Cervical cancer survival rate after abdominal vs. laparoscopic radical hysterectomy in two government hospitals in Jakarta, Indonesia

Lisa Novianti, MD[1], David Calvin, MD[1], Yuri Feharsal, MD[2], Fara Vitantri Diah Candrani, PhD[2], Tricia Dewi Anggraeni, PhD[1], Fitriyadi Kusuma, PhD[1], Andi Darma Putra, PhD[1], Chamim Shobari Singoprawiro, PhD[2], Gatot Purwoto, PhD[1], Hariyono Winarto, PhD[1]

[1]Department of Obstetrics and Gynaecology, Dr. Cipto Mangunkusumo Hospital, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia, [2]Department of Obstetrics and Gynaecology, Fatmawati Hospital, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia

ABSTRACT

Introduction: Cervical cancer ranks among the top ten globally. Its five-year survival rate is 67.9% across all stages. In Indonesia, laparoscopic radical hysterectomy (LRH) is gaining traction but remains less common than abdominal radical hysterectomy (ARH). Limited research exists on cervical cancer survival rates in Indonesia. Our study compared ARH to LRH survival rates for cervical cancer patients.

Materials and Methods: We reported a retrospective study that included 275 patients of all cervical cancer stages who met inclusion criteria from 2015 to 2019 in two of Jakarta's national teaching hospitals. The patients underwent ARH or LRH, radiotherapy, and chemotherapy and were observed for five years. Univariate and multivariate analyses were performed to investigate survival rates.

Results: 236 patients underwent ARH, and 39 patients underwent LRH. The median survival of LRH and ARH were 23.9 months and 29.6 months, respectively. The five-year survival rates of LRH and ARH patients were 75.0 % and 83.5%, respectively. The early-stage survival rate was higher than in the advanced stage (76.7% vs. 73.5%, p=0.006). Cox multivariate modelling determined that surgical approach (ARH vs. LRH) (HR: 2.3; 95% CI: 1.2 - 4.5; p = 0.01) and cancer stage (HR: 1.9; 95% CI: 1.18 – 2.92; p = 0.007) were significant factors.

Conclusion: The higher cancer stage resulted in a lower five-year survival rate. In this limited sample study, LRH demonstrated an inferior five-year survival rate compared to ARH.

KEYWORDS:
Uterine cervical neoplasms, survival, radical hysterectomy, laparoscopy, Indonesia

INTRODUCTION

Globally, cervical cancer is one of the ten most diagnosed cancers in the world. It is estimated that there were 662,301 (3.3%) new cases and 348,874 (3.5%) deaths in 2022. Of all the reported cases worldwide, 60% of all new cases were from Asia, with a 5-year prevalence of 1,186,812 (60,9%) cases.[1] In Indonesia, cervical cancer ranked third highest for incidence with 36,964 (9.0%) new cases and ranked fourth for mortality with 20,708 (8.5%) deaths in 2022.[2,3] According to national data from the Indonesian Society of Gynaecologic Oncology (INASGO), cervical cancer remains the leading cause of all gynaecologic cancer cases in Indonesia. Notably, the majority of patients fall within the middle age group (ages 36-55), with a predominant stage of IIIB and a histotype primarily identified as squamous cell carcinoma.[4]

The disparity in cervical cancer incidence and mortality between developed and developing countries remains substantial. In high-income settings, sustained reductions have been achieved through effective screening, follow-up, and timely treatment, whereas many low- and middle-income countries continue to face persistent barriers to implementing these measures.[5] In Indonesia, survival data are difficult to obtain because follow-up systems and patient compliance remain inadequate, and only limited studies have reported cervical cancer survival outcomes.[6] In addition, laparoscopic radical hysterectomy (LRH) is not routinely performed in Indonesia, likely due to the high proportion of patients diagnosed at an advanced stage and the greater cost and technical complexity of LRH compared with abdominal radical hysterectomy (ARH), with limited public insurance support in many hospitals.

