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Original Article

Comparison of survival between open and minimally invasive radical hysterectomies for stage IB1 cervical cancer (≤2 cm): A systematic review and meta-analysis

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Abstract

Objectives: Cervical cancer remains a leading cause of death among women globally, with surgery being a key treatment for early-stage disease. However, the survival outcomes (disease-free survival [DFS] and overall survival [OS]) of patients with early-stage cervical cancer treated using different surgical methods remain controversial. This systematic review and meta-analysis aimed to evaluate the survival outcomes of laparoscopic radical hysterectomy (LRH) versus open radical hysterectomy (ORH) for treating early-stage cervical cancer (tumor ≤2 cm). **Materials and Methods:** A comprehensive search of the PubMed, Web of Science, and Cochrane databases from 1960 to 2022 identified 12 retrospective cohort studies for inclusion. The primary outcome included DFS and OS. The pooled hazard ratio (HR) with 95% confidence intervals (CI) was calculated to compare DFS and OS. The I^2 statistic was used to estimate the heterogeneity of the included studies. A funnel plot was used to examine publication bias. Review Manager version 5.4 software was used for the analysis. $P < 0.05$ was statistically significant. **Results:** The results showed no significant difference between LRH and ORH in a 5-year OS (HR = 1.25; 95% CI, 0.82–1.86; $P = 0.3$) or 5-year DFS (HR = 1.03; 95% CI, 0.67–1.57; $P = 0.9$), with minimal publication bias in DFS. **Conclusion:** LRH is a safe and effective alternative to ORH for early-stage cervical cancer, with similar survival outcomes. The results may encourage further research into optimizing minimally invasive techniques, potentially influencing the clinical guidelines and promoting the broader adoption of LRH in treating cervical cancer.

Keywords: *Cervical cancer, Laparoscopy, Meta-analysis, Radical hysterectomy, Systematic review*

Introduction

With advancements in the human papillomavirus vaccine and implementation of strict screening measures, a decreasing trend in the incidence of cervical cancer worldwide has been observed [1]. However, cervical cancer remains one of the top four most common malignancies in women, with high mortality rates, especially in some less developed countries [2].

Optimal treatment for cervical cancer following diagnosis plays a significant role in controlling the disease and the associated mortality [3]. Radical hysterectomy with lymph node dissection or pelvic radiation remains the standard treatment for early-stage cervical cancer (International Federation of Gynecology and Obstetrics [FIGO] stages IB and IIA) [4]. However, the best option for most patients with Stage IIA or IIB disease is radiotherapy plus concurrent chemotherapy [5]. Systemic therapy is the standard protocol for advanced stages [6].

There are two surgical procedures for the treatment of cervical cancer: radical hysterectomy or trachelectomy [7]. Although trachelectomy allows women to preserve their ability to have children, it is usually performed through a vaginal or abdominal approach and sometimes laparoscopically [8].

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Meanwhile, radical hysterectomy can be performed through various routes, including abdominal (open hysterectomy), vaginal, laparoscopic, or robotic-assisted approaches, with the latter two as minimally invasive therapies [9]. The ultimate plan for surgery varies among patients, with considerations such as the size and extensiveness of the cancer, underlying comorbidities, and patient preferences [10].

The Laparoscopic Approach to Cervical Cancer trial published in 2018 revealed that the disease-free survival (DFS) and 3-year overall survival (OS) rates after laparoscopic radical hysterectomy (LRH) were worse than those after open radical hysterectomy (ORH) [11]. However, several previous meta-analyses showed no significant difference between LRH and ORH [12-14]. Overall, the outcomes of patients with early-stage cervical cancer treated using different surgical methods remain controversial.

In this study, we hypothesized that DFS and OS were the same for ORH and LRH in patients with stage IB1 cervical cancer (tumor size ≤2 cm). We aimed to conduct a systematic review and meta-analysis of DFS and OS between ORH and LRH in patients with stage IB1 cervical cancer.

Materials and methods

Search strategy

This systematic review and meta-analysis followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses 2020 guideline [15]. The research protocol has been registered on the Open Science Framework (https://osf.io/v8syj). In this systematic review, we searched for related studies in PubMed, Web of Science, and Cochrane Library from 1960 to 2022. The search was limited to the articles published in English. The search keywords included cervical cancer, minimally invasive surgery, radical hysterectomy, survival, laparotomy, robotic-assisted, and tumor size. We also manually searched the reference lists of selected journals. Supplementary Material describes the search strategy used for each database.

