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Imaging techniques for the pre-surgical diagnosis of adnexal tumours

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A correct diagnosis of any adnexal mass is essential to triage women to appropriate treatment pathways. Several imaging techniques are available that may be used to provide an assessment of a mass before treatment, such as transvaginal ultrasonography, magnetic resonance imaging, computed tomography, and positron emission tomography combined with computed tomography. In this chapter, we focus in depth on the role of

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transvaginal ultrasonography, as current evidence suggests it is the most appropriate initial imaging investigation to identify and characterise any mass if present in women suspected of having adnexal pathology. Subjective assessment by an experienced ultrasound examiner is the optimal approach to diagnose masses, followed by risk models and rules developed by the International Ovarian Tumor Analysis study. A group of tumours has proven difficult to classify with transvaginal ultrasound, and remain a diagnostic challenge for which accurate second-stage tests would be of value. Some studies suggest that magnetic resonance imaging (MRI), compared with other imaging modalities, may play a role in the assessment of this cohort of 'difficult to classify' adnexal masses. These studies, however, did not report quality of transvaginal ultrasonography (i.e. experience level of the examiner) and lacked uniformity in describing the criteria used to define such 'difficult' masses. On the basis of standardised terminology developed by the International Ovarian Tumor Analysis study to describe adnexal masses, as well as prediction models and rules developed in the course of the study, we propose new criteria that we can use to clearly define complex or 'difficult to classify' adnexal masses to focus the role for second-line imaging tests, such as conventional magnetic resonance imaging combined with dynamic contrast-enhanced or diffusion-weighted sequences on masses where further tests other than ultrasonography would be of value.

Introduction

An ovarian neoplasm or cyst is a relatively common clinical condition that occurs at all stages of life [1], and is a leading indication for gynaecologic surgery. The annual hospitalisation rate for women with suspected ovarian neoplasms is reported to range from 160,000 to 289,000 women in the USA. Most hospitalised women will eventually undergo surgery [2]. Fortunately, most women with an adnexal mass do not have cancer [3]. This implies that an accurate pre-surgical assessment of the likely pathology of any mass is pivotal, as unnecessary or overly radical surgery are significant risks to women with a cyst that is inappropriately characterised as malignant; the consequences of failing to recognise cancer will significantly affect prognosis [4–6]. Most presumed benign cysts in pre- and postmenopausal women can either be safely managed expectantly [7–9] or removed using laparoscopic surgery, therefore avoiding unnecessary costs and morbidity [10,11]. On the other hand, when suspicion of cancer is high, referral to a specialist oncology centre is warranted to improve overall survival [12].

Transvaginal ultrasonography

Subjective assessment of gray scale and colour Doppler ultrasound findings with transvaginal ultrasonography (TVS) is the first-line imaging technique for detecting and characterising adnexal masses [13]. The optimal approach using ultrasound to discriminate between the benign or malignant nature of an adnexal mass before surgery is the subjective assessment of gray-scale and Doppler ultrasound findings by an expert level III examiner [14] with a special interest in gynaecological ultrasonography [15–17]. In the International Ovarian Tumor Analysis (IOTA) six categories of diagnostic certainty have been proposed for the subjective assessment of adnexal masses (i.e. certainly malignant, probably malignant, uncertain but more likely to be malignant, uncertain but more likely to be benign,