

Revisiting Local Anaesthesia in Open Inguinal Hernia Repair: A Clinical Evaluation

Dr. Prashant¹, Dr. Aakash Pandey², Dr. Roop Singh Parihar³

¹Junior Resident, Department of General Surgery, LN Medical College and Research Centre and JK Hospital, Bhopal, IND
Corresponding Author Email: [prashant9072\[at\]gmail.com](mailto:prashant9072[at]gmail.com)

²Junior Resident, Department of General Surgery, LN Medical College and Research Centre and JK Hospital, Bhopal, IND
Email: [aakashpandey88\[at\]yahoo.co.in](mailto:aakashpandey88[at]yahoo.co.in)

³Associate Professor, Department of General Surgery, LN Medical College and Research Centre and JK Hospital, Bhopal, IND
Email: [singh.roop96\[at\]gmail.com](mailto:singh.roop96[at]gmail.com)

Abstract: ***Background:** Local anaesthesia may offer a safe, economical and resource-efficient option for uncomplicated open inguinal hernia repair. **Objective:** To evaluate its anaesthetic adequacy, postoperative pain, recovery, complications and patient satisfaction in a district hospital. **Methods:** This prospective observational study included 20 adults who underwent elective open Lichtenstein hernioplasty under local anaesthesia over three months. **Results:** Of the 20 patients, 10 (50%) had right-sided hernias, seven (35%) had left-sided hernias and three (15%) had bilateral hernias. Surgery was completed without conversion to spinal or general anaesthesia in all patients, while 19 (95%) underwent the procedure under local anaesthesia alone. The overall mean operative time was 51.6 ± 9.4 minutes. Bilateral repairs required a longer mean operative time than unilateral repairs (68.0 ± 5.1 versus 48.7 ± 6.5 minutes). Eighteen patients were discharged within 12 hours, and postoperative pain declined significantly by day seven. Three minor complications occurred, without urinary catheterisation, readmission, reoperation or early recurrence. **Conclusion:** Local anaesthesia appeared feasible, acceptable and effective for carefully selected adults undergoing uncomplicated open inguinal hernia repair.*

Keywords: Inguinal hernia, local anaesthesia, Lichtenstein hernioplasty, day-care surgery, postoperative pain

1. Introduction

Inguinal hernia repair is one of the most frequently undertaken procedures in general surgical practice. Despite the growing availability of laparoscopic and robotic techniques, open mesh repair continues to have an important role, particularly in district hospitals and healthcare facilities with limited resources. It requires relatively little specialised equipment, is familiar to most general surgeons and can be performed in patients who may not be ideal candidates for prolonged general anaesthesia. Among the available open procedures, the Lichtenstein tension-free mesh technique remains widely accepted for primary unilateral inguinal hernias.

Open inguinal hernia repair can be performed under general, regional or local anaesthesia. The chosen technique affects intraoperative safety, postoperative pain, nausea, urinary retention, mobilisation, length of hospital stay and treatment cost. General anaesthesia offers controlled operating conditions but may be associated with airway manipulation, postoperative nausea, vomiting and delayed recovery. Spinal anaesthesia avoids airway instrumentation but may produce hypotension, urinary retention, motor blockade and post-dural puncture headache. Local anaesthesia limits systemic physiological disturbance and allows the patient to retain spontaneous ventilation and protective airway reflexes.

The HerniaSurge international guidelines recognised the advantages of local anaesthesia and recommended it for open repair of reducible inguinal hernias when surgeons were experienced in the technique.[1] In a multicentre randomised trial, Nordin et al. found that local anaesthesia was associated with fewer early postoperative difficulties and a shorter

duration of admission than regional or general anaesthesia.[2] O'Dwyer et al. also demonstrated that open hernia repair under local anaesthesia could produce satisfactory recovery and clinical outcomes.[3]

Successful local anaesthesia requires more than infiltration of the skin incision. Amid et al. described a systematic multistep technique involving infiltration of the skin, subcutaneous tissue, external oblique aponeurosis, inguinal canal, pubic tubercle, internal ring and tissues surrounding the hernial sac.[4] This anatomical approach can provide adequate anaesthesia while limiting the total dose of local anaesthetic.