Minimally invasive radical hysterectomy (including LRH) gained popularity because it can reduce perioperative morbidity and shorten recovery compared with open ARH. However, oncologic safety concerns were raised after the phase III Laparoscopic Approach to Cervical Cancer (LACC) randomized trial demonstrated inferior survival with minimally invasive radical hysterectomy versus open surgery in early-stage cervical cancer (4.5-year disease-free survival 86.0% vs 96.5%), with increased hazards for recurrence or death (HR 3.74) and overall mortality (HR 6.00).[7] Subsequent large observational cohorts, including Surgery in Cervical Cancer, Observational, Retrospective (SUCCOR), reported higher relapse and death rates after minimally invasive approaches than after open radical hysterectomy, reinforcing

This article was accepted: 20 February 2026
Corresponding Author: Hariyono Winarto
Email: hariyono.winarto@ui.ac.id

Table I: Patient characteristics divided by surgical procedure

Characteristics	Laparoscopy n (%)	Abdominal n (%)
n (%)	26 (17.8)	120 (82.2)
Age (y)		
<50	13 (50.0)	76 (63.3)
≥50	13 (50.0)	44 (36.7)
Parity		
Nulliparity	5 (19.2)	16 (13.3)
Primiparity	0 (0.00)	17 (14.2)
Multiparity	21 (80.8)	87 (72.5))
Cancer Stage		
Early stage	26 (66.6)	120 (50.8)
Tumour size		
< 2 cm	21 (80.8)	95 (79.2)
≥ 2 cm	5 (19.2)	25 (20.8)
Histotype		
SCC	20 (76.9)	74 (61.7)
Adenocarcinoma	6 (23.0)	38 (31.7)
Adenosquamous	0 (0.0)	8 (6.7)
Differentiation		
1	3 (11.5)	36 (30.0)
2	19 (73.1)	74 (61.7)
3	4 (15.4)	10 (8.3)
Lymph Node extraction		
(mean±SD)	21.92±8.96	18.62±8.9
Min-Max	4-37	0-43

Table II: The five-year survival rate of all-stage cervical cancer patients

Factors	aFive-year survival Rate	bp-value
All		
Laparoscopy	76.9%	0.942
Abdominal	76.7%	
Age (y)		
<50	82.5%	0.053
≥50	69.7%	
Parity		
Nulliparity	44.4%	0.803
Primiparity	88.9%	
Multiparity	80.7%	
Tumour size		
< 2 cm	81.9%	0.753
≥ 2 cm	80.0%	
Histotype		
SCC	75.0%	0.709
Adenocarcinoma	78.6%	
Adenosquamous	87.5%	
Differentiation		
1	73.3%	0.242
2	81.8%	
3	66.7%	

Notes: [a]Data are % (95% confidence interval); blog rank test; *p-value <0.05; SCC = squamous cell carcinoma.

Table III: Estimated hazard ratio of cervical cancer

Characteristics	Adjusted HR	95%CI HR	[a]p-value
Age (years)	1.94	0.978 – 3.83	0.58
Parity	0.83	0.25 – 2.80	0.77
Tumor size	2.02	0.98 – 4.15	0.06
Histotype	1.74	0.22 – 13.72	0.60
Differentiation	1.25	0.50 – 2.99	0.23
Lymph Node extraction	1.1	0.92 – 1.02	0.96
Surgical Approach	1.04	0.43 – 2.50	0.942

Notes: alog-rank test; *p-value < 0.05; CI = confidence interval; HR = hazard ratio

the need for real-world evaluation.[8] In light of this evidence, contemporary guidance and reviews describe open ARH as the standard approach for radical hysterectomy in cervical cancer, while ongoing work investigates whether specific techniques or carefully selected low-risk subgroups may mitigate risk.[9] Accordingly, this study aimed to compare oncologic outcomes between cervical cancer patients undergoing LRH and ARH in two centres.

