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Maria Catarina Leonardo Fernandes de Viveiros
Proctocolectomia Total na Colite Ulcerosa: Laparotomia Vs Laparoscopia –
Uma Revisão Sistemática
Total Proctocolectomy in Ulcerative Colitis: Laparotomy Vs Laparoscopy –
A Systematic Review

MARÇO, 2022

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Proctocolectomia Total na Colite Ulcerosa: Laparotomia Vs Laparoscopia – Uma Revisão Sistemática

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Para o meu Pai, Mãe e Irmã.

À minha Avó Adelaide.

À memória do meu Avô João, Avô Miguel e Avó Maria.

Total Proctocolectomy in Ulcerative Colitis: Laparotomy Vs Laparoscopy – A Systematic Review

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ABSTRACT

Introduction: Ulcerative Colitis is a chronic inflammatory bowel disease affecting the rectum and extending proximally. Some patients remain asymptomatic, while others require surgical intervention. Currently, total proctocolectomy with an ileal pouch-anal anastomosis is accepted as the gold standard for the surgical treatment. Open or laparoscopic approach is still remaining controversial.

Aim: The aim of this systematic review is to determine whether the outcomes following laparoscopic approach are superior to the open approach in Ulcerative Colitis' patients.

Methods: This systematic review was carried out between August and September 2021, on Pubmed and Scopus, using the query "total proctocolectomy" AND "ulcerative colitis" AND (laparoscop* or (laparotom* or open)).

Results: Fifteen articles were included in this review. There was no significant difference between groups concerning amount of blood loss, small bowel obstruction, anastomotic leakage, wound disruption and infection, pouchitis, systemic sepsis, fecal incontinence and recovery of bowel movement. Laparoscopy was superior regarding number of blood transfusions, intestinal perforation and length of hospital stay. Concerning operative time, open approach showed a better outcome.

Conclusion: Laparoscopic approach is a safe treatment for these patients. Multicenter and prospective studies comparing both approaches are needed to clarify controversial outcomes.

Keywords: Ulcerative Colitis; Total Proctocolectomy; Laparotomy; Laparoscopy.

RESUMO

Introdução: A Colite Ulcerosa é uma doença inflamatória intestinal crónica que afeta o reto, estendendo-se proximalmente. Alguns doentes permanecem assintomáticos, outros necessitam de intervenção cirúrgica, sendo a proctocolectomia total com anastomose ileo-anal em bolsa, atualmente aceite como *gold standard*. A abordagem por laparotomia ou laparoscopia é uma escolha controversa.

Objetivo: O objetivo desta revisão sistemática é determinar se os resultados cirúrgicos na laparoscopia são superiores à laparotomia em doentes com Colite Ulcerosa.

Métodos: Esta revisão sistemática foi realizada na Pubmed e Scopus entre agosto e setembro de 2021, usando a query "total proctocolectomy" AND "ulcerative colitis" AND (laparoscop* or (laparotom* or open)).

Resultados: Foram incluídos quinze artigos. Não houve diferença significativa entre os grupos relativamente à quantidade de sangue perdida, obstrução do intestino delgado, deiscência da anastomose, infeção e rutura da ferida cirúrgica, infeção da bolsa, sépsis, incontinência fecal e recuperação do movimento intestinal. A laparoscopia foi superior no número de transfusões sanguíneas, perfuração intestinal e tempo de internamento. Em relação ao tempo cirúrgico, a laparotomia apresentou um melhor resultado.

Conclusão: A laparoscopia é uma opção segura para estes doentes. São necessários novos estudos multicêntricos e prospetivos comparando ambas as abordagens, de forma a esclarecer resultados ainda controversos.

Palavras-chave: Colite Ulcerativa; Proctocolectomia Total; Laparotomia; Laparoscopia.

INTRODUCTION

Ulcerative Colitis (UC) is a chronic inflammatory bowel disease affecting the rectum and extending proximally to the colon to a varying degree (1, 2), with a wide spectrum of disease severity (3). The precise aetiology is unknown, but it is thought to arise from an interaction of genetic and environmental factors (4). The natural course of UC varies depending on the site, the extent of bowel inflammation (5) and its severity, which are taken into account in The Montréal classification (6).

