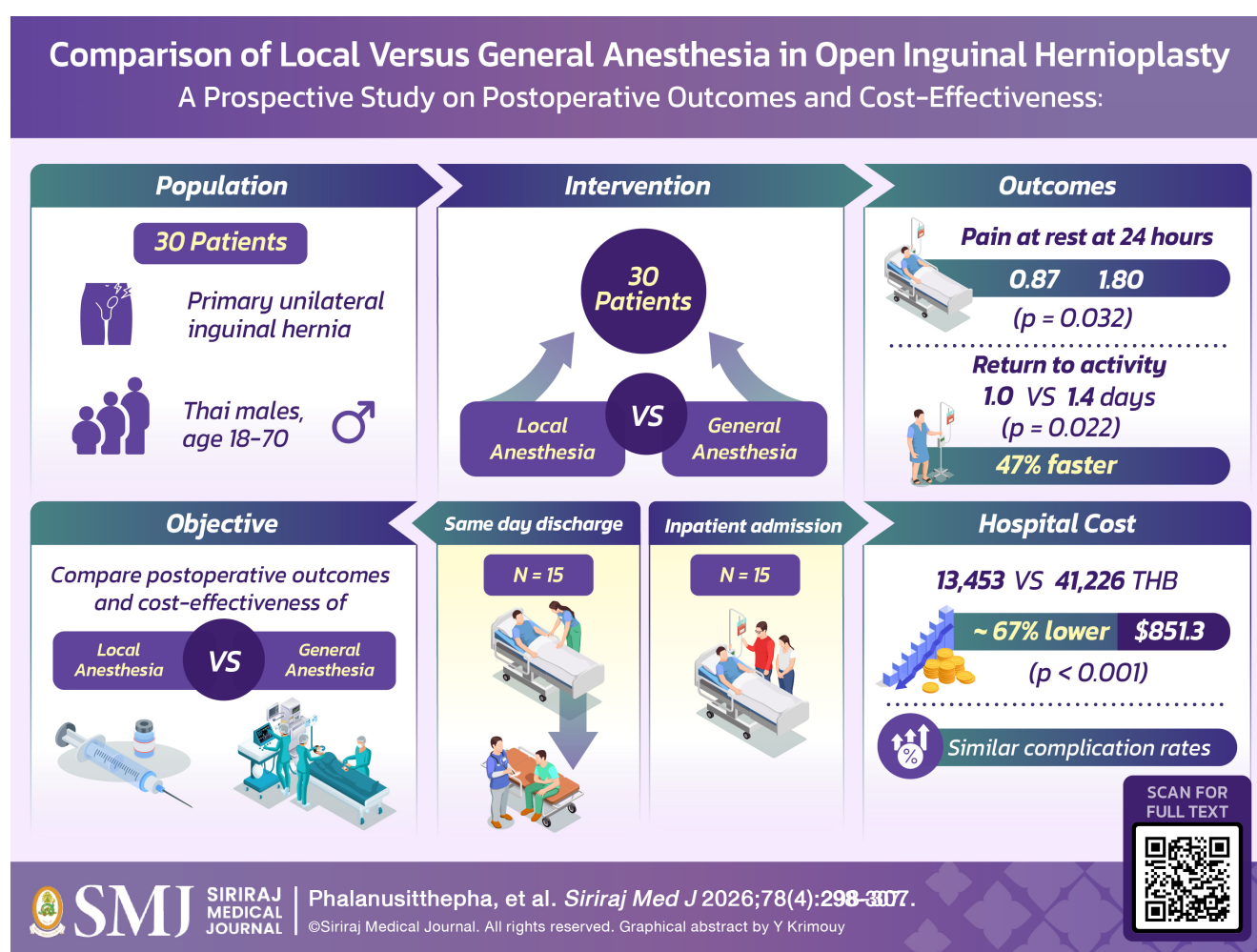


Comparison of Local Versus General Anesthesia in Open Inguinal Hernioplasty: A Prospective Study on Postoperative Outcomes and Cost-Effectiveness

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Received 17 February 2026 Revised 4 March 2026 Accepted 5 March 2026

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<https://doi.org/10.33192/smj.v78i4.280214>



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ABSTRACT

Objective: This study evaluates whether performing open inguinal hernia repair under local anesthesia with same-day discharge is comparable to general anesthesia with inpatient admission, with respect to postoperative outcomes, recovery time, and healthcare costs.

Materials and Methods: This prospective cohort study was conducted at Siriraj Hospital and included 30 adults undergoing unilateral open inguinal hernioplasty. Patients were allocated to either local anesthesia with same-day discharge (n=15) or general anesthesia with inpatient admission (n=15). Postoperative pain, recovery time, operative efficiency, complications, and total hospital costs were assessed.