MATERIALS AND METHODS

We conducted a retrospective cohort study of women with early-stage cervical cancer who received primary radical hysterectomy between 1 January 2015 and 31 December 2019. Early-stage disease was defined as FIGO (International Federation of Gynaecology and Obstetrics) stage IB2 or lower. Total sampling was used, including all eligible cases that met the study criteria during the study period. Demographic, clinicopathological, and treatment data were abstracted from medical records. Tumour stage and grade were assigned according to FIGO criteria. Inclusion criteria were early-stage cervical cancer treated initially between 1 January 2015 and 31 December 2019. Records with >50% missing clinical data or documented disease progression before definitive surgery were excluded.

All radical hysterectomies were performed by consultant gynaecological oncologists or by gynaecological oncology fellows under the direct supervision of a consultant gynaecological oncologist. Fellows participated only after meeting institutional competency milestones, and the supervising consultant was scrubbed for critical steps (e.g., parametrial dissection, pelvic lymphadenectomy, vaginal cuff closure) and responsible for intraoperative decision-making and final haemostasis.

We analysed the data using Statistical Package for the Social Sciences (SPSS), employing the Kaplan–Meier method to assess patients' five-year survival rates. The five-year survival rate was defined as the proportion alive 60 months after definitive surgery, counting death from any cause as the event and censoring patients at last contact or 31 January 2022, whichever occurred first. Additionally, logistic regression analysis was conducted where appropriate. We utilised the Cox proportional hazards regression model for univariate and multivariate analyses. The log-rank test was employed to compare prognostic factors in the multivariate analysis. Five-year survival was measured in all cases, survival curves were plotted using the Kaplan–Meier method, and results included the log-rank tests. All statistical analyses were considered significant at $p<0.05$.

This study was reviewed and approved by the Institutional Review Board and Ethics Committee of the Faculty of Medicine, University of Indonesia. Good clinical care guidelines were followed, and the principles of the Declaration of Helsinki were adhered to.

RESULTS

Of 801 records consisting of cervical cancer patients of all stages screened, 203 met the inclusion criteria for early-stage cervical cancer at initial diagnosis; however, some patients were subsequently upstaged to advanced disease based on postoperative histopathology and therefore proceeded to chemoradiation, and these cases were excluded because they no longer met the study criteria. After excluding 57 records due to inadequate follow-up or missing data and removing cases with documented progression before definitive surgery, 146 patients remained for analysis. We used total sampling of all eligible cases and followed patients for up to five years, with outcomes ascertained through 31 January 2022. The cohort comprised women treated between 1 January 2015 and 31 December 2019. Most were aged <50 years (60.9%), multiparous (74%), with squamous cell carcinoma (64.3%) and grade II differentiation (63.7%). Lymph nodes were assessed in 36% of patients. Among surgical approaches, 120 underwent ARH and 26 underwent LRH. Baseline characteristics are summarised in Table I.

The median survival for LRH and ARH was 23.9 months and 29.6 months, respectively. The shortest survival was one day (perioperative death), and the longest observed survival was five years. Across all stages, LRH and ARH patients' five-year survival rates were 75.0% and 83.5%, respectively (Table II). Log-rank testing with chi-squared analysis identified parity, cancer stage, and surgical approach as factors significantly associated with survival (Table II). Cox multivariate modelling indicated that the significant factors were parity (hazard ratio (HR) 0.5; $p<0.01$), cancer stage (HR 1.9; $p=0.007$), and surgical approach (HR 2.3; $p=0.01$) (Table III). Kaplan–Meier survival curves by surgical approach are shown in Figure 1.

DISCUSSION

In this two-centre retrospective cohort, we did not observe a statistically significant difference in overall survival between LRH and ARH. This finding suggests that, within our setting and case mix, LRH achieved oncologic outcomes comparable to open surgery. However, given the retrospective design and the relatively small LRH sample, the absence of statistical significance should be interpreted cautiously, because limited power and residual and residual confounding may mask modest between-group differences.