Eligibility criteria

Observational studies were included if they met the following eligibility criteria: (1) studies comprising adult women who required radical surgery for histologically confirmed early-stage (stages I–IIA) and IIB cervical cancer and (2) English literature.

Types of interventions

We included the articles that focused on the following interventions: (1) robot-assisted radical hysterectomy, (2) LRH, and (3) ORH.

Types of outcome measures

Primary outcomes

This meta-analysis focused on DFS or progression-free survival and OS as the primary outcomes.

Exclusion criteria

Articles were excluded from this study if they had no extractable data or if patients received preoperative neoadjuvant therapy. Studies were also excluded if they included patients who underwent fertility-sparing surgery, those with distant metastasis, or those who underwent nonradical hysterectomy. The reasons for excluding articles after a full-text review are presented in Supplementary Table 1.

Data collection and analysis

Selection of studies

We listed all the titles and abstracts identified through the electronic search and removed duplicates. Two authors independently and separately examined the remaining references. Articles that did not meet the inclusion criteria were excluded. Two authors assessed the quality of the articles. We documented the reasons for the exclusion of articles.

Data extraction and management

We abstracted the following data: author, year of publication, journal citation (including language), country, setting, inclusion and exclusion criteria, study design, study population (total number enrolled, patient characteristics, age, ethnicity, and cervical cancer details), FIGO stage, histological cell type, type of surgery (LRH vs. ORH), risk of bias in the study (see below), duration of follow-up, and outcomes (see above): DFS, OS, and recurrence rate.

Statistical analyses

The adjusted hazard ratio (HR) or crude HR with its 95% confidence interval (CI) reported in each included study was collected for the meta-analysis. The pooled HRs with 95% CIs were calculated to compare DFS and OS between patients who accepted LRH or ORH for stage IB1 cervical cancer with tumor size ≤2 cm.

The I^2 statistic was used to estimate the heterogeneity of the included studies. A fixed-effects model was used to estimate the pooled effects of survival outcomes. A random-effects model was used if $I^2 > 50\%$ indicated significant heterogeneity among the included studies. A funnel plot was used to examine the publication bias. All meta-analyses were performed using the Review Manager version 5.4 software (Cochrane, London, UK).

Results

Initially, 2445 articles were extracted from the databases, of which 1214 were removed because of duplication. The remaining 1231 articles were reviewed based on their titles and abstracts, and 1171 were removed because of irrelevance. Subsequently, 60 articles were reviewed based on our exclusion criteria and 48 were excluded. Finally, 12 articles met the inclusion criteria and were included in the meta-analysis [Figure 1].

Characteristics of the included studies

This meta-analysis included 12,635 participants. Of the 12 articles included in this meta-analysis, the sample sizes ranged from 120 to 2461. Most studies were conducted in China, Korea, Italy, Canada, the USA, and the Netherlands. In these 12 studies, the percentage of patients with stage IBI cervical cancer ranged from 18% to 96% [Table 1].