Ulcerative Colitis affects millions of adults and children worldwide (7) and has a peak of incidence during early adult life (8). The epidemiological data reveals that the incidence of UC is constantly rising, primarily as a consequence of the spreading of the “western” lifestyle and urbanization (9).

While some patients remain relatively asymptomatic, others present with disease manifestations requiring surgical intervention (5). When UC is not effectively controlled with pharmacological therapy, patients may be candidates for elective surgery. Whereas, under conditions of massive bleeding, perforation, dysplasia or toxic megacolon (1), patients are selected for urgent surgery. Despite the progress of medical management, surgery is still required in 15%-35% of UC patients (10, 11), being the only curative option for this disease.

The purpose of the surgical intervention is to remove the affected bowel segment. Pancolitis is the most common disease distribution (6). Surgery can be performed with either open or laparoscopic techniques (9). The main goals of surgical treatment are to obtain good function outcomes and improve quality of life (3). Currently, total proctocolectomy (TPC) with the creation of an ileal pouch-anal anastomosis (IPAA) is generally accepted as the gold standard for the surgical treatment of UC (9, 12), being mostly performed in young adults (8). This procedure, first performed by Peters in 1992

(13), offers patients an unchanged body image with no stoma and preserved anal route of defecation (7). Many aspects of this treatment still remain controversial, including the type of approach (open or laparoscopic), number of stages of surgery, type of pouch and construction type. Few prospective, randomized studies have been designed and performed regarding those aspects (7).

Laparoscopic approach has spread only relatively slowly due to its complicated technique, steep learning curve (14-16), and long operative times (17). Nevertheless, it has been shown to be both safe and feasible (18). A number of studies have shown that laparoscopic surgery has numerous short-term advantages, such as less postoperative pain, shorter hospital stay, less time required for recovery of the bowel function, better cosmetic appeal, less blood loss, lower incidence of incisional hernias, fewer operative adhesions (which are responsible for more than 75% of the small bowel obstructions following this technique (1)) and less major wound complications (9, 12, 18-25), compared with the open procedure. While there is adequate data on the long-term outcomes after conventional open TPC-IPAA, the same cannot be stated for the laparoscopic variant. Only a few small case series and prospective randomized trials (24, 26, 27) have evaluated the laparoscopic approach.

Therefore, the aim of this systematic review is to compare and determine whether the intraoperative and postoperative outcomes of TPC-IPAA following laparoscopic approach are superior to the outcomes following an open approach, in the surgical management of patients diagnosed with UC.

METHODS

Search Strategy

The research question was developed according to PICO. We focused on patients with Ulcerative Colitis diagnosis and aimed to compare open total proctocolectomy and laparoscopic total proctocolectomy in terms of outcomes and assess whether there is superiority of one over the other.

This study started with research on two data bases, Medline (PubMed) and Scopus, using the query "total proctocolectomy" AND "ulcerative colitis" AND (laparoscop* or (laparotom* or open)). The search took place between August and September 2021.

The query resulted in 53 articles on the PubMed database and 65 articles on Scopus. Two additional studies were found after searching the references of previous review articles.

Inclusion Criteria

We searched for articles published between 2010 and 2020, that included patients with Ulcerative Colitis diagnosis and evaluate the outcomes of open proctocolectomy, laparoscopic proctocolectomy or both. The search included randomized clinical trials, cohort studies, case-control studies as well as cross sectional studies.

Exclusion Criteria

Case reports as well as articles written in languages other than English or Portuguese were excluded. Articles in which full text was not available were also ruled out.

Summary Measure

The main summary measure in the quantitative synthesis was the number of individuals in which a particular outcome was recorded, when undergoing surgery.

The number of participants in some studies was calculated from the published value corresponding to the percentage.

