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Peer reviewed
Case report

Rapid progression of disease in two cases of undifferentiated endometrial carcinoma

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A R T I C L E   I N F O

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Undifferentiated endometrial carcinoma
Endometrial cancer
Dedifferentiated endometrial carcinoma

A B S T R A C T

Undifferentiated endometrial carcinoma, a rare histopathologic diagnosis, has a poor prognosis with high risk of progression during or shortly after completion of adjuvant treatment. We present two cases of undifferentiated endometrial carcinoma: one in a postmenopausal female who experienced recurrent disease immediately after completion of adjuvant treatment and one in a premenopausal female who experienced disease progression while receiving adjuvant treatment. These cases exemplify the aggressive behavior of undifferentiated endometrial carcinoma and suggest the need for a more effective treatment in the upfront setting than the current standard of care for endometrioid endometrial adenocarcinoma.

1. Introduction

The American Cancer Society estimates 63,230 new cases of uterine cancer and 11,350 uterine cancer-related deaths in 2018 (Siegel et al., 2018). The World Health Organization defines undifferentiated endometrial carcinoma as “those lacking any evidence of differentiation” (Silverberg et al., 2003). A historically underrecognized and under-reported subtype, undifferentiated carcinoma is present in approximately 9% of endometrial carcinomas, with only 29% purely undifferentiated endometrial carcinoma and the remaining 71% admixed with differentiated carcinoma (Altrabulsi et al., 2005; Silva et al., 2007). Undifferentiated endometrial cancers have been gaining attention in the pathology literature, with reports of hypermutated (mismatch repair deficiency), ultramutated (POLE mutated), copy number low (PTEN mutated) or copy number high (TP53 mutated) molecular pathways (Rosa-Rosa et al., 2016), but literature regarding early clinical management is limited.

Undifferentiated histology has not been observed in hereditary nonpolyposis colorectal cancer (HNPC) patients, but a subset of sporadic, MLH1-methylated tumors demonstrate undifferentiated histology (Broaddus et al., 2006; Garg et al., 2009). The undifferentiated tumors were weakly/patchy positive for pancytokeratin but negative for estrogen and progesterone receptor (Broaddus et al., 2006). In comparison to high grade endometrioid endometrial adenocarcinoma, which has 1–49% of glandular differentiation, patients with undifferentiated endometrial carcinoma also present with vaginal bleeding and/or pelvic pain but more often (54%–58%) present with advanced stage disease and more frequently (75%) die within 5 years of diagnosis (Altrabulsi et al., 2005; Tafe et al., 2010). Pelvic and para-aortic lymph nodes are the common sites of metastasis (Tafe et al., 2010; Al-Loh and Al-Hussaini, 2013), and advanced stage disease cases do not generally respond to conventional chemotherapy for endometrial adenocarcinoma.

2. Case reports (Table 1)

2.1. Case 1

A 69-year-old female (BMI 22.9 kg/m²) with postmenopausal bleeding was referred for undifferentiated endometrial carcinoma diagnosed on endometrial biopsy. She underwent an uncomplicated robotic assisted total laparoscopic hysterectomy with bilateral pelvic and para-aortic lymphadenectomy. Her pathology demonstrated International Federation of Gynecology and Obstetrics (FIGO) stage IA undifferentiated endometrial adenocarcinoma with intact expression of mismatch repair proteins. She completed 6 cycles of adjuvant carboplatin and paclitaxel. One month after completion of adjuvant chemotherapy, she reported clear fluid per vagina but had a normal pelvic examination. Computed tomography (CT) urogram showed no evidence of urinary tract fistula but demonstrated a soft tissue density above the...
Table 1
Clinical and pathologic features of 2 patients with undifferentiated endometrial carcinoma.

