Can the IOTA simple ultrasound rules be applied to CT in the diagnosis of ovarian cancer?

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Aims and objectives

Ovarian cancer is the sixth most common cancer in Ireland (excluding non-melanoma skin cancer) and the fourth most common cause of cancer-related deaths.[1] The Irish National Cancer Control Programme recently published a national clinical guideline on the diagnosis and staging of ovarian cancer.[2] Based on the most up-to-date literature available, this guideline recommends using the International Ovarian Tumour Analysis (IOTA) Group Simple Ultrasound Rules (**Table 1**) in conjunction with clinical assessment to determine if an adnexal lesion identified on ultrasound is suspicious for malignancy and thus requires further work-up.[2, 3] Where there are only B-features in relation to an adnexal lesion on ultrasound, the lesion is considered benign; where there are only M-features, it is considered malignant; and, where there is a mixture of B-features and M-features, the lesion is considered suspicious.

Given many adnexal lesions are first identified on computed tomography (CT), having CT-based criteria on which to predict the risk of malignancy in such cases would be beneficial, rather than having to refer these patients subsequently for ultrasound. The purpose of this study was to investigate if the IOTA M-Rules can be applied to CT in order to assess the malignancy potential of adnexal lesions.

Images for this section:

Table 1 IOTA group simple ultrasound rules

B-rules (For predicting a benign tumour)	M-rules (For predicting a malignant tumour)
• Unilocular cysts • Presence of solid components where the largest solid component < 7 mm • Presence of acoustic shadowing • Smooth multilocular tumour with largest diameter <100 mm • No blood flow on colour Doppler	• Irregular solid tumour • Ascites • At least four papillary structures • Irregular multilocular solid tumour with largest diameter ≥100 mm • Prominent blood flow on colour Doppler

Table 1: IOTA group Simple Ultrasound Rules

Methods and materials

Patient lists for the Gynae-oncology multidisciplinary meetings held at Cork University Hospital from August 2017 to August 2018 were assessed for patients with newly diagnosed or recurrent ovarian cancer. Of those identified, only those with histologically confirmed primary or secondary ovarian cancer were included. All relevant pre-operative pelvic imaging was identified for these patients. Two of the authors then independently applied the five IOTA M-Rules to the pelvic CT imaging of these patients. For the fifth M-feature, enhancement on contrast-enhanced CT was taken as a surrogate for prominent flow on colour doppler ultrasound.

Results

Thirty-four histologically confirmed cases of ovarian cancer were identified. Eleven of these had to be excluded as they either had no available pre-operative pelvic CT, or no ovarian mass lesion was demonstrated on their CT imaging. The average age of the 23 included patients at the time of their histological diagnosis was 56 years (range 17-80 years). Of the 6 patients who were aged under 50 at the time of their histological diagnosis, one had the risk factor of Lynch syndrome.

Figure 1 shows the breakdown of histological subtypes of ovarian cancer that the patients were diagnosed with. The majority (48%) had high-grade serous carcinoma. Fifty-two percent of the group were found to have bilateral ovarian involvement, and 65% had advanced disease i.e. Stage 3 or 4 of the FIGO classification (**Figure 2**)[4].

There was 100% inter-rater agreement regarding the presence or absence of all five of the IOTA M-features on the CT imaging of these patients. **Figure 3** shows examples of CT images depicting each IOTA M-feature. All patients had at least two M-features on their CT, with the majority (74%) showing at least three M-features. One patient's CT showed all 5 M-features. Assessing for the third M-feature, the presence of at least four papillary structures defined as solid projections measuring over 3 mm in height, proved difficult in some cases due to the poorer resolution of CT for pelvic structures compared with ultrasound. This did not result in inter-rater disagreement however. No association was demonstrated between the number of M-features present on CT and the histological subtype that was diagnosed nor stage of disease, although the ability to assess for this was likely limited by low patient numbers.

Images for this section:

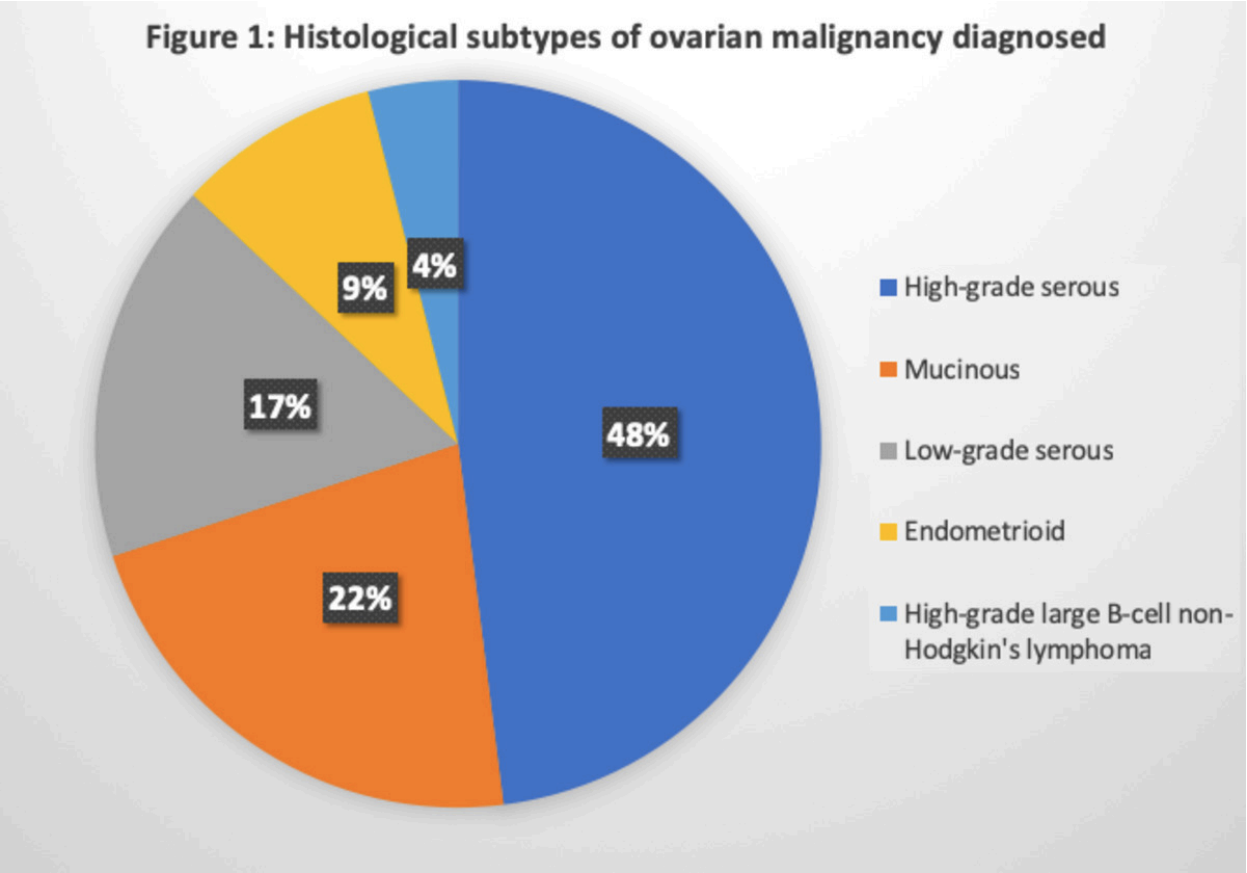

Fig. 1: Histological subtypes of ovarian malignancy that were diagnosed

Image 2: FIGO Classification of Ovarian Cancer (Stage 1-4)

