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Robotic beyond total mesorectal excision (TME) for locally advanced or recurrent rectal cancer: a systematic review protocol

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ABSTRACT

Introduction: The surgical treatment for locally advanced or recurrent rectal cancer requires oncological clearance with a pelvic exenteration or a beyond total mesorectal excision (TME). The aim of this systematic review is to explore the safety and feasibility of robotic surgery in locally advanced and recurrent rectal cancer by evaluating perioperative outcomes, oncological clearance rates and survival and recurrence rates post robotic beyond TME surgery.

Methods: The systematic review will include studies published until the end of September 2023. The MEDLINE, EMBASE and Scopus databases will be searched. After the study selection and data extraction, the quality assessment will be performed by two independent reviewers. Discrepancies will be resolved by consensus with a third independent reviewer. The risk of bias will be assessed with validated scores. The primary outcomes will be oncological clearance, overall and disease-free survival and local and systemic recurrence rates post robotic or robot-assisted beyond TME surgery for locally advanced or recurrent rectal cancer. Secondary outcomes will include perioperative outcomes.

Ethics and Dissemination: No ethical approval is required for this systematic review as no individual patient cases are studied requiring access to individual medical records. The results of the systematic review will be disseminated with conference presentations and peer-reviewed paper publications.

Strengths and limitations of this study

This study will use a robust search strategy protocol of current databases with the support of an experienced librarian to identify published work detailing the safety and feasibility of robotic beyond TME or exenterative surgery for locally advanced or recurrent rectal cancer. The literature search will be performed in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) guidelines. The lack of high-quality clinical trials or prospective studies evaluating the safety and feasibility of beyond TME robotic surgery for rectal cancer may lead to limited good quality available evidence.

INTRODUCTION

The management of rectal cancer is multimodal with surgery remaining the mainstay curative option. Total mesorectal excision (TME) is the standard operation for rectal cancer [1, 2]. Oncological clearance is defined by a circumferential resection margin (CRM) greater than 1 mm i.e. a distance greater than 1 mm between the tumour and the mesorectal envelope. CRM involvement is the most important prognostic indicator negatively affecting overall survival in rectal cancer [3] and therefore, oncological clearance is key in curative intent and patient survival.

Locally advanced rectal cancer, defined by the tumour involving the CRM or directly invading adjacent organs, requires an oncological resection in the form of a beyond TME or multi-organ en bloc resection [4]. In cases of recurrent rectal cancer, the CRM is no longer present due to previous surgery and therefore, the margin for clearance may be more extensive and/or involving adjacent pelvic organs [4]. Early recurrence is defined as local recurrence within 12 months of the primary surgery. Approximately 40% of local rectal cancer recurrence cases occur 36 months post index procedure [5]. Hence, a beyond conventional TME approach or a pelvic exenteration (anterior, middle, posterior, total) is recommended in locally advanced or recurrent rectal cancer.

Minimally invasive surgical approaches have been shown to improve post-operative pain and facilitate recovery following pelvic abdominal surgery [6,7]. However, laparoscopic surgery has significant limitations when working in a narrow pelvis with reduced access and lack of tactile feedback. Robotic surgery can overcome some of these limitations by offering additional benefits in accessing the pelvis with enhanced 3D vision and wristed instruments [6-9]. There have been several case reports and case series published worldwide on robotic pelvic exenterations and robotic beyond TME surgery suggesting that the robotic approach is safe and feasible for locally advanced or recurrent rectal cancer [8,9].

This systematic review aims to investigate, evaluate and present an overview of the reported perioperative and oncological outcomes as well as recurrence and survival data from robotic beyond TME surgery or robotic pelvic exenterations in locally advanced or recurrent rectal cancer. It is expected that the review may provide further insight and recommendations on

patient selection criteria and inform clinicians and patients on the safety and feasibility of the robotic approach for beyond TME surgery.

METHODS

Patients, intervention and outcomes

Patients: patients ≥18 years of age with locally advanced or recurrent rectal cancer having undergone pelvic exenteration or beyond TME with a robotic approach.

Interventions: robotic or robot-assisted pelvic exenteration, robotic or robot-assisted beyond TME.