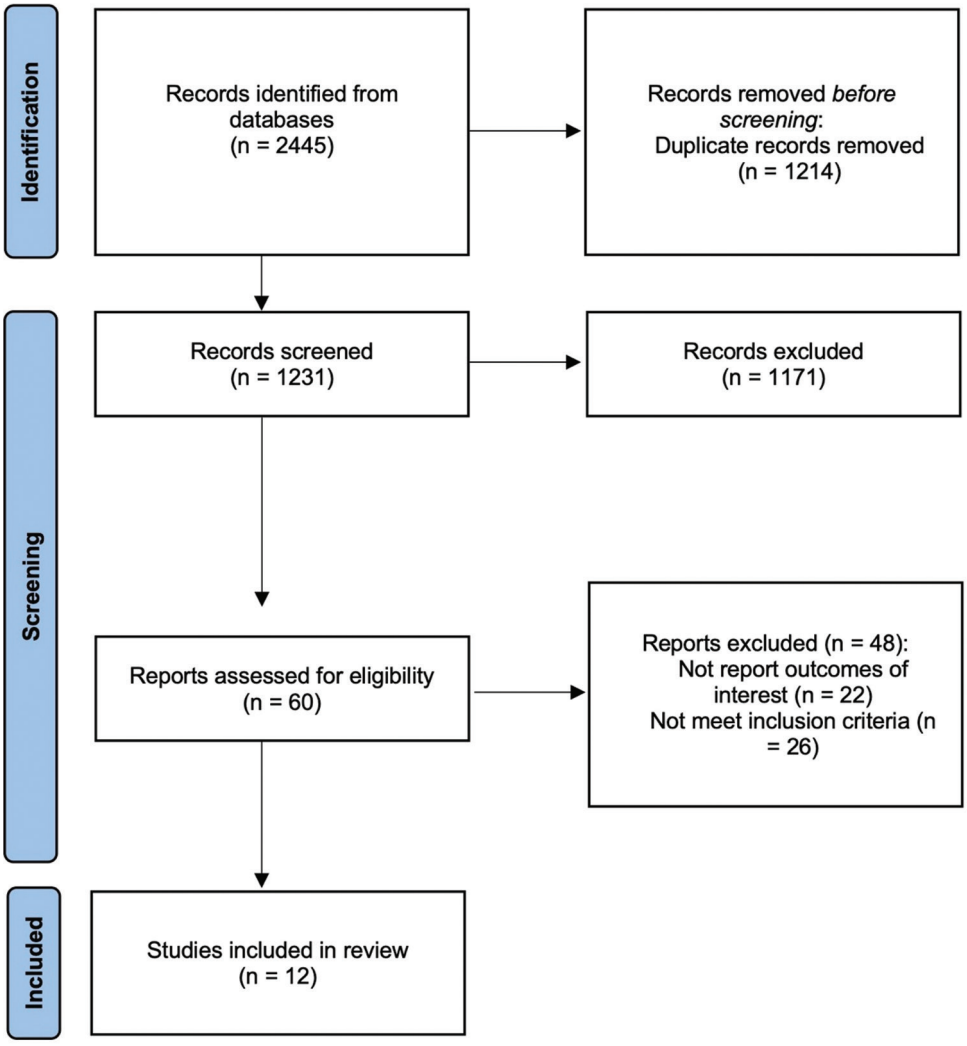

Figure 1: Study flowchart

Survival outcomes

Figure 2a shows the estimated pooled effect of LRH compared with ORH on OS in the eight included studies. The fixed-effects model was used to analyze OS because I^2 was 21% (<50%). LRH did not show a significantly higher risk than did ORH in OS (pooled HR = 1.25; 95% CI, 0.77–2.03). A random-effects model was used to estimate the pooled effect for DFS, as a moderate level of heterogeneity was observed among the ten included studies (I^2 = 56%, >50%). As shown in Figure 2b, LRH also showed no significantly higher risk than did ORH in DFS (pooled HR = 1.03; 95% CI, 0.67–1.57).

Publication bias

The funnel plot in Figure 3a shows no publication bias for OS among the selected studies. However, a minor publication bias was observed for DFS, as Figure 3b shows a slightly asymmetrical distribution of the included studies on the two sides of the funnel plot.

Discussion

Our meta-analysis of retrospective cohort studies comparing LRH with ORH suggested no significant difference in the risk between OS and DFS. This result aligns with the consensus that LRH and ORH are equally acceptable for the treatment of early-stage cervical cancer.

A recent meta-analysis comparing LRH and ORH for cervical cancer highlighted significant differences in outcomes [28]. LRH, which includes laparoscopic and robot-assisted procedures, offers advantages, such as shorter hospital stay, less blood loss, and quicker recovery times than those with open surgery [29]. However, recent evidence indicates that LRH may be associated with worse oncological outcomes, such as lower DFS and OS rates [11]. Potential reasons for these poor outcomes include tumor spillage or dissemination during surgery, particularly in early-stage cervical cancer [30]. This has led to some guidelines questioning using LRH in certain cases. A more recent study found that the survival outcomes were comparable between simple and radical hysterectomies in patients with low-risk cervical cancer [31]. Despite being a less extensive procedure, the simpler surgical approach achieved similar survival rates, although LRH is considered to be a more comprehensive method.

Table 1: Characteristics, description of patients, interventions, and endpoints of the 12 included studies