Quality Assessment of Studies and Data Extraction

Study quality and eligibility were individually assessed by two investigators, who assessed if all inclusion and exclusion criteria were met. Primarily, it was done through title and abstract analysis, and then, if abstracts were deemed acceptable, through full-text assessment. Data extraction (see Table I) was individually done from the data published in the articles, and then compared by the investigators. Different opinions regarding the relevance of articles were solved by consensus between the authors.

RESULTS

Our search identified 119 studies. After reviewing the titles and abstracts, as well as subsequently excluding repeated articles, 44 articles were included for review of the full text. 29 articles were excluded, since they did not provide enough data to evaluate the outcomes of either open or laparoscopic technique, did not separate Ulcerative Colitis from other Inflammatory Bowel Diseases or did not include total proctocolectomy (TPC) with the creation of an ileal pouch-anal anastomosis (IPAA) as the surgical technique. 15 articles were left and included in the final systematic review. A flowchart depicting the literature search method, as well as the resulting number of articles selected is displayed in figure 1.

The pooled analysis included a total of 1771 patients diagnosed with Ulcerative Colitis, of which 752 patients underwent laparoscopic TPC-IPAA and 1019 patients underwent open TPC-IPAA. Out of the 15 articles, 13 were retrospective studies and 2 were prospective. Table I presents the main characteristics of the different studies, as well as the number of patients who underwent both surgical techniques.

The present systematic review evaluated a few intraoperative outcomes, namely the amount of blood loss, number of blood transfusions needed and operative time, as well as some postoperative outcomes: small bowel obstruction, anastomotic leakage, wound infection and disruption, pouchitis, intestinal perforation, and the length of hospital stay.

Intraoperative Outcomes

Amount of Blood Loss

Amount of blood loss was compared between both techniques in two studies and measured by median. Inada's study (14) described less amount of blood in the laparoscopic TPC-IPAA group compared to the open group. Nevertheless, Dolejs et al (1) did not report any difference between the groups. Shimada et al (17) described a mean

of 512mL of blood loss in a group of 24 patients who underwent open TPC-IPAA. Another article (21) reported a median estimated blood loss of 100mL a in a group of 8 patients, who underwent the laparoscopic technique.

Number of Blood Transfusions

In addition, three articles (1, 14, 28) examined the number of blood transfusions, all showing patients undergoing open TPC-IPAA required significantly more transfusion than those who underwent laparoscopy.

Operative Time

Operative time was shown to be significantly longer in the laparoscopic group than in the open TPC-IPAA group, as reported in three studies (1, 14, 29). Jani et al (27) reported a mean operative time of 375 minutes in a group of 28 patients who underwent laparoscopic TPC-IPAA, while Geisler et al (21) showed a median operative time of 153 minutes when performing the same technique. In terms of open TPC-IPAA, one article (17) reported a mean operative time of 375 minutes in a total of 24 patients diagnosed with UC. Huntington et al (2) described 296 minutes as the median length of open surgery, in a total of 8 patients.

Postoperative Outcomes

Small Bowel Obstruction

Small bowel obstruction was defined as a disruption of the normal propulsive ability of the gastrointestinal tract, requiring fasting (30). Data from two studies (9, 29) showed significantly higher incidence of small bowel obstruction in patients undergoing open surgery technique, compared to those undergoing laparoscopy, while one study made by Mizushima (30) showed the opposite. Dolejs et al (1) reported no significantly difference between open and laparoscopic TPC-IPAA. One study (17) reported 4 cases of small bowel obstruction in a total of 24 patients undergoing open TPC-IPAA. Another report

(2) showed only one small bowel obstruction among a group of 8 patients who underwent the same technique. On the other hand, according to Kawamura et al (5) the present findings indicate that small bowel obstruction remains one of the most common complications after laparoscopic TPC-IPAA. Linden et al (31) reported one small bowel obstruction in a laparoscopic group of 68 patients diagnosed with UC, which was classified as a major complication of the surgery.

