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Dr. Manish Sharma
Ph.D. Scholar & General and laproscopic Surgeon, Institute of Ayurvedic studies and Research Shri Krishna AYUSH University Kurukshetra, Haryana, India

Dr. Rajinder Singh
Ph.D. Guide & Associate Professor and Chairperson, Institute of Ayurvedic studies and Research Shri Krishna AYUSH University Kurukshetra, Haryana, India

Sneha Dokania
Consultant, Department of Anesthesia, IOM, Tribhuvan University, Maharajganj, Katmandu, Nepal, India

Corresponding Author:
Dr. Manish Sharma
Ph.D. Scholar & General and laproscopic Surgeon, Institute of Ayurvedic studies and Research Shri Krishna AYUSH University Kurukshetra, Haryana, India

Multimodal anaesthetic strategy in a case of acute cholecystitis: Sensorcaine-based spinal block with sedation

Manish Sharma, Rajinder Singh and Sneha Dokania

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Abstract
Background: Acute cholecystitis commonly necessitates laparoscopic cholecystectomy, often requiring general anaesthesia. However, in elderly patients, a multimodal approach using regional anaesthesia with sedation may offer superior hemodynamic stability, reduced systemic drug load, and enhanced recovery outcomes. This case highlights such a strategy using *Sensorcaine* (heavy Bupivacaine) and Butorphanol for spinal block, supplemented by short-acting intravenous anaesthetic agents.
Case Presentation: A 60-year-old female presented with right upper quadrant abdominal pain, vomiting, and dyspepsia. Ultrasonography confirmed cholelithiasis with features of acute cholecystitis. The patient was planned for laparoscopic cholecystectomy.
Anaesthetic Technique: Combined spinal anaesthesia using heavy *Sensorcaine* (Bupivacaine) and Butorphanol was administered. Sedation and general support were provided using Inj. Midazolam and Butorphanol for premedication. Induction was achieved using Propofol, Succinylcholine, and Atracurium. Anaesthesia was maintained with oxygen, intermittent Atracurium, and Propofol infusion. Reversal was done using Neostigmine and Atropine.
Intraoperative Course: Surgery lasted approximately 90 minutes. Vital parameters remained stable (BP ~120/80 mmHg, SpO_2 98-100%). Intraoperative findings included adhesions between the gallbladder and omentum, which were carefully dissected. Drain placement was performed. No intraoperative complications occurred.
Outcome: The patient regained full consciousness postoperatively with stable hemodynamics and good pain control. Recovery was smooth with early ambulation and minimal need for systemic opioids.
Conclusion: Spinal anaesthesia with sedation is a viable multimodal strategy in selected cases of laparoscopic cholecystectomy for acute cholecystitis, especially in geriatric patients. It ensures effective anaesthesia, minimal stress response, and faster postoperative recovery.

Keywords: Acute cholecystitis, spinal anaesthesia, sensorcaine, butorphanol, multimodal anaesthesia, laparoscopic cholecystectomy

Introduction
In *Ayurveda*, *cholelithiasis* can be correlated with *Ashmari* (calculi) or *Pittashmari* in the *Yakrit-Pittashaya* (*liver and gallbladder*) [1]. It is believed to result from *Agnimandya* (hypofunction of digestive fire), leading to improper *Pachana* (digestion) and *Ama* formation. The accumulation of *Kapha* and *Pitta* in the *Pittashaya* leads to thickened bile, forming *Ashmari*. Dietary habits such as excessive intake of *Snigdha*, *Guru*, and *Abhishyandi Ahara* along with sedentary lifestyle contribute to the pathogenesis [2].
Symptoms of *Pittashmari* resemble the clinical picture of gallstone disease and cholecystitis: *Shoola* (pain) in the right upper quadrant, *Udarashoola*, *Chardi* (vomiting), *Arochaka* (anorexia), and *Daurbalya*. In cases of acute inflammation (*Pittaja shotha*), burning sensation, tenderness, and fever may occur. *Vata-Pitta* aggravation is most commonly involved in the acute phase [3].
Acute cholecystitis typically occurs due to obstruction of the cystic duct by gallstones, leading to inflammation of the gallbladder. The retained bile leads to chemical irritation, secondary bacterial infection (commonly *E. coli*, *Klebsiella*), increased intraluminal pressure, and edema. Clinically, this manifests as right upper quadrant pain, fever, nausea, Murphy's

sign, and leukocytosis. Ultrasound findings include gallstones, gallbladder wall thickening, and pericholecystic fluid [4].

Laparoscopic cholecystectomy is the gold standard for treating symptomatic gallstones and acute cholecystitis. It is minimally invasive, offers rapid recovery, and has fewer complications compared to open surgery. However, pneumoperitoneum and Trendelenburg position during laparoscopy require vigilant anaesthetic monitoring due to increased intra-abdominal pressure and potential cardiopulmonary effects [5].

