INPLASY

Meta-Analysis of Computed Tomography Imaging in the Assessment of Extrarenal Fat Invasion in Renal Cell Carcinoma Patients

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ADMINISTRATIVE INFORMATION

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 05 March 2024 and was last updated on 05 March 2024.

INTRODUCTION

Review question / Objective To use meta-analysis to determine the diagnostic performance of computed tomography (CT) imaging in renal cell carcinoma patients with extrarenal fat (perinephric or renal sinus fat) invasion.

Rationale Firstly, imaging is the most commonly utilized medical examination for clinical staging in patients with renal cell carcinoma, particularly computed tomography (CT). Secondly, at present, there are many studies on CT evaluation of renal cell carcinoma staging, especially involving T3a staging. However, previous studies have reported the diagnostic accuracy of CT for PFI and RSFI with conflicting sensitivity and specificity, and even among studies assessing the same CT features. Thirdly, Our team has also published a review of related subject research before.

Condition being studied The T stage in renal cell carcinoma (RCC) is a critical consideration for risk stratification, of which T3a has a great significance for clinical decision-making and prognostic assessment. Based on the Tumor Node Metastasis (TNM) system from the 8th American Joint Committee on Cancer (AJCC) staging guidelines, RCC with renal vein, perinephric fat, renal sinus fat or pelvicalyceal system invasion is defined as T3a . T3a is a high-risk subgroup of worse prognosis, which needs to be managed by more radical measures. Among different locally extended tumor growth, in total, renal sinus fat invasion (RSFI) has a relatively poor prognosis, and any combination of extrarenal invasion shows worse overall survival (OS) or cancer-specific survival (CSS) . Per the European Association of Urology (EAU) Guideline Group for RCC, radical nephrectomy (RN) is the standard therapy for locally advanced (T3a) RCC, whether laparotomy or laparoscope. As for localized RCC(T1-2), nephron-sparing surgery (NSS) is a preferred option, which can low the risk of cardiovascular and metabolic disorders by

preserving partial renal function. Therefore, pretreatment knowledge of tumor stage, and particularly T3a, could provide important prognostic information and guide optimal patient management.