Anastomotic Leakage

Five studies reported data concerning anastomotic leakage. Regarding open TPC-IPAA, Inada et al (14) showed only one anastomotic breakdown, in a total of 12 patients diagnosed with UC. Another article (17) also studied a group of 24 patients who underwent open surgery, reporting 2 cases of anastomotic leakage, while the laparoscopic group of 12 patients did not report any case of such event. In terms of laparoscopic TPC, one article (3) reported 9 anastomotic leakage in a group of 68 patients, while Kawamura et al (5) showed only one episode in a total of 31 patients, in a patient with severe UC. Linden et al (31) did not report any case of the outcome concerned.

Wound Disruption

Only Causey et al (28) reported wound disruption cases, showing no significant difference between both surgical approaches.

Wound Infection

Wound infection was mentioned in eight studies. According to Inada et al (14) wound infection was less frequent in the laparoscopic TPC-IPAA group when compared to the open group. In addition, Causey et al (28) also reported that laparoscopy was associated with lower number of wound infections. In Linden's study (29) and according to Tajti Jr et al (9), the wound infections accounted were similar between both techniques. The same results were described by Causey et al (28) who showed no statistically significant

difference between both groups. One article regarding open TPC-IPAA (2) reported only one case of wound infection in a group of 8 patients diagnosed with UC. Also, Shimada et al (17) showed that in a total of 12 patients undergoing open surgery, 3 had wound infections, while in the laparoscopic group of 12 patients, none developed surgical site infection. Regarding laparoscopic TPC-IPAA, Kawamura et al (5) reported 5 cases of wound infections in 31 patients diagnosed with UC, while Linden et al (31) reported none.

Pouchitis

Diagnosis of pouchitis was made upon review of the biopsy material by a pathologist (32), or confirmed by endoscopy (9). Only one article compared pouchitis incidence in open and laparoscopic surgery (9), reporting no significant difference between both techniques. Huntington et al (2) described a group of 8 patients diagnosed with UC undergoing open TPC-IPAA, where half of the patients developed inflammation of the pouch. In terms of laparoscopic surgery, pouchitis was mentioned in 3 studies. According to Khazraei et al (3), 13 cases of pouchitis occurred in a group of 68 patients. In addition, Kawamura et al (5) reported 5 cases, in a total of 31 UC patients, while other report (32) mentioned 9 events of pouchitis in a group of 27 patients.

Intestinal Perforation

Inada et al. (14) reported significantly less frequent intestinal perforation in the laparoscopic group in comparison to the open group. Among a group of 13 patients who underwent laparoscopic TPC-IPAA, perforation occurred in one patient - just proximal to the ileostomy site - according to Kawamura et al (5). Likewise, Jani et al (27) reported one proximal jejunal perforation, in a total of 28 patients undergoing laparoscopic surgery.

Systemic Sepsis

No significant difference was reported by Causey et al (28) between laparoscopic and open TPC-IPAA. No other article mentioned this parameter.

Length of Hospital Stay

Hospital discharge can be influenced by many factors, namely normal diet tolerance, acceptable stool frequency, improved complications and controlled pain by oral drugs (14). Eight articles described results concerning the length of hospital stay. Inada et al reported the median length hospital stay among patients undergoing the laparoscopic approach was significantly shorter than in those undergoing open TPC-IPAA group. In addition, Dolejs et al (1) also described the shorter length of hospital of the laparoscopic group as one of the benefits of that technique, in comparison with the open technique. Nevertheless, two other studies (9, 29) did not find significant difference between both groups. In a group of 28 patients, the mean hospital stay for the laparoscopic surgery was 7,4 days (27). Another article (31) reported a mean of 6 days, in a group of 68 patients who underwent laparoscopy, while Huntington et al (2) showed a mean hospital stay of 8,9 days, in a group of 8 patients undergoing the same technique. Meanwhile, Shimada et al (17) reported a mean hospital stay of 18 days in a group of 24 patients who underwent the open TPC-IPAA.

Recovery of Bowel Function

Only one study (9) evaluated the recovery of bowel function time, showing no significant difference between the groups.