Results: Postoperative pain at rest at 8 and 24 hours was lower in the LA group compared with the GA group (1.93 ± 1.10 vs 2.53 ± 1.55 $p=0.233$, 0.87 ± 0.83 vs 1.80 ± 1.65 $p=0.032$). Patients in the LA group resumed normal activities significantly earlier, and total hospital costs were significantly lower (1.00 ± 0.54 vs 1.40 ± 0.51 $p=0.022$, 13,453 THB vs. 41,226 THB; $p<0.001$). Operative time, theater time, complications, and patient demographics (age, BMI, ASA classification) were comparable between groups.

Conclusions: Open inguinal hernioplasty under local anesthesia in a day-surgery setting demonstrated clinical outcomes comparable to those of general anesthesia with inpatient admission. Additionally, this approach was associated with faster functional recovery and significantly reduced hospital costs. Local anesthesia represents a safe, efficient, and cost-effective alternative for appropriately selected patients.

Keywords: Hernioplasty; inguinal hernia; local anesthesia; day surgery; cost-effectiveness (Siriraj Med J 2026;78(4): 298-307)

INTRODUCTION

Inguinal hernia repair is one of the most performed procedures in general surgery worldwide, including in Thailand. The lifetime incidence of inguinal hernia is approximately 27% in males and 3% in females.^{1,2} Open Lichtenstein mesh-based inguinal hernia repair performed under local anesthesia is currently a widely accepted and recommended treatment. This approach is endorsed by both the European Hernia Society (EHS) and the Asian Pacific Hernia Society guidelines.³⁻⁵ Open inguinal hernia repair can be performed using various anesthetic techniques, including general anesthesia, spinal anesthesia, and local anesthesia.⁶⁻¹¹ Although both the EHS and Asia-Pacific Hernia Society guidelines recommend local anesthesia with same-day discharge, anesthetic techniques administered by anesthesiologists — particularly general and spinal anesthesia — remain widely practiced.¹² At Siriraj Hospital, anesthesiologist-administered anesthesia is still predominantly used. This preference may be attributed to patient anxiety, surgeons' concerns regarding intraoperative pain control, and the limited availability of structured training in local anesthesia techniques. Local anesthesia requires specific technical expertise and patient cooperation, as patients remain conscious during the procedure. In contrast, general and spinal anesthesia provide complete patient unawareness but are associated with potential. Systemic

complications, including respiratory, cardiovascular, and gastrointestinal adverse effects related to anesthetic agents.¹³⁻¹⁵ Therefore, selecting the most appropriate anesthetic technique is crucial and should involve a balanced consideration of potential benefits and risks. Factors such as postoperative outcomes, recurrence rates, operative time, and healthcare costs remain subjects of ongoing debate.^{16,17} With the increasing demand for healthcare services in Thailand, the One Day Surgery (ODS) initiative was launched in 2017 to enhance surgical capacity, improve patient access, and optimize hospital bed utilization for patients requiring inpatient care. Inguinal hernia repair represents an ideal model for comparing local anesthesia with anesthesiologist-administered anesthesia, as well as evaluating same-day discharge versus conventional inpatient admission.

This study aims to assess treatment efficacy, postoperative pain control, surgical and anesthetic complications, patient and caregiver satisfaction, and total healthcare costs. The findings are expected to support the development of evidence-based clinical practice guidelines for inguinal hernia management at Siriraj Hospital and within the Thai healthcare system.

MATERIALS AND METHODS**Patient selection**

This prospective cohort study was conducted at the

Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand. The research protocol was reviewed and approved by the Institutional Review Board of the Faculty of Medicine Siriraj Hospital (Certificate of Approval No. Si 812/2023). Eligible participants were Thai male patients aged 18 to 70 years who provided written informed consent for participation in the study. All included patients were diagnosed with primary unilateral inguinal hernia and had no history of previous inguinal hernia repair. Patients underwent elective open tension-free mesh-based inguinal hernioplasty and were classified as American Society of Anesthesiologists physical status I to III. In addition, all participants demonstrated good functional capacity, defined as a metabolic equivalent level of at least 4 METs. Patients were excluded if they presented with incarcerated inguinal hernia requiring emergency surgery or had a prior history of inguinal hernia repair. Additional exclusion criteria included contraindications to local or general anesthesia, a family history of malignant hyperthermia in first-degree relatives, and known allergies to paracetamol or tramadol. Patients were also excluded if they were unable to independently decide on the type of anesthesia or had cognitive, communication, or other limitations that prevented reliable completion of questionnaires or accurate assessment of pain scores. Participants were withdrawn from the study if they refused to provide study-related information or complete research questionnaires, or if they were unable to attend postoperative follow-up visits.

