# Epstein–Barr virus-associated gastric carcinoma diagnosed by EUS-guided fine needle biopsy (with video)

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A 64-year-old woman with a gastric tumor was referred to us for pathologic diagnosis and further treatment. Esophagogastroduodenoscopy revealed a 20-mm subepithelial lesion in the gastric body [Figure 1]. Forceps biopsy from the top of the lesion showed no evidence of malignancy. EUS showed a hypoechoic mass mainly in the submucosal layer [Figure 2a]. Immediately after injection of the contrast agent, Sonazoid (Perflubutane, Daiichi-Sankyo Pharmaceuticals, Tokyo, Japan), the lesion was heterogeneously enhanced [Video 1 and Figure 2b]. An EUS-guided fine needle biopsy (EUS-FNB) with an Acquire 22-G needle (Boston Scientific Japan, Tokyo, Japan) was conducted using a convex-type ultrasonic endoscope GF-UCT260 (Olympus Medical System Corp., Tokyo, Japan) with the observation

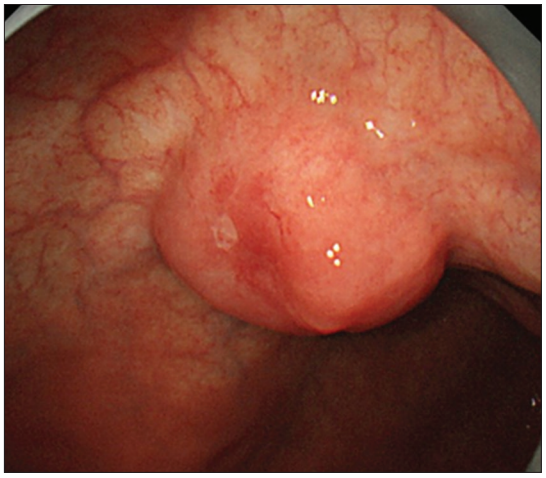

**Figure 1.** Endoscopic image revealed a 20-mm subepithelial lesion in the gastric body

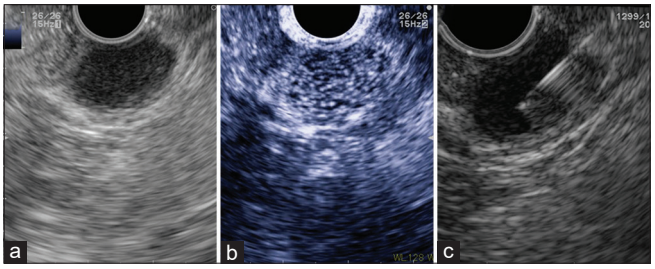


**Figure 2.** Endoscopic ultrasound image revealed a hypoechoic mass mainly in the submucosal layer (a). Contrast-enhanced endoscopic ultrasound revealed that the lesion was heterogeneously enhanced (b). An endoscopic ultrasound-guided fine-needle aspiration with a 22-G needle was conducted (c)

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**Website:** www.eusjournal.com

**DOI:** 10.4103/EUS-D-21-00026



**How to cite this article:** Nishikawa J, Kaino S, Goto A, Harada E, Sakaida I. Epstein–Barr virus-associated gastric carcinoma diagnosed by EUS-guided fine needle biopsy (with video). Endosc Ultrasound 2022;11:332-3.

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**Received:** 2021-01-13; **Accepted:** 2021-05-06; **Published online:** 2021-09-03

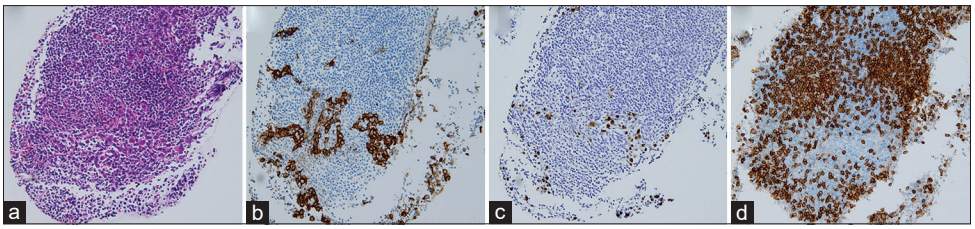


**Figure 3:** The pathologic specimen revealed poorly differentiated adenocarcinoma with prominent lymphocytic infiltration (a). The tumor cells were positive for pan epithelial marker, cytokeratin AE1/AE3, by immunohistochemistry (b). Epstein–Barr virus-encoded small RNA 1 in situ hybridization showed that signals of Epstein–Barr virus-encoded small RNA 1 were observed in the nuclei of tumor cells (c). The infiltrating lymphocytes were positive for pan T-cell marker, CD3 (d). (orig. mag. ×20)

device, ProSound alpha-10 (Aloka Co. Ltd., Tokyo, Japan) [Figure 2c]. The pathologic specimen revealed poorly differentiated adenocarcinoma with prominent lymphocytic infiltration that was diagnosed as carcinoma with lymphoid stroma (CLS) [Figure 3a]. We obtained enough tissue for immunohistochemistry and Epstein–Barr virus-encoded small RNA 1 (EBER1) *in situ* hybridization. The tumor cells were positive for a pan epithelial marker, cytokeratin AE1/AE3 [Figure 3b], and EBER1 signals were observed in the nuclei of tumor cells [Figure 3c]. The infiltrating lymphocytes were positive for pan T-cell marker, CD3 [Figure 3d]. Distal gastrectomy with lymph node dissection was performed, and the final pathological diagnosis was Epstein–Barr virus (EBV)-positive CLS limited to the submucosal layer. Lymphovascular invasion was positive but without lymph node metastasis.

The rate of lymph node metastasis is low in EBV-associated gastric carcinoma. Thus, endoscopic resection and minimally invasive surgery might be suitable for this subtype. Since the presence of EBV affects treatment strategies for gastric cancer, the importance of detecting EBV in gastric carcinoma is increasing.[1] Subepithelial lesion-like morphology is considered to be one of the features of CLS as CLS is comprised a poorly differentiated tumor mass that accompanies infiltrating lymphocytes in a submucosal or deeper layer.[2] EUS revealed a hypoechoic mass in the submucosal layer reflecting CLS histology.[3-5] Since >90% of gastric CLS cases are associated with EBV infection,[6] these findings might be helpful in the diagnosis of EBV-associated gastric carcinoma. EUS-FNB was useful for pathologic diagnosis for CLS and its association with EBV.

### *Declaration of patient consent*

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given her consent for her images and other clinical information to be reported in the journal. The patient understands that her names and initials will not be published and due efforts will be made to conceal her identity, but anonymity cannot be guaranteed.

### *Financial support and sponsorship*

Nil.

### *Conflicts of interest*

There are no conflicts of interest.

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