CASE REPORT

Isolated fallopian tube metastasis from colorectal cancer: ultrasonographic features

Aspetto ecografico di una metastasi della tuba di falloppio originaria di un cancro colico

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Abstract We present here the first-reported case of tubal metastasis from colorectal cancer diagnosed by a preoperative pelvic ultrasound. A 53-year-old woman suffering from vaginal discharge was referred to us 2 years after she underwent a partial colectomy for adenocarcinoma. The pelvic ultrasound examination revealed a right pelvic mass of $52 \times 24 \times 38$ mm, independent of the right ovary, which was apparently unaffected. A right salpingo-oophorectomy was performed and the definitive histopathology examination showed a recurrence of the initial adenocarcinoma with a right tubal metastasis. The eventuality of such an unusual site of metastasis should be remembered.

Keywords Fallopian tube carcinoma · Colorectal cancer metastasis · Adnexal mass · Pelvic ultrasound

Riassunto Presentiamo il primo caso di metastasi della tuba di falloppio proveniente da un cancro colico diagnosticato in pre-operatorio da un'ecografia pelvica. Si

trattava di una donna di 53 anni che soffriva di perdite vaginali, ci è stata indirizzata due anni dopo aver eseguito una colectomia parziale per adeno-carcinoma. L'ecografia mostrava una massa pelvica destra di $52 \times 24 \times 38$ mm indipendente dal ovaio destro che era sano. È stata realizzata un'ablazione delle tube e delle ovaie e l'esame istopatologico definitivo ha mostrato una recidiva del adenocarcinoma iniziale con metastasi della tuba destra. L'ipotesi di una localizzazione così rara deve essere conosciuta.

Introduction

Primitive fallopian tube carcinomas are the least common type of gynecological malignancy. With fewer than five cases per million women per year [1], they represent 0.3–1.8% of all gynecological malignancies [2, 3]. This incidence rate, however, is probably underestimated due to the misdiagnosis of primitive fallopian tube carcinoma as ovarian tumors (during either surgery or microscopic examination), given that their histological aspects are indistinguishable. Metastasis of the fallopian tube from non-gynecological malignancies is further underestimated for the same reasons. We report the case of a 53-year-old woman who had a previous history of colorectal cancer and presented a fallopian tube metachronous metastasis.

Case report

A 53-year-old postmenopausal woman, G3P3, was referred for investigation of intermittent watery vaginal discharge over a 1-year period. This patient was followed for 2 years

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after the resection of a colorectal adenocarcinoma without adjuvant therapy. The physical examination was normal except for the vaginal discharge. Transvaginal pelvic sonography was performed, inducing moderate right pelvic pain. The uterus was retroverted and measured $42.1 \times 38.2 \times 27.5$ mm. The endometrium was atrophic with 1.05 mm thickness. A small amount of fluid was noticed inside the uterine cavity, with a small echogenic structure measuring $8 \times 3 \times 9$ mm, which corresponded to a benign polyp (Fig. 1a, b).

A sausage-shaped solid mass measuring $52 \times 24 \times 38$ mm was found on the right adnexa, with a volume of 25 cm^3 (Fig. 2a, b).

The mass was exclusively solid with no liquid component and appeared bilobular. The wall was thin and regular (Fig. 3a, b).

The spectral Doppler revealed a central and anarchic neovascularization (Fig. 4).

The left adnexal was normal. The right ovary measured $18.2 \times 18.3 \times 11.1$ mm. It presented with a residual

Fig. 1 a, b Sagittal view of the uterus

Fig. 2 a, b Right adnexal mass

follicle and was surrounded by a small amount of fluid. The left ovary measured $15.8 \times 9.9 \times 6.4$ mm and was atrophic. Both seemed unaffected (Fig. 4a, b). In addition, no ascites was found. These findings were suggestive of a malignant lesion. The CA 125 and the CA 19-9 levels were normal, whereas the ACE level was moderately elevated to 3.10 UI/mL.

A suspect 2-cm-long nodule of the sigmoid and a 5-cm-diameter pelvic mass were confirmed with a CT scan and MRI (performed after the ultrasound).

The colonoscopy failed to reveal any intraluminal anomaly. The SPECT-CT showed a suspicious hyperfixation of the sigmoid nodule and the right pelvic mass.

An exploratory laparotomy was performed, finding a 5-cm adnexal mass adhering to the right utero-sacral ligament and a thicker sigmoid wall in front of the promontory. A right salpingo-oophorectomy was performed and the frozen section of the right tube revealed a Lieberkühnian metastatic tumor. This resulted in a radical carcinologic surgery consisting of sigmoidectomy and mesosigmoid resection with a colo-colic anastomosis, left salpingo-oophorectomy, and total intrafascial hysterectomy. Macroscopically, the right tube was dilated, containing a mostly necrotic tumor on a 6-cm length, and was consistent microscopically with a Lieberkühnian adenocarcinoma that completely involved the tubal wall

Fig. 3 a, b 3D aspect of the right adnexal mass

down to the serous membrane. There was also a carcinosis nodule that totally involved the sigmoid wall of 3 cm length, corresponding to a local recurrence. After

surgery, the patient received neo-adjuvant chemotherapy consisting of the FOLFOX protocol and has remained disease-free to date.