<table>
<thead>
<tr>
<th>Clinical features</th>
<th>Case 1</th>
<th>Case 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at diagnosis, years</td>
<td>69</td>
<td>43</td>
</tr>
<tr>
<td>Age at menopause, years</td>
<td>52 (surgical, BSO)</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>22.9</td>
<td>23.2</td>
</tr>
<tr>
<td>Initial diagnosis</td>
<td>High grade carcinoma, favor undifferentiated carcinoma</td>
<td>Abnormal uterine bleeding</td>
</tr>
<tr>
<td>Imaging findings</td>
<td>TVUS: Uterus normal size and shape, anteverted. Endometrium 0.8 mm anteriorly, 0.9 mm posteriorly with fluid in cavity. Total endometrial thickness 17 mm. Polypl on stalk with proximal attachment versus intracavitary fibroid measuring 2.3 × 1.6 × 2.0 cm. Ovaries not visualized. No free fluid.</td>
<td>TVUS: 5.1 cm intrauterine mass, 3.3 cm complex right ovarian mass, no free fluid. CT CAP: Uterus markedly enlarged with suggestion of multiple foci. Uterine cavity filled with fluid. No lymphadenopathy. Small 2 mm focus of pleural thickening in left chest.</td>
</tr>
<tr>
<td>Surgical management</td>
<td>RATLH BPPALND</td>
<td>RAH BPPALND</td>
</tr>
<tr>
<td>Operative findings</td>
<td>Superficial myometrial invasion. Large amount of necrotic tumor in lower uterine segment.</td>
<td>RAH BSO BPPALND omental biopsies</td>
</tr>
<tr>
<td>FIGO surgical stage</td>
<td>IA</td>
<td>IIB</td>
</tr>
<tr>
<td>Postoperative management</td>
<td>Chemotherapy (6 cycles carboplatin + paclitaxel)</td>
<td>Chemotherapy (3 cycles of carboplatin + paclitaxel)</td>
</tr>
<tr>
<td>First postoperative recurrence or progression</td>
<td>6 months</td>
<td>4 months</td>
</tr>
<tr>
<td>Imaging findings at recurrence</td>
<td>PET: 5.1 × 3.5 cm midline pelvic mass with SUV 39.4, 3.7 × 3.0 cm left pelvic mass with SUV 33.8, ill-defined hypermetabolic soft tissue along right pelvic sidewall with SUV 20.5</td>
<td>CT CAP: 13 × 15 × 9 cm pelvic mass occupying the pelvis, displacing the urinary bladder and encasing vasculature including the iliac vessels</td>
</tr>
<tr>
<td>Recurrence or progression management</td>
<td>Chemotherapy (1 cycle pegylated liposomal doxorubicin) followed by inpatient hospice</td>
<td>Left percutaneous nephrostomy tube placement, Immunotherapy (1 cycle of pembrolizumab), followed by transfer to other care provider</td>
</tr>
<tr>
<td>Clinical history</td>
<td>GERD</td>
<td>Breast cancer at age 30</td>
</tr>
<tr>
<td>Family history</td>
<td>Breast cancer (sister at 47, mother at 42), Appendiceal cancer (mother at 78), Ovarian cancer (maternal aunt at 54), Colon cancer (paternal grandfather at 80)</td>
<td>No family history of cancer</td>
</tr>
<tr>
<td>Genetic testing</td>
<td>BRCA1/2 wildtype</td>
<td>ATM VUS c.22117C &gt; T, BRIP1 VUS c.1442G &gt; A, CHEK2 VUS c.1111C &gt; T</td>
</tr>
<tr>
<td>Status at last follow-up</td>
<td>Deceased (7 months after initial diagnosis)</td>
<td>Unknown (moved out of country)</td>
</tr>
</tbody>
</table>

