Role of MRI perfusion and diffusion in Characterization of ovarian tumors

Essay

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[قَالُوا سُبْحَانَكَ لا عِلْمَ لَنَا إِلاَّ مَا عَلَّمْتَنَا إِنَّكَ أَنتَ العَلِيمُ الحَكِيم]

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Mai Ahmed Mostafa

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List of Abbreviations

AFP	:	Alpha feto protein
ADC	:	Apparent diffusion coefficient
DWI	:	Diffusion weighted image
DCE	:	Dynamic contrast enhanced
Dt	:	Lag time
FIGO	:	Federation of gynecology and obstetrics
FOV	:	Field of view
FT	:	Tissue blood flow
FS	:	Fat suppression
GRE	:	Gradient Echo
IAUC	:	Initial area under the curve
JZ	:	Junctional zone
MR	:	Magnetic resonance
PW	:	Perfusion weighted
ROI	:	Region of interest
SI max	:	Maximum absolute enhancement
SI rel	:	Maximum relative enhancement
WIR	:	Wash in rate
TSE	:	Turbo spin echo
TNM	:	Tumor, node, metastasis
Vb	:	Blood volume fraction

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Introduction

Female Gynecologic malignancies include cervical cancer, endometrial cancer, and ovarian cancer. Ovarian cancer is one of the most common female gynecologic malignancy, however it remains the leading cause of death among these diseases and is the fourth leading cause of cancer deaths in women. ***(Jeong et al, 2010)***

Adnexal masses are common and challenging diagnostic problem because overlapping imaging features of benign and malignant tumors. ***(Anthoulakis et al., 2014)***

Determination of a degree of suspicion of malignancy is critical and is based mainly on imaging appearance. ***(Jeong et al., 2010)***

Magnetic resonance (MR) imaging is better reserved for problem solving masses when US findings are equivocal because, it is more accurate for diagnosis. ***(Jeong et al., 2010)***

MRI has the capabilities to locate solid masses and is used for diagnosis of malignant ovarian tumors with an overall accuracy of 88–93 % and high sensitivity of 92 %, specificity of 85 %, MRI has the technical capabilities for preoperative determination and predicting the benign or malignant nature of ovarian masses. ***(Li et al., 2015)***

A new MRI technique Perfusion MR provides advanced abilities for functional imaging, Post-processing can be carried out in the form of visual analysis and by description of the curves. ***(Thomassin-Naggara et al., 2013)***

Perfusion is used to characterize the tumor vasculature in a tumor. Thus, malignant lesions show intense quick enchantment after contrast injection compared to benign lesions due to the extensive vascular system associated with malignant tumor***s (Li et al., 2015)***

Diffusion allows excellent delineation of malignant tumors because it shows suppression of background noise. We found that the combination of DWI and conventional non-enhanced MRI identified additional locations of pelvic tumors and improved the degree of confidence for interpretation.

Other advantages of DWI include its non-invasive and cost effectiveness. DWI does not involve radiation exposure and oral or intravenous administration of contrast material, and is comfortable for the patient. In patients with gynecological malignancies, DWI can play an major role in the detection of tumor recurrence within the pelvis as well as disseminated peritoneal recurrence. ***(Kitajima et al., 2015)***

Perfusion and diffusion MRI analysis can characterize sonographically indeterminate masses and help the radiologist to improve lesion characterization especially for benign masses helping the clinician to avoid unnecessary surgeries**.** ***(Thomassin-Naggaraetal, 2014).***

Aim of the Work

To discuss the value of MRI Diffusion and perfusion in characterization of ovarian tumors

Ovaries

The ovaries are paired organs of the female reproductive system, They lie within the ovarian fossa on the posterior wall of the true pelvis.

Ovarian embryology:

The ovaries develop on the posterior abdominal wall adjacent to the kidneys then descend into the pelvis as the kidneys ascend. The paramesonephric ducts in absence of the male hormones differentiate into female genital system including the ovaries, the uterus and upper two thirds of the vagina.The ovaries are the only truly intraperitoneal adnexal structures. The ovaries lie against Lateral pelvic walls, each is enclosed within the mesovarium of the broad ligament **(Fig.1**). ***(Schneck et al., 2012)***

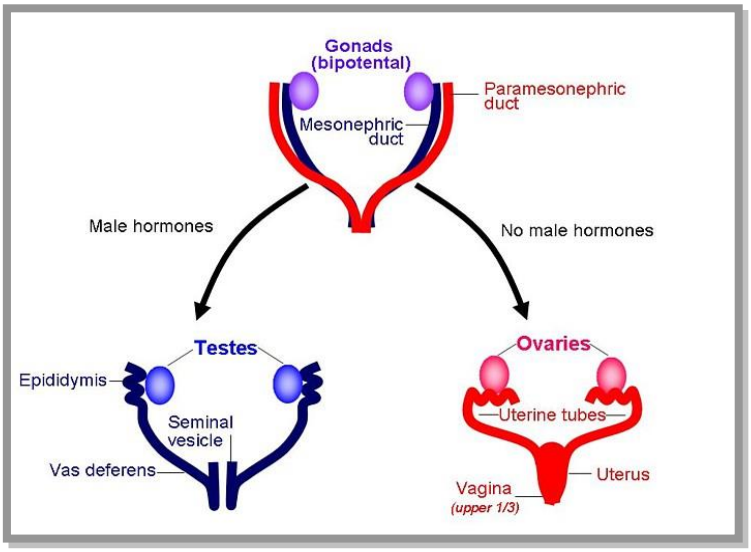

Fig. (1): Embryological origin of the ovaries ***(Quoted from Tanaka et al., 2004)***