Sample size calculation

The primary outcome was postoperative wound pain at 8 hours after inguinal hernia repair, assessed using a pain score. The sample size was calculated to compare mean pain scores between two independent groups. The type I error (α) was set at 0.05 with a two-sided test ($Z_{\alpha/2} = 1.96$), and the type II error (β) was set at 0.20 ($Z_{\beta} = 0.84$). Group 1 consisted of patients undergoing outpatient inguinal hernia repair under local anesthesia, while Group 2 consisted of patients undergoing inpatient inguinal hernia repair under anesthesiologist-administered anesthesia. Based on a literature review of postoperative pain following inguinal hernia repair¹⁹, the mean pain score was reported as 2.12 in the local anesthesia group and 3.58 in the anesthesiologist-administered anesthesia group, with standard deviations of 1.0 and 1.5, respectively. These values were used as reference parameters for sample size estimation. The required sample size per group was calculated using the following formula:

$$n = \frac{(Z_{\alpha/2} + Z_{\beta})^2 (\sigma_1^2 + \sigma_2^2)}{(\mu_1 - \mu_2)^2}$$

The calculated minimum sample size was 12 patients per group. To account for an anticipated dropout rate of 20%, the final sample size was increased to 15 patients per group.

Data Collection

Baseline patient characteristics were collected, including age, body weight, height, body mass index, underlying comorbidities, and history of drug allergies. Preoperative health status was assessed using the American Society of Anesthesiologists (ASA) physical status classification and functional capacity (functional class).

Patients who met the eligibility criteria were invited to participate in the study by surgical residents or study investigators at the outpatient surgical clinic. All eligible patients were provided with detailed written information regarding study participation and were given sufficient time to read the document thoroughly. Investigators explained the study protocol and answered any questions raised by the patients.

Patients independently selected their preferred method of anesthesia after undergoing standard pre-anesthetic risk assessment rather than randomization. Both local anesthesia and anesthesiologist-administered anesthesia were explained in detail, including the potential benefits and risks of each approach, to ensure informed decision-making. Patients were informed of their right to decline participation in the study without any impact on their standard medical care. Written informed consent was obtained from all patients prior to enrollment.

Procedural Care and Operative Technique

In the local anesthesia group, patients were scheduled for surgery in a minor operating room on the day of the procedure. They were performed under pure local infiltration without sedation or airway manipulation. Therefore, routine preoperative fasting was not required. In contrast, patients in the regional or general anesthesia group were admitted one day prior to surgery, underwent preoperative evaluation by an anesthesiologist, and were instructed to fast according to standard anesthesia guidelines and discontinue medications as advised. All patients in both groups received prophylactic antibiotics 30 minutes prior to skin incision. In the local anesthesia group, local infiltration was performed using a mixture of 1% lidocaine with adrenaline (30 mL) and 0.5% bupivacaine (20 mL). Local anesthetic was administered at four anatomical sites: the iliohypogastric nerve, superficial inguinal ring, incision site, and deep inguinal ring. Patients then underwent open inguinal hernioplasty using the Lichtenstein mesh-based tension-free technique. After surgery, patients in

the local anesthesia group were observed in the recovery room for 2 hours and were discharged on the same day if no complications occurred. In the regional or general anesthesia group, anesthesia was administered by an anesthesiologist, and patients underwent open inguinal hernioplasty using the same Lichtenstein mesh-based technique. Postoperatively, patients were monitored in the recovery room for 2 hours before being transferred to the inpatient ward and discharged on the following day if no complications were observed.

Postoperative Care and Follow-up

Both groups received the same postoperative oral analgesic regimen, consisting of paracetamol 500 mg every 6 hours for 3 days, with tramadol 50 mg every 6 hours as needed for breakthrough pain. Postoperative wound pain was assessed at 8 and 24 hours after surgery using the visual analog scale (VAS). Pain assessment was conducted via telephone interview for patients in the local anesthesia group and by direct assessment in the inpatient ward for patients in the anesthesiologist-administered anesthesia group. Discharge in the local anesthesia group was based on standardized clinical stability criteria, including stable vital signs, adequate pain control, and ability to ambulate. Although no formal geographic or caregiver-based exclusion criteria were applied, all patients received a 24-hour contact number for postoperative consultation in the event of complications after discharge. If patients presented to the emergency department, appropriate medical care was provided immediately. Patients were scheduled for follow-up visits at 2 weeks and 4 weeks postoperatively to assess surgical and anesthetic complications, healthcare costs (categorized as fixed operative costs and variable costs), and patient satisfaction. Return to normal activity was defined as the number of days until the patient self-reported resumption of routine daily activities without limitation and was assessed via direct questioning during follow-up. Surgical satisfaction was evaluated using a modified version of the Surgical Satisfaction Questionnaire (SSQ-8)(18). An additional follow-up at 1 year was conducted to assess the recurrence rate of inguinal hernia, and chronic groin pain. All treatment costs were covered under standard healthcare entitlements, as inguinal hernia is considered a basic disease covered by all healthcare schemes in Thailand, regardless of the anesthesia method used.