Study	MIS (*n*)	Robotic surgeries (%)	Open surgeries (*n*)	Recurrences (*n*)	Deaths (*n*)	Era	Study type	Covariates	Strategies to control confounding	Median follow-up (months) (MIS)	Median follow-up (months) (open)
Pedone Anchora *et al.* (2020) [16]	138		138	62	26	2016–2020	Multi-institutional retrospective	Age, BMI, histology, tumor diameter, LVSI, PI, technique specific, adjuvant therapies, LN status, surgical margins, recurrence pattern, FIGO	Propensity score matching	34	53
Chen *et al.* (2020) [17]	879	100	879	96	49	2004–2016	Multi-institutional retrospective	Age, region, histology, tumor size, LVSI, stromal invasion, PI, LN status, adjuvant treatment, surgical margins	Propensity score matching	24	69
Chen *et al.* (2020) [18]	926		926	81	40	2004–2016	Multi-institutional retrospective	Age, tumor size, histology, cervical invasion, LVSI, PI, surgical margin, LN status, adjuvant therapy, recurrence	Multivariable regression	36 (overall)	
Chen *et al.* (2021) [19]	510		999			2004–2016	Multi-institutional retrospective	Age, PI, vaginal margin involvement, LVSI, stromal invasion, tumor size	Propensity score matching		
Chen *et al.* (2020) [20]	129		196	16	7	2010–2018	Multi-institutional retrospective	Age, BMI, histology, FIGO, preoperative procedures, LVSI, PI, LN status, invasion depth, adjuvant treatment	Multivariable regression	51.8	49.5
Cusimano *et al.* (2019) [21]	473	10	485	110	85	2006–2017	Population-based retrospective	Age, year of surgery, material deprivation, comorbidities, stage, technique specific and cervical cancer volume	Multivariable regression	60	84
Ditto *et al.* (2015) [22]	60	0	60	7	4	2002–2013	Single institutional retrospective	Age, BMI, previous abdominal surgery, stage, FIGO grade, histology	Propensity score matching	31	48.7
Kim *et al.* (2019) [23]	158	0	435	51	24	2000–2018	Multi-institutional retrospective	Age, histology, tumor size, invasion depth PI, LVSI, surgical margin, LN status, adjuvant treatment	Multivariable regression	114.8 (overall)	
Li *et al.* (2021) [24]	574	0	574			2004–2016		Age, histology, stromal invasion, LVSI, LN status, surgical margin, visible tumor	Propensity score matching	42	48
Melamed *et al.* (2018) [25]	1225	79.8	1236		164	2010–2013	Multi-institutional retrospective	Age, race, insurance type, tumor grade, LN status, tumor size, adjuvant treatment	Inverse probability of treatment weighting	45 (overall)	
Nam *et al.* (2012) [26]	263	0	263	31	23	1997–2008	Multi-institutional retrospective	Age, LN status, PI, tumor size, LVSI	Propensity score matching	63	127
Wenzel *et al.* (2020) [27]	369		740	76	87	2010–2017	Nationwide retrospective	Age, BMI, FIGO, histology, LN status, invasion depth, LVSI, PI, surgical margin, adjuvant treatment	Multivariable regression	35	56

MIS: Minimally invasive surgery, BMI: Body mass index, DI: Depth of invasion, LN: Lymph node status, LVSI: Lymphovascular space invasion, PI: Parametrial invasion, FIGO: International Federation of Gynecology and Obstetrics

