Heliyon 10 (2024) e35821

Contents lists available at ScienceDirect

Heliyon

journal homepage: www.cell.com/heliyon

Research article

A retrospective analysis of single-port laparoscopy in myoma management

Hanqin Li [1], Wei You [1], Xiaoji Cai, Xiaoying Jin [**], Xuan Che [*]

Department of Obstetrics and Gynecology, Jiaxing University Affiliated Women and Children Hospital, Jiaxing, 314000, Zhejiang, China

ARTICLE INFO

Keywords:
Single-port laparoscopic
Uterine myomas
Myomectomy
Minimally invasive

ABSTRACT

Objective: This study assesses the effectiveness and safety of single-port laparoscopic myomectomy (SPLM) versus conventional laparoscopic myomectomy (CLM).
Methods: We conducted a retrospective case-control study at a university tertiary hospital, involving 262 patients treated from July 2020 to December 2022. Participants were divided into two groups: 132 underwent SPLM and 130 underwent CLM.
Results: The two groups were comparable in terms of age, body mass index, parity, delivery history, preoperative anemia, number of myomas, and size of the largest myoma. The SPLM group showed a significant reduction in operation time (average 93 min) and estimated blood loss (average 50 ml) compared to the CLM group (average 118.5 min and 100 ml, respectively). Subgroup analysis based on the size, location, and number of myomas further highlighted the advantages of SPLM, particularly for patients with large (diameter ≥8 cm) or multiple myomas (number ≥4). Patient satisfaction was also notably higher in the SPLM group.
Conclusions: Single-port laparoscopic myomectomy offers a highly effective, safer, and patient-preferred option for the surgical management of fibroids, especially in cases of large or multiple myomas. These findings suggest that SPLM could become the preferred surgical approach for complex fibroid cases, promising less trauma and quicker recovery for patients.

1. Introduction

Uterine myomas, or fibroids, represent a pervasive gynecological challenge, affecting a substantial up to 20%–40 % of women during their reproductive years [1,2]. Clinical manifestations can include menorrhagia, pelvic discomfort, and reproductive disturbances [3,4]. In 2012, the total annual cost of the disease was estimated to be approximately $34.4 billion in the United States alone [5]. Myomas can be treated with drugs and interventional radiology (uterine artery embolization and high-intensity focused ultrasound), but this approach remains controversial, and uterine-preserving laparoscopic myomectomy (CLM) is still the main method of treatment [6]. Surgical innovations continually aim to further maximize therapeutic efficacy while minimizing patient morbidity and improving postoperative quality of life [7,8].

With the increasing use of minimally invasive gynecological procedures, single-port laparoscopic surgery, including single-port

* Corresponding author. Department of Obstetrics and Gynecology, Jiaxing University Affiliated Women and Children Hospital, 2468 East Zhonghuan Road, Nanhu District, Jiaxing City, 314000, Zhejiang Province, China.
** Corresponding author.
E-mail address: chexuan@zjxu.edu.cn (X. Che).
[1] These authors contributed equally.

https://doi.org/10.1016/j.heliyon.2024.e35821
Received 7 April 2024; Received in revised form 4 August 2024; Accepted 5 August 2024
Available online 5 August 2024

laparoscopic myomectomy (SPLM), has emerged as a potential advancement [9–11]. Yeon Hee Hong et al. highlighted the favorable postoperative outcomes of SPLM for women considering future pregnancies [12]. However, a meta-analysis showed that single-port laparoscopic myomectomy is comparable to conventional laparoscopic myomectomy in terms of safety and feasibility and has similar surgical outcomes to conventional laparoscopic myomectomy [13]. Comprehensive data between the SPLM and CLM remain sparse. Altogether, the literature's consensus on the quantifiable benefits and potential limitations of SPLM remains incomplete, with varying reports on its comparative efficacy and safety profile against CLM.