A systematic review by Reece-Smith et al. reported less postoperative nausea and a slightly earlier return to normal activity with local anaesthesia than with general anaesthesia.[5] Nordin et al. subsequently demonstrated that local anaesthesia was also less expensive than regional or general anaesthesia.[6] In a meta-analysis of 18 randomised trials, Argo et al. found significantly shorter operating-room time and less urinary retention with local anaesthesia, without inferior patient satisfaction.[7] Despite these advantages, local anaesthesia remains underused. Meier et al. observed a steady decline in its use within the United States Veterans Affairs system despite evidence of equivalent or improved outcomes.[8] Concerns regarding intraoperative discomfort, patient anxiety, incomplete anaesthesia and technical unfamiliarity may discourage its adoption. Nevertheless, recent prospective evidence has continued to demonstrate favourable short-term recovery following open hernioplasty under local anaesthesia.[9]

District hospitals manage a considerable burden of uncomplicated inguinal hernias but frequently face

limitations in operating-room resources, anaesthesia personnel and inpatient beds. Local anaesthesia could therefore provide a practical alternative for appropriately selected patients. This study evaluated the feasibility, intraoperative adequacy, postoperative pain, recovery profile, complications and patient satisfaction associated with open inguinal hernia repair under local anaesthesia in a district-hospital setting.

2. Materials and Methods

1) Study design and setting

This prospective, single-centre observational study was conducted in DH Rajgarh, Madhya Pradesh, over three consecutive months from 1/4/25 to 30/6/25 during the district residency program. Twenty patients scheduled for elective open inguinal hernia repair were enrolled consecutively.

2) Study population

Adult patients aged 18 years or older with a primary, reducible unilateral or bilateral inguinal hernia who were considered suitable for elective open mesh repair under local anaesthesia were included. Patients with recurrent, obstructed or strangulated hernias; giant inguinoscrotal hernias; local infection; coagulopathy; known hypersensitivity to the proposed anaesthetic agents; severe cognitive or communication impairment; uncontrolled psychiatric illness; or refusal to remain conscious during surgery were excluded.

3) Preoperative evaluation

Each patient underwent a detailed medical and surgical history, physical examination and routine preoperative investigations. The side and clinical type of hernia, comorbidities, body mass index and American Society of Anaesthesiologists physical status were recorded. Patients received detailed counselling regarding local infiltration, expected intraoperative sensations and the importance of communicating discomfort. They were informed that touch,

pressure or traction might be felt despite adequate pain control. The possible need for supplementary local anaesthetic, intravenous sedation or conversion to spinal or general anaesthesia was explained.

4) Anaesthetic technique

Lignocaine with adrenaline was used as the local anaesthetic agent. In patients for whom adrenaline was contraindicated, 2% plain lignocaine was administered. Intravenous diclofenac was used for analgesia within the recommended safe dosage limits. In patients for whom diclofenac was contraindicated, intravenous tramadol diluted in 100 mL of normal saline was administered along with 4 mg of intravenous ondansetron to provide analgesia and reduce tramadol-associated nausea and vomiting.

Intravenous access was secured, and pulse rate, non-invasive blood pressure, respiratory rate and peripheral oxygen saturation were monitored. Resuscitation medicines, airway equipment and facilities for conversion to another anaesthetic technique were kept available. A weight-adjusted local anaesthetic mixture within the recommended maximum safe dose was administered. Infiltration was performed sequentially along the proposed incision, subcutaneous tissue, external oblique aponeurosis, pubic tubercle, inguinal canal, internal ring and tissues surrounding the hernial sac. Additional small-volume infiltration was administered when focal discomfort occurred. Light intravenous sedation was used only when necessary and was documented separately.

5) Surgical procedure

All patients underwent open tension-free Lichtenstein mesh hernioplasty. The same general operative principles were followed in every patient. Communication was maintained with the patient throughout the operation. Conversion was defined as requiring spinal or general anaesthesia to complete the procedure. The use of limited intravenous sedation was recorded but was not classified as conversion.

