Research Article ISSN 2639-846X

Anesthesia & Pain Research

# Postoperative Analgesia after Laparotomy in a Low-Income Country

**Gagara Mayaou M[1]*, Daddy H[1], Bachar Loukoumi O[1], Nanzir Sanoussi M[1], Hachimou Dankane AW[1], Ide G[2] and Chaibou MS[1]**

[1]*Department of Anesthesia, Intensive Care and Emergency Medicine, National Hospital of Niamey, Niger.*

[2]*Department of Surgery and Surgical Specialties, National Hospital of Niamey, Niger.*

***Correspondence:**

Gagara Mayaou M, Department of Anesthesia, Intensive Care and Emergency Medicine, National Hospital of Niamey, Niger, Tel: +227 90 45 70 08.

**Received:** 06 Jul 2026; **Accepted:** 13 Aug 2026; **Published:** 25 Aug 2026

**Citation:** Gagara Mayaou M, Daddy H, Bachar Loukoumi O, et al. Postoperative Analgesia after Laparotomy in a Low-Income Country. Anesth Pain Res. 2026; 10(2): 1-5.

## ABSTRACT

***Objective:*** *To evaluate the postoperative analgesic efficacy of intrathecal morphine after general anesthesia for elective laparotomy in abdominal surgery.*

***Patients and Methods:*** *This was a prospective, comparative, two-group study conducted over one year, from September 2, 2023, to August 31, 2024. Adult patients of both sexes undergoing laparotomy for abdominal surgery under general anesthesia were included.*

*Two groups were formed: one group receiving intrathecal morphine (GA+ITM) and a control group (GA).*

***Results:*** *One hundred patients, 50 in the GA+ITM group and 50 in the GA group, were included. The mean age of patients in the GA+ITM group was 42.88±16.71 years and 48.34±16.65 years in the GA group. The sex ratio was 0.37. Hypertension was the most frequent comorbidity in both groups. ASA I classification represented 78% of the GA+ITM group and 52% of the GA group. The total dose of fentanyl consumed intraoperatively showed a sparing of 270 γ in the GA+ITM group. Hypotension was the most common intraoperative adverse event, with 72% in the GA+ITM group and 64% in the GA group. The VAS score was significantly lower in the GA+ITM group, demonstrating excellent analgesia with a significant reduction in postoperative analgesic consumption. Adverse effects were mainly postoperative nausea and vomiting (PONV) in the GA+ITM group (14%). Mortality was negligible.*

***Conclusion:*** *Intrathecal morphine administration is an effective modality for preventing postoperative pain after abdominal surgery, but prevention of its side effects must be considered in patient management.*

## Keywords

Elective abdominal surgery, Morphine, Postoperative analgesia, National Hospital of Niamey, Niger.

## Introduction

Laparotomy for abdominal surgery is among the most painful surgical procedures. The management and control of this pain have always been a major concern for anesthesiologists and surgeons [1]. Over the past decade, several protocols and techniques have been developed to alleviate patients' pain and to prevent postoperative pain and its complications [2]. The administration of opioids in the subdural (intrathecal) space is a technique used to prevent pain following surgery. It has been demonstrated that low doses of morphine (0.1 mg) can provide prolonged analgesia, lasting an average of 12 hours, without clinical or paraclinical impact on respiratory function tests [3].

## Patients and Methods

This was a prospective, comparative, randomized, single-blind study conducted from September 2, 2023, to August 31, 2024. Adult

patients scheduled for elective laparotomy for abdominal surgery at the National Hospital of Niamey were included. Patients undergoing minimally invasive surgical procedures were excluded. Two equal groups were formed: one receiving intrathecal morphine at 100 µg (GA + ITM), and a control group receiving general anesthesia alone (GA). The first patient was selected by random draw, and administration of intrathecal morphine to subsequent patients was performed alternately. The patient was unaware of whether or not morphine had been administered. Paracetamol (1 g) and Tramadol (100 mg) were used at standard doses to manage moderate to severe postoperative pain, according to the Visual Analogue Scale (VAS).

The average dose of analgesics administered during the first 48 postoperative hours was calculated for each patient. Variables studied included age, sex, comorbidities, surgical procedure, ASA class, intraoperative parameters, intraoperative opioid consumption, incidents, complications, postoperative VAS scores, analgesic consumption, length of stay, complications, outcomes, and evolution. Data were collected and analyzed using Microsoft Word and Excel (2019) and Epi Info™ version 7.2.2.6.

