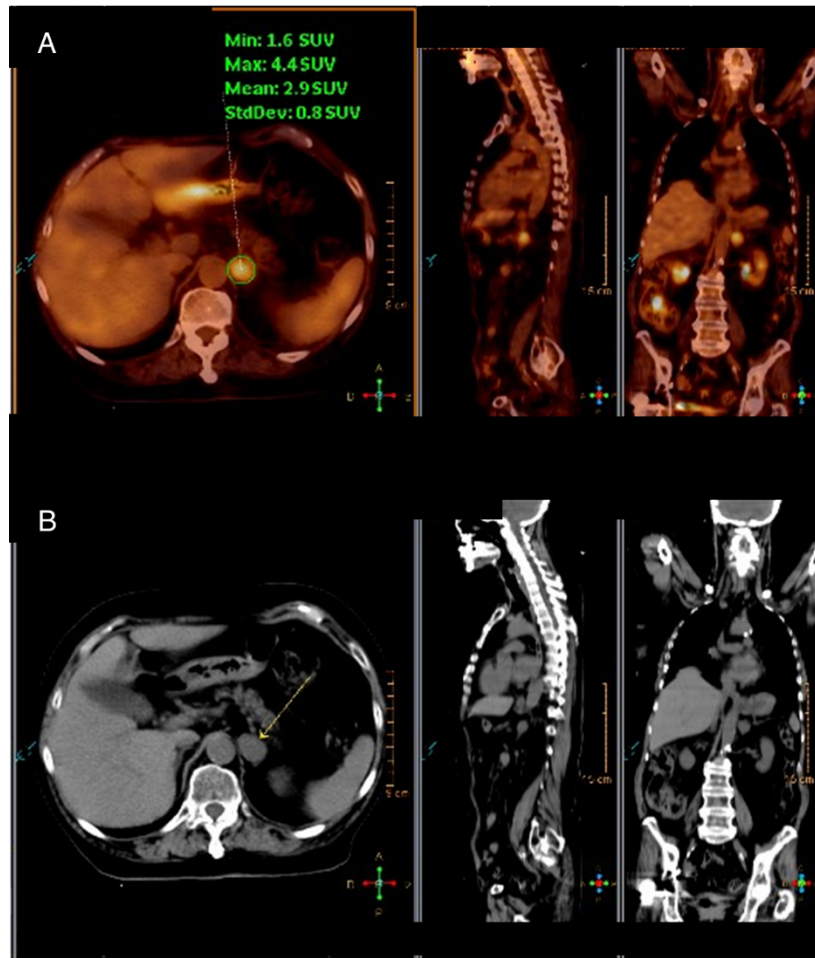
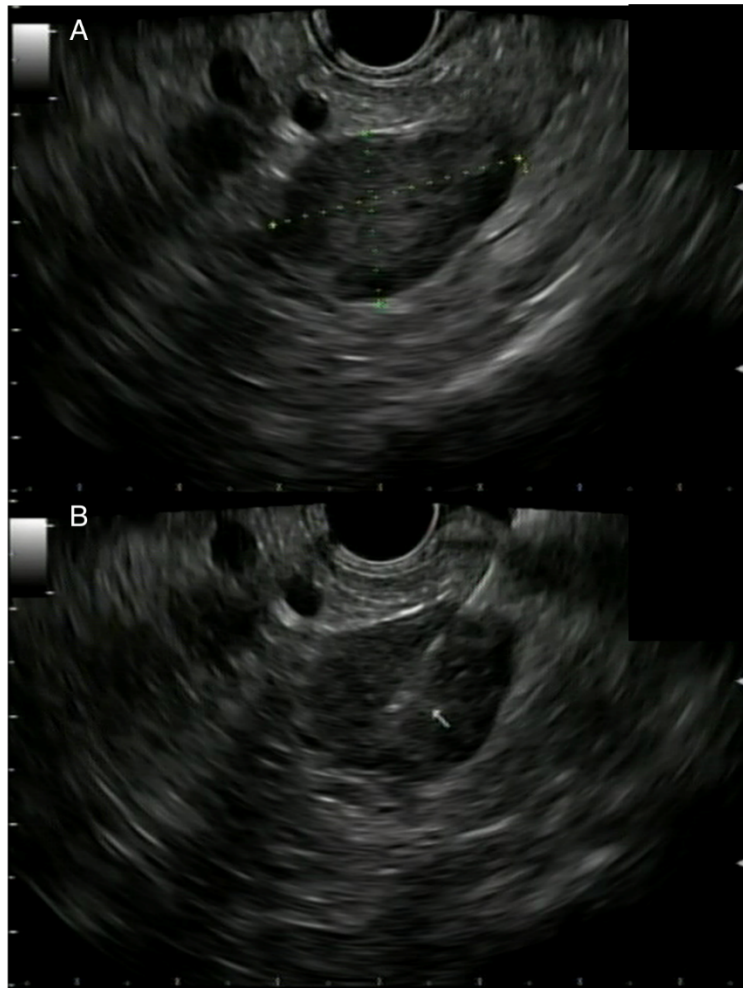
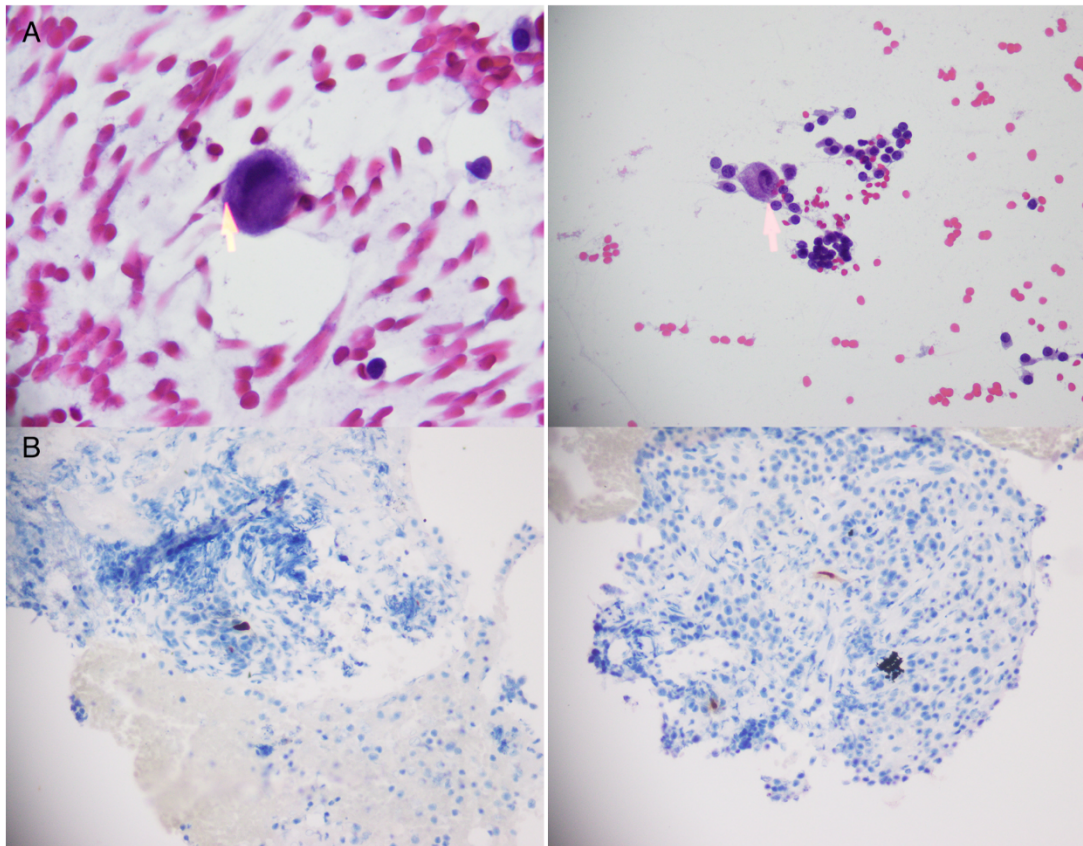


Figure 1. Computed tomography (CT) scan and positron emission tomography (PET). (a) PET showing abnormal metabolic activity in the left adrenal gland (standard uptake value: 4.4). (b) CT scan showing left adrenal gland with nodule located in a lateral wing conserving the 'seagull shape' morphology.



**Figure 2. Endoscopic ultrasound images of left adrenal gland. (a) A hypoechoic, heterogeneous nodular lesion, with well-defined margins, about 27x16mm of maximum diameters. (b) Endoscopic ultrasound-guided fine-needle aspiration of the left adrenal gland.**



**Figure 3. Cytopathology images. (a) Haematoxylin and eosin staining showing isolated epithelial cells without cytological atypia and focus of adrenal adenoma. (b) Immunohistochemistry showing cytomegalic inclusions with positive immunohistochemical expression for cytomegalovirus.**