To address this gap in knowledge, our investigation focused on a retrospective case−control study. Through meticulous extraction of intraoperative data, evaluation of postoperative outcomes, and assessment of patient satisfaction scores, this study aimed to conduct a comprehensive comparative analysis between SPLM and CLM patients. Our primary objective was to validate whether SPLM truly offers a superior therapeutic and patient satisfaction index compared to conventional measures, potentially heralding a new concept for minimally invasive gynecological intervention. This study aimed to provide a robust comparative analysis that has the potential to inform clinical decisions and shape future research directions in minimally invasive gynecological surgery.

2. Materials and methods

Ethical approval

The retrospective study protocol was approved by the institutional review board of Jiaxing University Affiliated Women and Children Hospital (KY-2023-134). Informed consent was obtained from all patients.

2.1. Study participants

This retrospective study included 262 female patients who underwent laparoscopic myomectomy between July 2020 and December 2022 at the Department of Obstetrics and Gynecology, Jiaxing University Affiliated Women and Children Hospital, a university tertiary hospital. The participants were assigned to two groups: 132 who underwent single-port laparoscopic myomectomy

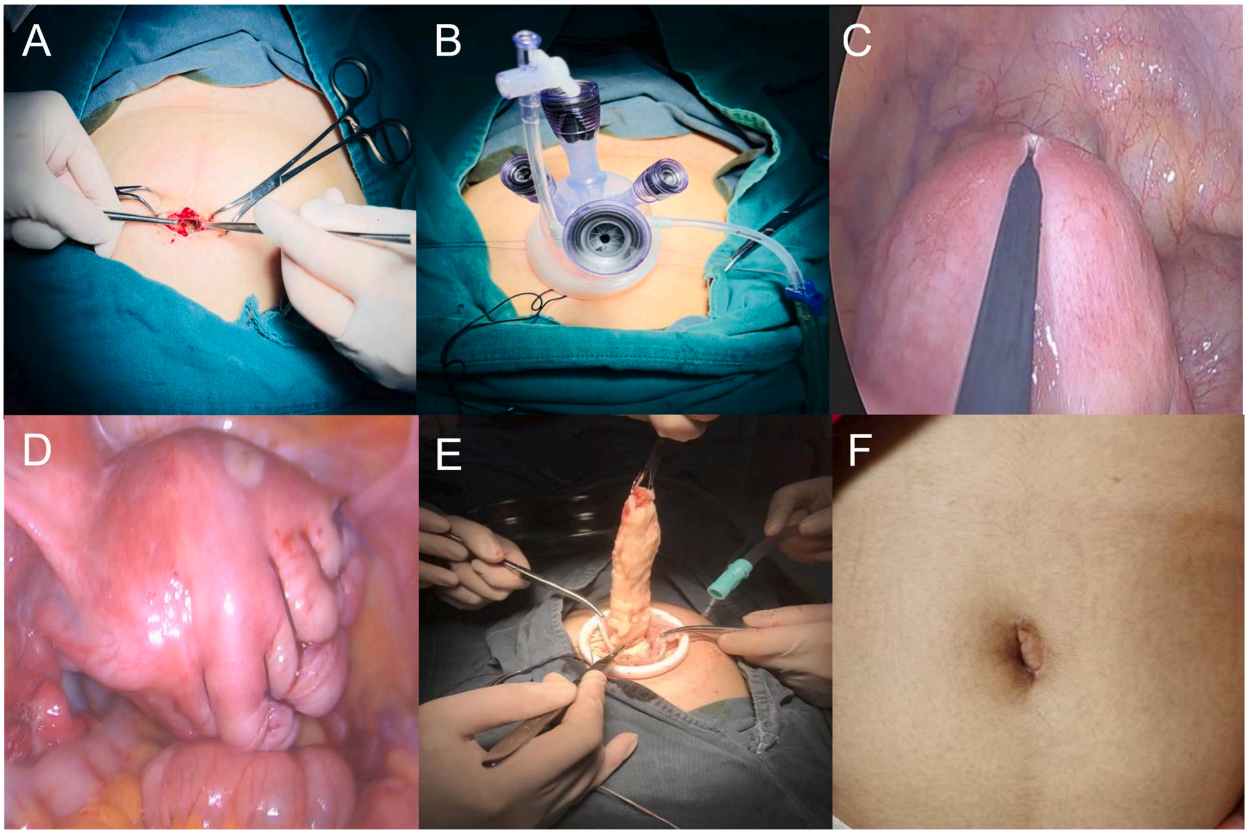

Fig. 1. The surgical procedure for single-port laparoscopic myomectomy (SPLM). (A) A 2–3 cm incision at the umbilicus. (B) Insertion of a single port into the umbilicus. (C) Uterine fibroids under endoscopic view, incision of fibroid capsule through monopolar. (D) Continuously sutured uterine fibroid incision. (E) Removal of uterine fibroids using the apple-peeling method in the retrieval bag. (F) Healing status of umbilical incision one month after surgery.

(SPLM) and 130 who underwent conventional laparoscopic myomectomy (CLM). The inclusion criteria for this study were as follows: female patients who were diagnosed with symptomatic myomas requiring surgical intervention, aged between 18 and 50 years, and who provided informed consent for laparoscopic myomectomy. Patients were excluded if they had pelvic inflammatory disease and a gynecological examination indicating suspicious pelvic adhesions or severe endometriosis that could affect the laparoscopic approach or malignancy or if they were pregnant at the time of surgery.