### Pathologic features

<table>
<thead>
<tr>
<th>Tumor location</th>
<th>Right uterine cornu</th>
<th>Endometrial cavity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tumor size</td>
<td>1.7 × 1.5 × 1.0 cm</td>
<td>6.7 × 3.5 × 3.0 cm</td>
</tr>
<tr>
<td>Myometrial invasion</td>
<td>20% of myometrium (2/10 mm)</td>
<td>50% myometrium (8/16 mm)</td>
</tr>
<tr>
<td>Lymphovascular space invasion</td>
<td>Absent</td>
<td>Present in parametrium</td>
</tr>
<tr>
<td>Cervical stromal invasion</td>
<td>Absent</td>
<td>Absent</td>
</tr>
<tr>
<td>Ovaries and fallopian tubes</td>
<td>Absent</td>
<td>Present in ligamentous soft tissues adjacent to left ovary</td>
</tr>
<tr>
<td>Pelvic lymph nodes</td>
<td>Absent</td>
<td>Absent</td>
</tr>
<tr>
<td>Para-aortic lymph nodes</td>
<td>Absent</td>
<td>Absent</td>
</tr>
<tr>
<td>Mismatch repair protein expression</td>
<td>Present</td>
<td>MLH-1, PMS-2 absent; MLH1 promoter methylation detected</td>
</tr>
<tr>
<td>Estrogen and progesterone receptor expression</td>
<td>Absent</td>
<td>Not done</td>
</tr>
</tbody>
</table>

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A 43-year-old female (BMI 23.2 kg/m²) with a personal history of breast cancer 12 years prior presented with several weeks of abnormal uterine bleeding. Endometrial biopsy demonstrated a poorly differentiated carcinoma of breast versus endometrial origin. She underwent radical abdominal hysterectomy, bilateral salpingo-oophorectomy, bilateral pelvic lymphadenectomy, right para-aortic lymphadenectomy and omental biopsies. Her surgical pathology was initially reported as FIGO stage IB poorly differentiated endometrial adenocarcinoma. Outside pathology review reported a FIGO stage IIIB differentiated carcinoma (predominantly undifferentiated with focal adenocarcinoma with mixed endometrioid and mucinous features), with lymphovascular invasion present in the parametrium and metastatic adenocarcinoma involving the ligamentous soft tissues adjacent to the left ovary, though there was no metastatic carcinoma involving the ovaries proper or fallopian tubes. She started adjuvant carboplatin and paclitaxel six weeks after surgery. During her office follow up after her third cycle of chemotherapy, she complained of sciatia nerve pain that had been worsening over several weeks. A CT was ordered for further evaluation and demonstrated a 13 × 15 × 9 cm pelvic mass displacing the urinary bladder, encasing vasculature (including iliac vessels), tracking beneath the psoas muscle and causing moderate left hydropneumosis. Given progression of disease while on active treatment,
her fourth cycle of carboplatin and paclitaxel was held. A left percutaneous nephrostomy tube was placed for management of her nephrosis. Her immunohistochemistry demonstrated loss of expression of MLH1 and PMS2, so she was started on pembrolizumab. Shortly after her first treatment, she and her family felt that continued declined was inevitable and elected to return to her country of origin to seek medical care with more family and social support.