Endpoints

The primary objective of this study was to compare the effectiveness of unilateral inguinal hernia repair between day-case surgery (same-day discharge) surgery and

conventional inpatient surgery. The secondary objectives included comparisons of postoperative complications, patient satisfaction, and healthcare costs between the day-case surgery and conventional inpatient surgery.

Statistical analysis

Baseline patient characteristics, including age, body weight, height, body mass index (BMI), postoperative length of stay, American Society of Anesthesiologists (ASA) physical status classification, and operative time, were summarized using descriptive statistics. Continuous variables were presented as mean and standard deviation (SD) or median with interquartile range (IQR), depending on data distribution, while categorical variables were reported as frequencies and percentages. Comparisons of postoperative pain scores and surgical satisfaction between patients undergoing inguinal hernia repair under local anesthesia and those receiving anesthesiologist-administered anesthesia were performed using the independent samples t-test. Categorical outcomes, including postoperative complications, were compared between groups using the chi-square test. This study was designed as a comparative prospective cohort study. Statistical analyses were performed using two-sided superiority testing with a significance threshold of $p < 0.05$.

RESULTS

Baseline Characteristics

A total of 30 patients were included in this study, with 15 patients in the local anesthesia group and 15 in the general anesthesia group. All patients were male. Baseline demographic characteristics, including age and body mass index (BMI), were comparable between the two groups. The prevalence of most underlying comorbidities did not differ significantly between groups; however, dyslipidemia was more frequently observed in the general anesthesia group compared to the local anesthesia group (73.3% vs. 33.3%, $p = 0.028$). There was no statistically significant difference in ASA physical status distribution, although a higher proportion of patients in the local anesthesia group were classified as ASA more than III compared with the general anesthesia group (6.7% vs. 33.3%, $p = 0.084$). Hernia laterality and hernia type (direct, indirect, or pantaloon) were similar between groups.

Operative details and postoperative recovery

Operative time and total operating room time were comparable between the two groups. The mean operative time was 79.00 ± 11.05 minutes in the local anesthesia group and 78.00 ± 25.55 minutes in the general anesthesia

TABLE 1. Demographic data.

	Local anesthesia (n = 15)	General anesthesia (n = 15)	p-value
Sex (male)	15 (100%)	15 (100%)	N/A
Age (year)	72.53±6.87	71.07±3.90	0.478
BMI (kg/m ²)	21.76±2.80	21.69±3.16	0.947
Underlying disease			
Hypertension	9 (60%)	10 (66.7%)	0.705
Dyslipidemia	5 (33.3%)	11 (73.3%)	0.028
Diabetes mellitus	4 (26.7%)	4 (26.7%)	1.000
Benign prostatic hypertrophy	5 (33.3%)	6 (40%)	0.705
Valvular heart disease	1 (6.7%)	2 (13.3%)	0.543
Arrhythmia	0 (0%)	3 (20%)	0.068
Chronic kidney disease	0 (0%)	2 (13.3%)	0.143
COPD	2 (13.3%)	2 (13.3%)	1.000
ASA classification			0.084
1-2	14 (93.3%)	10 (66.7%)	
≥ 3	1 (6.7%)	5 (33.3%)	
Laterality (Right side)	7 (46.7%)	8 (53.3%)	0.500
Hernia Type			0.550
Direct	3 (20.0%)	4 (26.7%)	
Indirect	9 (60.0%)	10 (66.7%)	
Pantaloon	3 (20.0%)	1 (6.7%)	

Data presented in n (%) for categorical variables, mean±standard deviation for normally distributed data, and median (P25, P75) for non-normally distributed data.

Abbreviations: BMI = Body mass index; COPD = Chronic Obstructive Pulmonary Disease; ASA = American Society of Anesthesiologists

TABLE 2. Operative details, postoperative pain scores, and recovery outcomes.

	Local anesthesia ¹⁵	General anesthesia ¹⁵	p-value
Operative time (minute)	79.00±11.05	78.00±25.55	0.891
Theater time (minute)*	101.67±12.91	107.67±25.77	0.429
Postoperative pain**			
Resting pain 8 hours	1.93±1.10	2.53±1.55	0.233
Resting pain 24 hours	0.87±0.83	1.80±1.65	0.032
Pain on movement 8 hours	4.67±1.17	4.67±1.17	0.310
Pain on movement 24 hours	2.33±0.82	2.47±1.55	0.386
Return to normal activity***	1.00±0.54	1.40±0.51	0.022

*Theater time includes the period from patient room-in, anesthesia induction, surgical procedure, and recovery of consciousness before room-out.