Preoperative MRI or B-ultrasound was performed on all patients to determine the number, location, and diameter of the uterine myomas. Postoperative pathological diagnosis revealed the presence of uterine smooth muscle myoma. The clinical data of all patients, including general conditions, preoperative evaluation, surgical process, and postoperative recovery, were extracted from medical records and follow-up records.

2.2. Surgical procedure for SPLM

The patient was placed in a supine position under general anesthesia. A vertical incision measuring 2–3 cm was made at the umbilicus (Fig. 1A). Subsequently, the skin was incised layer by layer to enter the abdominal cavity. The inner ring of the incision protective sleeve was inserted into the abdominal cavity, and the port cover was installed (Fig. 1B). The pneumoperitoneum pressure was maintained at 12–14 mmHg. The operators conducted a thorough exploration of both the abdominal and pelvic cavities, assessing the location, size, and relationship of the myomas with the surrounding tissues. Subsequently, the uterine myomas were excised (Fig. 1 C). The uterine wound was sutured (Fig. 1D). The pneumoperitoneum was then closed, and the surgical instruments were withdrawn. The specimen was removed through the umbilicus (Fig. 1E). Finally, the surgical incision was closed in layers. One month after the operation, the transumbilical incision healed well (Fig. 1F).

2.3. Clinical outcome measures

The baseline data included patient age, BMI, parity, delivery, preoperative anemia, menorrhagia, previous abdominal surgery, and preoperative comorbidities.

Intraoperative outcomes, including operative time, intraoperative blood loss, number of myomas removed, location of myomas, diameter of the largest myoma, operation time, estimated blood loss, complications, intraoperative blood transfusion, conversion to open surgery, and operation costs, were assessed. Site-specific fibroids are considered uterine fibroids located in anatomically distinct areas, including the lower posterior uterine wall, cervical region, broad ligament, uterine horn, and round ligament.

Postoperative outcomes, such as maximum body temperature, fever, abnormal leukocyte counts, abnormal CRP levels, 24-h abdominal drainage, the first bowel output, postoperative complications, postoperative hospital stay and postoperative satisfaction score, were assessed. We used the visual analog scale (VAS) to score the patient's postoperative satisfaction with the entire surgical effect, recovery process, and hospitalization experience on a scale from 1 to 10. On this scale, 1 indicates the least satisfaction, while 10 represents the highest level of satisfaction.