Research question: What are the oncological clearance rates, the survival data and the cancer recurrence rates from robotic beyond TME surgery or robotic pelvic exenterations in locally advanced or recurrent rectal cancer? And based on that data is robotic beyond TME or exenterative surgery safe and feasible?

Search Strategy

The systematic review will be conducted according to the PRISMA checklist [10]. The systematic search will be performed using the MEDLINE and EMBASE databases via OVID, and the SCOPUS database. The systematic review will also be informed of contemporary registered studies by searching the Clinical Trials database (clinicaltrials.gov) and the PROSPERO Registry (crd.york.ac.uk/prospero). A combination of search keywords and subject headings will be used for MEDLINE and EMBASE databases, whereas a combination of search headings will be used for the SCOPUS database (Appendix 1). This combination of keywords and/or subject headings forms our search strategy which will be supported by an experienced librarian. There will be no limits placed on the search strategy. Individual researchers may be contacted directly to request clarification of data if no sufficient information is provided in corresponding published literature.

Study Eligibility Criteria

The studies selected will require to meet the following criteria: (1) studies reporting on locally advanced or recurrent rectal cancer outcomes following robotic or robotic-assisted beyond TME or exenterative surgery; (2) studies comparing robotic/laparoscopic and open surgery with regards to beyond TME or exenteration surgery (3) randomised controlled trials, prospective or retrospective cohort studies, case series and case reports; (4) studies

published until the end of September 2023; (5) studies published in English. The reviewers will exclude: (1) reviews, letters, commentaries, abstracts, editorials and videos; (2) studies without full text. Although a minimum follow-up time of 3 years is required, survival analyses may not be feasible with studies reporting various follow-up lengths. Therefore, the inclusion of studies with variable follow-up will be assessed on a case-by-case basis. If studies are identified that report outcomes from the same cohort of patients in different time scales, the study with the largest sample size and longest follow-up data will be included. It is intended that by following this eligibility (inclusion/exclusion) criteria we will capture all available studies for our research question.

Outcomes

The primary outcome of the systematic review will be to identify the reported oncological clearance rates, survival data and recurrence rates from robotic or robot-assisted beyond TME surgery in locally advanced or recurrent rectal cancer. Survival is defined as the time between surgery and death. Recurrence following robotic beyond TME or exenterative surgery for locally advanced or recurrent rectal cancer is defined as confirmation of local or distant recurrence based on clinical, radiological and/or histological assessment. Secondary outcomes will include the safety and feasibility of the robotic approach for beyond TME or exenterative surgery in locally advanced or recurrent rectal cancer and will be examined by assessing perioperative outcomes and identifying reported complications. The outcome data will be compared with the standard practice of open exenterative or beyond TME surgery for locally advanced or recurrent colorectal cancer. If further outcomes are evaluated as important during the search, the systematic review protocol will be amended and these outcomes will be included in the systematic review report.

Data Management

Duplicates from the literature search results will be removed by using the reference manager Endnote (Clarivate, Philadelphia, PS, USA). The search results will then be uploaded on Rayyan QCRI web-based software management programme. Abstracts and articles will be uploaded as documents for the screening and study selection by the reviewers.

Study selection

A flow diagram depicting the screening process as per PRISMA guidelines will be included [11]. Potentially eligible studies for inclusion will be identified from screening the titles and abstracts of studies before being uploaded on Rayyan QCRI for analysis. During screening, the studies will receive scores by each of the two reviewers based on the eligibility criteria, with the final inclusion of studies occurring after full-text screening by the two reviewers.

Data Collection Process

A Microsoft Excel® file will be created when extracting the data in a standardised form and the two screening authors (IGP and AP) will extract the data from eligible studies for comparison on the Excel file. The data will include the study details, the patient demographics, the methods and the corresponding outcomes of interest.

Data Items and Outcomes

The following data will be extracted from the included studies: study details (first author, journal, year of publication, study type, country), population demographics (age, gender, number of patients), tumour characteristics (TNM stage, organs involved, neoadjuvant treatment type), surgery characteristics (robotic versus. robotic-assisted beyond TME versus. pelvic exenteration), surgery outcomes (oncological clearance, duration of surgery, estimated blood loss, blood transfusion, intraoperative complications, use of endoanal ultrasound or other imaging intraoperatively, postoperative complications, 30-day mortality rate, readmission rates), survival outcomes, disease free survival, local and systemic recurrence.