Our results should be interpreted in the context of an evolving and sometimes conflicting evidence base. High-profile evidence, most notable the randomized LACC trial, reported inferior disease-free and overall survival with minimally invasive radical hysterectomy compared with open surgery for early-stage cervical cancer.[10] In addition, large observational datasets and meta-analyses have reported increased risks of recurrence and death with minimally invasive radical hysterectomy overall.[11,12] Nonetheless, not all real-world studies demonstrated a survival disadvantage, and some multicentre series have reported similar long-term survival between open and minimally invasive approaches, particularly when stratified by tumour size and other risk features.

One plausible explanation for heterogeneity across studies is that technique-related factors may modify oncologic risk in minimally invasive surgery. The SUCCOR study reported

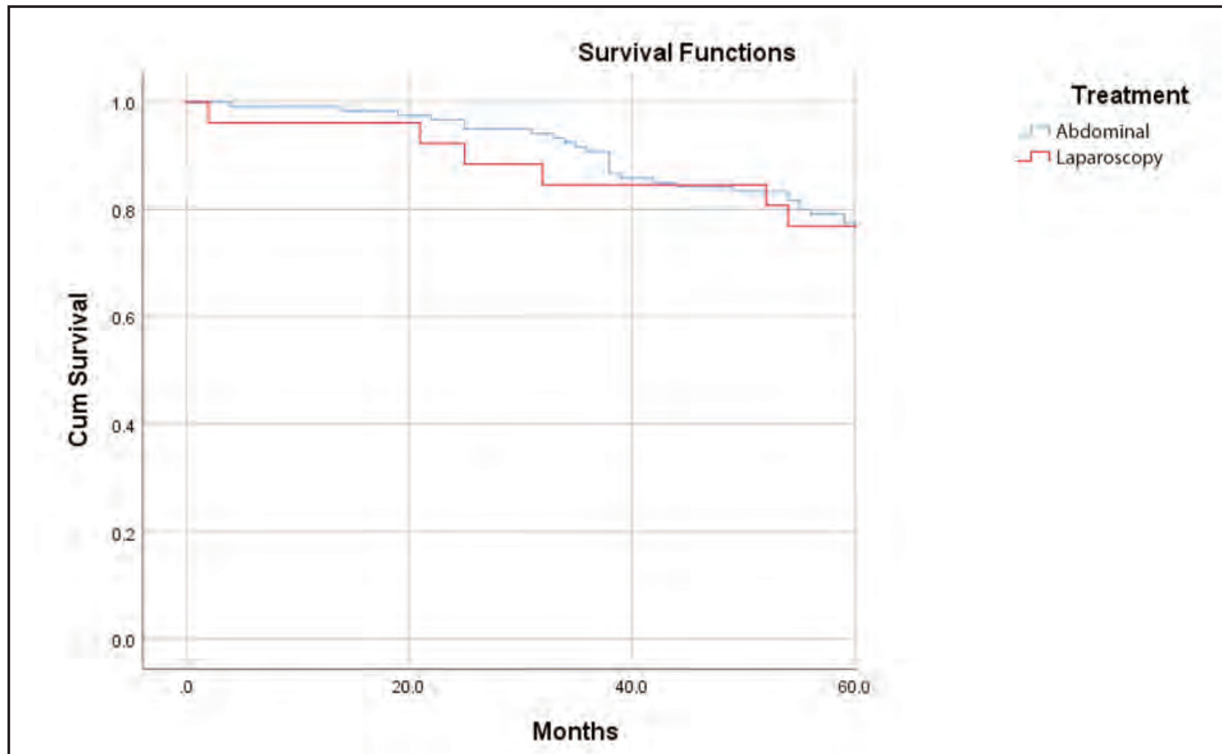

Fig. 1: Five-year survival rate by surgical approach

worse outcomes overall with minimally invasive radical hysterectomy, but suggested that avoiding uterine manipulators and adopting tumour-containment measures at colpotomy could yield outcomes close to open surgery.[13] The "No-look No-touch" technique—which involves vaginal cuff closure, avoidance of uterine manipulators, minimal handling of the cervix, and enclosing the excised organ in a bag—demonstrated progression-free survival and overall survival rates comparable to those of ARH.[14] Furthermore, Chiva et al.'s research indicated that the employment of uterine manipulators could increase the risk of recurrence by 2.76-fold (HR: 2.07; 95% CI: 1.35 to 3.15; p=0.001).[8] These observations support the interpretation that surgical approach alone may not fully explain differences in survival; rather, how minimally invasive radical hysterectomy is performed (and in which patients) may be critical. Finally, the potential impact of surgeon expertise was possibly not fully considered in the LACC trial. Research by Matsuo et al. demonstrated that surgeries performed at high-volume centres were linked to a reduced rate of recurrence and lower overall mortality compared to those conducted at low-volume centres.[15] Additionally, a study by Kim et al. suggested that surgeons who are at the initial stages of mastering minimally invasive radical hysterectomy (MIRH) had poorer progression-free survival (PFS) outcomes than those who are more advanced in their training (5-year PFS, late-stage 100% vs. early 78.2%; p=0.014).[16]

Tumour size and case selection are also frequently cited as effect modifiers. Some studies have suggested that any disadvantage of minimally invasive radical hysterectomy is more apparent in larger tumours, while carefully selected small-volume disease may have comparable outcomes.[17,18] In our cohort, the lack of significant difference between LRH and ARH may reflect selection of LRH for patients with more favourable prognostic features, centre-specific surgical practices, or perioperative pathways that reduce differences between approaches. These factors highlight the importance of reporting detailed operative technique, such as manipulator use, colpotomy method, vaginal cuff closure, and tumour characteristics (e.g. size cut-offs, lymphovascular invasion, and nodal status) when interpreting oncologic outcomes by surgical approach.