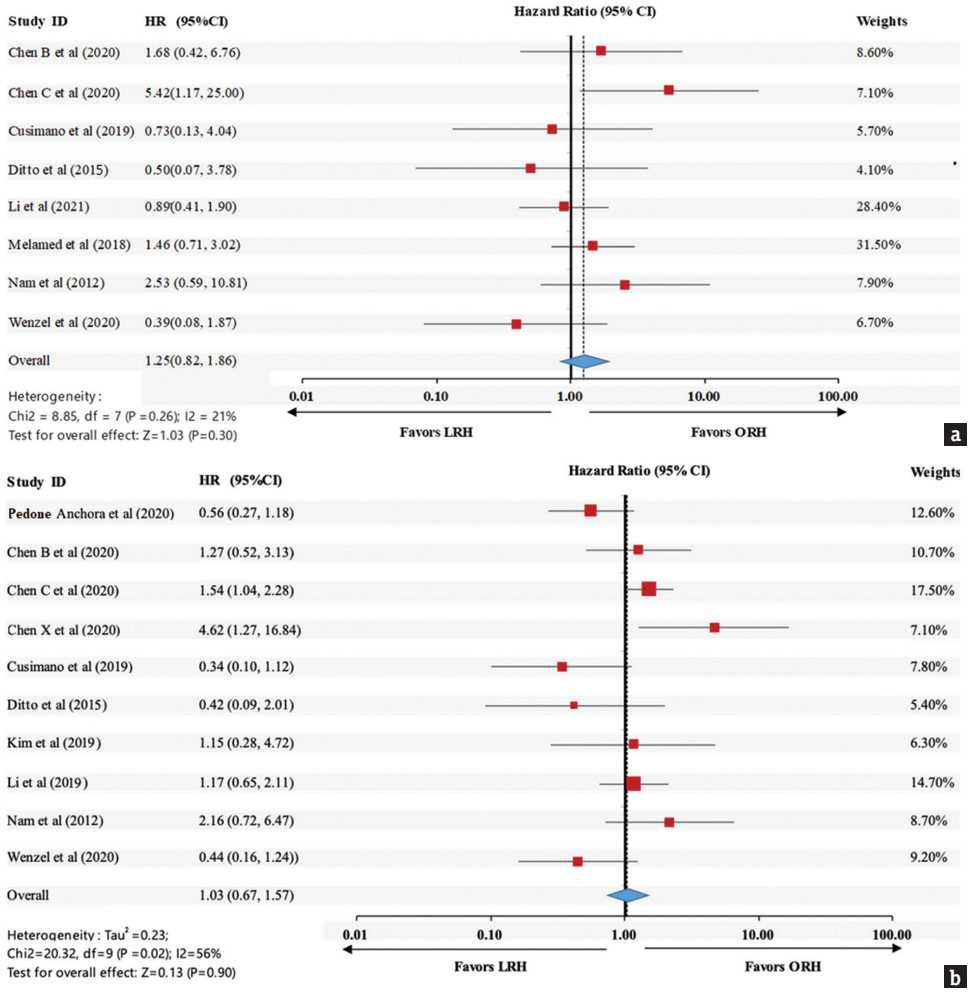

Figure 2: (a) Overall survival, Chen B: [17], Chen C: [18], Cusimano: [21]; Ditto: [22]; Li: [24]; Melamed: [25]; Nam: [26]; Wenzel: [27]. (b) Disease-free survival, Pedone Anchora: [16]; Chen B: [17], Chen C: [18]; Chen X: [20]; Cusimano: [21]; Ditto: [22]; Kim:[23] ; Li: [24]; Nam: [26]; Wenzel: [27].

Conversely, ORH remains the preferred approach for achieving better long-term oncological outcomes in patients with cervical cancer [32]. Despite being associated with longer recovery times, more significant postoperative pain, and higher complication rates, open surgery offers better cancer control, especially in cases where tumor containment is critical [11,33]. This meta-analysis highlights the need for careful patient selection [34]. It suggests that although LRH may be suitable for specific low-risk cases, open surgery may provide more reliable cancer control in patients with higher-risk cervical cancer [34].

Our results are consistent with those of previous studies. Doo *et al*. found no significant difference in either OS or DFS in both the minimally invasive group or ORH group with patients with stage IB disease and tumor size ≤2 cm [35]. Kwon *et al.* [36] also showed similar results regarding the noninferiority of laparoscopic-assisted hysterectomy compared with total abdominal hysterectomy in terms of DFS and OS in early cervical cancer [36]. Another study by Zanagnolo *et al.* focusing on the outcomes of robotic radical hysterectomy also demonstrated results consistent with those of our study, especially for cervical cancer tumors ≤2 cm [37].

However, a previous study of a similar meta-analysis by Nitecki *et al.* showed contradictory results, revealing higher recurrence and mortality rates in the minimally invasive group [28]. This may be related to the bias contributed by a higher number of studies in which study groups have a larger pool of participants with higher than stage IB disease and with tumors >2 cm, which is demonstrated by previous studies showing that open surgery has a better outcome in this group of patients [38,39].

It is important to note the heterogeneity of the conclusions drawn from the studies included in this meta-analysis. No publication biases were observed. We have included some of the most recent studies on this controversial topic. Our study provides insights into whether minimally invasive surgery is equally feasible for the treatment of early-stage cervical cancer. One of our selection criteria was studies that attempted to control for bias so that our results would be more reliable than those of studies that did not.

More evidence is required to conclude this ongoing debate. The dispute between the studies calls for more action and trials to be implemented. It is crucial to evaluate whether the new idea of setting a cut-off point of ≤2 cm for tumor size

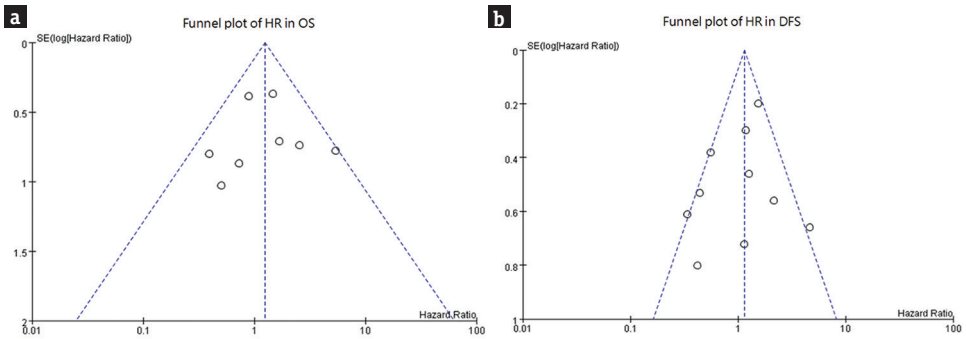

Figure 3: Funnel plots assessing the distribution of study results regarding the hazard ratio. (a) Overall survival. (b) Disease-free survival. SE, standard error, HR: Hazard ratio, OS: Overall survival, DFS: Disease-free survival

