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Robotic-Assisted Ureteric Reimplantation Versus Laparoscopic and Open Approaches: Systematic Review and Meta-analysis

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ADMINISTRATIVE INFORMATION

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

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202610099

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 30 January 2026 and was last updated on 30 January 2026.

INTRODUCTION

Review question / Objective In patients undergoing ureteric reimplantation (ureteroneocystostomy), how do robotic-assisted procedures compare with laparoscopic and open approaches in terms of reconstruction success, postoperative morbidity, perioperative recovery, and resource use/costs?

Condition being studied Patients with distal ureteral pathology requiring ureteric reimplantation (ureteroneocystostomy/ureteral reimplantation) as reconstructive management—typically performed for ureteral injury/iatrogenic damage, benign ureteral stricture/obstruction, or selected ureteral malignancy–related defects—and treated via robotic-assisted, laparoscopic, or open surgical approaches.

METHODS

Participant or population Individuals (adults and children) undergoing ureteric reimplantation / ureteroneocystostomy as the principal reconstructive procedure for distal ureteral pathology (e.g., iatrogenic injury, benign stricture/obstruction, or ureteral defect requiring reimplantation). Studies with mixed-age cohorts are eligible if reimplantation is the main operation.

Series primarily addressing vesicoureteral reflux antireflux repair (without reconstructive indications) are excluded.

Intervention Robotic-assisted ureteric reimplantation, including robot-assisted ureteroneocystostomy and related reconstructive variants when performed robotically (e.g., with or without adjuncts such as psoas hitch or Boari flap, as reported).

Comparator Conventional laparoscopic ureteric reimplantation and/or open ureteric reimplantation performed for the same indication (including adjunct maneuvers such as psoas hitch or Boari flap when applicable and reported).

Study designs to be included Comparative clinical studies evaluating robotic-assisted versus laparoscopic and/or open ureteric reimplantation, including randomized trials (if available), prospective cohort studies, retrospective cohort studies, and case–control studies. Studies without a comparison group (single-arm series), conference abstracts, reviews/editorials, and case reports will be excluded. Where multiple reports draw on overlapping patient cohorts, the most informative dataset (e.g., largest sample or most recent report) will be retained.

Eligibility criteria Timeframe: Studies published (or available online) from database inception to 20 January 2026 were eligible.
Publication type / availability: Only full-text comparative reports with extractable data were considered; conference-only abstracts and other non–full-text records were not eligible.
Data sufficiency: Studies were excluded if they did not provide usable perioperative/clinical outcome data relevant to the review endpoints.
Study setting: Non-clinical experimental studies (e.g., laboratory/technical feasibility without patient outcomes) were excluded.
Duplicate/overlap handling: For overlapping cohorts, the most informative report (typically the largest sample or latest dataset) was retained to avoid double-counting.
Language: No language restrictions were planned; non-English studies would be assessed if sufficient information could be reliably extracted.

Information sources Electronic searches will be performed in PubMed, Embase, Web of Science, and the Cochrane Library, from inception to 20 January 2026. In addition, we will hand-search the reference lists of all included studies and relevant reviews, and conduct forward citation tracking of key eligible articles to identify additional comparative reports not captured by database indexing. When outcome data are unclear or incomplete, we will attempt to contact corresponding authors to request clarifications or missing information.

Main outcome(s) Reconstruction success (primary effectiveness endpoint).
Defined as a successful ureteric reimplantation without recurrent obstruction/stricture and without the need for secondary interventions (e.g., repeat reconstruction, endoscopic re-intervention, or long-term diversion), based on each study's reported criteria (clinical symptoms and/or imaging findings). The primary timepoint will be the latest follow-up available in each study.

Effect measure: Risk ratio (RR) with 95% CI (or odds ratio if required by data structure), comparing robotic-assisted versus laparoscopic/open approaches.

Postoperative complications (primary safety endpoint).
Overall postoperative complications, and when reported, major complications using standardized grading (preferably Clavien–Dindo grade ≥III), assessed within the postoperative period as defined in each study (in-hospital and/or within 30–90 days, when available).

