Cervical Carcinoma with negative Papanicolaou smear: imaging findings with MDCT and MRI
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Patient: 41 years, female

Clinical History:

Carcinoma of the cervix is one of the most common cancers in developing countries and one of the most frequent causes of death in women. The accuracy of cervical cytology screening programmes (Papanicolaou test) has been questioned, because of the reported false-negative results. 

Imaging Findings:

A 41-year old woman was referred to the Gynaecology department for a colposcopic examination, after the completion of the antibiotic treatment for a previous cervical infection. The last Papanicolaou test performed 2 months ago reported signs of cervicitis and the presence of abnormal cells, without evidence of malignancy. Colposcopy revealed the presence of a hemorrhagic exophytic cervical mass, highly suspicious for malignancy (Fig 1). Pelvic examination under anaesthesia confirmed the presence of cervical malignancy, probably extending into the left parametrium (FIGO IIB).

Patient underwent multidetector CT examination of the abdomen on a 16-row CT scanner. A hypodense cervical tumour was revealed (Fig 2), with ill-defined cervical margins (Fig 2a,c), a finding that could not exclude parametrial infiltration. Neither pelvic nor retroperitoneal lymphadenopathy was detected. MR imaging of the pelvis was followed, confirming the presence of cervical carcinoma (Fig 3). The tumour was of high signal intensity on both T2 and diffusion-weighted (DW) images (Fig 3b,c,e), with a low apparent diffusion coefficient (ADC) value (Fig 3f). Disruption of the stromal ring around the neoplasm (Fig 3b) could not exclude microscopic parametrial invasion. Based on imaging findings the diagnosis of primary cervical carcinoma (FIGO stage IIB) was made. The patient underwent radical hysterectomy, with preservation of the ovaries and pelvic lymphadenectomy. Histology reported low-grade squamous carcinoma of the cervix, with isolated foci of keratinization, infiltrating both parametria (FIGO stage IIB, TNM stage pT2bN0Mx, Fig 4). The patient refused radiation therapy after surgery.

Discussion:

Invasive cervical cancer is the third most common gynecologic malignancy [1-6]. Mortality rates have decreased significantly over the past years due to prevention and early detection of the disease, as a result of the development of the Papanicolaou smear [1]. Papanicolaou tests although effective, are not always diagnostic, with reported sensitivities ranging from 30-87% [7-9]. Their results may appear physiologic, even in the presence of abnormal cells of the cervix [1, 7-9]. Our patient was a case of invasive cervical carcinoma, with a Papanicolaou test negative for malignancy. The preoperative diagnosis was based in the combination of both clinical and imaging findings. The prognosis of the disease is based on the stage, volume of the mass, the histologic grade of the primary tumor.
and the status of the lymph nodes. There are four stages of disease as defined by the staging system of the International Federation of Gynecology and Obstetrics (FIGO) [1-6, 10]. FIGO classification of primary cervical carcinoma, recently modified encourages the use of cross-sectional studies, as MRI/CT for the assessment of the size of the primary tumor and staging of the disease [10].

MR imaging has been accepted as a satisfactory modality in the evaluation of invasive cervical carcinoma, providing a reliable measurement of tumor dimensions and a high accuracy in assessing parametrial invasion [3-6, 11, 12]. Complete disruption of the hypointense stromal ring with tumoral mass extending into the parametrium is considered as reliable sign of invasion [3-6, 11, 12]. With disruption of the cervical stroma, but without any definite parametrial mass, microscopic infiltration of the parametria should not be excluded, as proved also in our patient.