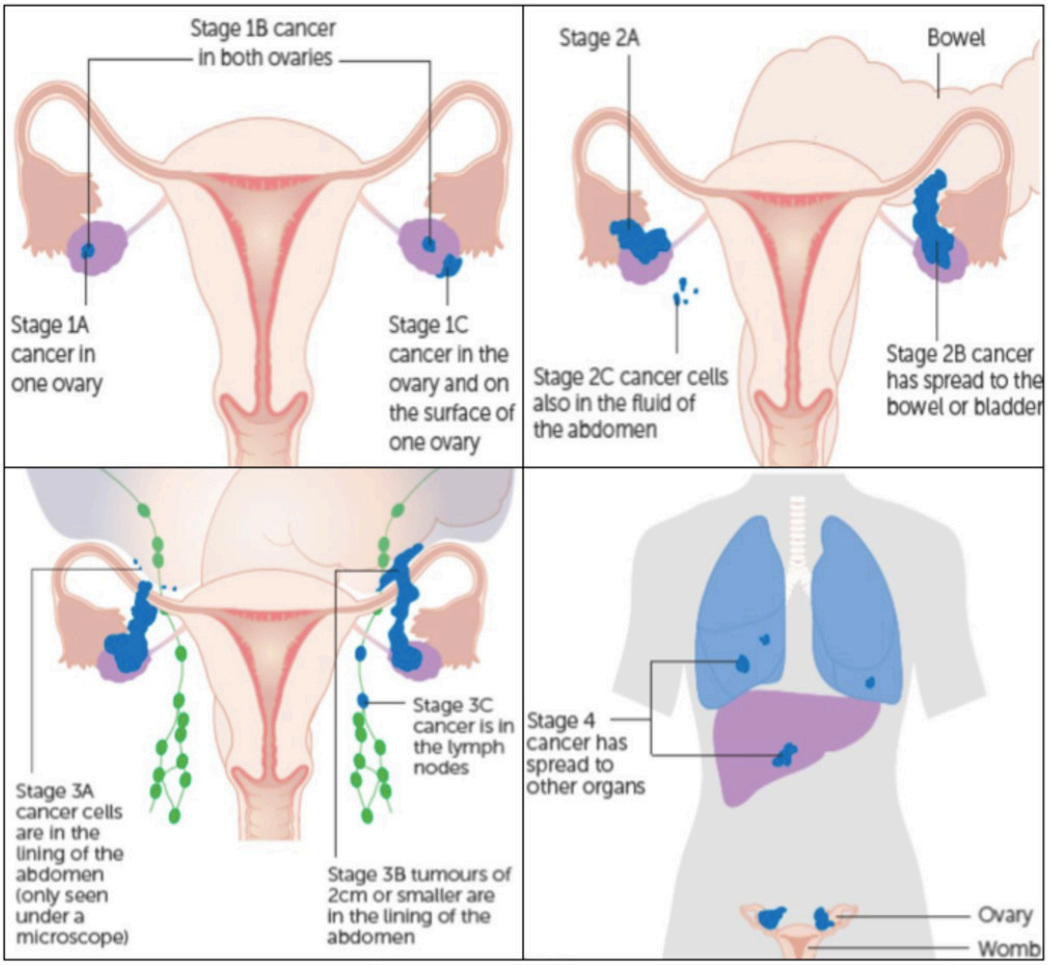

Fig. 2: FIGO Classification of Ovarian Cancer

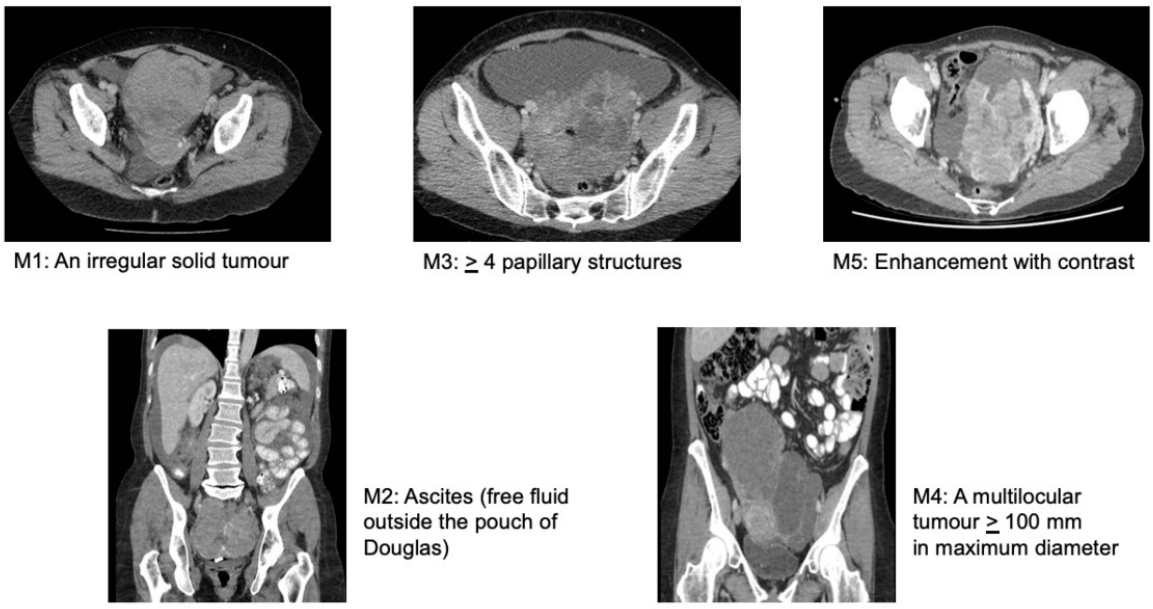

Fig. 3: CT images depicting each of the five IOTA M-features

Conclusion

This study suggests that the IOTA M-rules can be successfully applied to CT in the assessment of adnexal masses. Further research with greater patient numbers is required to confirm these findings.

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References

1.National Cancer Registry Ireland. Cancer Factsheet Ovary. Available at: https://www.ncri.ie/sites/ncri/files/factsheets/Factsheet%20ovary.pdf

2.IOTA 2017 International Ovarian Tumour Analysis. Available from: :// www.iotagroup.org/simplerules/

3.NCCP National Clinical Guideline. Diagnosis and staging of ovarian cancer. Available at: https://www.hse.ie/eng/services/list/5/cancer/profinfo/guidelines/diagnosis-and-staging-of-patients-with-ovarian-cancer.pdf

4.Ovarian Cancer. Available at: https://howlingpixel.com/i-en/Ovarian_cancer