## Results

During the study period, 100 patients were included out of a total of 2,084 who underwent elective abdominal surgery, representing a frequency of 4.79%. Among these 100 patients, 50 received general anesthesia alone (GA) and 50 received general anesthesia combined with intrathecal morphine (GA + ITM).

The mean age of patients was 42.88 ± 16.71 years in the GA + ITM group and 48.34 ± 16.65 years in the GA group, with a statistically significant difference (p = 0.05). The 20–40-year age range was the most represented in the GA + ITM group (52%, n = 26), whereas the 40–60-year range predominated in the GA group (38%, n = 19) (Figure 1).

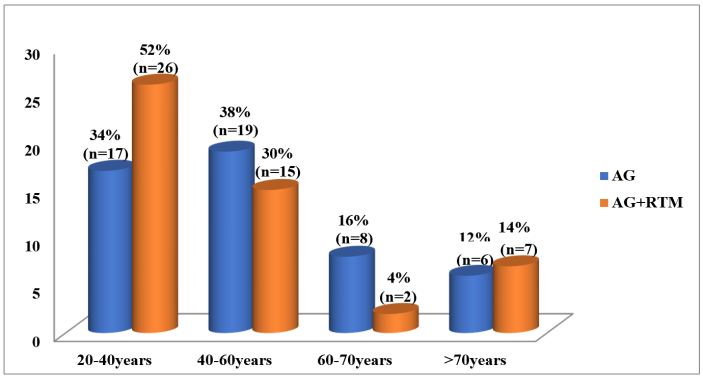


**Figure 1:** Distribution of patients according to age group.

Females predominated in both groups, with 40 women and 10 men in the GA group, and 33 women and 17 men in the GA + ITM group (p = 0.11). Hypertension was the most frequent comorbidity in both groups, accounting for 16% (n = 8) and 18% (n = 9) in the GA + ITM and GA groups, respectively (p = 1).

ASA class I was the most frequent, with 78% (n = 39) in the GA + ITM group and 52% (n = 26) in the GA group. ASA class II was found in 18% (n = 9) and 44% (n = 22), respectively, while ASA class III accounted for 4% (n = 2) in each group (p = 0.013).

Fentanyl was the only opioid used for induction in all patients (p = 0.24). The total intraoperative fentanyl dose was 9,440 µg in the GA + ITM group and 9,710 µg in the GA group, corresponding to a saving of 270 µg.

The mean arterial pressure (MAP) was slightly higher in the GA group than in the GA + ITM group from admission to the operating room until the end of surgery. This difference was statistically significant at intubation (p = 0.0004) and at the end of the procedure (p < 0.05) (Figure 2).

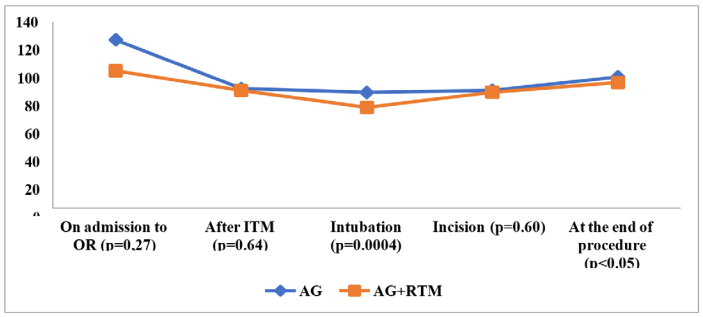


**Figure 2:** Patients' intraoperative average MAP during the procedure.

The mean heart rate was slightly higher in the GA + ITM group than in the GA group from admission to intubation and incision, then reversed at the end of the procedure (Figure 3). Hypotension was the most frequent intraoperative adverse event in both groups, occurring in 75% (n = 27) of patients in the GA + ITM group versus 50% (n = 16) in the GA group (p = 0.03).

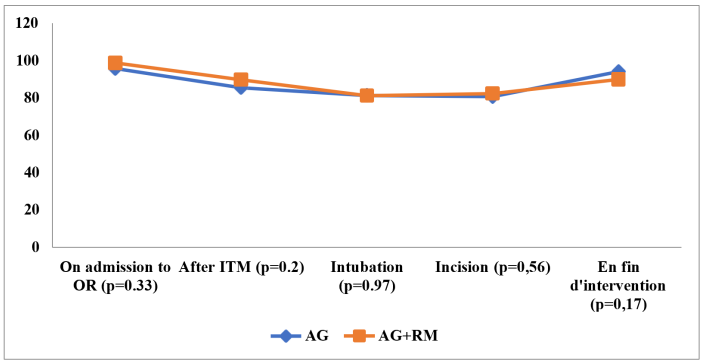


**Figure 3:** Patients' intraoperative mean heart rate.

Incisional hernia repair was the most common surgical procedure in both groups, with 40% in the GA + ITM group versus 24% in the GA group (p = 0.38) (Table 1). The mean duration of surgery was 101.22 ± 59.06 minutes in the GA group and 95.18 ± 41.84 minutes in the GA + ITM group (p = 0.28).