Quality Assessment and Risk of Bias

The quality of the included studies will be assessed by the review authors (IGP and AP) independently. Disagreements will be resolved by consensus but if required a third reviewer will be invited (GNP). All authors have expertise in the management of rectal cancer. The methodological quality and the risk of bias at the study level will be assessed with the Cochrane RoB 2 Tool [12] for randomised controlled trials and with the ROBINS-I assessment tool [13] for observational or non-randomised studies. If a synthesis of the results of published case reports or case series is required due to lack of higher level of evidence, the 13-item Case Report (CARE) checklist [14] will be used for critical appraisal.

Statistical Analysis

The statistical analysis will be performed using IBM SPSS® Statistics or Graphpad Prism®. Categorical data will be described with median values and interquartile ranges and will be analysed with x^2 test. Continuous data will be described with mean values and standard deviation and will be analysed with the Kruskal-Wallis test. A p value of <0.050 will be considered statistically significant. If a meta-analysis is performed, standardised mean differences and descriptive statistics will be used to show the study data. Heterogeneity will be assessed with I^2 statistics (I^2 values of 25%, 50% and 75% will be low, moderate and high respectively). A random effects model will be adopted to provide the pool estimates of mean differences in case of moderate or high heterogeneity in the included studies. If a random effects model is used, a sensitivity analysis will be performed.

Data Synthesis

A narrative synthesis of the review findings from the included studies will be provided. Outcomes will be presented in a structured or tabular form with a meta-analysis performed if more than three studies with the same outcome measures are identified. If a meta-analysis is not possible, descriptive statistics and primary effect measures will be used to synthesize the results of a small number of studies. The scarcity of prospective studies on the application of robotic surgery for beyond TME for locally advanced or recurrent rectal cancer may result in limited high-quality evidence and therefore, a narrative review of the available evidence will be performed.

Meta-bias(es)

The potential of publication bias will be assessed by accessing the studies' published protocols before the start of patient recruitment/inclusion. The potential of reporting bias will be assessed by comparing outcomes reported in the published study protocol with those reported in the corresponding published paper article.

Confidence in Cumulative Evidence

The strength of the body of evidence with regards to the research question will be assessed using the GRADE tool (Grading of Recommendations Assessment, Development and Evaluation) [15]. The quality of the available evidence will be reported with the GRADE

certainty ratings of high, moderate, low and very low [16]. This assessment will offer clear indications of the quality of the literature used in the systematic review.

Patient and Public Involvement

There was no formal patient and public involvement in the creation of the systematic review protocol. The results will be communicated with patients in lay language via patient organisations such as the patient representative body of the Association of Coloproctology of Great Britain and Ireland (ACPGBI).

Ethics and Dissemination

No ethical approval has been obtained for this systematic review as no individual patient cases are studied requiring access to individual medical records. The results of the systematic review will be disseminated with conference presentations and peer-reviewed paper publications.

Study Planning

The literature search will include studies published up until the end of September 2023. The data collection and analysis will be performed, and the risk of bias will be completed by the end of November 2023. The systematic review will be written up by the end of December 2023.

Amendments

If an amendment is made to the systematic review protocol, the reason for the amendment and the date for the change will be provided.

Acknowledgements

We thank Eleanor Jane Barker of the University of Cambridge Medical Library for her help and support in developing the search strategy.

Contributors

Substantial contributions to the conception and design of this systematic review protocol: IGP, MH, GAM and JSK. Drafting the protocol: IGP. Critical appraisal: AP, GNP, GAM, MH and

JSK . Final approval of the version to be published: IGP, AP, GNP, MH, GAM and JSK. All authors agreed to be accountable for all aspects of the work included in this manuscript.

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Competing interests

JK is a proctor for Intuitive Surgical. No financial or other support has been received from the company for this manuscript. All other authors declare no support from any organisation for the submitted manuscript and no relationships or activities that could influence the submitted systematic review protocol.

Patient consent for publication

Not applicable.

Provenance and peer review

This systematic review protocol is not commissioned but it is externally peer reviewed.