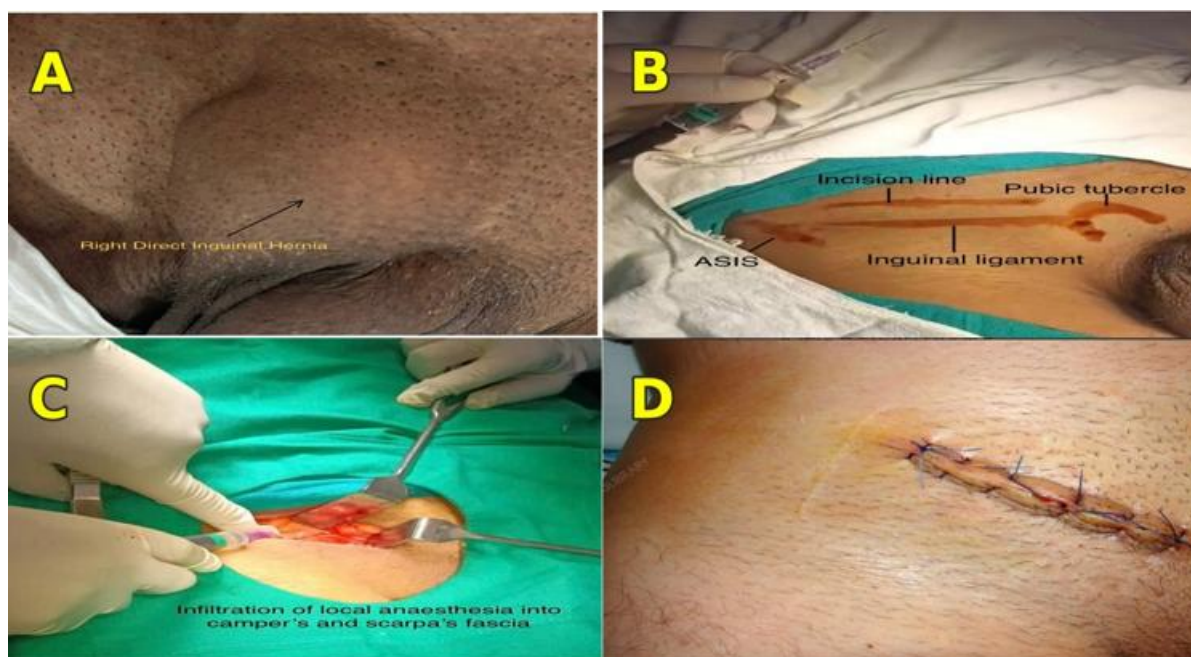


Image- (A) Shows swelling in right inguinal region, Image (B) Shows incision making and important anatomical landmarks, Image (C) Infiltration of local anaesthesia, Image (D) Skin Closure with interrupted suture

6) Outcome assessment

The primary outcome was successful completion of surgery under local anaesthesia without conversion. Secondary outcomes included the volume of local anaesthetic, supplementary infiltration, sedation, intraoperative pain, operative time, time to oral intake, ambulation, spontaneous voiding, discharge, complications and satisfaction. Pain was measured on a 0–10 numerical rating scale, where 0 indicated no pain and 10 indicated the worst imaginable pain. Intraoperative pain and postoperative pain at six hours and on days one, three and seven were documented. Satisfaction was graded using a five-point scale from very dissatisfied to very satisfied. Follow-up examinations were performed on postoperative days 7 and 30.

7) Statistical analysis

Continuous variables were reported as mean and standard deviation or median and interquartile range. Categorical variables were presented as frequency and percentage. Changes in repeated postoperative pain scores were evaluated using the Friedman test. Wilcoxon signed-rank tests with Bonferroni correction were used for pairwise comparisons. A probability value below 0.05 was considered statistically significant.

