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PET/CT in ovarian carcinomas

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Key words: Ovarian Neoplasms; Diagnostic Imaging; Tomography, X-Ray Computed; Positron-Emission Tomography; Fluorodeoxyglucose F18; CA-125 Antigen

During this last decade, many technical advances occurred in different areas of medical imaging for the detection, staging, re-staging and monitoring therapy of ovarian cancers. Thus, medical imaging in this setting remains a challenge. The molecular and metabolic imaging nuclear medicine modality using positron emission tomography (PET) and the more recent PET and X-rays computed tomography (CT) hybrid or integrated cameras (PET/CT) using radioactive labelled glucose analogue 18F-Fluorodeoxyglucose (18FDG) has improved our knowledge of this disease and contributed to a better understanding of its natural history.
After recalling the molecular biology of metabolic deregulation that occurs as a real hallmark of cancer in ovarian tumours and describing the advantages as well as the limitations of PET and PET/CT regarding this disease, the presentation will address its performances in different settings like initial staging, restaging, detection of recurrences and monitoring response to chemotherapy and/or targeted therapies through a review of recent literature.
As for others types of cancer, 18FDG PET and PET/CT appears to be specially useful in recurrence setting, when clinical and/or biological and/or radiological suspicion of recurrence occurs especially in occult recurrence setting when increasing levels of CA125 are detected while conventional imaging modalities remain negative or non contributive.
Different studies have shown that 18FDG PET and PET/CT have significant impact on the patient management and can improve the detection of lesions in other situations. This impact on management is particularly interesting when considering the impact on treatment option selection, particularly when an optimal surgery is indicated and can be used as a predictive tool to predict early response or non-response to systemic or targeted therapy in order to stop early and inefficient treatment acting as a very useful tool to reach a tailored and personalised therapy of ovarian cancer.

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Mini-invasive procedure in gynecological surgery

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Key words: Genital Neoplasms, Female; Antineoplastic Protocols; Gynecologic Surgical Procedures; Hysterectomy; Lymph Node Excision; Brachytherapy; Chemotherapy, Adjuvant

Our aim was to report the possibilities of mini-invasive surgery in the treatment of gynecologic cancers. In early cervical cancer less than 2 cm without lymph vascular space involvement or involved pelvic lymph nodes, there is a conservative treatment preserving the young women's fertility: the radical trachelectomy of Dargent with 4% of recurrence at five years. For patients with cervical cancer less than 4 cm, laparoscopic radical hysterectomy could be performed even after brachytherapy. In locally advanced cervical cancer (>=4cm), the standard treatment is concomitant chemoradiation. The superior limit of concomitant chemoradiation depends on para-aortic lymph nodes involvement. We performed extraperitoneal laparoscopic para-aortic lymphadenectomy in cases of FDG-PET without extra-pelvic disease (definitive results = para-aortic pN1=15%). In case of persistent disease after concomitant chemoradiation, radical hysterectomy was performed by laparoscopy.
In endometrial cancer, randomized studies and 1 meta analysis reported the superiority of laparoscopy. Laparoscopy must be the gold standard surgical approach in apparent FIGO stage I disease (about 80% of all the stages). Concerning pelvic lymphadenectomy and with the results of 2 recent randomized studies, the indications in early endometrial cancer are low (so with less dysethesia or lymphedema). But para-aortic lymphadenectomy could be performed especially by mini-invasive approach in high-risk endometrial cancer tailoring the radiation. In early ovarian cancer, lymph nodes staging is important for the indications of chemotherapy. This surgical staging could be performed by laparoscopic approach. Finally, we see now the development of robotic assisted laparoscopy especially in endometrial cancer and cervical cancer. Actual and recent studies have reported data. There is a place for mini-invasive treatment in gynecologic cancers with less adverse effects (in surgery, adjuvant treatment and quality of life).

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Pathology: common/uncommon cancer

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Key words: Ovarian Neoplasms; Carcinoma; Classification; Neoplasms, Glandular and Epithelial; Neoplasms, Cystic, Mucinous, and Serous; Carcinoma Endometrioid; Carcinosarcoma; Neoplasms, Germ Cell and Embryonal; Sex Cord-Gonadal Stromal Tumors; Adenocarcinoma, Clear Cell

We are chiefly speaking about tumors of the ovary, which are rare and more often benign. Ovarian cancers, which account for 3% of all cancers in women, are of several types according to the WHO histological classification of 2003. The most common type is epithelial cancer, which accounts for 80% to 90% of malignant ovarian neoplasms in adults. Epithelial cancer is classically further subcategorized based on histological and prognostic characteristics. Borderline tumors (10% to 15%) of good prognosis (5-year survival rate of 95%), must be separated from invasive carcinoma. The diagnosis is sometimes difficult, chiefly for mucinous tumors particularly on frozen sections. It is important to identify borderline tumors with invasive abdominal implants (10%) for which chemotherapy is applied after surgery. Invasive carcinoma is subcategorized in serous (50% to 70% of carcinoma), endometrioid (10% to 15 %), clear cell (10%), and mucinous carcinoma (5% to 7%). Serous carcinoma is graded in grades 1 to 3 of malignancy but this grading, although very important in localized stages, is not always applied and is not recommended for other types of carcinoma. In 2004, the Anderson Cancer Center proposed a two-tiered nuclear grading system and the Baltimore group proposed a pathogenic classification opposing type I pathway which are serous carcinoma of low-grade and type II of high-grade. Furthermore, they proposed a two-tier model based on morphologic, molecular and pathogenetic characteristics of all ovarian carcinoma: type 1 (25%), characterized by frequency of mutations Kras, Braf or Erbb2, included low grade serous and endometroid carcinoma, clear cell and mucinous carcinoma and Brenner tumors. Type 2 (75%), characterized by mutations of TP53 (80%) and BRCA (10%), included high-grade serous (90% of serous) and endometroid carcinoma, undifferentiated carcinoma and carcinosarcoma. This histo-molecular and pathogenic classification is prognostic but large homogenous studies must confirm it that would authorize better comprehension of ovarian carcinogenesis and progress in targeted therapies for chemo-resistant carcinoma. Pathologic stratification of carcinoma is based on the FIGO one, which particularly distinguishes between localized stages with good prognosis and advanced stages (60% to 70%) with 5-year survival rate of 5% to 25%.
Other less common ovarian tumors include germ cell neoplasms (25% in adults to 60% before 20 years of age), sex cord-stromal tumors (6% to 10%) and miscellaneous tumors. Only 5% of germ cell tumors are malignant in adults, but one third are malignant before the age of 20 and are sometimes difficult to diagnose. Among sex cord-stromal tumors, rare Granulosa tumors and very rare Sertoli-Leydig tumors are potentially malignant with not well-established histoprognosis.
Mammary, digestive and genital tract are the main sites of origin of ovarian metastasis (6% of tumors). One important challenge is to identify secondary ovarian mucinous tumors chiefly when bilateral or associated with peritoneal pseudomyxoma.
Ovarian tumors diagnosis takes advantage of centralized second reading in regional and national expert centers (RINGOR to which PATHGYN from APHP of PARIS belongs to). This second reading concerned mucinous and clear cell carcinoma, borderline tumors with peritoneal implants, non-teratomatous germ cell tumors and non-fibromatous sex cord-stromal tumors (www.ovaire-rare.org). This would permit to obtain more homogenous series for identifying prognostic factors better and for research in molecular targeted therapy.

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