Fecal Incontinence

Scores were calculated with the Wexner/Cleveland Clinical Fecal Incontinence Symptom Severity Scoring System (33). Fecal incontinence was only reported in articles regarding laparoscopic TPC-IPAA. Khazraei et al (3) studied a group of 68 patients diagnosed with

UC, where only 6 patients developed fecal incontinence after the laparoscopic surgery.
In addition, Ates et al (33) reported 2 cases of fecal incontinence in a group of 6 patients.

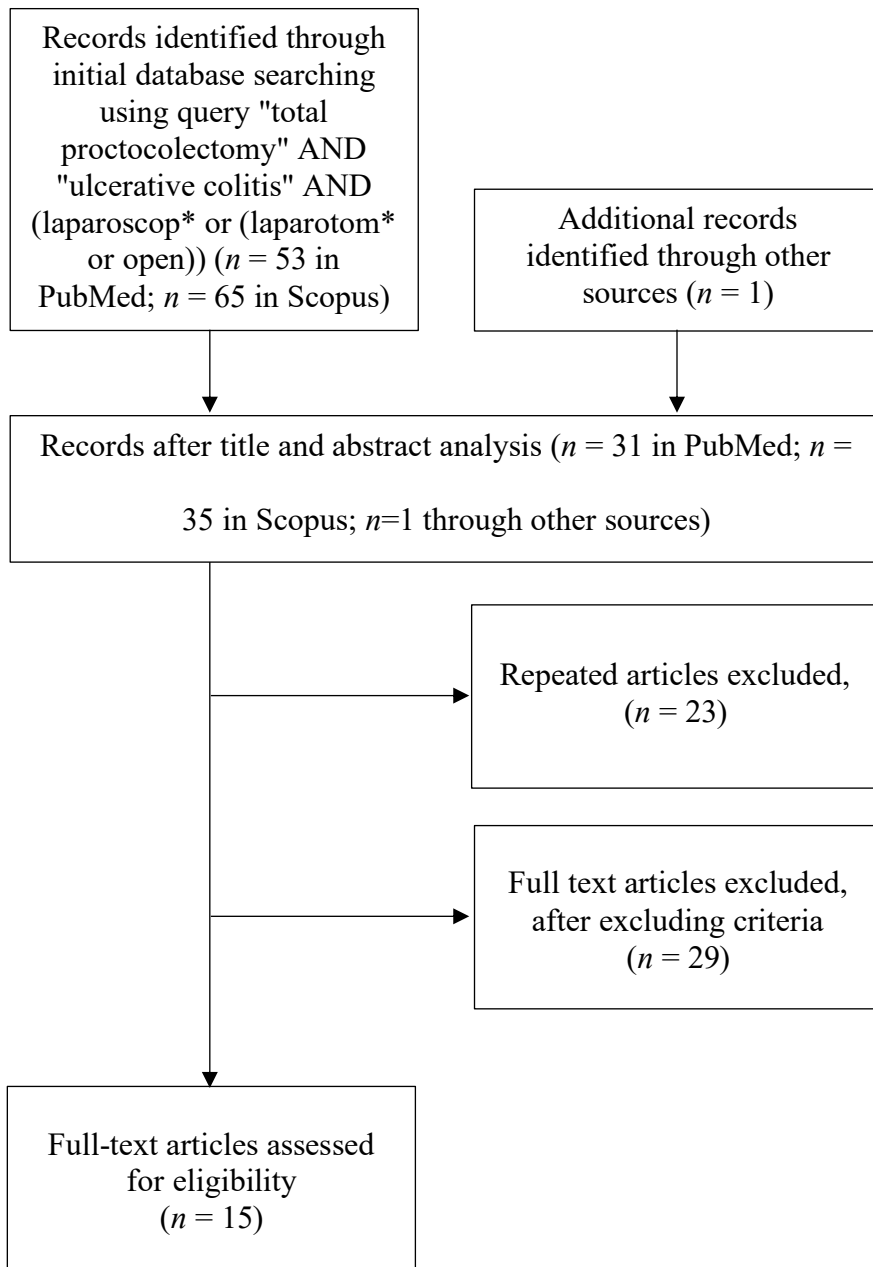


Figure 1. Flowchart showing the literature search method.