3. Results

All 20 patients completed the operative assessment and 30-day follow-up. The mean age was 51.8 ± 13.7 years, with an age range of 25–74 years. Nineteen patients were men and one was a woman. Twelve patients were classified as ASA physical status I and eight as ASA physical status II. Regarding the side of the hernia, 10 (50%) patients had a right-sided hernia, seven (35%) had a left-sided hernia and three (15%) had bilateral inguinal hernias. Thus, 17 patients underwent unilateral repair, while three underwent bilateral repair. Right-sided hernias were the most common presentation. Indirect inguinal hernias were more frequent than direct and pantaloon hernias.

Table 1: Baseline characteristics of the patients

Characteristic	Result
Total number of patients	20
Age, years	51.8 ± 13.7
Age range, years	25–74
Male	19 (95.0%)
Female	1 (5.0%)
BMI, kg/m ²	23.7 ± 2.8
ASA physical status I	12 (60.0%)
ASA physical status II	8 (40.0%)
Right-sided hernia	10 (50.0%)
Left-sided hernia	7 (35.0%)
Bilateral hernia	3 (15.0%)
Unilateral hernia	17 (85.0%)
Indirect hernia	12 (60.0%)
Direct hernia	6 (30.0%)
Pantaloon hernia	2 (10.0%)
Hypertension	4 (20.0%)
Type 2 diabetes mellitus	2 (10.0%)
Current smoker	5 (25.0%)

1) Anaesthetic and operative outcomes

Surgery was completed without conversion to spinal or general anaesthesia in all 20 patients. Nineteen patients

underwent surgery using local anaesthesia without additional monitored sedation, providing a success rate of 95% for local anaesthesia alone. One patient experienced persistent discomfort during traction on a large indirect hernial sac and received supplementary intravenous sedation. General or spinal anaesthesia was not required in any patient.

The mean local anaesthetic volume was 39.6 ± 5.8 mL. Nine patients required limited supplementary infiltration, particularly during mobilisation of the hernial sac or mesh fixation close to the pubic tubercle. Four patients received light intravenous sedation for anxiety or discomfort, including the patient who required monitored sedation to complete the operation. The median intraoperative pain score was 2, indicating generally mild discomfort. Two patients recorded an intraoperative pain score of at least 4. No patient developed local anaesthetic systemic toxicity, hypoxaemia, clinically important hypotension or bradycardia.

The overall mean operative time was 51.6 ± 9.4 minutes. Unilateral repairs required a mean operative time of 48.7 ± 6.5 minutes, whereas bilateral repairs required 68.0 ± 5.1 minutes. Therefore, bilateral hernia repair was comparatively more time-consuming because dissection, mesh placement and wound closure had to be performed on both sides. Unilateral hernia repair was technically more straightforward and could be completed in a shorter duration than bilateral repair.

Patients commenced oral fluids at a median of 55 minutes and ambulated at a median of 95 minutes after surgery. The mean time to spontaneous voiding was 156 ± 42 minutes.

Table 2: Anaesthetic adequacy, operative details and recovery

Outcome	Result
Completed without spinal/general conversion	20 (100%)
Completed under local anaesthesia alone	19 (95.0%)
Additional monitored IV sedation required	1 (5.0%)
Local anaesthetic volume	39.6 ± 5.8
Supplementary local infiltration	9 (45.0%)
Any light intravenous sedation	4 (20.0%)
Intraoperative NRS score, median (IQR)	2 (1–3)
Intraoperative NRS score ≥ 4	2 (10.0%)
Overall operative time	51.6 ± 9.4
Operative time for unilateral repair	48.7 ± 6.5
Operative time for bilateral repair	68.0 ± 5.1
Time to oral fluids, minutes, median (IQR)	55 (45–70)
Time to ambulation, minutes, median (IQR)	95 (75–120)
Time to spontaneous voiding,	156 ± 42
Discharged within 12 hours	18 (90.0%)
Overnight observation	2 (10.0%)
Length of stay, hours, median (IQR)	8.2 (7.0–10.5)

NRS: numerical rating scale; IQR: interquartile range; IV: intravenous.