**Table I:** Distribution of patients according to surgical procedures.

| Surgical procedures | AG | | AG+ITM | | Total | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| Ventral hernia repair | **12** | **24.00%** | **20** | **40.00%** | **32** | **32.00%** |
| Salpingo-oophorectomy | 3 | 6.00% | 0 | 0.00% | 3 | 3.00% |
| Colectomy | 2 | 4.00% | 0 | 0.00% | 2 | 2.00% |
| Cholécystectomy | 8 | 16.00% | 4 | 8.00% | 12 | 12.00% |
| Hartman | 1 | 2.00% | 0 | 0.00% | 1 | 1.00% |
| Gastro-entero-anastomosis | 1 | 2.00% | 0 | 0.00% | 1 | 1.00% |
| Hystérectomy | 5 | 10.00% | 7 | 14.00% | 12 | 12.00% |
| Cystectomy | 2 | 4.00% | 2 | 4.00% | 4 | 4.00% |
| Abdominal mass | 3 | 6.00% | 5 | 10.00% | 8 | 8.00% |
| Myomectomy | 7 | 14.00% | 7 | 16.00% | 15 | 15.00% |
| Oophorectomy | 1 | 2.00% | 0 | 0.00% | 1 | 1.00% |
| Intestinal continuity restoration | 5 | 10.00% | 5 | 10.00% | 10 | 10.00% |
| **Total** | **50** | **100.00%** | **50** | **100.00%** | **100** | **100.00%** |

The mean postoperative consumption of the Paracetamol 1 g + Tramadol 100 mg combination during the first 48 hours was 3 doses in the GA + ITM group, compared to 5 doses in the GA group. This difference was statistically significant ($p < 0.001$) (Table 2). Pain intensity was greater during the first 48 postoperative hours in the GA group compared to the GA + ITM group, with a significant difference across all time intervals (Table 3).

**Table II:** Distribution of patients according to Paracetamol 1g + Tramadol 100mg doses used for postoperative analgesia during the first 48 hours.

| Paracetamol + Tramadol 100mg doses | AG | | AG+ITM | | Total | |
|---|---|---|---|---|---|---|
| | n | % | n | % | N | % |
| 1 dose | 0 | 0% | 5 | 10% | 5 | 5% |
| 2 doses | 3 | 6% | 13 | 26% | 16 | 16% |
| 3 doses | 5 | 10% | **20** | **40%** | 25 | 25% |
| 4 doses | 12 | 24% | 6 | 12% | 18 | 18% |
| 5 doses | **21** | **42%** | 6 | 12% | 27 | 27% |
| 6 doses | 9 | 18% | 0 | 0% | 9 | 9% |
| **Total** | **50** | **100%** | **50** | **100%** | **100** | **100%** |

**Table III:** Evolution of pain intensity during the first 48 hours.

| EVA | Mild pain | | | | Moderate pain | | | | Severe pain | | | | p-value |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | AG | | AG+ITM | | AG | | AG+ITM | | AG | | AG+ITM | | |
| | n | % | n | % | n | % | n | % | n | % | n | % | |
| [0-6h] | 3 | 6% | 38 | 76% | 26 | 52% | 10 | 20% | 21 | 42% | 2 | 4% | <0.001 |
| [6-12h] | 6 | 12% | 42 | 84% | 31 | 62% | 8 | 16% | 13 | 26% | 0 | 0% | <0.001 |
| [12-18h] | 5 | 10% | 43 | 86% | 39 | 78% | 7 | 14% | 6 | 12% | 0 | 0% | <0.001 |
| [18-24h] | 8 | 16% | 39 | 78% | 33 | 66% | 10 | 20% | 9 | 18% | 1 | 2% | <0.001 |
| [24-30h] | 21 | 42% | 36 | 72% | 23 | 46% | 13 | 26% | 6 | 12% | 1 | 2% | 0.005 |
| [30-36h] | 30 | 60% | 43 | 86% | 18 | 36% | 7 | 14% | 2 | 4% | 0 | 0% | 0.008 |
| [36-42h] | 38 | 76% | 46 | 92% | 12 | 24% | 4 | 8% | 0 | 0% | 0 | 0% | 0.05 |
| [42-48h] | 43 | 86% | 50 | 100% | 7 | 14% | 0 | 0% | 0 | 0% | 0 | 0% | 0.01 |