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Appendix 1

Scopus Search Strategy

(robot* W/3 (surg* OR procedure* OR resection* OR exent* OR "beyond TME" OR "beyond total mesorectal excision*")))) AND (TITLE-ABS-KEY (((colorectal* OR rectal* OR rectum* OR rectosigmoid*) W/3 (cancer* OR carcinoma* OR adenocarcinoma* OR tumor* OR tumour* OR neoplas* OR malignan*)))

Reporting checklist for protocol of a systematic review and meta analysis.

Based on the PRISMA-P guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the PRISMA-Preporting guidelines, and cite them as:

Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart LA. Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) 2015 statement. Syst Rev. 2015;4(1):1.

		Reporting Item	Page Number
Title			
Identification	#1a	Identify the report as a protocol of a systematic review	1
Update	#1b	If the protocol is for an update of a previous systematic review, identify as such	n/a
Registration			
	#2	If registered, provide the name of the registry (such as PROSPERO) and registration number	n/a
Authors			
Contact	#3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	1
Contribution	#3b	Describe contributions of protocol authors and identify the guarantor of the review	9,10

Amendments			
	#4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	n/a
Support			
Sources	#5a	Indicate sources of financial or other support for the review	10
Sponsor	#5b	Provide name for the review funder and / or sponsor	n/a
Role of sponsor or funder	#5c	Describe roles of funder(s), sponsor(s), and / or institution(s), if any, in developing the protocol	n/a
Introduction			
Rationale	#6	Describe the rationale for the review in the context of what is already known	3,4
Objectives	#7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	5
Methods			
Eligibility criteria	#8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	5,6
Information sources	#9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	5,6
Search strategy	#10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	13
Study records - data management	#11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	6,7
Study records - selection process	#11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	6,7

Study records - data collection process	#11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	7
Data items	#12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	7
Outcomes and prioritization	#13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	7
Risk of bias in individual studies	#14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	7
Data synthesis	#15a	Describe criteria under which study data will be quantitatively synthesised	8
Data synthesis	#15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I2, Kendall's τ)	8
Data synthesis	#15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	8
Data synthesis	#15d	If quantitative synthesis is not appropriate, describe the type of summary planned	8
Meta-bias(es)	#16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	8
Confidence in cumulative evidence	#17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	8,9

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ABSTRACT

Introduction: The surgical treatment for locally advanced or recurrent rectal cancer requires oncological clearance with a pelvic exenteration or a beyond total mesorectal excision (TME). The aim of this systematic review is to explore the safety and feasibility of robotic surgery in locally advanced and recurrent rectal cancer by evaluating perioperative outcomes, oncological clearance rates and survival and recurrence rates post robotic beyond TME surgery.

Methods: The systematic review will include studies published until the end of December 2023. The MEDLINE, EMBASE and Scopus databases will be searched. The screening process, study selection, data extraction, quality assessment and analysis will be performed by two independent reviewers. Discrepancies will be resolved by consensus with a third independent reviewer. The risk of bias will be assessed with validated scores. The primary outcomes will be oncological clearance, overall and disease-free survival and local and systemic recurrence rates post robotic or robot-assisted beyond TME surgery for locally advanced or recurrent rectal cancer. Secondary outcomes will include perioperative outcomes.

Ethics and Dissemination: No ethical approval is required for this systematic review as no individual patient cases are studied requiring access to individual medical records. The results of the systematic review will be disseminated with conference presentations and peer-reviewed paper publications.

PROSPERO registration of the study: CRD42023408098

Strengths and limitations of this study

- A robust search strategy protocol of current databases will be used with the support of an experienced librarian to identify published work detailing the safety and feasibility of robotic beyond TME surgery for locally advanced or recurrent rectal cancer
- The literature search will be performed in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) guidelines
- Two independent reviewers will be involved in the whole systematic review process from the screening of studies to the data analysis
- The lack of high-quality clinical trials or prospective studies, due to the robotic approach being currently implemented for beyond TME surgery, may lead to limited good quality evidence available for analysis

INTRODUCTION

The management of rectal cancer is multimodal with surgery remaining the mainstay curative option. Total mesorectal excision (TME) is the standard operation for rectal cancer [1, 2]. Oncological clearance is defined by a circumferential resection margin (CRM) greater than 1 mm i.e. a distance greater than 1 mm between the tumour and the mesorectal envelope. CRM involvement is the most important prognostic indicator negatively affecting overall survival in rectal cancer [3] and therefore, oncological clearance is key in curative intent and patient survival.