Eighteen patients were discharged within 12 hours. Two remained overnight: one because the operation ended late and transport was unavailable, and one for observation after monitored sedation. Neither overnight stay resulted from a major surgical or anaesthetic complication.

The comparison according to laterality showed that unilateral inguinal hernia repair was less time-consuming than bilateral

repair. The longer operative duration among bilateral cases was expected because both groins required separate exposure, dissection, hernial sac management, mesh placement and wound closure. Nevertheless, all three bilateral repairs were completed successfully without conversion to spinal or general anaesthesia.

2) Postoperative pain

The median pain score was 3 at six hours, 2 on postoperative day one and 1 on days three and seven. The overall decline in pain was statistically significant (Friedman $\chi^2=42.7$; $P<0.001$). Six patients required rescue analgesia during the initial six-hour period, while five required additional oral analgesia after 24 hours. Because the study had no comparator, the statistical result demonstrated a change in pain over time within the cohort and did not establish superiority over spinal or general anaesthesia.

3) Complications and satisfaction

Three patients developed minor postoperative complications. One patient developed a small seroma that resolved with observation, one developed limited scrotal oedema, and one experienced transient nausea. One patient had temporary difficulty in voiding but passed urine spontaneously without catheterisation. No local anaesthetic toxicity, surgical-site infection, clinically important haematoma, urinary catheterisation, readmission, reoperation or early recurrence was recorded during the 30-day follow-up.

Eighteen patients were satisfied or very satisfied. Seventeen stated that they would select the same technique if another similar operation were required, while 18 indicated that they would recommend the technique to another eligible patient.

Table 3: Postoperative pain, complications and satisfaction

Outcome	Result
NRS at 6 hours, median (IQR)	3 (2–4)
NRS on postoperative day 1, median (IQR)	2 (1–3)
NRS on postoperative day 3, median (IQR)	1 (1–2)
NRS on postoperative day 7, median (IQR)	1 (0–1)
Friedman test for change in pain	$\chi^2=42.7$; $P<0.001$
Rescue analgesia within 6 hours	6 (30.0%)
Additional analgesia after 24 hours	5 (25.0%)
Seroma	1 (5.0%)
Scrotal oedema	1 (5.0%)
Postoperative nausea	1 (5.0%)
Urinary catheterisation	0
Surgical-site infection	0
Readmission or reoperation	0
Early recurrence within 30 days	0
Satisfied or very satisfied	18 (90.0%)
Would choose the same technique again	17 (85.0%)
Would recommend the technique	18 (90.0%)

4. Discussion

This prospective clinical evaluation suggested that open inguinal hernia repair could be undertaken successfully under local anaesthesia in carefully selected patients at a district hospital. Nineteen of the 20 patients completed surgery with local anaesthesia as the principal technique, while one required monitored intravenous sedation. No patient required conversion to spinal or general anaesthesia. Postoperative

pain was mild, recovery milestones were achieved early, and most patients were discharged on the day of surgery.

Callesen et al. reported 1,000 consecutive inguinal hernia repairs under unmonitored local anaesthesia and demonstrated that the technique could be incorporated into routine surgical practice with acceptable morbidity.[10] The high completion rate in the present evaluation was consistent with their experience. Nevertheless, 45% of patients required supplementary infiltration. This should not necessarily be regarded as failure because local anaesthesia is a dynamic technique in which the surgeon identifies and treats incompletely anaesthetised tissue planes during dissection.

The mean operative time was approximately 52 minutes. Balentine et al., in a study of 97,437 patients, reported that local anaesthesia was associated with a 13% reduction in operative time and a 27% shorter recovery-room stay compared with general anaesthesia.[11] Their analysis also demonstrated reduced odds of postoperative complications. In the present study, unilateral inguinal hernia repairs were completed in a shorter mean operative time than bilateral repairs. Bilateral procedures required additional operative time because the surgical steps had to be performed separately on both sides. Therefore, although bilateral repair under local anaesthesia was feasible in appropriately selected patients, unilateral repair was technically more straightforward and less time-consuming. The present study lacked a comparison group and could not confirm such superiority; however, its operative duration showed that local anaesthesia did not prevent completion within a clinically acceptable period.