**Hour after surgery.

***Day after surgery.

group ($p = 0.891$). Similarly, total theater time did not differ significantly (101.67 ± 12.91 minutes vs. 107.67 ± 25.77 minutes, $p = 0.429$).

Postoperative pain scores at 8 hours, both at rest and during movement, were not significantly different between groups. At 24 hours postoperatively, pain at rest was significantly lower in the local anesthesia group compared to the general anesthesia group (0.87 ± 0.83 vs. 1.80 ± 1.65 , $p = 0.032$), whereas pain during movement remained comparable between groups ($p = 0.386$). Although rescue analgesia was available under a standardized protocol, the exact number of rescue doses was not formally recorded, which may influence interpretation of VAS differences.

Patients in the local anesthesia group returned to normal activity significantly earlier than those in the general anesthesia group (1.00 ± 0.54 days vs. 1.40 ± 0.51 days, $p = 0.022$).

Postoperative complications

Early postoperative complications were infrequent and did not differ significantly between groups. Acute urinary retention (AUR), seroma, neurapraxia, and early postoperative groin pain occurred at low and comparable rates, and all postoperative complications were minor complications (Clavien–Dindo grade I–II), with no major complications observed. In the local anesthesia group, one patient with a pantaloon hernia developed a postoperative seroma at 2 weeks, which resolved spontaneously. One high-risk patient with multiple comorbidities — including dilated cardiomyopathy, triple-vessel disease requiring percutaneous coronary intervention while on aspirin therapy, and chronic obstructive pulmonary disease — experienced transient neurapraxia, likely due to inadvertent femoral nerve block. The patient was admitted for observation, and symptoms resolved within 24 hours without sequelae. He was discharged without residual weakness. Early postoperative groin pain occurred in one patient and resolved during follow-up, with no cases of chronic groin pain observed. In the general anesthesia group, one patient experienced postoperative AUR requiring temporary Foley catheterization, which was successfully discontinued during outpatient follow-up. Two patients developed postoperative seroma following repair of indirect inguinal hernias with defect sizes of 3 cm and 4 cm, respectively, both resolving spontaneously within 3 months.

Late postoperative outcomes were comparable between groups. One patient in the general anesthesia group with an indirect inguinal hernia defect of 4 cm reported

early postoperative groin numbness and subsequently developed chronic groin pain persisting at 1 year. One-year hernia recurrence occurred in one patient in each group (6.7%), with no statistically significant difference ($p = 0.759$). In the local anesthesia group, one patient with a left direct inguinal hernia developed a recurrent defect measuring approximately 3 cm at 1-year follow-up and subsequently underwent laparoscopic totally extraperitoneal (TEP) repair. In the general anesthesia group, one patient who initially underwent right direct inguinal hernia repair developed a recurrent right indirect inguinal hernia at 1 year and proceeded to laparoscopic TEP repair. There were no 28-day readmissions in either group.

Patient satisfaction and healthcare costs

Patient satisfaction scores were high in both groups, with no statistically significant difference between the local anesthesia and general anesthesia groups (8.60 ± 1.24 vs. 8.87 ± 1.13 , $p = 0.653$).

In contrast, total hospital cost was significantly lower in the local anesthesia group (median 13,453 THB [IQR 12,983, 14,225]) compared with the general anesthesia group (41,226 THB [40,092, 43,184]; $p < 0.001$). Fixed operative cost was also lower with local anesthesia (13,332 THB [12,980, 14,004] vs 30,656 THB [29,394, 32,108]; $p < 0.001$). Regarding variable costs, anesthesia service fees and inpatient stay costs were absent in the local anesthesia group for both, whereas these costs were substantial in the general anesthesia group (7,725 THB [6,882, 8,368] and 3,400 THB [3,198, 5,350], respectively; both $p < 0.001$).

Overall, open hernia repair with local anesthesia was associated with comparable patient satisfaction but significantly reduced hospital expenditures.

DISCUSSION

This prospective cohort study demonstrates that open inguinal hernioplasty performed under local anesthesia with same-day discharge yields clinical outcomes comparable to those of general anesthesia with inpatient admission, while offering significant advantages in postoperative recovery and healthcare cost reduction.

Postoperative outcomes and safety

Postoperative pain control was at least equivalent — and in some respect superior — in the local anesthesia group. Although pain scores at 8 hours postoperatively did not differ significantly between groups, pain at rest at 24 hours was significantly lower in patients receiving local anesthesia. This finding reflects a sustained analgesic

TABLE 3. Overall postoperative complications.