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This systematic review aims to investigate, evaluate and present an overview of the reported perioperative and oncological outcomes as well as the recurrence and survival data from robotic or robot-assisted beyond TME or exenterative surgery in locally advanced or recurrent

rectal cancer. The review may provide insight on the safety and feasibility of the robotic approach for beyond TME surgery.

METHODS

Study Eligibility Criteria

The studies selected will require to meet the following criteria: (1) studies reporting on locally advanced or recurrent rectal cancer outcomes following robotic or robotic-assisted beyond TME or exenterative surgery in patients aged ≥18 years of age; (2) studies comparing the robotic vs. open surgery with regards to beyond TME or exenteration surgery (3) randomised controlled trials, prospective or retrospective cohort studies, case series and case reports; (4) studies published up until the end of December 2023; (5) studies published in English. The reviewers will exclude: (1) reviews, letters, commentaries, abstracts, editorials and videos; (2) studies without full text. Although a minimum follow-up time of 3 years is required, survival analyses may not be feasible with studies reporting various follow-up lengths. Therefore, the inclusion of studies with variable follow-up will be assessed on a case-by-case basis. If studies are identified that report outcomes from the same cohort of patients in different time scales, the study with the largest sample size and longest follow-up data will be included. It is intended that by following these eligibility (inclusion/exclusion) criteria we will capture all available studies for our research question.

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A Microsoft Excel® file will be created when extracting the data in a standardised form and the two screening authors (IGP and AP) will extract the data from eligible studies for comparison on the Excel file. The data will include the study details, the patient demographics, the methods and the corresponding outcomes of interest.

Outcomes

The primary outcome of the systematic review will be to identify the reported oncological clearance rates, survival data and recurrence rates from robotic or robot-assisted beyond TME surgery in locally advanced or recurrent rectal cancer. Survival is defined as the time between surgery and death. Recurrence following robotic beyond TME or exenterative surgery for locally advanced or recurrent rectal cancer is defined as confirmation of local or distant recurrence based on clinical, radiological and/or histological assessment. Secondary outcomes will include the safety and feasibility of the robotic approach for beyond TME or exenterative surgery in locally advanced or recurrent rectal cancer and will be examined by assessing perioperative outcomes and identifying reported complications. The outcome data will be compared with the standard practice of open exenterative or beyond TME surgery for locally advanced or recurrent colorectal cancer. If further outcomes are evaluated as

important during the search, the systematic review protocol will be amended and these outcomes will be included in the systematic review report.

Quality Assessment and Risk of Bias

The quality of the included studies will be assessed by the review authors (IGP and AP) independently. Disagreements will be resolved by consensus but if required a third reviewer will be invited (GNP). All authors have expertise in the management of rectal cancer. The methodological quality and the risk of bias at the study level will be assessed with the Cochrane RoB 2 Tool [12] for randomised controlled trials and with the ROBINS-I assessment tool [13] for observational or non-randomised studies. If a synthesis of the results of published case reports or case series is required due to lack of higher level of evidence, the 13-item Case Report (CARE) checklist [14] will be used for critical appraisal.

Data Synthesis

A narrative synthesis of the review findings from the included studies will be provided. Outcomes will be presented in a structured or tabular form with a meta-analysis performed if more than three studies with the same outcome measures are identified. If a meta-analysis is not possible, descriptive statistics and primary effect measures will be used to synthesize the results of a small number of studies. The scarcity of prospective studies on the application of robotic surgery for beyond TME for locally advanced or recurrent rectal cancer may result in limited high-quality evidence and therefore, a narrative review of the available evidence will be performed.