2.4. Statistical analysis

SPSS 26.0 was used to statistically analyze the data. T tests were used to compare normally distributed data between groups, and the data are presented as the mean ± standard deviation, while variables without a normal distribution are presented as medians (interquartile ranges). Rates were used to represent categorical data, and the $\chi 2$ test was used to compare categorical variables.

Table 1
Baseline clinical characteristics.

Demographic characteristics	SPLM (N = 132)	CLM (N = 130)	P value
Age(years)	40.26 ± 6.46	41.41 ± 6.36	0.15
BMI (kg/m^2)	22.73 ± 2.65	23.11 ± 2.59	0.21
Patients with anemia(n)	34	32	0.83
Patients with bradymenorrhea(n)	22	12	0.07
Patients with menorrhagia(n)	25	22	0.67
Parity(n)	116	118	0.45
Vaginal delivery	58	56	0.89
Cesarean section	61	64	0.63
Previous abdominal surgery(n)	72	81	0.20
Preoperative comorbidities(n)	9	6	0.44

BMI = body mass index; Data are shown as the mean ± standard deviation. Bradymenorrhea is characterized by bleeding that lasts for more than 7 days, significantly longer than the average menstrual period.

3. Results

3.1. Baseline characteristics

A total of 262 female patients who underwent laparoscopic myomectomy were assigned to this cohort between July 2020 and December 2022. A total of 132 patients underwent SPLM, and 130 underwent CLM. No statistically significant differences were observed between the two groups with regard to age, BMI, parity, delivery, preoperative anemia, menorrhagia, previous abdominal surgery, or preoperative comorbidities. The baseline characteristics of patients are shown in Table 1.

3.2. Intraoperative outcomes

The median number of myomas was 1 (IQR:1–2) in the SPLM group and 1 (IQR:1–3) in the CLM group. Similarly, the median diameter of the largest myoma was 6.5 cm (IQR: 6–7) in the SPLM group and 6.5 cm (IQR: 6–8) in the CLM group. The median estimated blood loss in the SPLM and CLM groups was 50 ml (IQR: 30–60) and 100 ml (IQR: 50–150)], respectively, with a statistically significant difference between the groups ($P < 0.05$). The median operation times in the SPLM group and CLM group were 93 min (IQR: 80–115) and 118.5 min (IQR: 94.75–152.75), respectively, and the difference between the groups was also statistically significant ($P < 0.05$). Compared with the CLM group, the SPLM group had obvious advantages in terms of operative time and estimated blood loss. Additionally, the operation costs in the SPLM group and the CLM group were 2925.5 ¥ (IQR: 2726.125–3297.9) and 3136.25 ¥ (IQR: 2845.5–3697.7), respectively. The operation costs of the SPLM group were less than those of the CLM group ($P < 0.05$). One patient in the CLM group received blood transfusion due to extensive bleeding during surgery. There were no statistically significant differences between the two groups in terms of intraoperative complications or conversion to open surgery. The intraoperative outcomes are shown in Table 2.

3.3. postoperative outcomes

The 48-h maximum postoperative body temperatures in the SPLM group were 37.2 °C (IQR: 36.9–37.7) and 37.7 °C (IQR: 37.4–38.0) in the CLM group, respectively. The number of patients with fever 48 h after surgery was 47 in the SPLM group and 80 in the CLM group. The 48-h postoperative body temperature and number of patients with fever in the SPLM group were significantly lower than those in the CLM group ($P < 0.05$). The number of patients with abnormal leukocytes after surgery was 25 in the SPLM group and 59 in the CLM group. However, first bowel output of the CLM group was longer than that of the SPLM group by 38 h (IQR: 25–45) in the SPLM group and 26.5 h (IQR: 21–41) in the CLM group ($P < 0.05$). There was no significant difference in the percentage of patients who experienced a decrease in hemoglobin or an increase in the CRP level or who underwent 24-h abdominal drainage between the two groups ($P > 0.05$). The length of hospitalization in the SPLM group was shorter than that in the CLM group (4.83 ± 0.62 days in the SPLM group and 5.08 ± 0.65 days in the CLM group, $P < 0.05$). Additionally, the SPLM group was more satisfied (9.75 ± 0.51 in the SPLM group and 9.23 ± 1.27 in the CLM group for the satisfaction score, $P < 0.05$). There were no postoperative complications, such as incision/pelvic infection or lower limb venous thrombosis. Postoperative outcomes are shown in Table 3.