Effect measure: RR with 95% CI for overall and major complications.

Quality assessment / Risk of bias analysis Two reviewers will independently appraise methodological quality for each included study. Because the evidence base is expected to be predominantly non-randomized, risk of bias will be evaluated using the ROBINS-I framework across its standard domains (confounding, selection of participants, intervention classification, deviations from intended interventions, missing data, outcome measurement, and selective reporting). Each domain will be judged as low, moderate, serious, critical risk of bias, or no information, leading to an overall study-level judgement. Discrepancies will be resolved by discussion, with arbitration by a third reviewer when necessary. If any randomized trials are identified, they will be assessed using the Cochrane RoB 2 tool.

Strategy of data synthesis
Effect measures:
Dichotomous outcomes (e.g., success/failure, overall complications, major complications): pooled as risk ratios (RRs) with 95% confidence intervals (CIs). When a study reports zero events in

one arm, a standard continuity correction will be applied; studies with zero events in both arms will be handled using appropriate methods or described narratively if pooling is not meaningful.
Continuous outcomes (e.g., operative time, estimated blood loss, drain removal time, length of stay, costs): pooled as mean differences (MDs) with 95% CIs when units are consistent; otherwise standardized mean differences (SMDs) will be used.

Meta-analysis model:
Pooled estimates will be calculated primarily using a random-effects model to account for between-study variability (with between-study variance estimated using a standard approach such as REML/DerSimonian–Laird as appropriate). A fixed-effect model may be used in sensitivity analyses for comparison.
Heterogeneity assessment:
Statistical heterogeneity will be quantified using I^2 and τ^2, and tested with the Cochran Q statistic. Predefined thresholds will guide interpretation (e.g., low/moderate/substantial heterogeneity), and sources of heterogeneity will be explored where feasible.
Planned additional analyses:
Subgroup analyses (as data allow): e.g., adult vs pediatric cohorts; differences by reconstruction complexity/adjunct techniques (e.g., psoas hitch/Boari flap) if consistently reported.
Sensitivity analyses: excluding studies at higher risk of bias; leave-one-out analyses; alternative pooling assumptions (random vs fixed).
Meta-regression (if sufficient studies): exploring moderators such as publication year and other clinically relevant study-level variables to explain heterogeneity.
Publication bias / small-study effects:
When ≥10 studies are available for an outcome, funnel plots will be inspected and Egger's regression test (and/or Begg's test) will be used to evaluate asymmetry; results will be interpreted cautiously given heterogeneity and outcome definitions.
Software and reporting:
Analyses will be performed in standard meta-analysis software (e.g., R), and results will be presented with pooled estimates, 95% CIs, and corresponding forest plots; outcomes not suitable for pooling will be summarized narratively with structured tables.

Subgroup analysis Subgroup analysis:
Subgroup meta-analyses will be conducted when there are sufficient studies/data to support meaningful comparisons. Prespecified subgroups include:
Age group: adult versus pediatric populations.
Comparator type: robotic-assisted versus laparoscopic, and robotic-assisted versus open (analysed separately to avoid mixing comparator effects).
For each subgroup, pooled estimates will be calculated using the same effect measures and meta-analytic model as the primary analysis, and subgroup differences will be examined using an interaction test where applicable.

Sensitivity analysis Robustness of pooled estimates will be examined using the following prespecified sensitivity analyses (where data permit):
Risk of bias restriction: repeating meta-analyses after excluding studies judged at serious/critical risk of bias (ROBINS-I) and/or restricting to studies at low–moderate risk.
Influence diagnostics: leave-one-out analyses to evaluate whether any single study disproportionately drives the pooled result; influential studies will be reported and their impact described.

Language restriction No language restrictions will be applied during the search. Studies published in any language will be considered, and translations will be sought when necessary.

Country(ies) involved China.

Keywords Ureteric reimplantation, Robot-assisted surgery, Laparoscopic surgery, Open surgery, Systematic review and Meta-analysis.

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