Statistical Analysis

The statistical analysis will be performed using IBM SPSS® Statistics or Graphpad Prism®. Categorical data will be described with median values and interquartile ranges and will be analysed with x^2 test. Continuous data will be described with mean values and standard deviation and will be analysed with the Kruskal-Wallis test. A p value of <0.050 will be considered statistically significant. If a meta-analysis is performed, standardised mean differences and descriptive statistics will be used to show the study data. Heterogeneity will be assessed with I^2 statistics (I^2 values of 25%, 50% and 75% will be low, moderate and high

respectively). A random effects model will be adopted to provide the pool estimates of mean differences in case of moderate or high heterogeneity in the included studies. If a random effects model is used, a sensitivity analysis will be performed.

Meta-bias(es)

The potential of publication bias will be assessed by accessing the studies' published protocols before the start of patient recruitment/inclusion. The potential of reporting bias will be assessed by comparing outcomes reported in the published study protocol with those reported in the corresponding published paper article.

Confidence in Cumulative Evidence

The strength of the body of evidence with regards to the research question will be assessed using the GRADE tool (Grading of Recommendations Assessment, Development and Evaluation) [15]. The quality of the available evidence will be reported with the GRADE certainty ratings of high, moderate, low and very low [16]. This assessment will offer clear indications of the quality of the literature used in the systematic review.

Patient and Public Involvement

There was no formal patient and public involvement in the creation of the systematic review protocol. The results will be communicated with patients in lay language via patient organisations such as the patient representative body of the Association of Coloproctology of Great Britain and Ireland (ACPGBI).

Ethics and Dissemination

No ethical approval has been obtained for this systematic review as no individual patient cases are studied requiring access to individual medical records. The results of the systematic review will be disseminated with conference presentations and peer-reviewed paper publications.

Study Planning

The literature search will include studies published up until the end of December 2023. The data collection and analysis will be performed between January and February 2024. The systematic review will be written up by the end of April 2024.

Amendments

If an amendment is made to the systematic review protocol, the reason for the amendment and the date for the change will be provided.

Acknowledgements

We thank Eleanor Jane Barker of the University of Cambridge Medical Library for her help and support in developing the search strategy.

Contributors

Substantial contributions to the conception and design of this systematic review protocol: IGP, MH, GAM and JSK. Drafting the protocol: IGP. Critical appraisal: AP, GNP, GAM, MH and JSK . Final approval of the version to be published: IGP, AP, GNP, MH, GAM and JSK. All authors agreed to be accountable for all aspects of the work included in this manuscript.

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Competing interests

JK is a proctor for Intuitive Surgical. No financial or other support has been received from the company for this manuscript or the systematic review. All other authors declare no support from any organisation for the submitted manuscript and no relationships or activities that could influence the submitted systematic review protocol.

Patient consent for publication

Not applicable.

Provenance and peer review

This systematic review protocol is not commissioned but it is externally peer reviewed.

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Supplement File of search strategy

Filters:

There will be no temporal restriction other than the studies being included up until the search date. Studies published in English will be included.

Scopus search strategy:

(robot* W/3 (surg* OR procedure* OR resection* OR exent* OR "beyond TME" OR "beyond total mesorectal excision*")))) AND (TITLE-ABS-KEY (((colorectal* OR rectal* OR rectum* OR rectosigmoid*) W/3 (cancer* OR carcinoma * OR adenocarcinoma* OR tumor* OR tumour* OR neoplas* OR malignan*)))

Medline search strategy:

1 (robot* adj3 (surg* or procedure* or resection* or exent* or beyond TME or beyond total mesorectal excision*)).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]

2 exp pelvic exenteration/ or exp robotic surgical procedures/

3 1 or 2

4 ((colorectal or rectal or rectum) adj3 (cancer* or carcinoma* or adenocarcinoma* or tumor* or tumour* or neoplas* or malignan*)).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]

5 colorectal neoplasms/ or exp colorectal neoplasms, hereditary nonpolyposis/ or exp rectal neoplasms/

6 4 or 5

7 3 and 6

EMBASE search strategy:

1 (robot* adj3 (surg* or procedure* or resection* or exent* or beyond TME or beyond total mesorectal excision*)).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word]

2 exp *pelvis exenteration/

3 *robot assisted surgery/

4 1 or 2 or 3

5 ((colorectal* or rectal* or rectum* or rectosigmoid*) adj3 (cancer* or carcinoma* or adenocarcinoma* or tumor* or tumour* or neoplas* or malignan*)).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word]

6 *colorectal cancer/ or exp *colorectal carcinoma/ or exp *hereditary colorectal cancer/ or exp *rectosigmoid cancer/ or exp *rectum cancer/

7 5 or 6

8 4 and 7

Prospero search

Website: https://www.crd.york.ac.uk/prospero/#searchadvanced

Search: robotic and locally advanced or recurrent rectal cancer

Clinical trials search

Website: https://classic.clinicaltrials.gov/ct2/search/advanced

Search:

Condition or disease: locally advanced or recurrent rectal cancer

Other terms: robotic

Reporting checklist for protocol of a systematic review and meta analysis.