3.4. Estimated blood loss outcomes based on subgroup analysis

We performed subgroup analyses of estimated blood loss during laparoscopic myomectomy via single-port (SPLM) versus conventional multiport (CLM) approaches according to the diameter, location, and number of myomas. When the myoma diameter was <8 cm, the SPLM resulted in considerably less blood loss (56.30 ± 57.63 ml) than did the CLM (103.28 ± 99.83 ml). This trend persisted for larger myomas (≥8 cm), with SPLM again showing lower blood loss (65.00 ± 47.88 ml) than CLM (168.97 ± 161.45 ml).

According to the analysis of location, the blood loss in the anterior wall was lower in patients with SPLM (56.25 ± 44.57 ml) than in those with CLM (119.55 ± 109.80 ml). A similar pattern was observed for myomas in the posterior wall, fundus, and lateral wall. However, for myomas located in special sites, the difference in blood loss between the SPLM and CLM groups was not statistically significant.

The results of subgroup analysis by fibroid number showed that SPLM also had superiority over CLM. With a single myoma, the

Table 2
Intraoperative outcomes between two groups.

	SPLM (N = 132)	CLM (N = 130)	P value
No. of myomas removed(n)	1 [1,2]	1 [1,3]	0.99
Diameter of largest myoma(cm)	6.5 [6,7]	6.5 [6,8]	0.90
Estimated blood loss(ml)	50 [30, 60]	100 [50, 150]	< 0.001
Operation time (min)	93 [80, 115]	118.5 [94.75, 152.75]	< 0.001
Complications(n)	0	0	
Blood transfusion(n)	0	1	
Conversion to open surgery (n)	0	0	
Operation costs (¥)	2925.5 [2726.125, 3297.9]	3136.25 [2845.5, 3697.7]	0.03

Data are shown as the mean ± standard deviation or median (interquartile range, IQR).

Table 3
Postoperative outcomes between two groups.

	SPLM (N = 132)	CLM (N = 130)	P Value
Maximum body temperature (48h after operation, °C)	37.2 [36.9, 37.7]	37.7 [37.4, 38]	< 0.001
Patients with fever (48h after operation, n)	47	80	< 0.001
Patients with abnormal Leukocyte(n)	25	59	< 0.001
the first bowel output (h)	38 [25, 45]	26.5 [21, 41]	< 0.001
Patients with abnormal CRP(n)	76	63	0.14
Decrease in hemoglobin (g/L)	15 [9, 22]	15.5 [10, 22]	0.83
24-h abdominal drainage (ml)	160 [45, 315.5]	183.5 [103.75, 287.5]	0.18
Days of postoperative antibiotic	2 [2,3]	2 [2,3]	0.06
Postoperative complications	0	0	
Incision/Pelvic Infection(n)	0	0	
lower limb venous thrombosis(n)	0	0	
Postoperative hospital stay(d)	4.83 ± 0.62	5.08 ± 0.65	0.002
Postoperative Satisfaction score	9.75 ± 0.51	9.23 ± 1.27	< 0.001

Data are shown as the mean ± standard deviation or median (interquartile range, IQR).

SPLM group had lower blood loss (54.26 ± 62.27 ml) than the CLM group (87.12 ± 69.38 ml). For 2 to 3 myomas, the blood loss of the SPLM (60.75 ± 34.81 ml) remained significantly lower than that of the CLM (159.49 ± 157.08 ml). Even with ≥4 myomas, the SPLM group maintained less blood loss (68.33 ± 65.01 ml) than did the CLM group (171.11 ± 161.68 ml). Across all subgroups, SPLM consistently resulted in less estimated blood loss than CLM, as detailed in Table 4 of the study.