should indicate the use of minimally invasive surgery to treat cervical cancer [40]. The recent LAUNCH 2 trial is expected to provide further insights to guide gynecologists in making informed decisions [41].

This study has several key strengths as a systematic review and meta-analysis. First, it synthesizes the data from multiple studies, enhancing the statistical power and providing a more comprehensive evaluation of LRH compared to ORH for early-stage cervical cancer. By aggregating data from a broad range of sources, the study reduces potential biases inherent in individual studies and provides a higher level of evidence. In addition, the inclusion of survival outcomes such as OS and DFS ensures a thorough and reliable comparison. This comprehensive approach offers valuable insights, supporting the safety and efficacy of LRH and guiding future clinical decision-making.

This study has some limitations. The current study requires more information on the treatment procedures and surgical techniques applied in some studies, which may affect the overall OS and DFS. Moreover, this study only focused on OS and DFS in the two groups; other surgical complications were not included and could be compared in future studies to compare the two surgical methodologies. We recognized the considerable variation in study periods (1997–2020), which spanned advancements in surgical techniques and perioperative care. In addition, the wide range in follow-up durations (24–127 months) presented a limitation, as it may affect the reported survival outcomes.

Conclusion

This meta-analysis of retrospective cohort studies comparing LRH with ORH suggested no significant difference in OS and DFS. However, ensuring that patients receive comprehensive information regarding conflicting the data and thoroughly discussing these issues before treatment initiation are essential. The importance of our study's findings lies in the validation of LRH as a viable and safe alternative to ORH for early-stage cervical cancer, offering comparable survival outcomes. This is a significant contribution to the field of gynecologic oncology, as it supports the shift toward minimally invasive procedures, which are often associated with faster recovery times, fewer complications, and better patient quality of life. Our findings also open avenues for future research by encouraging deeper exploration into optimizing surgical techniques in minimally invasive surgery. In addition, this study could influence the clinical guidelines and decision-making processes, promoting the broader adoption of LRH as a standard treatment option. These results may also prompt further investigation into the cost-effectiveness and long-term outcomes of LRH, as well as its applicability in more advanced cancer stages, thus shaping future surgical practices and research applications. Further studies are required to confirm these findings.

Data availability statement

All the data generated or analyzed during this study are included in this published article.

Financial support and sponsorship

Nil.

Conflicts of interest

Dr. Dah-Ching Ding and Tsung-Cheng Hsieh, the editorial board members at *Tzu Chi Medical Journal*, had no roles in the peer review process of or decision to publish this article. The other authors declared no conflicts of interest in writing this paper.

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Supplementary material

Search strings

PubMed

(radical hysterectomy [tiab] OR radical hysterectom* [tiab]) AND (cancer* [MeSH terms] OR neoplasm* [MeSH terms] OR neoplasm [title] OR carcinoma [title] OR malig* [title] AND cervi* [title] NOT ovar* [title] NOT endometr* [title]) AND (cohort* OR prospective* OR retrospective*)

Web of Science

TITLE: ((cancer OR cancers OR neoplasm OR neoplasms OR cervi* carcinoma OR maligna*) AND (radical hysterectomy OR radical hysterectom*)) AND TOPIC: (cohort* OR prospective* OR retrospective*)

Cochrane

(cancer:ti or cancers: ti or neoplasm: ti or neoplasms: ti or cervix: ti or cervi*:ti or carcinoma: ti or maligna*:ti) and (cohort* OR prospective* OR retrospective)

