The role of CT in the management of patients with ovarian carcinoma: CT-Pathologic correlation.

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Purpose

Ovarian tumors are the gynaecologic malignant tumors that cause more deaths in Spain and Europe. 90% are sporadic usually postmenopausal. The rest are hereditary, in this case presents itself in younger women associated with breast-ovarian cancer syndrome (BRCA1, BRCA2), or more rarely with the Lynch II syndrome complex.

The risk for ovarian cancer is related to ovulation. The incessant ovulation theory has been proposed and suggests that more ovulation implies greater risk of mutation. Therefore the population with more risk are nulliparous, early menarche and late menopause women.

These tumors are classified on the basis of tumor origin as epithelial tumors (serous and mucinous tumors, endometrioid and clear cell carcinomas, Brenner tumor and undifferentiated), germ cell tumors (mature and immature teratomas, dysgerminoma, endodermal sinus tumor, embryonal carcinoma), sex cord-stromal tumors (fibrothecoma, granulosa cell, sclerosingstromal, and Sertoli-Leydig cell tumors), and metastatic tumors.

Epithelial ovarian tumors represent 90% of all ovarian neoplasms. This group is subdivided in serous tumors (the most frequent 50%), mucinous tumors (20%), endometrioid carcinoma (20%), clear cell carcinoma (10%) and undifferentiated (<5%).

Tumors of germ cell origin are the second most common group of ovarian neoplasms, representing 10% of all ovarian tumors, and 60% of those appearing in young women. In this group of tumors are included mature and immature teratoma, dysgerminoma, endodermal sinus tumor, embryonal carcinoma, and choriocarcinoma. Of this group of germ cell tumor only the mature teratoma is benign; however, it is by far the most common lesion in this group. All the other tumors are malignant and account for less than 5% of malignant ovarian tumors.

Sex cord tumors that derive from coelomic epithelium or mesenchymal cells of the embryonic gonads. They account for 1%-2% of all ovarian malignancies. They included granulosa cells, theca cells, fibroblasts, Leydig cells, and Sertoli cells. Sex cord-stromal tumors are of interest partly because of their hormonal effects, which are rare in other ovarian neoplasms.

Ovarian carcinoma can spread by local extension (fallopian tube, uterus, contralateral ovary, rectum, bladder or pelvic wall), lymphatic invasion, intraperitoneal implantation,
hematogenous dissemination (liver, lung, pleura, and kidney). Intraperitoneal dissemination is the most common and recognized characteristic of ovarian cancer.

The purpose of this exhibit is through the analysis of 188 cases of patients diagnosed with recurrent ovarian cancer, is to describe the most frequent forms of ovarian tumor presentations in CT and to review the role of CT in the prediction of the most frequent forms of relapse presentation in this type of tumors, correlating with histological findings.

Methods and Materials

In total 188 CT studies of patients (59y mean age) with pathologically proven ovarian carcinoma were reviewed, collecting CT images from January 1996 to December 2010.

CT findings of the tumor, local involvement and distant metastases were described and correlated with their histological findings. A chi-squared statistical analysis was used.

All studies were performed after iv contrast administration with 16-slice MDCT.

One-hundred and sixty had primary invasive epithelial tumor which 51% serous, 27% mucinous, 9% clear cell, 5,5% undifferentiated, and 5% endometrioid; other tumors 2.5% (n=28) included: 16 borderline, 7 mullerian and 5 granulosa cell.

Results

Forty-three patients had a FIGO stage I, 19 stage II, 93 stage III and 33 stage IV (fig 1). In this study CT findings, at the time of diagnostic, in relation to histological subtype were: bilateral complex masses in 40% of serous tumors, unilateral cystic masses in 37% of mucinous tumors and in 55% of clear cell tumors; bilateral solid masses were observed in 70% undifferentiated adenocarcinomas (fig.2) whereas bilateral mixed solid and cystic were seen in 50% endometrioid tumors (p=0,009).

The commonest relapse presentation was in form of peritoneal carcinomatosis (fig.3) (58% of cases); 53% of them were related to serous tumors (p= 0,005); 19% of cases had lymph node metastases (fig.4) , more frequently observed (29%; p=0,824) in
endometrioid tumors. Metastases from serous tumors (p=0.714), were also observed in liver (2.6%), lung (1%), pleura (0.5%) (fig.5) and adrenals (0.5%).

Images for this section:

<table>
<thead>
<tr>
<th>Stage</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I</td>
<td>Tumor limited to the ovaries.</td>
</tr>
<tr>
<td>IA</td>
<td>Tumor limited to one ovary, no malignant ascites.</td>
</tr>
<tr>
<td>IB</td>
<td>Tumor limited to both ovaries, no malignant ascites.</td>
</tr>
<tr>
<td>IC</td>
<td>Stage IA or IB with malignant ascites.</td>
</tr>
<tr>
<td>Stage II</td>
<td>Tumor involves one or both ovaries with pelvic extension.</td>
</tr>
<tr>
<td>IIA</td>
<td>Extension or implants on the uterus or fallopian tubes, no malignant ascites.</td>
</tr>
<tr>
<td>IIB</td>
<td>Extension to other pelvic tissues, no malignant ascites.</td>
</tr>
<tr>
<td>IIIC</td>
<td>Stage IIA or IIB with malignant ascites.</td>
</tr>
<tr>
<td>Stage III</td>
<td>Tumor involves one or both ovaries with peritoneal implants outside the pelvis or retroperitoneal lymph node metastasis.</td>
</tr>
<tr>
<td>IIIA</td>
<td>Microscopic peritoneal metastasis beyond the pelvis.</td>
</tr>
<tr>
<td>IIIB</td>
<td>Macroscopic peritoneal metastasis beyond the pelvis 2cm or less.</td>
</tr>
<tr>
<td>IIIC</td>
<td>Peritoneal metastasis beyond the pelvis more than 2cm or regional lymph node metastasis.</td>
</tr>
<tr>
<td>Stage IV</td>
<td>Distant metastasis including liver parenquima.</td>
</tr>
</tbody>
</table>

*FIGO staging of ovarian carcinoma.*

Fig. 1
Fig. 2: undifferentiated ovarian tumor in a 39-year-old woman. Contrast-enhanced CT scan shows a large, intensely enhancing solid mass occupying the central portion of the pelvis. Ascitis in the cul-de-sac can be seen (arrow)
Fig. 3: Peritoneal spread disease in a 39 year-old woman with history of undifferentiated ovarian tumor. Axial contrast-enhanced CT shows scalloping of the liver surface by tumor implants (arrows). A large amount of ascites can also be seen.
Fig. 4: 70-year-old woman with a history of complete remission of papillary serous adenocarcinoma. Axial contrast-enhanced CT was performed after biochemical progression and demonstrates retroperitoneal lymphadenopathy (arrow).
Fig. 5: Contrast-enhanced CT obtained in a 67-year-old woman with a history of serous adenocarcinoma 6 years earlier that shows metastatic pleural implant on the right side. (arrow)
Conclusion

Although ovarian tumors have similar clinical and radiologic findings, predominant or specific key features are present in some type of ovarian tumor.

Moreover in this study we observed a statistically significant correlation between CT findings in tumor relapse presentation and histologic subtype of tumors (p=0.009). Commonest CT finding was peritoneal carcinomatosis related to serous tumors (p=0.005). Knowledge of these features may allow a specific diagnosis or substantial narrowing of the differential diagnosis, and can aid in therapeutical management.

References


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