Lastly, practice patterns have changed substantially following publication of LACC, with marked reductions in minimally invasive radical hysterectomy rates in some settings. In Indonesia, where LRH adoption has been limited by cost, technical demands, and referral patterns, our findings contribute local data to a global debate and underscore a need for larger, methodically robust studies. Future work should prioritise adequate power, rigorous adjustment for confounding (or propensity-based methods), and explicit documentation of tumour-containment steps, as these may be key determinants of oncologic safety for minimally invasive approaches.

Although we explored several potential prognostic covariates (age, parity, tumour size, histotype, and differentiation), none showed a statistically significant association with overall survival in this early-stage surgical cohort, which is plausible for several reasons. First, case-mix restriction (FIGO ≤IB2) narrows the biological and clinical heterogeneity that often drives prognostic separation; even variables that are prognostic in broader populations can lose discriminatory value when the cohort is limited to surgically treated early-

stage disease. Second, the number of events is typically low in early-stage cohorts, so the study may be underpowered to detect modest effect sizes, particularly for subgroup comparisons (e.g., non-squamous histotypes). This is relevant because tumour size, grade, and histology have repeatedly been linked to outcomes in other settings: tumour size (including 2-cm interval cut points) has been reported as an independent prognostic factor after radical hysterectomy, with larger tumours correlating with other adverse features and the need for adjuvant therapy.[19] Differentiation/grade has also been associated with survival—especially in squamous cervical cancer—although its prognostic signal can be attenuated by interobserver variability and missingness in retrospective datasets.[20,21] For histotype, the literature is mixed: some early-stage series report similar survival between adenocarcinoma and squamous carcinoma after hysterectomy/lymphadenectomy (particularly in node-negative disease), while others find histology contributes to risk stratification; therefore, the lack of significance in our dataset may reflect small numbers in non-squamous categories rather than true equivalence.[21,22] Finally, age and parity may have limited direct prognostic impact once patients are selected for curative surgery; age often operates through comorbidity and treatment tolerance rather than tumour biology, and parity is more consistently associated with risk of developing cervical cancer than with post-treatment survival, which may explain why neither variable emerged as significant here.

