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CT radiomics for predicting malignant residual retroperitoneal masses after chemotherapy in metastatic testicular cancer: a systematic review and meta-analysis

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Completed but not published.

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 January 2026 and was last updated on 27 January 2026.

INTRODUCTION

Review question / Objective What is the diagnostic performance of CT-based radiomics for predicting malignant pathology in residual retroperitoneal masses following chemotherapy in patients with metastatic nonseminomatous germ cell tumours?

Rationale Residual retroperitoneal masses are commonly observed following chemotherapy for metastatic nonseminomatous germ cell tumours, with up to half representing benign necrosis or fibrosis. Current clinical and radiological criteria lack sufficient accuracy to reliably distinguish benign from malignant residual disease, leading to potential overtreatment with post-chemotherapy retroperitoneal lymph node dissection. Radiomics has emerged as a quantitative imaging approach with potential to improve preoperative risk stratification. This review aims to systematically evaluate and synthesize the available evidence regarding the diagnostic accuracy of CT-based radiomics in this clinical setting.

Condition being studied Residual retroperitoneal masses in metastatic NSGCTs.

METHODS

Search strategy ("artificial intelligence" OR "machine learning" OR "deep learning" OR "radiomics") AND ("testicular cancer" OR "testicular neoplasm" OR "seminoma" OR "germ cell tumor") AND ("retroperitoneal" OR ''lymph node' OR ''mass" OR ''tumour").

Participant or population Patients with RRMs following chemotherapy for metastatic nonseminomatous germ cell tumours.

Intervention T-based radiomic analysis of residual retroperitoneal masses following chemotherapy.

Comparator Histopathological assessment of residual retroperitoneal masses following post-chemotherapy retroperitoneal lymph node dissection.

Study designs to be included Observational cohort studies (retrospective, prospective, and ambispective) evaluating the diagnostic accuracy of CT-based radiomic analysis.

Eligibility criteria Inclusion criteria:
Studies enrolling adult patients with histologically confirmed nonseminomatous germ cell tumours who underwent platinum-based chemotherapy and subsequent CT imaging for evaluation of residual retroperitoneal masses. Eligible studies were required to apply CT-based radiomic or machine learning analysis to residual masses and report diagnostic performance for predicting malignant versus benign pathology, with histopathological confirmation following post-chemotherapy retroperitoneal lymph node dissection. Only observational cohort studies (retrospective, prospective, or ambispective) published in English within the last 10 years were included.
Exclusion criteria:
Studies without radiomic or machine learning analysis, those using imaging modalities other than CT, studies without histopathological reference standards, case reports, case series, conference abstracts, editorials, reviews, incomplete datasets, and non-English publications.

Information sources Electronic databases including PubMed, EMBASE, and the Cochrane Library were systematically searched. Reference lists of included studies were also manually screened to identify additional relevant publications.

Main outcome(s) Diagnostic accuracy of CT-based radiomic analysis for predicting malignant versus benign pathology in residual retroperitoneal masses, measured by sensitivity, specificity, and area under the receiver operating characteristic curve (AUC).

Quality assessment / Risk of bias analysis Risk of bias was assessed independently by two reviewers using the Risk Of Bias In Non-randomized Studies of Interventions (ROBINS-I) tool. Disagreements were resolved by consensus or consultation with a third reviewer. Studies were classified as having low, moderate, serious, or critical risk of bias.

Strategy of data synthesis A quantitative meta-analysis of diagnostic accuracy was performed. Pooled estimates of sensitivity, specificity, and summary receiver operating characteristic (SROC) curves were generated using a bivariate random-effects model (Reitsma method) to account for between-study heterogeneity. Analyses were conducted separately for training and validation cohorts where reported. Results were presented with corresponding 95% confidence intervals.

Subgroup analysis Where data permitted, subgroup analyses were planned according to model type (training versus validation cohorts). Formal subgroup analyses based on patient or imaging characteristics were not performed due to the limited number of included studies and heterogeneity in reporting.

Sensitivity analysis Formal sensitivity analyses were not performed due to the limited number of included studies and heterogeneity in reporting. Study robustness was assessed qualitatively through risk-of-bias evaluation and comparison of training versus validation model performance.

Country(ies) involved Department of Urology Connolly Hospital Blanchardstown, Dublin - Ireland.

Keywords Radiomics; Computed tomography; Testicular cancer; Nonseminomatous germ cell tumour; Retroperitoneal mass; Artificial intelligence; Diagnostic accuracy.

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