Supplementary Table 1: Reason for exclusion of articles by full-text review

References	Reason of exclusion
Laparoscopic versus open radical hysterectomy for elderly patients with early-stage cervical cancer. Am J Obstet Gynecol 2012;207:195.e1.	Not report outcome of interest
Comparative effectiveness of minimally invasive and abdominal radical hysterectomy for cervical cancer. Gynecol Oncol 2012;127:11.	Not meet inclusion criteria
Robotic versus laparoscopic radical hysterectomy in cervical cancer patients: A matched-case comparative study. Int J Gynecol Cancer 2014;24:1466.	Not report outcome of interest
Total laparoscopic radical hysterectomy: A change in practice for the management of early stage cervical cancer in a U.K. cancer center. Eur J Gynaecol Oncol 2015;36:711	Not meet inclusion criteria
Matched-case comparisons in a single institution to determine critical points for inexperienced surgeons' successful performances of laparoscopic radical hysterectomy versus abdominal radical hysterectomy in stage IA2-IIA cervical cancer. PLoS One 2015;10:e0131170	Not report outcome of interest
Robotic single site versus robotic multiport hysterectomy in early endometrial cancer: A case control study. J Gynecol Oncol 2016;27:e39	Not meet inclusion criteria
Survival rate comparisons amongst cervical cancer patients treated with an open, robotic-assisted or laparoscopic radical hysterectomy: A five year experience. Surg Oncol 2016;25:66	Not report outcome of interest
Robot-assisted versus open radical hysterectomy: A multi-institutional experience for early-stage cervical cancer. Eur J Surg Oncol 2016;42:513	Not report outcome of interest
Surgical and clinical safety and effectiveness of robot-assisted laparoscopic hysterectomy compared to conventional laparoscopy and laparotomy for cervical cancer: A systematic review and meta-analysis. Eur J Surg Oncol 2017;49:994.	Not meet inclusion criteria
Comparison of the long-term oncological outcomes between the initial learning period of robotic and the experienced period of laparoscopic radical hysterectomy for early-stage cervical cancer. Int J Gynecol Cancer 2018;28:226	Not meet inclusion criteria
Robotic surgery in the elderly and very elderly gynecologic cancer patients. J Minim Invasive Gynecol 2018;28:872	Not meet inclusion criteria
Robotic versus laparoscopic radical hysterectomy in early cervical cancer: A case matched control study. Eur J Surg Oncol 2018;44:754	Not meet inclusion criteria
Long-term outcomes of laparoscopic radical hysterectomy (type III Piver) for early stage cervical cancer (IA1-IB1 FIGO). Int J Gynecol Cancer 2019;29:A200	Not meet inclusion criteria
Comparative outcomes between robotic and abdominal radical hysterectomy for IB1 cervical cancer: Results from a single high-volume institution. Gynecol Oncol 2019;153:242	Not meet inclusion criteria
The impact of the surgical routes and learning curve of radical hysterectomy on the survival outcomes in stage IB cervical cancer: A retrospective cohort study. Int J Surg 2019;68:72	Not meet inclusion criteria
Oncologic and surgical outcomes of robotic versus open radical hysterectomy for cervical cancer. J Obstet Gynaecol Can 2019;41:450	Not meet inclusion criteria
Robotic radical hysterectomy for cervical cancer: A population-based study of adoption and immediate postoperative outcomes in the United States. J Minim Invasive Gynecol 2019;26:551	Not meet inclusion criteria
Rates over time and regional variation of radical minimally invasive surgery for cervical cancer: A population based study. Gynecol Oncol 2019;154:338	Not meet inclusion criteria
Laparoscopic versus open abdominal radical hysterectomy for cervical cancer: A single-institution, propensity score matching study in China. Front Oncol 2019;9:7	Not report outcome of interest
Patterns of recurrence after laparoscopic versus open abdominal radical hysterectomy in patients with cervical cancer: A propensity-matched analysis. Int J Gynecol Cancer 2020;30:987	Not report outcome of interest
Efficacy of different surgical approaches on survival outcomes in patients with early-stage cervical cancer: Protocol for a multicentre longitudinal study in China. BMJ Open 2020;10:e038020	Not meet inclusion criteria
SUCCOR study: An international European cohort observational study comparing minimally invasive surgery versus open abdominal radical hysterectomy in patients with stage IB1 cervical cancer. Int J Gynecol Cancer 2020;30:1269	Not report outcome of interest
Is laparotomy better than laparoscopic surgery in early cervical cancer? Euro J Gynaecol Oncol 2020;41:949	Not meet inclusion criteria
Minimally invasive surgery versus laparotomy for early stage cervical cancer: A propensity score-matched cohort study. Cancer Med 2020;9:9236	Not report outcome of interest
Comparison of laparoscopic and abdominal radical hysterectomy for early stage cervical cancer: Oncologic outcomes based on tumor diameter. Int J Gynecol Cancer 2020;30:1308	Not report outcome of interest
Comparison of laparoscopic versus open radical hysterectomy in patients with early-stage cervical cancer: A multicenter study in China. Int J Gynecol Cancer 2020;30:1143	Not report outcome of interest
Minimally invasive radical hysterectomy for early-stage cervical cancer: Volume-outcome relationship in the early experience period. Gynecol Oncol 2020;158:390	Not meet inclusion criteria
A comparison of laparoscopies and laparotomies for radical hysterectomy in stage IA1-IB1 cervical cancer patients: A single team with 18 years of experience. Front Oncol 2020;10:12	Not report outcome of interest
Oncological outcomes of minimally invasive radical hysterectomy versus radical abdominal hysterectomy in patients with early stage cervical cancer: A multicenter retrospective analysis. Int J Gynecol Cancer 2021;31:504	Not report outcome of interest