This study has several important limitations inherent to its retrospective, medical-record-based design, including incomplete documentation and potential misclassification of clinicopathological variables. Although we used total sampling, a large proportion of screened records were excluded due to inadequate follow-up and missing data, which may introduce selection bias and reduce statistical power, particularly for the LRH arm. In addition, the LRH cohort was relatively small and likely influenced by access and reimbursement constraints (laparoscopy coverage being more limited during the study period), which may have resulted in systematic differences between patients selected for LRH versus ARH. Because the analysis was restricted to early-stage disease (FIGO ≤IB2), the findings may not be generalisable to more advanced stages or to settings with different case-mix and surgical pathways. Key operative and perioperative determinants of oncologic outcomes, such as colpotomy technique, uterine manipulator use, tumour containment steps, and granular measures of surgeon experience/volume were not consistently available and therefore could not be fully controlled for, leaving the possibility of residual confounding. Finally, lymph node assessment was performed in only a minority of patients, limiting interpretation of nodal risk stratification and adjustment, and the small number of events in an early-stage cohort may have limited our ability to detect modest prognostic effects of covariates beyond surgical approach.

CONCLUSION

In this two-centre retrospective cohort of women with early-stage cervical cancer (FIGO ≤ IB2) undergoing primary radical hysterectomy between 2015 and 2019, LRH demonstrated no statistically significant difference in overall survival compared with ARH in our setting. None of the other evaluated baseline clinicopathological variables (age, parity, tumour size, histotype, and differentiation) were significantly associated with survival, which may reflect the restricted early-stage case mix and limited event numbers. While these findings support LRH as a potentially comparable option to ARH in selected early-stage patients, larger studies with more events, robust control of confounding, and clearer documentation of key operative techniques are needed to confirm safety and define which patients and surgical practices yield equivalent outcomes.

ACKNOWLEDGEMENTS

The authors declare that we have no financial or personal relationship that may have inappropriately influenced us in writing this article.

FUNDING

The authors hereby declare that there is no conflict of interest.

REFERENCES

1. Bray F, Laversanne M, Sung H, Ferlay J, Siegel RL, Soerjomataram I, et al. Global cancer statistics 2022: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA: A Cancer Journal for Clinicians 2024; 74(3): 229-63.
2. WHO. Indonesia Fact Sheets. Int Agency Res Cancer Globocan;
3. Cohen PA, Jhingran A, Oaknin A, Denny L. Cervical cancer. The Lancet 2019: 393(10167): 169-82.
4. INASGO. Indonesian Society of Gynecologic Oncology National Data [Internet]. [cited 2020 Nov 13]. Available from: http://www.inasgo.org/fusionchart/APP/Staging_cervix_bar.asp
5. Beddoe AM. Elimination of cervical cancer: Challenges for developing countries. ecancermedicalscience 2019; 13.
6. Aziz MF. Gynecological cancer in Indonesia. J Gynecol Oncol 2009; 20(1): 8-10.
7. Dai D, Huang H, Feng Y, Wan T, Liu Z, Tong C, et al. Minimally invasive surgery vs laparotomy for early stage cervical cancer: A propensity score-matched cohort study. Cancer Med 2020; 9(24): 9236-45.
8. Chiva L, Zanagnolo V, Querleu D, Martin-Calvo N, Arévalo-Serrano J, Căpîlna ME, et al. 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(9): 1269-77.
9. Levin G, Ramirez PT, Wright JD, Slomovitz BM, Hamilton KM, Schneyer RJ, et al. Approach to radical hysterectomy for cervical cancer after the Laparoscopic Approach to Cervical Cancer trial and associated complications: a National Surgical Quality Improvement Program study. Am J Obstet Gynecol 2025; 232(2): 208.e1-208.e11.
10. Kanao H, Matsuo K, Aoki Y, Tanigawa T, Nomura H, Okamoto S, et al. Feasibility and outcome of total laparoscopic radical hysterectomy with no-look no-touch technique for FIGO IB1 cervical cancer. J Gynecol Oncol 2019; 30(3): e71.
11. Nitecki R, Ramirez PT, Frumovitz M, Krause KJ, Tergas AI, Wright JD, et al. Survival after minimally invasive vs open radical hysterectomy for early-stage cervical cancer: A systematic review and meta-analysis. JAMA Oncol 2020;6(7): 1019-27.