Postoperative nausea and vomiting (PONV) were observed in 14% (n = 7) and pruritus in 10% (n = 5) of patients in the GA + IM group during the first six postoperative hours (Table 4). Outcomes were favorable in most patients in both groups. However, one death occurred on postoperative day 3 and one case of surgical site infection was noted in the GA group ($p = 0.49$). The mean hospital stay was 4.34 ± 1.91 days in the GA group and 4.28 ± 1.90 days in the GA + ITM group ($p = 0.88$).

**Table IV:** Distribution based on the side effects of Morphine.

| Side effects of Morphine | AG | | AG+ITM | | Total | |
|---|---|---|---|---|---|---|
| | n | % | n | % | n | % |
| PONV | 0 | 0% | 5 | 50% | 5 | 50% |
| PONV + Pruritus | 0 | 0% | 2 | 20% | 2 | 20% |
| Pruritus | 0 | 0% | 3 | 30% | 3 | 30% |
| **Total** | **0** | **0%** | **10** | 100% | **10** | 100% |

(P=N/A).

## Discussion

In our study, there was a predominance of female patients, with a sex ratio of 0.37.This result differs from that of Chaibou MS, et al. [4], who reported a sex ratio of 1.14. The predominance of women in our study could be explained by the high frequency of gynecological pathologies, whereas the study by Chaibou MS, et al. included all elective surgical cases, with a predominance of orthopedic and urological surgeries.

Indeed, the National Hospital of Niamey receives a wide range of pathologies, including gynecological cases, due to long waiting times in other hospital facilities such as the reference maternity hospital.

The mean age of our patients was 42.88 ± 16.71 years in the GA + ITM group and 48.34 ± 16.65 years in the GA group. Our results differ from those of Jefferson T, et al. [5] and Koeberle P, et al. [6], who reported mean ages of 75 ± 5.8 years and 71.14 ± 10.17 years, respectively. This difference could be explained by the higher prevalence of elderly patients in their studies.

Hypertension was the main comorbidity found in both groups, affecting 16% (n=8) in the GA + ITM group and 18% (n=9) in the GA group. This low rate could be explained by the relatively young age of our study population.

ASA class I was predominant, representing 78% (n=39) of patients in the GA + ITM group and 52% (n=26) in the GA group. This predominance of ASA class I in our study also reflects the young age of our population, with fewer comorbidities.

The total intraoperative fentanyl consumption was 9,440 µg in the GA + ITM group and 9,710 µg in the GA group, indicating a saving of 270 µg. Our results are consistent with those of several authors who found intraoperative opioid sparing in the intrathecal morphine (ITM) group. For instance, Jefferson T, et al. [5] reported a mean morphine consumption of 26.7 mg in the ITM group versus 33.3 mg in the control group, and Mark V. Koning et al. also reported a lower sufentanil consumption in the intervention group (30 µg) compared to the control group (45 µg). However, our findings differ from those of Meylan N, et al. [8], who found fentanyl and sufentanil consumption of 280–400 µg in the ITM group and 300–380 µg in the control group.

The mean arterial pressure (MAP) was higher in the GA group compared to the GA + ITM group, with a significant difference at the time of intubation, indicating the intraoperative analgesic effect of intrathecal morphine.

However, the mean heart rate was comparable between the two groups without significant difference, although a lower degree of tachycardia was observed at the end of surgery in the GA + ITM group. Intraoperative tachycardia has multifactorial causes that must be properly diagnosed and managed.

Intraoperative hypotension was the most frequent adverse event in both groups, occurring in 75% of patients in the GA + ITM group compared to 50% in the GA group ($p = 0.03$). There was thus a higher incidence of hypotension in the GA + ITM group, with a statistically significant difference. According to data in the literature, intrathecal morphine analgesia does not induce sympathetic blockade, hence the low risk of arterial hypotension [9]. Our contradictory result could be explained by a pharmacological interaction between intrathecal morphine and the anesthetic agents used during general anesthesia.