Legend: *n* = number

Table I. Overview of the selected studies.

	Year	Country	Study Design	No. of Laparoscopic Surgery	No. of Open Surgery
Mizushima et al	2017	Japan	Retrospective	169	316
Khazraei et al	2018	Iran	Retrospective	68	7
Kawamura et al	2013	Japan	Retrospective	31	3
Inada et al	2015	Japan	Retrospective	12	12
Jani et al	2015	India	Prospective	28	-
Linden et al	2013	USA	Retrospective	68	39
Shimada et al	2016	Japan	Retrospective	-	24
Linden et al	2012	USA	Retrospective	68	-
Ateş et al	2017	Turkey	Retrospective	6	-
Bismar et al	2018	USA	Retrospective	27	-
Dolejs et al	2011	USA	Retrospective	100	290
Geisler et al	2011	USA	Prospective	4	-
Huntington et al	2016	USA	Retrospective	-	8
Causey et al	2012	USA	Prospective	148	298
Tajti Jr et al	2015	Hungary	Retrospective	23	22

DISCUSSION

In the present report, a systematic review was performed to assess the current state-of-art concerning intraoperative and postoperative outcomes of the open TPC-IPAA, as well as the laparoscopic TPC-IPAA. Laparoscopic surgery provides a good field of view of the abdominal cavity and is known for smaller skin incisions and consequently a better cosmetic outcome. Due to progress in medical therapies for UC (34-36), the use of laparoscopic TPC-IPAA for UC has gradually increased. Yet its use in UC's patients remains relatively infrequent (28). In fact, in comparison to the open approach, the laparoscopic technique is a more complex surgery and difficult to handle without causing injury, especially in inflamed bowels (17).

It was thought that using a less invasive approach would possibly reduce the chances of less desired outcomes and increase the most advantageous. However, this paper found modest evidence comparing both surgical procedures and its outcomes simultaneously, in patients diagnosed with Ulcerative Colitis alone.

In terms of intraoperative outcomes, these are intrinsically related to the surgical work and may be an indirect measure of surgical complexity. Comparisons of both open and laparoscopic groups showed a reduced number of blood transfusions in patients undergoing laparoscopic TPC-IPAA and confirmed it as one of the advantages of that technique. Nevertheless, the length of operation was confirmed to be longer in the laparoscopic group, which showed superiority for the open approach in this aspect. This may be related to the great learning curve that underlies minimally invasive techniques, such as laparoscopic TPC-IPAA. In terms of amount of blood loss, given the lack of articles with statistically significant data, it was not possible to draw conclusions of superiority of one approach towards the other.

Regarding post operative outcomes, these mainly assess the patient physical status. Small bowel obstruction was one of the most frequent complications reported in both open and laparoscopic surgery. It is associated with impaired quality of life, prolonged length of hospital stay and surgery need, unless it responds to fasting and tube decompression (30). There was no significant difference between both groups. In addition, due to lack of homogeneity between articles, when comparing open and laparoscopic approaches, no differences were reported concerning anastomotic leakage. Wound disruption and systemic sepsis were only reported in one prospective article, showing no difference between both groups, not allowing to conclude any superiority of one approach towards the other. Despite being reported in 8 articles, it is not possible to draw conclusions regarding wound infection due to high heterogeneity between data concerning open and laparoscopic approach. Pouchitis was a frequent complication of both open and laparoscopic TPC-IPAA. Nevertheless, data taken from the reviewed articles addressing this outcome, did not allow any clear conclusion regarding comparison of both techniques. Intestinal perforation was proven to be less frequent in the laparoscopic surgical technique. Length of hospital stay was shorter in patients undergoing laparoscopic, which favors the superiority of laparoscopy over the open approach. Regarding fecal incontinence, there is no terms of comparison between both surgical techniques, leading to no conclusions concerning this outcome. Although the group of patients undergoing open and laparoscopic surgery being a reduced sample of patients, both groups were homogenous, the results shown in this study allow us to conclude there is no superiority of one technique towards the other, regarding recovery of bowel function.

