Magnetic Resonance Manifestations of Villoglandular Papillary Adenocarcinoma of the Uterine Cervix with a Fern-leaf-like Appearance

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Villoglandular papillary adenocarcinoma (VGPA) is a rare subtype of cervical adenocarcinoma that generally affects young women and has a favorable prognosis. Its preoperative diagnosis is important to avoid excessive surgery. We report the magnetic resonance (MR) findings of a case in which the cervical tumor showed a fern-leaf-like appearance on high resolution T²-weighted images obtained at 3 tesla. MR imaging clearly showed this pathological feature that may suggest this disease.

Keywords: cervical cancer, MRI, uterus, villoglandular papillary adenocarcinoma

Introduction

Villoglandular papillary adenocarcinoma (VGPA) is a rare subtype of adenocarcinoma of the uterine cervix that usually affects young women and has a better prognosis than other cervical adenocarcinomas.¹–⁶ Cervical conization is suggested to treat patients with VGPA of childbearing age, and conservative management may be considered in patients during pregnancy.¹–⁷ Cervical cytology is performed as an initial procedure in diagnosing cervical lesions, but VGPA is often either missed or diagnosed as atypical glandular cells (AGC) because of its relatively bland cytological features.⁸ Preoperative differentiation from other cervical lesions based on imaging is important to avoid excessive surgery. We report a case of VGPA with characteristic imaging findings that reflect its pathological features.

Case Report

A 38-year-old woman, gravida 2, para 2, was referred to our hospital with genital bleeding and watery discharge. On admission, biochemistry revealed a slight elevation of serum CA 19-9 up to 73 IU/mL (normal level, 37 IU/mL). Cervical cytology was performed, and the diagnosis was Class III (AGC). Colposcopy revealed a cancer-suspicous papillary tumor in the cervix, and a biopsy specimen was diagnosed as mucinous adenocarcinoma. The patient underwent magnetic resonance (MR) examination of the pelvis with a 3-tesla superconducting MR imaging system (Discovery MR750, GE Healthcare, Milwaukee, WI, USA) with 32-channel torso array coil. Sagittal T²-weighted images (Fig. 1A) showed an exophytic, papillary tumor in the cervix. Coronal high resolution T²-weighted images (Fig. 1B) demonstrated the tumor with a fern-leaf-like villous appearance. The tumor’s high signal intensity on diffusion-weighted imaging with low apparent diffusion coefficient (ADC) (Fig. 1C) suggested it was malignant. Dynamic contrast-enhanced MR imaging showed early intense enhancement and rapid washout of contrast material in the tumor (Fig. 1D). High-resolution post-contrast T₁-weighted images revealed intensely enhanced arborescent structures within the tumor (Fig. 1E). VGPA was suspected based on the MR imaging findings, and cervical conization was performed (Fig. 2A). The tumor was histologically diagnosed as VGPA without lymphovascular involvement (Fig. 2B). However, because
Fig. 1. A. Sagittal fast spin-echo T2-weighted image (repetition time [TR]/
effective echo time [TE], 5319/123.2 ms; slice thickness, 3 mm) shows an exo-
phytic papillary tumor (arrow) of intermediate signal intensity in the cervix. B.
Sequential coronal high resolution fast spin-echo fat-saturated T2-weighted images
(TR/effective TE, 5000/103.9 ms; slice thickness, 2 mm) demonstrate the tumor’s
fern-leaf-like villous appearance (arrows). C. Diffusion-weighted imaging (left)
(TR/TE, 4000/60.4 ms; b factor, 1500 s/mm²) shows the tumor’s (arrows) high
signal intensity, and the corresponding apparent diffusion coefficient (ADC) map
generated from b values of 0 and 1500 s/mm² (right) shows its low ADC. D. Three-
dimensional dynamic contrast-enhanced magnetic resonance (MR) images (3D fast
spoiled gradient-recalled echo sequence with fat-suppression; TR/TE, 4.6/2.1 ms;
slice thickness, 3 mm/1.5 mm overlap) with intravenous administration of
0.1 mmol/kg of gadopentetate dimeglumine at 2 mL/s show early intense enhance-
ment and rapid washout of contrast material in the tumor (arrows). E. High reso-
lution post-contrast gradient echo fat-saturated T1-weighted images (TR/TE, 3.9/
1.7 ms; slice thickness, 3 mm/1.5 mm overlap) (left: coronal, right: sagittal) reveal
intensely enhanced arborescent structures within the tumor (arrows).
the tumor invaded the stroma more than 3 mm,\(^1\) radical hysterectomy was performed. No cancer cells were identified in the resected specimen.

**Discussion**

The incidence of cervical adenocarcinoma, which has poorer prognosis than squamous cell carcinoma, has recently increased in young women.\(^4,9\) Young and Scully first described VGPA, a rare subtype of cervical adenocarcinoma, in 1989.\(^1\) WHO classification criteria (2003) refer to this tumor as “mucinous adenocarcinoma, villoglandular type.”\(^10\) VGPA accounts for 3.7 to 4.8% of cervical adenocarcinomas\(^1,6\) and has a more favorable prognosis than other types of cervical adenocarcinomas. Preoperative diagnosis is important because less radical surgery, such as cervical conization, may be appropriate in patients with VGPA in the absence of lymphovascular invasion, deep stromal invasion, or other more aggressive cancerous components.\(^1-6\)

VGPA is histologically characterized by exophytic growth with numerous papillary villous structures lined by columnar tumor cells with mild cytologic atypia. The tumor cells may contain mucin, and the central fibrovascular cores of the papillae usually have varying numbers of inflammatory cells.\(^1-6\)

Our patient’s tumor appeared as an exophytic cervical mass that exhibited a fern-leaf-like villous appearance on high resolution T2-weighted images. The intensely enhanced arborescent structures within the tumor on high resolution post-contrast T1-weighted images may reflect the branching central fibrovascular cores of the papillae in the villous tumor. Recently, MR scanners with field strengths of 3T have become available for clinical use, and Kataoka and colleagues suggested the potential of MR imaging of the female pelvis at 3T to provide excellent images of the uterine cervix on high resolution T2-weighted images that 1.5T MR cannot sufficiently analyze in a reasonably short acquisition time.\(^11\) In our case, high resolution MR images at 3T were considered useful in demonstrating detailed morphological characteristics of VGPA. Serous adenocarcinoma and clear cell adenocarcinoma of the uterine cervix may also show a papillary growth pattern, but these tumors usually appear with varying amounts of solid growth and may often show invasive growth.\(^4\) The fern-leaf-like appearance of VGPA may allow its differentiation from these malignant cervical tumors. The high signal intensity of our case on diffusion-weighted imaging with low ADC suggested the tumor’s malignant nature and may be a helpful finding in distinguishing VGPA from benign pathologies, such as cervical polyps.\(^12\)

We conclude that a tumor’s fern-leaf-like appearance on high resolution T2-weighted MR images obtained at 3T may suggest VGPA and thereby facilitate patient management.

**References**