3.5. Operation time outcomes based on subgroup analysis

We performed subgroup analyses of operation time for SPLM versus CLM according to myoma size, location, and number. For myomas <8 cm, the operation time was shorter for SPLM (96.21 ± 24.44 min) than for CLM (117.69 ± 45.64 min). This trend continued for larger myomas (≥8 cm), with SPLM again showing shorter operation times (105.04 ± 27.84 min) than CLM (148.12 ± 34.39 min).

Analyzed by location, the operation time remained shorter for SPLM than for CLM for anterior wall myomas (97.49 ± 24.30 min SPLM, 128.80 ± 46.41 min CLM), posterior wall myomas (96.59 ± 25.14 min SPLM, 122.78 ± 42.54 min CLM), fundal myomas (101.33 ± 24.35 min SPLM, 131.65 ± 37.70 min CLM) and lateral myomas (97.33 ± 29.22 min SPLM, 135.57 ± 62.51 min CLM). However, there was no significant difference in operation time between approaches for special site myomas.

Considering the number of myomas, the SPLM had shorter operation times than did the CLM for the removal of 1 myoma (88.72 ± 22.46 min in the SPLM, 113.73 ± 40.51 min in the CLM), 2–3 myomas (108.08 ± 23.89 min in the SPLM, 132.77 ± 44.61 min in the CLM) and ≥4 myomas (114.39 ± 24.01 min in the SPLM, 158.44 ± 45.20 min in the CLM). Across all subgroups, SPLM consistently resulted in shorter operation times than CLM, as detailed in Table 5 of the study.

4. Discussion

This study demonstrated that compared with conventional laparoscopic myomectomy (CLM), single-port laparoscopic myomectomy (SPLM) results in reduced blood loss, operative time, postoperative fever, and length of stay. SPLM was associated with comparable costs, complications, and patient satisfaction. These findings support the feasibility and advantages of SPLM over CLM for improving perioperative outcomes.

Previous research, such as that conducted by Jackson et al., highlighted the cosmetic superiority of the SPLM [14]. Dayong Lee et al. made parallel observations, noting enhanced cosmetic outcomes and patient satisfaction with SPLM [15]. However, concerning surgical outcomes such as operation time and blood loss, previous studies have presented inconsistent results [11,15,16]. Our findings,

Table 4
Estimated blood loss outcomes based on subgroup analysis.

		SPLM (N = 132)	CLM (N = 130)	P value
Diameter of largest myoma	< 8 cm	56.30 ± 57.63(104)	103.28 ± 99.83(96)	< 0.001
	≥8 cm	65.00 ± 47.88(28)	168.97 ± 161.45(34)	0.001
Location of largest myoma	Anterior	56.25 ± 44.57(68)	119.55 ± 109.80(55)	< 0.001
	Posterior	66.34 ± 75.99(41)	114.69 ± 104.75(49)	0.02
	Fundus	60.00 ± 20.00(6)	162.65 ± 196.55(17)	0.22
	Lateral	53.33 ± 52.46(12)	124.29 ± 128.9(7)	0.11
	Special sites	26.00 ± 15.17(5)	60.00 ± 56.57(2)	0.55
Number of myomas	1	54.26 ± 62.27(74)	87.12 ± 69.38(73)	0.003
	2–3	60.75 ± 34.81(40)	159.49 ± 157.08(39)	< 0.001
	≥4	68.33 ± 65.01(18)	171.11 ± 161.68(18)	0.02

Data are shown as the mean ± standard deviation(n).

Table 5
Operation time outcomes based on subgroup analysis.