Based on the PRISMA-P guidelines.

Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the PRISMA-Preporting guidelines, and cite them as:

Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, Shekelle P, Stewart LA. Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols (PRISMA-P) 2015 statement. Syst Rev. 2015;4(1):1.

		Reporting Item	Page Number
Title			
Identification	#1a	Identify the report as a protocol of a systematic review	1
Update	#1b	If the protocol is for an update of a previous systematic review, identify as such	n/a
Registration			
	#2	If registered, provide the name of the registry (such as PROSPERO) and registration number	n/a
Authors			
Contact	#3a	Provide name, institutional affiliation, e-mail address of all protocol authors; provide physical mailing address of corresponding author	1
Contribution	#3b	Describe contributions of protocol authors and identify the guarantor of the review	9,10

Amendments			
	#4	If the protocol represents an amendment of a previously completed or published protocol, identify as such and list changes; otherwise, state plan for documenting important protocol amendments	n/a
Support			
Sources	#5a	Indicate sources of financial or other support for the review	10
Sponsor	#5b	Provide name for the review funder and / or sponsor	n/a
Role of sponsor or funder	#5c	Describe roles of funder(s), sponsor(s), and / or institution(s), if any, in developing the protocol	n/a
Introduction			
Rationale	#6	Describe the rationale for the review in the context of what is already known	3,4
Objectives	#7	Provide an explicit statement of the question(s) the review will address with reference to participants, interventions, comparators, and outcomes (PICO)	5
Methods			
Eligibility criteria	#8	Specify the study characteristics (such as PICO, study design, setting, time frame) and report characteristics (such as years considered, language, publication status) to be used as criteria for eligibility for the review	5,6
Information sources	#9	Describe all intended information sources (such as electronic databases, contact with study authors, trial registers or other grey literature sources) with planned dates of coverage	5,6
Search strategy	#10	Present draft of search strategy to be used for at least one electronic database, including planned limits, such that it could be repeated	13
Study records - data management	#11a	Describe the mechanism(s) that will be used to manage records and data throughout the review	6,7
Study records - selection process	#11b	State the process that will be used for selecting studies (such as two independent reviewers) through each phase of the review (that is, screening, eligibility and inclusion in meta-analysis)	6,7

Study records - data collection process	#11c	Describe planned method of extracting data from reports (such as piloting forms, done independently, in duplicate), any processes for obtaining and confirming data from investigators	7
Data items	#12	List and define all variables for which data will be sought (such as PICO items, funding sources), any pre-planned data assumptions and simplifications	7
Outcomes and prioritization	#13	List and define all outcomes for which data will be sought, including prioritization of main and additional outcomes, with rationale	7
Risk of bias in individual studies	#14	Describe anticipated methods for assessing risk of bias of individual studies, including whether this will be done at the outcome or study level, or both; state how this information will be used in data synthesis	7
Data synthesis	#15a	Describe criteria under which study data will be quantitatively synthesised	8
Data synthesis	#15b	If data are appropriate for quantitative synthesis, describe planned summary measures, methods of handling data and methods of combining data from studies, including any planned exploration of consistency (such as I2, Kendall's τ)	8
Data synthesis	#15c	Describe any proposed additional analyses (such as sensitivity or subgroup analyses, meta-regression)	8
Data synthesis	#15d	If quantitative synthesis is not appropriate, describe the type of summary planned	8
Meta-bias(es)	#16	Specify any planned assessment of meta-bias(es) (such as publication bias across studies, selective reporting within studies)	8
Confidence in cumulative evidence	#17	Describe how the strength of the body of evidence will be assessed (such as GRADE)	8,9