3. Discussion

Although the pathology literature addressing undifferentiated and dedifferentiated endometrial carcinoma has increased over the past few years, PubMed search results using terms undifferentiated endometrial carcinoma and dedifferentiated endometrial carcinoma demonstrate scant medical or surgical oncology literature regarding management of these patients. Undifferentiated carcinomas represent a rare but extraordinarily aggressive subset of endometrial cancers. Multiple reports characterize the immunohistochemical profile and molecular pathways (Rosa-Rosa et al., 2016; Broadus et al., 2006; Garg et al., 2009; Tafe et al., 2010; Al-Loh and Al-Hussaini, 2013; Espinosa et al., 2017; Kobel et al., 2018; Ramalingam et al., 2016; Romero-Perez et al., 2015; Tessier-Cloutier et al., 2018; Yokomizo et al., 2017), including rates of loss of expression of mismatch repair proteins as high as 58% (n = 7) in undifferentiated endometrial carcinoma (Tafe et al., 2010). Also referenced as “grade 4” tumors, undifferentiated carcinomas have higher likelihood of advanced stage at diagnosis and higher 5-year mortality as compared to high grade endometrioid endometrial adenocarcinomas (Altrabulsi et al., 2005; Tafe et al., 2010). Undifferentiated carcinomas of the endometrium can be associated with a differentiated component, most often FIGO grade 1–2 endometrioid adenocarcinoma (Silva et al., 2006). The University of Texas MD Anderson Cancer Center describes these as “dedifferentiated” (Altrabulsi et al., 2005; Silva et al., 2007; Silva et al., 2006) while the Memorial Sloan Kettering Cancer Center describes them as “combined undifferentiated and differentiated carcinomas” (Tafe et al., 2010). The Department of Pathology at the MD Anderson Cancer Center put forth a refined definition of undifferentiated carcinoma as being characterized by proliferation of medium- or large-sized, monotonous epithelial cells growing in solid sheets without a pattern, with a complete absence of glandular differentiation and with absent or minimal (< 10%) neuroendocrine differentiation (Altrabulsi et al., 2005; Silva et al., 2007). Some of the earlier literature on undifferentiated carcinoma of the endometrium included cases of large and small cell carcinomas with neuroendocrine differentiation; however, more recently these have been classified as neuroendocrine carcinomas rather than included among undifferentiated carcinomas since they do display a form of differentiation (Al-Loh and Al-Hussaini, 2013). Undifferentiated carcinomas of the endometrium demonstrate heterogeneous expression of epithelial markers, with only 5–10% of cells positive for keratin in approximately 80–90% of cases (Silva et al., 2007). Regardless of the nomenclature, anywhere from 37 to 87% of undifferentiated carcinomas have been reported to be admixed with endometrioid adenocarcinoma (Altrabulsi et al., 2005; Tafe et al., 2010; Silva et al., 2006) and carcinomas with an undifferentiated component are consistently reported to be more aggressive than high grade endometrioid adenocarcinomas (Yokomizo et al., 2017; Han et al., 2017). Perinuclear staining of cytokeratin and EMA, loss of expression of PAX-8, ER, PR and E-cadherin have been shown to be helpful in distinguishing undifferentiated carcinoma from endometrioid adenocarcinoma (Han et al., 2017).

Undifferentiated carcinoma may develop from any of the four molecular pathways described by The Cancer Genome Atlas for endometrial carcinoma: hypermutated (mismatch repair deficiency), ultramutated (POLE mutated), copy number low (PTEN mutated) or copy number high (TP53 mutated) (Rosa-Rosa et al., 2016). Among undifferentiated carcinomas, POLE-mutated tumors have been shown to have favorable prognosis, with diagnosis at earlier stages (8 of 9 patients stage I or II) and no deaths from disease after 4 years in one retrospective study of 21 patients (Espinosa et al., 2017).

The only case series identified in Obstetrics and Gynecology literature is a 20-year retrospective cohort in Turkey with 1690 cases of endometrial cancer identified, 18 (1.1%) of which were reported to be undifferentiated carcinomas (Ureyen et al., 2015). Four (22.2%) of those patients had early (stage I or II) disease, while fourteen (77.8%) had advanced (stage III or IV) disease. Six (33.3%) of the eighteen patients were lost to follow up after surgery. Among the remaining twelve patients, two (16.6%) experienced disease progression while on active treatment and died of the disease 6–7 months after initial surgery. Another two (16.6%) experienced disease recurrence 12 and 14 months after initial surgery: one had a distal vaginal recurrence treated with surgery and chemotherapy and had no evidence of disease six years later and one had a vaginal cuff and lung recurrence and was subsequently lost to follow up. While this study is one of the larger case reports available and the only one with a clinical rather than pathologic focus, it is limited by the large number of patients lost to follow up, lack of rigorous pathologic review and immunohistochemistry and diversity of adjuvant treatment.

In conclusion, reliable classification of undifferentiated carcinoma represents the first step in learning more about this clinical entity and which subset of patients may have a more favorable course; however, data remain scarce regarding approach to adjuvant treatment in this population. We have reported two patients who failed to achieve disease control after surgery with no evidence of residual disease followed by adjuvant carboplatin and paclitaxel; both rapidly declined in functional status shortly after institution of second line therapy. Given the poor response to standard therapy and the high portion of undifferentiated carcinomas of the endometrium with mismatch repair deficiency, it raises the question of whether early molecular testing and non-standard chemotherapy including immunotherapy should be considered as frontline therapy for this subset of patients.

Conflicts of interest and disclosures

The authors have no conflicts of interest to declare.

Acknowledgements

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