Fig. 4 Anarchic and central neovascularization highlighted by the Doppler

Discussion

Colic metastases from a primitive fallopian tube carcinoma have already been described in the literature [4, 5]. Fallopian tube metastasis from non-gynecological malignancies is very rare. Stewart et al. reported a series of 20 cases: only two cases were secondary to a colic adenocarcinoma, and the other cases were secondary to appendix ($n = 6$), gastric ($n = 6$), breast lobular ($n = 2$), breast ductal ($n = 1$), bile duct ($n = 1$), neuro-endocrine colon ($n = 1$), and unknown ($n = 1$) primitive tumors [1]. In a series of 100 cases, Rabban et al. found that the two main primary tumors that metastasized to the fallopian tube were the colon (35%) and the breast (15%), and that they were adenocarcinoma in 87% of cases [6]. A tubal nodule or mass was macroscopically individualized in only 35% of cases. Tumors involved the fimbriae in 49% of cases and ovarian metastases were present in 95% of cases, although 23% seemed macroscopically safe [6].

In most of cases, a tubal carcinoma is asymptomatic, but the most specific signs are vaginal bleeding and discharge, abdominal pain (colicky due to forced peristalsis, or dull due to distention of the tube), and an abdominal mass.

In case of a suspicious adnexal mass, CA-125 is frequently measured because this antigen is produced by peritoneal and ovarian carcinoma. However, this marker lacks specificity, because it also increases in benign gynecologic diseases such as endometriosis or with other malignant tumors of the colon or pancreas, especially in cases of peritoneal carcinosis [7]. HE4 is a glycoprotein from the WFDC2 family which is overexpressed in serous, endometrioid, and clear-cell ovarian carcinomas starting in

the early stage (FIGO I and II). The ROMA algorithm (Risk of Ovarian Malignancy Algorithm) is used to assess the risk of ovarian malignancy by taking into account the CA 125 and the HE4 rates as well as the menopausal status of the patient. The patients are classified into two groups: low risk and high risk of ovarian malignancy. A few studies are available to assess the efficiency of this diagnostic strategy for fallopian tube malignancy. Jacob et al. have measured the CA 125 and the HE4 rates and the ROMA in a cohort of 160 patients, including six cases of fallopian tube carcinoma [8]. These six patients had the most important median value for HE4 (703 pM, IR = 127–2115) and CA 125 (134 U/mL, IR = 31–1330). When the group of patients with benign diseases ($n = 71$) was compared to the group with fallopian tube and ovarian carcinoma, the authors showed that the best diagnostic performance for HE4 was with a sensibility = 78.9%, specificity = 85.9%, and AUC = 0.86, and for ROMA, with a sensibility = 78.9%, specificity = 87.3%, and AUC = 0.87.

The ultrasonographic features of tubal metastasis are similar to those already described for primitive fallopian tube carcinoma and they consist of a solid adnexal mass with a papillary projection and pseudo-septa, and an anarchic neovascularization with a low index of resistance [9, 10]. The mass content is mainly solid in 46.1% of cases, with a partial liquid component in 24.6% of cases, and it appears homogeneously hypoechogenic [9]. In 20% of cases, the mass is mainly liquid and looks like a simple hydrosalpinx, which is one of the differential diagnoses.

In case of tubal occlusion at the proximal and distal part, the tumoral serous secretion explains this aspect of hydrosalpinx, which is associated with a better prognosis

because the distal occlusion of the fimbria prevents the tumoral spread into the peritoneal cavity. In case of a mixed adnexal mass, incomplete septa can be seen. The mass may have an ovoid, sausage-shaped aspect. Papillary projections are also important signs and are defined as 3-mm protrusions from the mucosal part of the fallopian tube. An irregular and thick capsule is in favor of malignancy. The neovascularization, constituted by many vessels that run through the mass with an anarchic architecture, is an important sign in favor of malignancy. The Doppler mode can eliminate the possibility of a hydrosalpinx or pyosalpinx. The index of resistance is low and can be explained by the thin tumoral vessels that have an incomplete endothelium, a low density of muscular fibers, and a high arteriovenous shunt density [11].

Contrast-enhanced ultrasonography (CEUS) is an accurate method using ultrasound contrast agents consisting of microbubbles of air or gases of low solubility, stabilized by a lipid, surfactant, or polymer shell. Some studies have shown that CEUS, when compared to traditional ultrasound, significantly improves the sensitivity and the specificity of small hepatic metastases of colorectal cancer by increasing the liver-to-lesion contrast [12, 13]. On CEUS, hepatic metastases appeared mainly hypervascular in the arterial phase and hypoechoic in the venous and delayed phases. There were no significant differences between CEUS and multidetector CT in terms of sensitivity and specificity. No data are available for tubal metastases, but the CEUS features would probably be comparable.

The hysterosalpingography has no interest because of its low diagnostic value. Indeed, it cannot distinguish benign lesions (such as hydrosalpinx) or infectious lesions (such as pyosalpinx) from malignant lesions. Moreover, this exam can cause a tumoral spread in the peritoneal cavity. The pelvic CT scan provides the same data as ultrasound. This exam can also look for distant metastasis, and iodine injection can highlight the adnexal mass. However, its low resolution cannot allow a loco-regional staging as good as that of a pelvic MRI [14]. The pelvic MRI remains the gold standard in the diagnostic exploration of undetermined adnexal masses [15]. The fallopian tube carcinoma appears in hyposignal T1 or in hypersignal or isosignal T2, and the gadolinium highlights the mass, revealing a pathologic neovascularization [14, 16]. The MRI is more efficient in the loco-regional staging by assessing spread to neighboring organs, and it offers a better resolution.

Conclusion

Fallopian tube metastasis from non-gynecological cancers is uncommon, and the eventuality of such an unusual site of metastasis should be remembered. To our knowledge,

this is the first reported case of tubal metastasis from a colorectal cancer to have been diagnosed by a preoperative pelvic ultrasound. This case emphasizes the role of the fallopian tubes as a potential conduit between the gynecological tract and the peritoneal cavity by transporting tumor cells inside its lumen.

Compliance with ethical standards

Conflict of interest The authors have no conflict of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Written informed consent was obtained from the patient for the publication of this case report and accompanying images.

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