12. Marchand G, Masoud AT, Abdelsattar A, King A, Ulibarri H, Parise J, et al. Meta-analysis of laparoscopic radical hysterectomy, excluding robotic assisted versus open radical hysterectomy for early stage cervical cancer. Sci Rep 2023; 13(1): 273.
13. Chiva L, Zanagnolo V, Querleu D, Martin-Calvo N, Arévalo-Serrano J, Căpîlna ME, et al. 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(9): 1269-77.
14. Kanao H, Matsuo K, Aoki Y, Tanigawa T, Nomura H, Okamoto S, et al. Feasibility and outcome of total laparoscopic radical hysterectomy with no-look no-touch technique for FIGO IB1 cervical cancer. J Gynecol Oncol 2019; 30(3): e71.
15. Matsuo K, Shimada M, Yamaguchi S, Matoda M, Nakanishi T, Kikkawa F, et al. Association of radical hysterectomy surgical volume and survival for early-stage cervical cancer. Obstet Gynecol 2019; 133(6): 1086-98.
16. Kim S, Min KJ, Lee S, Hong JH, Song JY, Lee JK, et al. Learning curve could affect oncologic outcome of minimally invasive radical hysterectomy for cervical cancer. Asian J Surg 2021; 44(1): 174-80.
17. Nasioudis D, Albright BB, Ko EM, Haggerty AF, Ii RLG, Kim SH, et al. Oncologic outcomes of minimally invasive versus open radical hysterectomy for early stage cervical carcinoma and tumor size <2 cm: a systematic review and meta-analysis. Int J Gynecol Cancer 2021; 31(7): 983-90.
18. Tsui WL, Deng GH, Hsieh TC, Li PC, Ding DC. Comparison of survival between open and minimally invasive radical hysterectomies for stage IB1 cervical cancer (≤2 cm): A systematic review and meta-analysis. Tzu Chi Medical Journal 2025; 37(4): 430.
19. Park JY, Kim DY, Kim JH, Kim YM, Kim YT, Nam JH. Outcomes after radical hysterectomy according to tumor size divided by 2-cm interval in patients with early cervical cancer. Ann Oncol 2011; 22(1): 59-67.
20. Matsuo K, Mandelbaum RS, Machida H, Purushotham S, Grubbs BH, Roman LD, et al. Association of tumor differentiation grade and survival of women with squamous cell carcinoma of the uterine cervix. J Gynecol Oncol 2018; 29(6): e91.
21. Rudtanasudjatum K, Charoenkwan K, Khunamornpong S, Siriaunkgul S. Impact of histology on prognosis of patients with early-stage cervical cancer treated with radical surgery. Int J Gynaecol Obstet 2011; 115(2): 183-7.
22. Wu SG, Sun JY, He ZY, Chen QH, Zhou J. Early-stage node negative cervical adenocarcinoma and squamous cell carcinoma show similar survival outcomes after hysterectomy: a population-based study. J Gynecol Oncol 2017; 28(6): e81.