Computed tomography was used primarily to stage patients with advanced disease and evaluate for recurrence [2, 4, 13-21]. The limitations of CT were difficulties in visualization of the primary neoplasm and inaccuracies in evaluating parametrial invasion [11-19]. Multidetector CT (MDCT) scanners by reducing slice thickness, greatly improve spatial resolution [21-23]. Moreover, the creation of multiplanar reformatted and three-dimensional (3D) reconstructed images of satisfactory anatomic information is possible [21-23]. Therefore, both the detectability of the primary neoplasm, as well as the local staging of the disease in patients with primary cervical carcinoma may be improved. Multiplanar reformations in sagittal and coronal planes depict the superior and inferior extent of the neoplasm more accurately than the transverse plane. Transverse and coronal reformatted images provide valuable information regarding parametrial invasion, as seen in this case. Three-dimensional reconstructed images nicely depict the disease as seen during surgery. The relationship of the primary tumor to the cul de sac, pelvic viscera, side wall and blood vessels can be displayed on the 3D images and used for surgical planning. MDCT may represent an efficient diagnostic modality in the detection and staging of cervical cancer, especially in cases when MR imaging is contraindicated. Among the advantages of the technique is the reduced scan time, low cost and wide availability.

**Differential Diagnosis List:** Primary cervical carcinoma.

**Final Diagnosis:** Primary cervical carcinoma.

**References:**

Figure 1

Description: Colposcopic view revealing the presence of a friable, irregularly-surfaced exophytic cervical mass, highly suspicious for malignancy. Origin:
Figure 2

Description: (a) Transverse, (b) sagittal and (c) coronal multiplanar reformatted CT images depict a hypodense cervical mass (asterisk), with ill-defined margins (short arrow), a finding suggestive of parametrial invasion. The uterine body is normal (b). The presence of gas within the neoplasm was attributed to necrosis (long arrow, b). A small amount of fluid in the Douglas space (long arrow, a) was considered as physiologic. Origin:
Description: (a) Transverse, (b) sagittal and (c) coronal multiplanar reformatted CT images depict a hypodense cervical mass (asterisk), with ill-defined margins (short arrow), a finding suggestive of parametrial invasion. The uterine body is normal (b). The presence of gas within the neoplasm was attributed to necrosis (long arrow, b). A small amount of fluid in the Douglas\space space (long arrow, a) was considered as physiologic. **Origin:**

Description: (d) 3D-reconstructed image (sagittal plane) depicting the cervical neoplasm (asterisk). **Origin:**
**Description:** (a) Transverse T1, (b) transverse and (c) sagittal T2-weighted images. Cervical carcinoma (asterisk) is isointense and hypeintense on T1 and T2-weighted images, respectively. There is partial disruption of the hypointense cervical ring (small arrows) around the neoplasm, a finding that could not exclude microscopic parametrial invasion, as proved on histology. Free fluid in the Douglas' space (long arrow). **Origin:**
(a) Transverse T1, (b) transverse and (c) sagittal T2-weighted images. Cervical carcinoma (asterisk) is isointense and hypeintense on T1 and T2-weighted images, respectively. There is partial disruption of the hypointense cervical ring (small arrows) around the neoplasm, a finding that could not exclude microscopic parametrial invasion, as proved on histology. Free fluid in the Douglas' space (long arrow). Origin:

(d) Sagittal post-contrast MR image shows the tumor (asterisk) of reduced vascularity, when compared to the normal myometrium. Origin:
**Description:** (e) Transverse DW echo planar image (b = 800 s/mm²) depicts hyperintensity of the cervical carcinoma (arrow). **Origin:**
Description: (f) The ADC value of the tumor (arrow) was 0.71 x 10^{-3} mm^2/s, lower than that of the normal myometrium (1.8 x 10^{-3} mm^2/s, long arrow) and endometrium (1.31 x 10^{-3} mm^2/s). Origin:
Figure 4

Description: (a, b) Gross appearance of invasive squamous cell carcinoma seen as a polypoid mass at the os in the opened cervix. Origin:
Description: (a, b) Gross appearance of invasive squamous cell carcinoma seen as a polypoid mass at the os in the opened cervix. **Origin:**

c

Description: (c) Microscopic appearance of poorly-differentiated, invasive squamous cell carcinoma of cervix (arrows, H-EX 200). **Origin:**
Description: (d) Invasion of the parametria by the neoplasm (H-EX40). Origin: