Case Report
PIK3CA and p53 Mutations by Next Generation Sequencing in Lymphoepithelioma-Like Carcinoma of the Endometrium

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1. Introduction

Lymphoepithelioma-like carcinoma of the endometrium is a very rare variant of endometrial carcinoma characterized by syncytial nests of pleomorphic epithelial cells and heavy infiltration of the stroma by lymphocytes (in particular CD8 cytotoxic T-lymphocytes) and plasma cells. Until now, only five cases have been characterized in this location. This report describes the clinicopathological and the molecular features of this unusual tumor. In particular, using the next generation sequencing (NGS) technique, we have demonstrated that this tumor could be associated with PIK3CA and p53 gene mutations. These data have not been reported to date and suggest that lymphoepithelioma-like carcinoma of the endometrium shares common molecular features with high grade endometrioid and serous-like endometrial carcinoma which are associated with poor outcome. Nevertheless, in endometrial lymphoepithelioma-like carcinoma, the alterations on cell cycle, apoptosis, and/or senescence secondary to p53 mutations could potentially be counterbalanced by the antitumoral response induced by CD8 cytotoxic T-lymphocytes numerous in these tumors.
A 67-year-old woman was admitted in March 2016, to the Erasme University Hospital for irregular and abnormal vaginal bleeding occurring one year before. Her past medical history was characterized by severe obesity with a body mass index evaluated to 35, hypertension, and type 2 diabetes mellitus. Gynaecological examination was unremarkable but vaginal ultrasound and pelvic MRI control showed a corporal endocavitary mass of $25 \times 17$ mm relevant to endometrial neoplasia stage FIGO IA. Endometrial curettage was performed and revealed a poorly differentiated invasive carcinoma and therefore the patient underwent radical hysterectomy with bilateral salpingo-oophorectomy associated with a pelvic and lumbar-aortic lymphatic dissection.

Macroscopically, a partially polypoid mass of $20 \times 15$ mm, mainly located in the uterine fundus, was observed. The tumor was soft, with areas of haemorrhage and necrosis, and invaded less than half of the myometrium (Figure 1). The adnexa, parameters, and lymph nodes were macroscopically unremarkable.

Microscopically, the tumor consisted of syncytial tumor nests of pleomorphic epithelial cells often with large nuclei and prominent nucleoli. No or only minimal glandular differentiation was observed. The surrounding stroma was heavily infiltrated by lymphocytes and plasma cells with numerous lymphoepithelial complexes. An infiltration of the inner layers of the myometrium was observed (Figure 2).

Using immunohistochemistry, as we have previously described, the carcinomatous component was positive for broad spectrum cytokeratins AE1/AE3 (clone AE1/AE3, 1:150, Dako Glostrup, Denmark), cytokeratin 7 (CK7) (clone OV/TL2/30, 1:400, Leica Newcastle, United Kingdom), estrogen (ER) (clone EPI, 1:50, Dako Glostrup, Denmark) and progesterone (PR) (clone 16 + SAN27, 1:500, Leica Newcastle, United Kingdom), Vimentin (vim) (clone V9, 1:1000, Dako Glostrup, Denmark), p53 protein (strong nuclear staining) (clone DO-7, 1:200, Dako Glostrup, Denmark), MLH1 (MutL homolog 1) (clone ES05, 1:50, Leica Newcastle, United Kingdom), MSH2 (MutS homolog 2) (clone FE11, 1:50, Dako Glostrup, Denmark), MSH6 (MutS homolog 6) (clone EP49, 1:100, Dako Glostrup, Denmark), and PMS2 (postmeiotic segregation 2) (clone EP51, 1:100, Dako Glostrup, Denmark) [21, 22] (Figure 3). Stromal lymphoid cell showed a CLA (clone 2B11 + PD7/26, ready to use, Dako Glostrup, Denmark) positivity in mirror of epithelial component. Immunophenotyping demonstrated an increase of CD8+ cytotoxic T-lymphocytes (clone 22C3, ready to use, Dako Glostrup, Denmark) expression in the epithelial component but scattered lymphocytes in peritumoral infiltrate were positive (Figure 3).

Gene mutation testing has been performed by next generation sequencing (NGS), as we have previously validated, with a panel of 16 genes described in Table 1 [23].

Two mutations were found: K132M mutation of the p53 gene and R88Q mutation of the PIK3CA gene.

### Table 1: Cancer hotspot panel used by NGS.

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<thead>
<tr>
<th>Gene</th>
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<tr>
<td>AKT1</td>
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<td>BRAF</td>
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<td>CDKN2A</td>
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Figure 2: Microscopic aspects of lymphoepithelioma-like carcinoma. At low power view, the endometrial tumor appeared as “bluish” relatively well limited with focal myometrial invasion (a). At high power view, note the syncytial aspect of the tumor nests and heavy infiltration of the stroma by lymphocytes and plasma cells closely intermingled with epithelial cells (b).

Figure 3: Immunohistochemical aspect of lymphoepithelioma-like carcinoma. Positivity of epithelial component for cytokeratin AE1/AE3 (a) and in mirror of the stromal lymphocytes for CLA (b). Note that CD8+ cytotoxic T-lymphocytes are numerous (c). Strong nuclear expression of tumor cells for the p53 (d) and lesser for MLH1 (e). PDL1 expression was restricted to some stromal lymphocytes but the epithelial cells were negative (f).

In situ hybridization (ISH) with EBER probe for qualitative identification of Epstein-Barr Virus (EBV) using the automated Leica BOND-III system (Leica Biosystems, Nussloch, Germany) was negative [24]. In addition, the detection of High Risk-HPV DNA (HPV 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 59, 66, and 68) from the paraffin-embedded sample using the BD onclarity HPV assay (BD diagnostics, Sparks, USA) was also negative [25].

According to all these pathological and molecular data, the diagnosis of lymphoepithelioma-like carcinoma was performed. The tumor was limited to the uterus, no lymph node involvement was observed, and therefore it was staged pT1aNo according to the WHO 2014. No complementary treatment was applied and to date with a follow-up of 16 months the patient was disease free.

3. Discussion

In the present study, we have demonstrated for the first time some molecular characteristics of lymphoepithelioma-like carcinoma of the endometrium which is an extremely rare uterine tumor [12–16]. In particular, we have demonstrated
mutations affecting, respectively, p53 and PIK3CA genes. Classically, according to new molecular subclassification of endometrial carcinoma, mutations of p53 gene were associated with poor prognosis uterine tumors including high grade endometrioid, serous carcinomas, and mixed epithelial and mesenchymal tumors/carcinosarcoma [17–19]. PIK3CA mutations are less specific and encountered in all the four molecular endometrial carcinoma subtypes and to date as in the present case lymphoepithelioma-like carcinoma was not associated with microsatellite instability and loss of the MLH1 protein expression [13].

P53 mutations appeared as common genetic trait in breast medullary carcinoma which showed common features with other lymphoepithelioma-like carcinoma including syncytial sheet of large pleomorphic cells without glandular differentiation and numerous mature lymphocytes and plasma cells in the adjacent stroma [26, 27]. Interestingly, these tumors have been reported to have a better prognosis than common invasive breast carcinoma subsequently firstly to a better response to chemotherapy due to intense mitotic activity and secondly the increase of T-lymphocytes and particularly CD8 cytotoxic T-lymphocytes which play a crucial function in antitumor response [25]. Classically, in high grade endometrioid and serous carcinoma of the endometrium often associated with p53 mutations and a poor clinical outcome, there is a major CD8 downregulation on cytotoxic T-lymphocytes [28]. Therefore, the alterations on cell cycle, apoptosis, and/or senescence consecutive to the loss p53 function by mutations are not counterbalanced by antitumor immune response. Concerning our patient, even if it is encouraging, the unremarkable follow-up without additional therapy of 16 months is too short to draw any relevant conclusions. Furthermore, studies investigating the immunologic and molecular biomarkers associated with this rare variant of endometrial carcinoma are warranted.

Conflicts of Interest

The authors declare that they have no conflicts of interest regarding the publication of this article.

References