The VAS pain scores were significantly lower in the GA + ITM group. Our findings are consistent with those of the majority of authors [10-12]. We therefore affirm that intrathecal morphine provides optimal analgesia, ensuring excellent control of postoperative pain.

Analgesic consumption was markedly reduced in the GA + ITM group, with a statistically significant difference ($p < 0.001$). Our result is similar to those reported in the literature [5,11-13], confirming the strong analgesic effect of intrathecal morphine against postoperative pain.

Adverse effects such as postoperative nausea and vomiting (PONV) and pruritus were observed in 14% and 10% of cases, respectively, in the GA + IM group during the first six postoperative hours. Our results are close to those of Wan Mohd Nazaruddin WH, et al. [13], who reported an incidence of pruritus of 16% in the ITM group versus none in the control group; vomiting occurred in 4% of patients in both groups, and nausea in 16% of the ITM group versus 4% of the control group.

We recorded one case of death and one case of surgical site infection in the GA group (2% each).

These findings confirm the advantages of intrathecal morphine in abdominopelvic surgery, providing effective analgesia with minimal risk.

In our study, the duration of hospital stay was comparable between the two groups, with favorable outcomes in both.

Our results are similar to those of Mark Koning V et al. [7], who demonstrated a correlation between intrathecal morphine and improved postoperative recovery.

## Conclusion

Intrathecal morphine represents an attractive, effective, and efficient multimodal analgesic technique for managing postoperative pain in major surgeries. In our study, its efficacy began during the intraoperative period and persisted up to 48 hours postoperatively. It improved pain scores and significantly reduced both intraoperative and postoperative analgesic consumption, with minimal adverse effects.

## References


1. Colin MANON. Évaluation de l'efficacité de la rachianalgésie morphine chez les patients opérés d'une colectomie cœlioscopique. [Thèse de médecine], faculté des sciences médicales et paramédicales. Marseille. 2021; 194-202.
2. Philippe S. Péridurale thoracique + anesthésie générale. Institut de cancérologie. Douleur-Anesthésie locorégionale. MAPAR. 2012; 71-82.
3. Touré MK, Coulbaly M, Koné J, et al. Intrathecal morphine administration for postoperative pain in gynecological and obstetrical surgery. RAMUR. 2018.
4. Maman Sani C, Samuila S, Rachid S, et al. Management of postoperative pain: experience of the Niamey National Hospital, Niger. J Pain Res. 2012; 5: 591-595.
5. Jefferson T, Leonid C, Chang OT, et al. Intrathecal morphine is associated with reduction in post operative opiod requirements and improvement in postoperative analgesia in patients undergoing open liver resection. BMC Anesthesiology. 2020; 20: 207.
6. Koeberle P, Bourion P, Bettinger G, et al. Analgésie postopératoire par morphine intrathécale et dépression respiratoire: intérêt des faibles doses (à propos de 285 cas). Paris. 1992; 33: 55-57.
7. Koning MV, Teunissen AJW, Harst E van der, et al. Intrathecal morphine for laparoscopic segmental colonic resection as part of an enhanced recovery protocol: a randomized controlled trial. Regional anesthesia and pain medicine. 2018; 43: 166-172.
8. Meylan N, Elia N, Lysakowski C, et al. Bénéfice et risque de la morphine intrathécale sans anesthésie locale chez les patients subissant une intervention chirurgicale majeure : méta-analyse d'essais randomisés. Br J Anaesth. 2009; 102: 156-167.
9. Fitzpatrick J, Moriarty DC. Intrathecal morphine in the management of pain following cardiac surgery a comparison with morphine I.v. British journal of anesthesia. 1998; 60: 639-644.
10. Yang T, Breen TW, Archer D, et al. Comparison of 0,25 mg and 0,1 mg intrathecal morphine for analgesia after cesarean section. Can J Anesth. 1999; 46: 856-860.
11. Yamaguchi H, Watanabe S, Fukuda T, et al. Minimal effective dose of intrathecal morphine for pain relief following transabdominal hysterectomy. Anesth analg. 1989; 68: 537-540.
12. Clergue F, Montembault C, Despierres O, et al. Respiratory effects of intrathecal morphine after upper abdominal surgery. Anesthesiology. 1984; 61: 677-685.
13. Wan Mohd Nazaruddin WH, Anafairos Md N, Azmi AH, et al. Comparison of single-shot intrathecal morphine injection and continuous epidural Bupivacaine for post-operative analgesia after elective abdominal hysterectomy. Malays J Med Sci. 2017; 24: 21-28.