Elderly patients undergoing laparoscopic surgery require a tailored anaesthetic approach to minimize hemodynamic fluctuations. Spinal anaesthesia supplemented with sedation (as used in this case) can reduce the need for opioids, promote early ambulation, and provide effective analgesia. Drugs like *Sensorcaine* (heavy bupivacaine) with *Butorphanol* offer stable blocks, while propofol and atracurium assist in controlled sedation and muscle relaxation. Postoperative recovery is smooth when multimodal anaesthesia is applied [6].

Case report

A 60-year-old female patient named Raj Bala presented with symptoms of acute cholecystitis and was diagnosed with cholelithiasis on ultrasonography, revealing multiple gallstones. She was scheduled for laparoscopic cholecystectomy and was managed under a multimodal anaesthetic approach combining spinal anaesthesia and sedation. Spinal anaesthesia was administered using heavy *Sensorcaine* (bupivacaine) with *Butorphanol* as an adjuvant, providing adequate intraoperative analgesia. Premedication included Inj. Midazolam and Inj. Butrum, followed by induction with Inj. Propofol, Succinylcholine, and Atracurium. Anaesthesia was maintained with oxygen, propofol infusion, and intermittent doses of Atracurium. Reversal was achieved using Inj. Neostigmine and Inj. Atropine. The intraoperative course was uneventful with stable hemodynamics, and the patient tolerated the procedure well. Postoperatively, she regained consciousness fully oriented with no complications, demonstrating the efficacy and safety of a combined regional and general anaesthetic strategy in elderly patients undergoing laparoscopic biliary surgery [7].

Table 1: General information

Parameter	Details
Hospital Registration No.	4328
Age	60 years
Sex	Female
Date of Admission	13/06/2025
Diagnosis	Acute Cholecystitis with Cholelithiasis
Planned Procedure	Laparoscopic Cholecystectomy
ASA Grade	ASA II
Preoperative Status	Elective Case
Type of Surgery	Minimally Invasive (Laparoscopic)

Table 2: Vital examination

Parameter	Observation
General Build	Average, well-nourished
Consciousness	Alert, oriented
Pulse Rate	88 beats/min
Blood Pressure	130 / 80 mmHg
Respiratory Rate	18 breaths/min
Temperature	98.6 °F (Afebrile)
SpO_2 (Room Air)	98%

Table 3: Systemic examination

System	Findings
Cardiovascular	S_1, S_2 audible; regular rhythm; no murmurs; peripheral pulses palpable
Respiratory	Vesicular breath sounds; no added sounds; bilateral equal air entry
Abdominal	Soft; mild right upper quadrant guarding; no organomegaly or ascites
Central Nervous	Conscious, cranial nerves intact; motor and sensory systems normal
Renal/Genitourinary	No pedal edema; adequate urine output
Skin & Mucosae	No pallor, icterus, cyanosis, clubbing, lymphadenopathy, or pedal edema

Table 4: Spinal anaesthetic drugs

Drug Name	Dosage	Route	Purpose	Frequency / Timing
Sensorcaine (Bupivacaine heavy)	3.0 mL (0.5%)	Intrathecal (spinal)	Spinal anaesthesia	Single dose (pre-induction)
Butorphanol (Spinal adjuvant)	0.3 mg	Intrathecal	Sedation, analgesia	Single dose (with spinal)
Midazolam	1 mg	IV	Premedication, anxiolysis	Single dose (pre-op)
Butorphanol (IV)	1 mg	IV	Sedation, analgesia	Single dose (pre-op)
Propofol	100-150 mg (induction); infusion as per need	IV bolus + infusion	Induction + maintenance	Induction & continuous
Succinylcholine	1-1.5 mg/kg (~100 mg)	IV	Muscle relaxation (rapid sequence)	Single dose (induction)
Atracurium	0.5 mg/kg (initial); intermittent boluses	IV	Muscle relaxation	Induction + intra-op boluses
Oxygen (O_2)	5-6 L/min (via circuit)	Inhalation	Oxygenation	Continuous during procedure
Neostigmine	0.05 mg/kg (~2.5 mg)	IV	Reversal of muscle relaxant	Single dose (post-op)
Atropine	0.02 mg/kg (~1.2 mg)	IV	Reversal adjunct	Single dose (with neostigmine)

Spinal Anaesthetic Procedure

1. Pre-Anaesthetic Preparation

- Informed consent taken.
- Fasting status confirmed (NPO ≥6 hours).
- IV access secured with 18G cannula.
- Baseline vitals recorded: Pulse 88/min, BP 130/80 mmHg, SpO_2 98%.