METHODS

Search strategy Show only some search strategies:(((("Tomography, X-Ray Computed"[Mesh]) OR (((((((((((((((((((((((((((((((((((((X-Ray Computed Tomography[Title/Abstract]) OR (Tomography, X-Ray Computerized[Title/Abstract])) OR (Tomography, X Ray Computerized[Title/Abstract])) OR (Computed X Ray Tomography[Title/Abstract])) OR (X-Ray Computer Assisted Tomography[Title/Abstract])) OR (X Ray Computer Assisted Tomography[Title/Abstract])) OR (Tomography, X-Ray Computer Assisted[Title/Abstract])) OR (Tomography, X Ray Computer Assisted[Title/Abstract])) OR (Computerized Tomography, X Ray[Title/Abstract])) OR (Computerized Tomography, X-Ray[Title/Abstract])) OR (X-Ray Computerized Tomography[Title/Abstract])) OR (CT X Ray[Title/Abstract])) OR (CT X Rays[Title/Abstract])) OR (X Ray, CT[Title/Abstract])) OR (X Rays, CT[Title/Abstract])) OR (Tomodensitometry[Title/Abstract])) OR (Tomography, X Ray Computed[Title/Abstract])) OR (X Ray Tomography, Computed[Title/Abstract])) OR (X-Ray Tomography, Computed[Title/Abstract])) OR (Computed X-Ray Tomography[Title/Abstract])) OR (Tomographies, Computed X-Ray[Title/Abstract])) OR (Tomography, Computed X-Ray[Title/Abstract])) OR (Tomography, Xray Computed[Title/Abstract])) OR (Computed Tomography, Xray[Title/Abstract])) OR (Xray Computed Tomography[Title/Abstract])) OR (CAT Scan, X Ray[Title/Abstract])) OR (CAT Scan, X-Ray[Title/Abstract])) OR (CAT Scans, X-Ray[Title/Abstract])) OR (Scan, X-Ray CAT[Title/Abstract])) OR (Scans, X-Ray CAT[Title/Abstract])) OR (X-Ray CAT Scan[Title/Abstract])) OR (X-Ray CAT Scans[Title/Abstract])) OR (Tomography, Transmission Computed[Title/Abstract])) OR (Computed Tomography, Transmission[Title/Abstract])) OR (Transmission Computed Tomography[Title/Abstract])) OR (CT Scan, X-Ray[Title/Abstract])) OR (CT Scan, X Ray[Title/Abstract])) OR (CT Scans, X-Ray[Title/Abstract])) OR (Scan, X-Ray CT[Title/Abstract])) OR (Scans, X-Ray CT[Title/Abstract])) OR (X-Ray CT Scan[Title/Abstract])) OR (X-Ray CT Scans[Title/Abstract])) OR (Computed Tomography, X-Ray[Title/Abstract])) OR (Computed Tomography, X Ray[Title/Abstract])) OR (X Ray Computerized Tomography[Title/Abstract])) OR (Cine-CT[Title/Abstract])) OR (Cine CT[Title/Abstract])) OR (Electron Beam Computed Tomography[Title/Abstract])) OR (Electron Beam Tomography[Title/Abstract])) OR (Beam Tomography, Electron[Title/Abstract])) OR (Tomography, Electron Beam[Title/Abstract])) OR (Tomography, X-Ray Computerized Axial[Title/Abstract])) OR (Tomography, X Ray Computerized Axial[Title/Abstract])) OR (X-Ray Computerized Axial Tomography[Title/Abstract])) OR (X Ray Computerized Axial Tomography[Title/Abstract]))) AND (("Carcinoma, Renal Cell"[Mesh]) OR (((((((((((((((((((((((((((((((Carcinomas, Renal Cell[Title/Abstract]) OR (Renal Cell Carcinomas[Title/Abstract])) OR (Nephroid Carcinoma[Title/Abstract])) OR (Carcinoma, Nephroid[Title/Abstract])) OR (Nephroid Carcinomas[Title/Abstract])) OR (Adenocarcinoma Of Kidney[Title/Abstract])) OR (Adenocarcinoma Of Kidneys[Title/Abstract])) OR (Kidney, Adenocarcinoma Of[Title/Abstract])) OR (Renal Cell Carcinoma[Title/Abstract])) OR (Renal Cell Cancer[Title/Abstract])) OR (Cancer, Renal Cell[Title/Abstract])) OR (Renal Cell Cancers[Title/Abstract])) OR (Adenocarcinoma, Renal[Title/Abstract])) OR (Renal Adenocarcinoma[Title/Abstract])) OR (Renal Adenocarcinomas[Title/Abstract])) OR (Renal Carcinoma[Title/Abstract])) OR (Carcinoma, Renal[Title/Abstract])) OR (Renal Carcinomas[Title/Abstract])) OR (Adenocarcinoma, Renal Cell[Title/Abstract])) OR (Adenocarcinomas, Renal Cell[Title/Abstract])) OR (Renal Cell Adenocarcinoma[Title/Abstract])) OR (Renal Cell Adenocarcinomas[Title/Abstract])) OR (Chromophobe Renal Cell Carcinoma[Title/Abstract])) OR (Sarcomatoid Renal Cell Carcinoma[Title/Abstract])) OR (Papillary Renal Cell Carcinoma[Title/Abstract])) OR (Renal Cell Carcinoma, Papillary[Title/Abstract])) OR (Chromophil Renal Cell Carcinoma[Title/Abstract])) OR (Clear Cell Renal Cell Carcinoma[Title/Abstract])) OR (Grawitz Tumor[Title/Abstract])) OR (Tumor, Grawitz[Title/Abstract])) OR (Clear Cell Renal Carcinoma[Title/Abstract])) OR (Carcinoma, Hypernephroid[Title/Abstract])) OR (Hypernephroid Carcinoma[Title/Abstract])) OR (Hypernephroid Carcinomas[Title/Abstract])) OR (Hypernephroma[Title/Abstract])) OR (Hypernephromas[Title/Abstract])) OR (Collecting Duct Carcinoma (Kidney[Title/Abstract]))) OR (Carcinoma, Collecting Duct (Kidney[Title/Abstract])) OR (Carcinomas, Collecting Duct (Kidney[Title/Abstract]))) OR (Collecting Duct Carcinomas (Kidney[Title/Abstract]))) OR (Collecting Duct Carcinoma of the Kidney[Title/Abstract])) OR (Renal Collecting Duct Carcinoma[Title/Abstract])) OR (Collecting Duct Carcinoma[Title/Abstract])) OR (Carcinoma, Collecting Duct[Title/Abstract])) OR (Carcinomas, Collecting Duct[Title/Abstract])) OR (Collecting