Contd...

Supplementary Table 1: Contd...

References	Reason of exclusion
Robotic surgery using Senhance (R) robotic platform: Single center experience with first 100 cases. J Robotic Surg 2020;17:371	Not meet inclusion criteria
Postoperative comparison of laparoscopic radical resection and open abdominal radical hysterectomy for cervical cancer patient. Arch Gynecol Obstet 2020;302:473	Not meet inclusion criteria
Survival outcomes in patients with cervical cancer treated with open versus robotic radical hysterectomy: Our surgical pathology interrogation. Gynecol Oncol 2020;159:373	Not report outcome of interest
Oncologic outcomes of laparoscopic radical hysterectomy using the no-look no-touch technique for early stage cervical cancer: A propensity score-adjusted analysis. Cancers 2021;13:12	Not report outcome of interest
Minimal-invasive or open approach for surgery of early cervical cancer: The treatment center matters. Arch Gynecol Obstet 2021;304:503	Not report outcome of interest
Comparison of survival outcomes after laparoscopic radical hysterectomy versus abdominal radical hysterectomy in patients with cervical cancer. J Minim Invasive Gynecol 2021;28:971	Not meet inclusion criteria
Comparison of abdominal and minimally invasive radical hysterectomy in patients with early stage cervical cancer. Int J Med Sci 2021;18:1312	Not report outcome of interest
Outcomes of minimally invasive versus open radical hysterectomy for early stage cervical cancer incorporating 2018 FIGO staging. J Minim Invasive Gynecol 2021;28:824	Not report outcome of interest
Decreasing utilization of minimally invasive hysterectomy for cervical cancer in the United States. Gynecol Oncol 2021;162:43	Not meet inclusion criteria
Oncological outcomes of laparoscopic radical hysterectomy versus radical abdominal hysterectomy in patients with early-stage cervical cancer: A multicenter analysis. Int J Gynecol Cancer 2021;31:504	Not report outcome of interest
Challenges and controversies in the surgical treatment of cervical cancer: Open radical hysterectomy versus minimally invasive radical hysterectomy. J Clin Med 2021;10:18	Not meet inclusion criteria
The surgeon's proficiency affected survival outcomes of minimally invasive surgery for early-stage cervical cancer: A retrospective study of 851 patients. Front Oncol 2021;11:8	Not report outcome of interest
Comparison of survival outcomes between laparoscopic and abdominal radical hysterectomy for early-stage cervical cancer: A French multicentric study. J Gynecol Obstet Hum Reprod 2021;50:102046	Not report outcome of interest
Survival outcomes in patients with 2018 FIGO stage IA2-IIA2 cervical cancer treated with laparoscopic versus open radical hysterectomy: A propensity score-weighting analysis. Front Oncol 2021;11:12	Not report outcome of interest
Open versus minimally invasive radical hysterectomy in cervical cancer: The CIRCOL group study. Ann Surg Oncol 2022;29:1151	Not report outcome of interest
Comparison of survival outcomes between minimally invasive surgery and open radical hysterectomy in early-stage cervical cancer. Cancers 2022;14:11	Not report outcome of interest
Analysis of abdominal versus robotic radical hysterectomies for patients with cervical cancer: A Bulgarian experience. J Robot Surg 2022;16:339	Not report outcome of interest
Comparison of the oncological outcomes between robot-assisted and abdominal radical hysterectomy for cervical cancer based on the new FIGO 2018 staging system: A multicentre retrospective study. Front Oncol 2022;12:8	Not report outcome of interest
Pattern of relapse in patients with stage IB1 cervical cancer after radical hysterectomy as primary treatment. Minimally invasive surgery versus open approach. Systematic review and meta-analysis. Gynecol Oncol 2022;164:455	Not meet inclusion criteria