- Premedication: Inj. Midazolam 1 mg IV and Inj. Butorphanol 1 mg IV.

2. Positioning and Aseptic Technique

- Patient positioned in **sitting** posture.
- Back painted with Betadine and spirit; draped with sterile towels.
- Landmark identified: L3-L4 interspace.

3. Spinal Anaesthesia Administration

- Using a 25G Quincke spinal needle, subarachnoid block was administered in the L3-L4 space via midline approach.
- After confirmation of clear CSF flow, 3.0 mL of 0.5% heavy Bupivacaine (Sensorcaine) + 0.3 mg Butorphanol was injected slowly.
- Patient was immediately placed supine with head-down tilt to achieve T6-T8 level sensory block.

4. Monitoring and Confirmation

- Sensory level checked with spirit-soaked swab every 2 min.
- Adequate motor block confirmed.
- Intraoperative sedation maintained with intermittent IV Propofol and oxygen support.
- Hemodynamics remained stable throughout.

Surgical procedure

Procedure: Laparoscopic Cholecystectomy

Diagnosis: Acute Cholecystitis with Cholelithiasis

Pre-operative phase (preparation)

- Patient kept NPO for ≥6 hours prior to surgery.
- Informed consent obtained after explanation of procedure and risks.
- Baseline investigations done: CBC, LFT, RFT, ECG, chest X-ray, USG abdomen.
- USG findings: Multiple gallstones (7-8 in number, 5-11 mm), gallbladder wall mildly thickened.
- IV line secured, vitals stable pre-op.
- Premedication: Inj. Midazolam 1 mg IV + Inj. Butorphanol 1 mg IV.
- Spinal anaesthesia administered using Sensorcaine (Bupivacaine heavy) 3.0 mL + Butorphanol 0.3 mg intrathecally.
- Positioning: Supine initially; later shifted to reverse Trendelenburg for surgery.
- Prophylactic antibiotics: Inj. Ceftriaxone 1 g IV pre-incision.

Operative phase (intraoperative procedure)

- Patient positioned in reverse Trendelenburg with slight left tilt.
- Pneumoperitoneum created using CO_2 to maintain pressure at 12-14 mmHg.
- Port placement:
  - 10 mm umbilical port (camera)
  - 10 mm epigastric port (working)
  - 5 mm right midclavicular and anterior axillary line ports
- Initial laparoscopic assessment revealed inflamed gallbladder with omental adhesions.
- Adhesiolysis done carefully.
- Dissection of Calot's triangle to identify cystic duct and artery.
- Clipping and division of cystic duct and artery using titanium clips.
- Gallbladder dissected from liver bed using monopolar cautery.
- Gallbladder removed via umbilical port using endobag.
- Peritoneal lavage done with warm normal saline.
- Subhepatic drain placed through lateral port.
- Hemostasis ensured, no active bleeding.
- Ports closed using absorbable sutures, skin stapled.
- Surgical duration: Approximately 90 minutes.
- Intraoperative course: Uneventful.

Post-operative phase (recovery & care)

- Patient regained consciousness; oriented and hemodynamically stable.
- Pain managed with Inj. Paracetamol IV and PRN analgesics.
- IV fluids continued (DNS/RL at 100 ml/hr for 6-8 hrs).
- NPO maintained for 4-6 hours post-op, followed by clear liquids.
- Antibiotics continued as per protocol (e.g., Ceftriaxone 1 g BID).
- Drain output monitored for volume, color, and signs of bile leakage.
- Early mobilization encouraged after 6-8 hours.
- Wound dressing checked daily under aseptic precautions.
- Discharge planned on postoperative day (POD) 2-3 if stable.
- Follow-up advised after 7 days for suture removal and HPE report review.

Results and Findings

- USG showed multiple gallstones (5-11 mm) with mild gallbladder wall thickening.
- Patient had right upper quadrant pain, nausea, and vomiting.
- Gallbladder was found inflamed and distended with omental adhesions.
- Cystic duct and artery were identified, clipped, and divided successfully.
- Gallbladder dissected and removed without rupture or spillage.
- Peritoneal cavity was clear; no bile leak observed.
- Subhepatic drain placed; peritoneal lavage performed.
- Patient was conscious and hemodynamically stable postoperatively.
- Minimal drain output observed, serous in nature.
- Pain managed effectively with IV analgesics.
- Early mobilization initiated within 6-8 hours.
- No postoperative complications noted.
- Patient discharged on postoperative day 2 in stable condition.

Contraindications of spinal anaesthesia

Spinal anaesthesia is a widely used regional anaesthetic technique. However, it is contraindicated in the following conditions due to the risk of complications:

A. Absolute Contraindications

- Patient refusal - Most important and ethical contraindication.
- Infection at the puncture site - Risk of introducing infection into the spinal canal.