There are several limitations which should be acknowledged when interpreting the present data. Firstly, the heterogenous nature of the current data as well as the potential

for confounding factors (namely age, sex, Ulcerative Colitis' severity, use of preoperative immunosuppressive therapies, underlying pathological issues or previous surgeries) should be considered. Also, most of the articles covered in the present review, included very few UC patients either in laparoscopic surgery or in open surgery (2, 3, 5, 9, 14, 17, 21, 27, 29, 31-33) which made data extrapolation difficult. Therefore, there are no appropriate large scale studies of laparoscopic TPC-IPAA for UC. Also, surgical methods in each review were not selected in accordance with any definitive criteria, but rather by surgeons' preference, which could introduce some element of bias. Nevertheless, 12 of the 15 articles included in this review were retrospective studies and, therefore, selection bias always remains. For this reason, it may be difficult to make reliable conclusions with the number of predictor variables examined.

Longer term evaluation and larger trials are of utmost importance in order to validate our findings and define the parameters that are still incongruous, achieving an adequate statistical power.

CONCLUSION

In conclusion, laparoscopic surgery is a safe and feasible treatment for patients diagnosed with UC who are candidates for elective surgery. It is associated with a lower incidence of intestinal perforation, fewer number of blood transfusions and shorter length of hospital stay, despite longer operative time in comparison with the open approach.

Further studies are needed to compare the open TPC-IPAA to laparoscopic TPC-IPAA with respect the controversies regarding the amount of blood loss, small bowel obstruction, anastomotic leakage, wound disruption and infection, pouchitis, systemic sepsis, fecal incontinence and recovery to bowel function. We underline need to test these results preferably from multicenter, prospective trials comparing open and laparoscopic approaches in the surgical treatment of UC.

In addition, we emphasize the interest to evaluate long term outcomes, namely 5-10 year survival rate. It is also crucial to perform cost-effectiveness and cost-benefit analysis regarding investment in laparoscopic surgery and its widespread impact of its widespread in healthcare systems.

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The authors have no supportive foundations to declare.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

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PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page and paragraph/ table #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	Page 1: "Total Proctocolectomy in Ulcerative Colitis: Laparotomy Vs Laparoscopy – A Systematic Review".
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	Page 3: "Ulcerative Colitis is a chronic inflammatory (...) clarify controversial outcomes".
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	Page 6: "While there is adequate data on the long-term outcomes after conventional open TPC-IPAA, the same cannot be stated for the laparoscopic variant"
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	Page 6: "the aim of this systematic review is to compare and determine whether the intraoperative and postoperative outcomes of TPC-IPAA following laparoscopic approach are superior to the outcomes following an open approach, in the surgical management of patients diagnosed with UC"
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	Not available
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	Page 7: "We searched for articles published between 2010 and 2020 (...) included randomized clinical trials, cohort studies, case-control studies as well as cross sectional studies".
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	Page 7: "The search took place between August and September 2021. The query resulted in 53 articles on the PubMed database and 65 articles on Scopus. Two additional studies were found after searching the references of previous review articles".