	Local anesthesia ¹⁵	General anesthesia ¹⁵	p-value
Early postoperative complication			0.357
Acute urinary retention	0 (0%)	1 (6.7%)	
Seroma	1 (6.7%)	2 (13.3%)	
Neurapraxia	1 (6.7%)	0 (0%)	
Groin pain	2 (13.3%)	0 (0%)	
Clavien-dindo classification			N/A
Minor complication (I-II)	4 (%)	3 (100%)	
Major complication (III-IV)	0 (0%)	0 (0%)	
Late postoperative complication			
Chronic groin pain	0 (0%)	1 (6.7%)	0.500
1-year recurrence	1 (6.7%)	1 (6.7%)	0.759
28-day readmission	0 (0%)	0 (0%)	N/A

TABLE 4. Satisfaction and hospital cost.

	Local anesthesia ¹⁵	General anesthesia ¹⁵	p-value
Patient satisfaction score	8.6±1.24	8.87±1.13	0.653
Total hospital cost* (THB) (Median, IQR)	13,453 (12,983, 14,225)	41,226 (40,092, 43,184)	< 0.001
Fixed Operative cost** (THB) (Median, IQR)	13,332 (12,980, 14,004)	30,656 (29,394, 32,108)	< 0.001
Variable cost (THB) (Median, IQR)			
Anesthesia services***	0 (0, 0)	7,725 (6,882, 8,368)	< 0.001
Inpatient stay ****	0 (0, 0)	3,400 (3,198, 5,350)	< 0.001

*Total hospital cost included the surgery cost in addition to inpatient care and medications administered during the hospital stay.

**Fixed operative cost included operative-related expenses, such as sterile surgical instruments, prostheses, operating room services, surgeon/scrub nurse fee and intraoperative medications used during surgery.

***Anesthesia service cost included anesthetic equipment, intraoperative anesthetic medications, anesthetic doctor/nurse fee, and monitoring equipment used during anesthetic process.

****Inpatient stay cost included ward care service, private room charges varied by room type and medical care fee during admission.

benefit beyond the immediate postoperative period and may facilitate earlier mobilization and functional recovery. Similar observations have been reported in both randomized controlled trials and meta-analyses, in which local anesthesia was associated with comparable or reduced postoperative pain compared with general or regional anesthesia.¹⁹⁻²¹

Importantly, postoperative complications were infrequent and mild in both groups, with no major complications observed. All early adverse events were classified as Clavien–Dindo grade I–II, and no 28-day readmissions occurred. The low complication rate in the local anesthesia group suggests comparable short-term safety within this cohort. However, the sample size was insufficient to exclude rare complications. This finding is consistent with recent evidence demonstrating favorable short-term outcomes of local anesthesia-based inguinal hernia repair, including in elderly and frail patients, without increased risks of bleeding, surgical site infection, or mortality.²²

Acute urinary retention, a well-recognized complication associated with general and regional anesthesia, occurred only in the general anesthesia group in our study. This finding mirrors results from prior randomized trials and meta-analyses showing a lower incidence of urinary retention following local anesthesia–based hernia repair.^{20,22} Avoidance of neuraxial or systemic anesthetic agents may therefore represent an additional advantage of local anesthesia, particularly in older patients or those with underlying urological risk factors.

Operative efficiency and recovery

Operative time and total theater time were comparable between groups, indicating that local anesthesia does not compromise procedural efficiency. Although an earlier multicenter randomized trial reported longer theater times in the local anesthesia group²⁰, subsequent studies and meta-analyses have shown equivalent or even shorter theater times when local anesthesia is performed by experienced surgical teams.^{3,22} The slight numerical reduction in theater time observed in our study, although not statistically significant, likely reflects standardized local infiltration techniques and streamlined perioperative workflows within the day-surgery pathway.

Patients undergoing surgery under local anesthesia returned to normal daily activities significantly earlier than those receiving general anesthesia. This finding is clinically relevant and aligns with prior reports demonstrating shorter length of stay and faster functional recovery following local anesthesia–based inguinal hernia repair.¹⁹⁻²¹ Early ambulation and reduced postoperative fatigue may be

attributed to the avoidance of systemic anesthetic effects and inpatient admission.

Patient satisfaction

Despite differences in anesthetic technique and discharge timing, patient satisfaction scores were high and comparable between groups. Even patients who remained awake during surgery under local anesthesia reported high levels of satisfaction. This may be attributable to several factors, including earlier discharge, shorter preoperative and postoperative fasting periods, short work leave, faster return to normal activities, reduced postoperative pain at 24 hours, and reduced anxiety regarding anesthesia-related complications. This suggests that concerns regarding patient discomfort or dissatisfaction with awake surgery may be overstated when appropriate patient counseling and intraoperative pain control are provided. Similar levels of satisfaction between local and general anesthesia have been reported in randomized trials and systematic reviews.^{18,20,22} These findings support the acceptability of local anesthesia from the patient perspective.

