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Diagnostic value of intravenous contrast-enhanced ultrasound versus lymphatic contrast-enhanced ultrasound for cervical lymph node metastasis in thyroid carcinoma

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Data analysis.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 27 March 2026 and was last updated on 27 March 2026.

INTRODUCTION

Review question / Objective To compare the value of intravenous contrast-enhanced ultrasound (ICEUS) and lymphatic contrast-enhanced ultrasound (LCEUS) for diagnosing cervical lymph node metastasis in thyroid cancer.

Condition being studied Although conventional ultrasound is the first-line imaging modality, it cannot efficiently distinguish cervical lymph node metastasis in thyroid cancer. It was reported that the diagnostic efficiency of intravenous contrast-enhanced ultrasound (ICEUS) was better than that of routine ultrasound. However, it was challenging for ICEUS to distinguish micro-metastasis in lymph nodes.
Recently, several studies revealed that lymphatic contrast-enhanced ultrasound (LCEUS) could correctly predict small foci of metastases in cervical lymph nodes. However, which method offers better diagnostic performance was unknown.

METHODS

Participant or population Patients diagnosed with thyroid carcinoma based on pathological findings from either surgical or needle biopsy procedures.

Intervention Patients with thyroid carcinoma were examined by ICEUS to detect cervical lymph node metastasis.

Comparator Patients with thyroid carcinoma were examined by LCEUS to detect cervical lymph node metastasis.

Study designs to be included Diagnostic experimental study.

Eligibility criteria The inclusion criteria for study selection were as follows: i) Patients were diagnosed with thyroid cancer based on pathological findings from either surgical or needle biopsy procedures; ii) patients underwent intravenous contrast-enhanced ultrasound (ICEUS) or lymphatic contrast-enhanced ultrasound (LCEUS) or both for the detection of cervical lymph

node metastasis; iii) studies with complete 2×2 contingency tables or with sufficient data to reconstruct 2×2 contingency tables to assess the diagnostic efficacy using ICEUS and LCEUS.

Information sources Pubmed, Embase, OVID and Cochrane library.

Main outcome(s) The primary outcomes included sensitivity, specificity, diagnostic odds ratio, and area under the summary recipient's performance characteristic curve.

Quality assessment / Risk of bias analysis Quadas 2(Quality Assessment of Diagnostic Accuracy Studies 2) tool developed by Whiting to evaluate the Quality of Diagnostic tests was used to evaluate the methodological Quality of the included Studies.

Strategy of data synthesis MetaDiSc (ver.1.4) (25) and STATA statistical software (ver.19.0; StataCorp LP) were used for data synthesis, and determination of the pooled sensitivity with 95% confidence interval (CI), pooled specificity with 95% CI, summary receiver operating characteristic (SROC) curve and diagnostic odds ratio (DOR) were conducted. The Chi-square test and I2 test were conducted to evaluate the heterogeneity; P<0.05 indicated heterogeneity for the Chi-square test and I2 ≥50% for the I2
test. The random-effects model was used for data synthesis. Deeks' funnel plot analysis was conducted to assess publication bias, in which the Deeks' asymmetry test was used. The Z-test was used to compare the diagnostic performance between ICEUS and LCEUS.

Subgroup analysis Subgroup analyses will be conducted based on clinical and methodological variables—including study design, geographic region, assay methodology, and cutoff value—to explore potential effect modifiers.

Sensitivity analysis The robustness assessment was conducted by omitting individual studies one by one.

Country(ies) involved China.

Keywords thyroid cancer; cervical lymph node metastasis; contrast-enhanced ultrasound; diagnosis; meta-analysis.

Contributions of each author

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