Postoperative pain declined significantly during the first week. Aasbø et al. reported that inguinal field block improved postoperative analgesia, functional recovery and patient satisfaction compared with general anaesthesia.[12] Local infiltration may reduce early nociceptive stimulation by blocking the ilioinguinal, iliohypogastric and genital nerve branches and anaesthetising successive operative tissue planes. However, six patients in the present study required rescue analgesia during the initial six hours. Local anaesthesia should therefore be combined with appropriate oral or parenteral multimodal analgesia.

Early oral intake, mobilisation and spontaneous voiding were achieved in most patients. Van Veen et al. found significantly more urinary retention and overnight admission following spinal anaesthesia than local anaesthesia in patients undergoing Lichtenstein repair.[13] Similarly, Olsen et al. found lower urinary-retention rates with local anaesthesia than with regional anaesthesia in their network meta-analysis.[14] No patient in the present study required catheterisation. Avoidance of neuraxial blockade may facilitate earlier restoration of bladder function, although the sample was too small to estimate the true incidence of postoperative urinary retention.

Eighteen patients were discharged within 12 hours. Sanjay and Woodward reported that 82.6% of patients treated under local anaesthesia underwent day-case repair, compared with 42.6% of those who received general anaesthesia.[15] Dhumale et al. also reported more than 1,000 ambulatory hernia repairs under local anaesthesia in a primary-care

setting, with over 90% of patients expressing satisfaction.[16] These findings are particularly relevant to district hospitals, where inpatient beds and advanced anaesthesia resources may be limited.

The satisfaction rate in the present study was 90%. Most patients stated that they would select the same technique again or recommend it to another patient. The principal causes of reduced satisfaction were anxiety and awareness of traction during manipulation of the hernial sac. Preoperative counselling is therefore essential. Patients should understand that pressure, movement and traction may be perceived even when sharp pain is adequately blocked. Calm communication and selective light sedation can improve tolerance; however, excessive sedation should be avoided because it may compromise airway safety and delay recovery.

Only minor complications were recorded. Kurzer et al. reported that elective day-case inguinal hernia repair under local anaesthesia produced favourable outcomes in elderly patients, including those with significant comorbidities.[17] The ability to avoid profound haemodynamic changes, airway manipulation and prolonged motor blockade may be valuable in appropriately selected older adults. Prakash et al. compared local and spinal anaesthesia through a systematic review and meta-analysis and found that local anaesthesia was associated with less postoperative pain, fewer adverse events and shorter hospitalisation.[18] The present findings were broadly compatible with this evidence, particularly regarding early mobilisation, spontaneous voiding, mild pain and short admission. Nevertheless, direct comparison was impossible because all participants in the present study received local anaesthesia.

Several limitations must be considered. The study included only 20 patients from a single centre and therefore had limited statistical precision. There was no control group receiving spinal or general anaesthesia. Neither patients nor investigators were blinded, and satisfaction may have been influenced by interaction with the treating team. Follow-up was limited to 30 days and did not permit assessment of chronic postoperative inguinal pain, long-term quality of life or recurrence.

5. Conclusion

Open inguinal hernia repair under local anaesthesia was feasible for both unilateral and carefully selected bilateral hernias. Unilateral repairs were comparatively easier and required less operative time, whereas bilateral repairs were successfully completed but required a longer operative duration. Most operations were completed without additional monitored sedation, postoperative pain remained mild, and early oral intake, mobilisation, spontaneous voiding and same-day discharge were achievable. Patient satisfaction was high, and only minor, conservatively managed complications were recorded. Local anaesthesia may therefore represent a useful approach where anaesthetic and inpatient resources are limited. Nevertheless, these findings require confirmation through genuine prospective data and larger comparative studies with longer follow-up to evaluate chronic pain, recurrence, uncommon adverse events and cost-effectiveness.

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