		SPLM (N = 132)	CLM (N = 130)	P Value
Diameter of largest myoma	< 8 cm	96.21 ± 24.44(104)	117.69 ± 45.64(96)	< 0.001
	≥8 cm	105.04 ± 27.84(28)	148.12 ± 34.39(34)	< 0.001
Location of largest myoma	Anterior	97.49 ± 24.30(68)	128.80 ± 46.41(55)	< 0.001
	Posterior	96.59 ± 25.14(41)	122.78 ± 42.54(49)	0.001
	Fundus	101.33 ± 24.35(6)	131.65 ± 37.70(17)	0.08
	Lateral	97.33 ± 29.22(12)	135.57 ± 62.51(7)	0.17
	Special sites	116.40 ± 35.74(5)	166.00 ± 55.15(2)	0.20
Number of myoma	1	88.72 ± 22.46(74)	113.73 ± 40.51(73)	< 0.001
	2–3	108.08 ± 23.89(40)	132.77 ± 44.61(39)	0.003
	≥4	114.39 ± 24.01(18)	158.44 ± 45.20(18)	0.001

Data are shown as the mean ± standard deviation(n).

which support the use of the SPLM procedure in these areas, might reflect the increasing proficiency of the SPLM surgical technique [17]. Shi-Fang Zhou raised concerns regarding the efficacy of SPLM for larger myomas, who considered SPLM to be safe and feasible, but if the diameter of the myomas is ≥ 8 cm, the myomas are located in the posterior wall, or if the number of myomas is ≥ 4, the practicality of single-port surgery should be carefully considered [18]. However, our study revealed that myomectomy via single-port laparoscopy has more obvious advantages than traditional multiport laparoscopy for uterine fibroids larger than 8 cm and more than 4 uterine fibroids.

Importantly, our subgroup analyses provide reassurance of consistent SPLM feasibility and advantages irrespective of myoma number, size, or location. This finding suggests that SPLM may be more widely adopted for myomectomy patients who have historically undergone only open surgery, such as those with large or multiple myomas. This could significantly expand patient access to minimally invasive surgery. In addition, due to the 2–3 cm longitudinal incision in the umbilical region, rapid removal of specimens in the specimen bag is more conducive to avoiding the use of an electromechanical morcellator to achieve the tumor-free principle and avoid the spread of tumor cells [19–21]. Payers may also preferentially endorse SPLM given the outcome benefits and equivalent costs profiled here.

Nevertheless, our study has limitations, including the limited sample size from a single institution and retrospective cohort. Selection biases between cohorts may be present given the nonrandomized design. The variability between surgeons in terms of technique and learning curves may have introduced confounders. Larger multicenter prospective randomized trials are needed to validate these findings and assess long-term outcomes.

5. Conclusion

In summary, this study provides strong evidence that SPLM offers advantages over CLM in terms of reduced intraoperative blood loss, shorter operative time, decreased postoperative fever, and accelerated recovery irrespective of myoma characteristics, particularly when dealing with multiple or large myomas. Our findings endorse SPLM as a feasible, safe and beneficial minimally invasive surgical option for properly selected patients, supporting its wider implementation.

Finding information

The work was supported by Science and Technology Bureau of Jiaxing City (grant numbers 2021AY30004, 2023AD31110) and Natural Science Foundation of Zhejiang Province (grant number LTGY24H040002).

Informed consent

Informed consent was obtained from all the patients.

Ethical approval

Approval was obtained from the ethics committee of the institutional review board of Jiaxing University Affiliated Women and Children Hospital (KY-2023-134).

Data availability statement

Data will be made available on request.

CRediT authorship contribution statement

Hanqin Li: Writing – original draft, Methodology, Formal analysis, Data curation. **Wei You:** Methodology, Investigation, Formal analysis, Data curation. **Xiaoji Cai:** Methodology, Investigation, Data curation. **Xiaoying Jin:** Investigation, Formal analysis, Conceptualization. **Xuan Che:** Writing – review & editing, Writing – original draft, Supervision, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