- Severe hypovolemia or shock - May worsen hypotension due to sympathetic blockade.
- Uncorrected coagulopathy or anticoagulant therapy - Increased risk of spinal hematoma.
- Raised intracranial pressure (especially with mass lesions) - Risk of brainstem herniation.
- Allergy to local anaesthetic agents - Risk of anaphylactic reactions.

B. Relative Contraindications

- Severe aortic or mitral stenosis - Risk of compromised cardiac output during vasodilation.
- Pre-existing neurological disorders - Risk of worsening neurological symptoms.
- Uncooperative or confused patient - Difficult to maintain positioning or stillness during the procedure.
- Fixed cardiac output states (e.g., constrictive pericarditis, tamponade) - May not tolerate vasodilation.
- Anatomical abnormalities (e.g., severe scoliosis, spinal deformities) - Difficulty in administration and unpredictable spread.

Table 5: Pathya and apathya

Category	Pathya (Recommended)	Apathya (To Be Avoided)
Ahara (Diet)	*Yavagu*, *Manda*, *Peya* (liquid gruels) *Mudga Yusha* (green gram soup) Warm water (*Ushnodaka*) Boiled vegetables (e.g., bottle gourd, pumpkin) Small, frequent light meals	Oily, spicy, heavy foods (*Guru*, *Snigdha*, *Vidahi*) Fried and fermented items Cold drinks, curd, and ice cream Excess meat, eggs, and high-fat dairy Carbonated beverages
Vihara (Lifestyle)	Adequate rest, early ambulation after 6-8 hours Gentle *Abhyanga* and *Snana* after 3rd day Avoiding *Vega dharana* (urge suppression) Use of loose cotton clothing Light *Pranayama* (e.g., Bhramari) for calmness	Daytime sleep (*Divaswapna*) Exposure to cold or taking cold baths Excess talking, coughing, or straining Smoking, alcohol, or lifting heavy weights Anxiety, emotional stress, and late-night sleeping

Discussion

Laparoscopic cholecystectomy has emerged as the gold standard surgical intervention for symptomatic cholelithiasis and acute cholecystitis due to its minimally invasive nature, shorter recovery time, and reduced postoperative morbidity. However, the choice of anaesthetic technique plays a crucial role in ensuring optimal surgical conditions and patient safety, particularly in geriatric patients [8]. In this case, a multimodal anaesthetic approach was adopted, using spinal anaesthesia with heavy bupivacaine (*Sensorcaine*) and butorphanol, supplemented with intravenous sedatives and muscle relaxants. This strategy aimed to achieve effective analgesia, stable hemodynamics, and smooth intraoperative muscle relaxation [9].

Spinal anaesthesia offers several advantages in laparoscopic procedures, including reduced stress response, minimal systemic drug burden, and enhanced postoperative pain control. The addition of butorphanol to the intrathecal injection provided synergistic analgesic effects and sedation, minimizing the requirement for higher doses of general anaesthetic agents. Intravenous propofol and atracurium ensured adequate sedation and muscle relaxation for pneumoperitoneum and port insertion. The combination provided excellent anaesthetic depth without compromising spontaneous respiration and allowed smooth maintenance of intraoperative conditions [10].

Intraoperatively, the gallbladder was found inflamed with omental adhesions, consistent with acute cholecystitis. Careful dissection of Calot's triangle allowed identification and clipping of the cystic duct and artery. The gallbladder was removed intact, and a subhepatic drain was placed as a precautionary measure. No complications such as bile leak, bleeding, or injury to adjacent structures occurred, reflecting the technical efficiency of the surgical and anaesthetic team. Postoperatively, the patient remained stable, had minimal drain output, and mobilized early, which is a major benefit of regional anaesthesia techniques [11].

This case highlights the effectiveness of combining spinal anaesthesia with sedation in select laparoscopic procedures, especially in elderly or low-risk patients. It ensures minimal exposure to inhalational agents and opioids, reduces the incidence of postoperative nausea and vomiting, and facilitates early ambulation. The findings support the clinical safety, feasibility, and effectiveness of multimodal anaesthetic strategies in laparoscopic biliary surgeries, offering an alternative to conventional general anaesthesia in carefully selected patients [12].

Conclusion

The successful management of laparoscopic cholecystectomy in this 60-year-old female using a multimodal anaesthetic approach combining spinal anaesthesia with butorphanol and intravenous sedation demonstrates the efficacy and safety of regional techniques in select surgical cases. This method provided effective analgesia, stable intraoperative hemodynamics, minimal postoperative complications, and facilitated early recovery and ambulation. The case highlights that, with proper patient selection and monitoring, spinal anaesthesia with sedation can serve as a viable alternative to general anaesthesia in laparoscopic procedures, particularly in elderly or low-risk patients.

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