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Prospective validation of a modified O-RADS-based discriminating ovarian tumors

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Objectives

To address the diagnostic limitations of O-RADS in distinguishing atypical benign tumors from early-stage malignancies, we optimized clinical parameters and assigned appropriate weights to ultrasound features in O-RADS, constructing a logistic regression model to evaluate its potential in reducing overdiagnosis and overtreatment.

Methods

This prospective study enrolled 306 patients with ovarian tumors classified as O-RADS 3–4 between 2023 and 2024. All patients underwent transvaginal or transabdominal ultrasonography, with complete ultrasound images and clinical data. Univariate and multivariate logistic regression analyses were used to identify independent predictors of malignancy. A logistic regression model was constructed, and its diagnostic performance was evaluated using receiver operating characteristic (ROC) curves, with comparisons made against O-RADS.

Results

Among 306 patients, 267 (87%) had benign tumors and 39 (13%) had malignancies. Logistic regression identified menopausal status, CA125 levels, irregular tumor morphology/cyst wall, color Doppler flow score, acoustic shadowing, and ascites as independent predictors of malignancy. The model demonstrated an AUC of 0.96, sensitivity of 0.96, and specificity of 0.91, outperforming O-RADS (AUC: 0.93, sensitivity: 0.95, specificity: 0.87). DeLong's test confirmed a statistically significant improvement in AUC for the logistic model compared to O-RADS ($p < 0.05$).

Conclusion

The logistic regression model, integrating clinical parameters and weighted ultrasound features, exhibits superior diagnostic accuracy in differentiating benign and malignant ovarian tumors, potentially mitigating overdiagnosis and overtreatment in clinical practice.