PRISMA 2009 Checklist

Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Page 7: "This study started with research on two data bases, Medline (PubMed) and Scopus, using the query "total proctocolectomy" AND "ulcerative colitis" AND (laparoscop* or (laparotom* or open))"
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	Page 9: "Our search identified 119 studies. After reviewing the titles and abstracts, as well as subsequently excluding repeated articles, 44 articles were included for review of the full text. 29 articles were excluded, since they did not provide enough data (...)15 articles were left and included in the final systematic review".
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	Page 8: "Data extraction (...) was individually done from the data published in the articles, and then compared by the investigators".
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	Page 9: "(...) evaluated a few intraoperative outcomes, namely the amount of blood loss, number of blood transfusions needed and operative time, as well as some postoperative outcomes: small bowel obstruction, anastomotic leakage, wound infection and disruption, pouchitis, intestinal perforation, and the length of hospital stay".
Risk of bias in individual studies / Risk of bias across studies	12/ 15	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	Page 8: "Study quality and eligibility were individually assessed by two investigators (...) Different opinions regarding the relevance of articles were solved by consensus between the authors".
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means). –	Non applicable, since this review does not include a meta-analysis.
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	Non applicable, since this review does not include a meta-analysis.
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	Non applicable, since this review does not include a meta-analysis.
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	Page 15



PRISMA 2009 Checklist

Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	Page 16
Risk of bias within and across studies	19/22	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	Page 9-14: "Intraoperative Outcomes (...) in a group of 6 patients".
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	Non applicable, since this review does not include a meta-analysis.
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	Non applicable, since this review does not include a meta-analysis.
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	Non applicable, since this review does not include a meta-analysis.
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	Page 17-18 "This paper found modest evidence comparing both surgical procedures and its outcomes simultaneously (...) the results shown in this study allow us to conclude there is no superiority of one technique towards the other, regarding recovery of bowel function".
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	Page 18-19: "There are several limitations which should be acknowledged (...), it may be difficult to make reliable conclusions with the number of predictor variables examined".
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	Page 20: ". We underline need to test these results preferably from multicenter, prospective trials comparing open and laparoscopic approaches in the surgical treatment of UC".
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	Page 22: "The authors have no supportive foundations to declare".

From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

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A Revista Portuguesa de Coloproctologia publica Artigos Originais, Artigos de Revisão, Estados da Arte, Casos Clínicos e Instantâneos em Coloproctologia sobre todos os temas médicos e cirúrgicos da Coloproctologia, assim como Cartas ao Editor. Os manuscritos submetidos para publicação devem ser preparados de acordo com os "Uniform Requirements for Manuscripts Submitted to Biomedical Journals – Updated 2007" elaborados pelo "International Committee of Medical Journal Editors (www.icmje.org)". Os artigos aceites para publicação passarão a ser propriedade da Sociedade Portuguesa de Coloproctologia, não podendo ser reproduzidos, no todo ou em parte, sem autorização do Corpo Editorial da Revista. A aceitação dos originais enviados para publicação será feita após apreciação por membros do Conselho Científico cujos pareceres serão sempre comunicados aos autores; estes disporão de um período de quatro semanas para efetuar as eventuais modificações propostas. Os manuscritos recebidos que não estejam de acordo com as normas definidas serão devolvidos aos autores sem serem apreciados pelo Conselho Científico. Todos os artigos aceites e publicados na Revista Portuguesa de Coloproctologia, são candidatos ao Prémio Melhor Artigo Científico. O prémio teve início em 2016 e é referente aos trabalhos publicados na Revista Portuguesa de Coloproctologia no ano imediatamente anterior. O Júri do Prémio é nomeado pelo Corpo Editorial, sendo constituído por membros do Conselho Científico da Revista Portuguesa de Coloproctologia. O Artigo anualmente premiado é revelado, e o respetivo Prémio entregue, na Sessão de Encerramento do Congresso Nacional de Coloproctologia desse mesmo ano.

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Os conflitos de interesses incluem apoio financeiro da indústria biomédica ou outras origens comerciais sob a forma de bolsas de investigação, pagamento de honorários por trabalhos de consultadoria, emprego na indústria biomédica ou fabricantes de equipamentos e/ou propriedade de ações destas empresas. Estes interesses devem ser mencionados em relação a cada autor. Caso não existam conflitos de interesses, deve haver uma declaração nesse sentido, assegurando que tal se aplica a todos os autores. Caso os trabalhos tenham sido efetuados com o apoio de uma Bolsa de Investigação atribuída por uma Sociedade Científica, este facto deverá ser mencionado.

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