

INPLASY PROTOCOL

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None declared.

Meta-analysis of the diagnostic value of dual-energy computed tomography parameters for lymph node metastasis in papillary thyroid cancer

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Review question / Objective: This study was to investigate the diagnostic value of quantitative parameters of dual-energy computed tomography (CT) for diagnosing lymph nodes (LNs) metastasis in papillary thyroid cancer (PTC).

Eligibility criteria: Inclusion criteria follow PICOS (participants, interventions, comparisons, outcomes, and study design) principles; participants: patients with PTC confirmed by pathology using a dual-energy CT machine for CT examination; interventions and comparisons: the observation group was PTC patients with LN metastases, and the control group was PTC patients without LN metastases; outcomes: iodine concentration, NIC, and the slope of the energy spectrum curve (λ HU) of LNs in the arterial and the venous phases were compared between metastatic and non-metastatic LNs; study design: observational study; articles published in English or Chinese; if duplicate articles exist, only the one with the most complete information would be included. The exclusion criteria were: animal experiments, reviews, meta-analyses, conference abstracts, letters, guidelines, and errata; studies with no control group.

INPLASY registration number: This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 24 September 2022 and was last updated on 24 September 2022 (registration number INPLASY202290110).

INTRODUCTION

Review question / Objective: This study was to investigate the diagnostic value of quantitative parameters of dual-energy computed tomography (CT) for diagnosing lymph nodes (LNs) metastasis in papillary thyroid cancer (PTC).

Condition being studied: The parameters based on the dual-energy CT showed diagnostic value in diagnosing LN metastasis in PTC patients which may serve as a promising tool for the diagnosis of LN metastasis in PTC.

METHODS

Participant or population: Twelve studies involving 1,522 PTC patients were included in this study.

Intervention: There are no interventions.

Comparator: Studies that evaluated the diagnostic value of dual-energy CT for detecting LNs metastasis in PTC patients were included.

Study designs to be included: PubMed, Cochrane, Embase, Web of Science, China Biology Medicine disc, WangFang, VIP, and China National Knowledge Infrastructure databases were searched up to April 20, 2022. Studies that evaluated the diagnostic value of dual-energy CT for detecting LNs metastasis in PTC patients were included. The standardized mean difference (SMD) and 95% confidence interval (CI) were used to assess the diagnostic value of quantitative parameters based on dual-energy CT for LNs metastasis in PTC. The publication bias and sensitivity analysis were performed.

Eligibility criteria: Inclusion criteria follow PICOS (participants, interventions, comparisons, outcomes, and study design) principles; participants: patients with PTC confirmed by pathology using a dual-energy CT machine for CT examination; interventions and comparisons: the observation group was PTC patients with LN metastases, and the control group was PTC patients without LN metastases; outcomes: iodine concentration, NIC, and the slope of the energy spectrum curve (λ HU) of LNs in the arterial and the venous phases were compared between metastatic and non-metastatic LNs; study design: observational study; articles published in English or Chinese; if duplicate articles exist, only the one with the most complete information would be included. The exclusion criteria were: animal experiments, reviews, meta-analyses, conference abstracts, letters, guidelines, and errata; studies with no control group.

Information sources: PubMed, Cochrane, Embase, Web of Science, China Biology Medicine disc, WangFang, VIP, and China National Knowledge Infrastructure databases were searched up to April 20, 2022.

Main outcome(s): Twelve studies involving 1,522 PTC patients were included in this study. The iodine concentration (IC) in the venous phase (SMD: 0.33, 95% CI: 0.06 to 0.60, $P=0.015$), normalized iodine concentration (NIC) in venous phase (SMD: 0.15, 95% CI: 0.12 to 0.19, $P<0.05$), NIC in arterial phase (SMD: 0.22, 95% CI: 0.16 to 0.28, $P<0.05$), and the slope of the energy spectrum curve (λ HU) in arterial phase (SMD: 0.99, 95% CI: 0.59 to 1.40, $P<0.05$) were associated with LNs metastasis in PTC.

Quality assessment / Risk of bias analysis: The evaluation of the quality of included studies was based on Newcastle-Ottawa Scale (NOS). The NOS comprises 9 items. In general, studies with a score of 5 or higher are considered high quality. This meta-analysis was performed and reported based on the Preferred Reporting Items for Systematic Reviews and Meta-analysis of Diagnostic Test Accuracy Studies (PRISMA-DTA) statement.

Strategy of data synthesis: Statistical analyses were performed using Stata 15.0. The standardized mean difference (SMD) was used as the effect indicator, and the effect size was expressed by a 95% confidence interval (CI). Heterogeneity was tested using the Q test. $I^2 \geq 50\%$ indicated the existence of significant heterogeneity, and the random-effect model was used as the pooling method; otherwise, the fixed-effects model was applied. Deeks' funnel plot was used to assess publication bias. Sensitivity analysis was conducted to assess the stability of the results. $P < 0.05$ were regarded as having a statistically significant difference. From inception to April 20, 2022, relevant studies were searched via PubMed, Cochrane, Embase, Web of Science, China Biology Medicine disc, WangFang, VIP, and China National Knowledge Infrastructure databases.

Subgroup analysis: Diagnostic value of IC for LN metastasis in PTC; Diagnostic value of NIC for LN metastasis in PTC; Diagnostic value of λ HU for LN metastasis in PTC.

Sensitivity analysis: Sensitivity analyses showed that no single study would influence the overall findings, indicating the reliability and robustness of the results. The results of heterogeneity revealed no evidence of publication bias in this meta-analysis.

Language restriction: There are no language limits.

Country(ies) involved: China.

Keywords: dual-energy CT, lymph node metastasis, papillary thyroid cancer, quantitative parameter, meta-analysis.

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