[1] F. Barra, et al., Relugolix for the treatment of uterine fibroids, Drugs Today 55 (8) (2019) 503–512.
[2] N. Duhan, Current and emerging treatments for uterine myoma - an update, Int J Womens Health 3 (2011) 231–241.
[3] E. Giuliani, S. As-Sanie, E.E. Marsh, Epidemiology and management of uterine fibroids, Int. J. Gynaecol. Obstet. 149 (1) (2020) 3–9.
[4] S. Gupta, J. Jose, I. Manyonda, Clinical presentation of fibroids, Best Pract. Res. Clin. Obstet. Gynaecol. 22 (4) (2008) 615–626.
[5] E.R. Cardozo, et al., The estimated annual cost of uterine leiomyomata in the United States, Am. J. Obstet. Gynecol. 206 (3) (2012) 211.e1–211.e9.
[6] E.E. Don, V. Mijatovic, J.A.F. Huirne, Infertility in patients with uterine fibroids: a debate about the hypothetical mechanisms, Hum. Reprod. 38 (11) (2023) 2045–2054.
[7] S. Ghosh, et al., Natural history of uterine fibroids: a radiological perspective, Curr Obstet Gynecol Rep 7 (3) (2018) 117–121.
[8] X. Liu, et al., Comparison of high-intensity focused ultrasound ablation and secondary myomectomy for recurrent symptomatic uterine fibroids following myomectomy: a retrospective study, Bjog 127 (11) (2020) 1422–1428.
[9] J. Wang, X. Xu, J. Xu, Application of single-port procedure and ERAS management in the laparoscopic myomectomy, BMC Wom. Health 23 (1) (2023) 401.
[10] Y. Li, R. Liu, X. Li, Comparison of efficacy of single-port versus conventional laparoscopic treatment for uterine leiomyoma: a latest meta-analysis, Front. Oncol. 13 (2023) 1192582.
[11] L. Jiang, et al., Application of single-port laparoscopic surgery in myomectomy, Front. Oncol. 11 (2021) 722084.
[12] Y.H. Hong, et al., Operative and obstetric outcomes after single-port laparoscopic myomectomy: a retrospective single-center analysis of 504 cases, J. Minim. Invasive Gynecol. 28 (12) (2021) 2080–2088.
[13] D. Lee, et al., A systematic review and meta-analysis comparing single port laparoscopic myomectomy with conventional laparoscopic myomectomy, Eur. J. Obstet. Gynecol. Reprod. Biol. 239 (2019) 52–59.
[14] T.R. Jackson, J.I. Einarsson, Single-incision laparoscopic myomectomy, J. Minimal Access Surg. 7 (1) (2011) 83–86.
[15] D. Lee, et al., Advantages of single-port laparoscopic myomectomy compared with conventional laparoscopic myomectomy: a randomized controlled study, J. Minim. Invasive Gynecol. 25 (1) (2018) 124–132.
[16] C.H. Choi, et al., Surgical outcomes of a new approach to laparoscopic myomectomy: single-port and modified suture technique, J. Minim. Invasive Gynecol. 21 (4) (2014) 580–585.
[17] H.J. Lee, et al., Learning curve analysis and surgical outcomes of single-port laparoscopic myomectomy, J. Minim. Invasive Gynecol. 22 (4) (2015) 607–611.
[18] T. Song, et al., Laparoendoscopic single-site myomectomy compared with conventional laparoscopic myomectomy: a multicenter, randomized, controlled trial, Fertil. Steril. 104 (5) (2015) 1325–1331.
[19] R. Anupama, et al., Disseminated peritoneal leiomyosarcomas after laparoscopic "myomectomy" and morcellation, J. Minim. Invasive Gynecol. 18 (3) (2011) 386–389.
[20] E.M. Sandberg, et al., Disseminated leiomyoma cells can be identified following conventional myomectomy, Bjog 123 (13) (2016) 2183–2187.
[21] T. Song, et al., Laparoendoscopic single-site myomectomy compared with conventional laparoscopic myomectomy: a multicenter, randomized, controlled trial, Fertil. Steril. 104 (5) (2015) 1325–1331.