Duct Carcinomas[Title/Abstract])))) AND (((((((((extrarenal fat[Title/Abstract]) OR (extrarenal fat invasion[Title/Abstract])) OR (perirenal fat[Title/Abstract])) OR (perinephric fat[Title/Abstract])) OR (perinephric fat invasion[Title/Abstract])) OR (perirenal fat invasion[Title/Abstract])) OR (renal sinus fat[Title/Abstract])) OR (renal sinus fat invasion[Title/Abstract])) OR (("Neoplasm Staging"[Mesh]) OR ((((((((((((((((Staging, Neoplasm[Title/Abstract]) OR (Tumor Staging[Title/Abstract])) OR (Staging, Tumor[Title/Abstract])) OR (Cancer Staging[Title/Abstract])) OR (Staging, Cancer[Title/Abstract])) OR (TNM Staging[Title/Abstract])) OR (Staging, TNM[Title/Abstract])) OR (TNM Staging System[Title/Abstract])) OR (Staging System, TNM[Title/Abstract])) OR (Staging Systems, TNM[Title/Abstract])) OR (System, TNM Staging[Title/Abstract])) OR (Systems, TNM Staging[Title/Abstract])) OR (TNM Staging Systems[Title/Abstract])) OR (TNM Classification[Title/Abstract])) OR (Classification, TNM[Title/Abstract])) OR (Classifications, TNM[Title/Abstract])) OR (TNM Classifications[Title/Abstract]))))) AND (sensitiv*[Title/Abstract] OR sensitivity and specificity[MeSH Terms] OR (predictive[Title/Abstract] AND value*[Title/Abstract]) OR predictive value of tests[MeSH Terms] OR accuracy*[Title/Abstract]).

Participant or population Renal cell carcinoma patients with PFI and RSFI assessed by CT.

Intervention No intervention.

Comparator No comparative intervention.

Study designs to be included Diagnostic studies.

Eligibility criteria Inclusion criteria: the assessment of above local invasion by CT is limited to the qualitative sign analysis and quantitative data measurement of relevant image data by radiologists.

Information sources 1.Electronic databases: PubMed, Web of Science, EMBASE and Cochrane Library databases 2.Grey literature.

Main outcome(s) (a) studies involving minors were excluded (the main pathological type of them is usually the Wilms' tumor); (b) studies on renal capsule invasion (renal capsule invasion and infiltration was two distinct pathological results); (c) studies in which the texture analysis, radiomics and artificial intelligence were the only assessment methods (one exception in which human interpretation was the comparison of the above tools and there are available data).

Additional outcome(s) No.

Data management Excel table.

Quality assessment / Risk of bias analysis Risk of bias and concerns regarding applicability were assessed using the Quality Assessment of Diagnostic Accuracy Studies-2 (QUADAS-2) tool by two reviewers.

Strategy of data synthesis Pooled summary estimates for sensitivity, specificity, diagnostic odds ratio (DOR), negative likelihood ratio, and positive likelihood ratio were obtained from a bivariate mixed effects model, considering all included studies and other subsets of composable CT features and criteria. The potential heterogeneity between all included studies was assessed by the Cochran's Q-statistic and I2 tests. A summary curve of diagnostic performance-the area under the curve (AUC), was obtained by the hierarchical summary receiver operating characteristics (HSROC) model. Publication bias of included studies was evaluated by Deek's funnel plot.
Statistical analysis was performed using STATA, version MP 16.0 (stataMP). The significance level was set at $P < 0.05$.

Subgroup analysis The univariate meta-regression, or subgroup analysis were performed based on publication year, number of patients, number of readers, number of CT imaging features or criteria, and consensus read, which we anticipated could represent heterogeneity sources.

Sensitivity analysis No sensitivity analysis.

Language restriction No language restriction.

Country(ies) involved China.

Other relevant information No

Keywords Renal cell carcinoma, Perinephric fat invasion, Renal sinus fat invasion, Computed tomography, Meta-analysis.

Dissemination plans Not yet determined.

Contributions of each author
Author 1 - Junchao Ma - 1.Author 1 participated in the formulation of the literature search strategy and completed the literature search. 2.Author 1 participated in literature review. 3.Author 1 participated in the statistical analysis. 4.Author 1 drafted the manuscript.
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