Cost implications and healthcare system impact

One of the most striking findings of this study is the substantial reduction in both surgical and total hospital costs associated with local anesthesia and same-day discharge. Total hospital costs in the local anesthesia group were approximately one-third of those in the general anesthesia group. This cost difference was primarily driven by the avoidance of inpatient admission and anesthesiologist-administered anesthesia, rather than differences in operative time or complication-related costs.

Previous studies have demonstrated similar cost advantages of local anesthesia for inguinal hernia repair at both institutional and national levels. *Balentine et al.* reported potential national cost savings ranging from 9 to 45 million USD with broader adoption of local anesthesia in older patients.²¹ Although our study did not assess national-level economic impact, the marked cost reduction suggests that wider implementation of local anesthesia–based day surgery could significantly improve resource utilization and surgical capacity within the Thai healthcare system, particularly in the context of the One Day Surgery policy initiative.

Clinical implications

Taken together, these findings support the routine consideration of local anesthesia with same-day discharge for primary unilateral inguinal hernia repair in appropriately selected patients. Beyond cost savings, this approach

offers equivalent safety, comparable patient satisfaction, and faster functional recovery. From a health system perspective, increased adoption of this strategy may help alleviate inpatient bed shortages and improve access to elective surgical care.

Successful implementation, however, requires surgeon preference with local anesthesia techniques, appropriate patient selection, and structured perioperative pathways. Patient education and expectation management remain critical, particularly in settings where general anesthesia has traditionally been preferred.

Limitations

This study has several limitations. First, the non-randomized design and patient self-selection of anesthesia may introduce selection bias. Patients choosing local anesthesia may have differed in motivation, expectations, or perceived recovery priorities compared with those choosing general anesthesia. Second, although the study was adequately powered for the primary endpoint of postoperative pain at 8 hours, the sample size was insufficient to detect rare complications. Third, the cost analysis was performed at the institutional level and may not fully capture indirect or societal costs. Despite these limitations, the prospective design, standardized surgical technique, and comprehensive outcome assessment strengthen the validity of the findings.

CONCLUSIONS

Open inguinal hernioplasty performed under local anesthesia with same-day discharge provides clinical outcomes comparable to those of general anesthesia with inpatient admission. This approach is associated with equivalent operative efficiency, low complication rates, and high patient satisfaction, while offering advantages in postoperative pain control, faster return to normal activities, and a substantial reduction in healthcare costs. These findings support the use of local anesthesia-based day surgery as a safe, effective, and cost-efficient strategy for appropriately selected patients with primary unilateral inguinal hernia. Wider adoption of this approach may contribute to improved resource utilization and surgical capacity within the healthcare system.

Data Availability Statement

The data supporting the findings of our study are available from the corresponding author upon request at the following contact information.

ACKNOWLEDGEMENTS

We thank Dr. Saowalak Hunnangkul, and Nerisa

Thronsri for statistical consultation, as well as Aditya Rana for assistance with English language editing of this manuscript.

DECLARATIONS

The study was conducted in accordance with the Declaration of Helsinki and relevant ethical guidelines. The patient confidentiality was strictly maintained, and no identifying information was disclosed.

Grants and Funding Information

This was an unfunded study.

Conflict of Interest

The authors declare that there are no conflicts of interest or financial ties.

Author Contributions

Conceptualization and methodology, C.P., B.D., C.T., T.S., T.A., and S.J. ; Investigation, C.P., B.D., C.T., T.S., T.A., and S.J. ; Formal analysis, C.P., B.D., C.T., T.S., T.A., and S.J. ; Visualization and writing – original draft, C.P., B.D., C.T., T.S., T.A., and S.J. ; Writing – review and editing, C.P., B.D., C.T., T.S., T.A., and S.J. ; Funding acquisition, none; Supervision, C.P., T.S., T.A., and S.J. All authors have read and agreed to the final version of the manuscript.

Use of Artificial Intelligence

Artificial intelligence tools were used to assist with language editing and the improvement of grammar in the manuscript. The authors critically reviewed and revised all content, took full responsibility for the accuracy, integrity, and originality of the work, and confirmed that the use of artificial intelligence did not influence the study design, data analysis, interpretation of results, or conclusions.

REFERENCES

1. Fitzgibbons RJ, Jr., Forse RA. Clinical practice. Groin hernias in adults. *N Engl J Med*. 2015;372(8):756-63.
2. Primates P, Goldacre MJ. Inguinal hernia repair: incidence of elective and emergency surgery, readmission and mortality. *Int J Epidemiol*. 1996;25(4):835-9.
3. Simons MP, Aufenacker T, Bay-Nielsen M, Bouillot JL, Campanelli G, Conze J, et al. European Hernia Society guidelines on the treatment of inguinal hernia in adult patients. *Hernia*. 2009; 13(4):343-403.
4. Miserez M, Peeters E, Aufenacker T, Bouillot JL, Campanelli G, Conze J, et al. Update with level 1 studies of the European Hernia Society guidelines on the treatment of inguinal hernia in adult patients. *Hernia*. 2014;18(2):151-63.
5. Lomanto D, Cheah WK, Faylona JM, Huang CS, Lohsiriwat

- D, Maleachi A, et al. Inguinal hernia repair: toward Asian guidelines. *Asian J Endosc Surg*. 2015;8(1):16-23.
6. Burney RE, Prabhu MA, Greenfield ML, Shanks A, O'Reilly M. Comparison of spinal vs general anesthesia via laryngeal mask airway in inguinal hernia repair. *Arch Surg*. 2004;139(2):183-7.
7. Nordin P, Haapaniemi S, van der Linden W, Nilsson E. Choice of anesthesia and risk of reoperation for recurrence in groin hernia repair. *Ann Surg*. 2004;240(1):187-92.
8. Kehlet H, Aasvang E. Groin hernia repair: anesthesia. *World J Surg*. 2005;29(8):1058-61.
9. van Veen RN, Mahabier C, Dawson I, Hop WC, Kok NF, Lange JF, et al. Spinal or local anesthesia in lichtenstein hernia repair: a randomized controlled trial. *Ann Surg*. 2008;247(3):428-33.
10. Law LS, Tan M, Bai Y, Miller TE, Li YJ, Gan TJ. Paravertebral Block for Inguinal Herniorrhaphy: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. *Anesth Analg*. 2015;121(2):556-69.
11. Prakash D, Heskin L, Doherty S, Galvin R. Local anaesthesia versus spinal anaesthesia in inguinal hernia repair: A systematic review and meta-analysis. *Surgeon*. 2017;15(1):47-57.
12. Bakota B, Kopljar M, Baranovic S, Miletic M, Marinovic M, Vidovic D. Should we abandon regional anesthesia in open inguinal hernia repair in adults? *Eur J Med Res*. 2015;20(1):76.
13. Kazaure HS, Roman SA, Sosa JA. The resident as surgeon: an analysis of ACS-NSQIP. *J Surg Res*. 2012;178(1):126-32.
14. Lee SL, Sydorak RM, Applebaum H. Training general surgery residents in pediatric surgery: educational value vs time and cost. *J Pediatr Surg*. 2009;44(1):164-8.
15. Papandria D, Rhee D, Ortega G, Zhang Y, Gorgy A, Makary MA, et al. Assessing trainee impact on operative time for common general surgical procedures in ACS-NSQIP. *J Surg Educ*. 2012;69(2):149-55.
16. Sungurtekin H, Sungurtekin U, Erdem E. Local anesthesia and midazolam versus spinal anesthesia in ambulatory pilonidal surgery. *J Clin Anesth*. 2003;15(3):201-5.
17. Tverskoy M, Cozacov C, Ayache M, Bradley EL, Jr., Kissin I. Postoperative pain after inguinal herniorrhaphy with different types of anesthesia. *Anesth Analg*. 1990;70(1):29-35.
18. Haff RE, Stoltzfus J, Lucente VR, Murphy M. The Surgical Satisfaction Questionnaire (SSQ-8): A Validated Tool for Assessment of Patient Satisfaction Following Surgery To Correct Prolapse and/or Incontinence. *J Minim Invasive Gynecol*. 2011;18(6):S49-S50.
19. Li R, Atahar J, Noureldin A, Kartiko S. Favorable 30-day outcomes of initial open inguinal hernia repair with local anesthesia among frail patients. *J Visc Surg*. 2025;162(3):178-84.
20. Nordin P, Zetterström H, Gunnarsson U, Nilsson E. Local, regional, or general anaesthesia in groin hernia repair: multicentre randomised trial. *The Lancet*. 2003;362:853-8.
21. Balentine CJ, Meier J, Berger M, Reisch J, Cullum M, Lee SC, et al. Using Local Anesthesia for Inguinal Hernia Repair Reduces Complications in Older Patients. *J Surg Res*. 2021;258:64-72.
22. Argo M, Favela J, Phung T, Huerta S. Local VS. other forms of anesthesia for open inguinal hernia repair: A meta-analysis of randomized controlled trials. *Am J Surg*. 2019;218(5):1008-15.