

## Comparison between IV Paracetamol and IV Morphine in Prevent Postoperative Pain during Laparoscopic Cholecystectomy

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### Abstract

**Background;** Postoperative pain management is a critical aspect of surgical care, particularly after laparoscopic cholecystectomy, which is one of the most common abdominal surgeries performed worldwide. **Aims of the study;** Compare the effectiveness of intravenous paracetamol and intravenous morphine in preventing postoperative pain in patients undergoing laparoscopic cholecystectomy. Specifically, the study seeks to evaluate the level of pain relief provided by each drug, assess patient satisfaction, and identify any adverse effects associated with their use. **Methodology;** This study took place at Al Imam Ali Hospital in Baghdad from December 2018 to February 2020. It included 60 adult patients who had laparoscopic cholecystectomy while under general anaesthesia. Patients were split into two groups: Group A, with 30 patients, got 2 mg of intravenous morphine, while Group B, also with 30 patients, received 1 g of intravenous paracetamol. Before surgery, we checked medical history, did physical checks, and performed standard tests. Pain was measured postoperatively using a mixed pain scale for 30 minutes. Anaesthesia was started using propofol, ketamine, and muscle relaxants. **Result;** The study found significant differences in patient distribution by age groups and ASA classification, with 45% in ASA 1 and 55% in ASA 2. Older age groups, especially >39 years, had a higher representation in ASA 2. Gender did not significantly impact ASA classification. Pain scores in the morphine and paracetamol groups were similar at all time points, showing no statistically significant difference ( $P > 0.05$ ). Both groups exhibited a gradual decrease in pain scores from 4.83 to 3.5 over 30 minutes. **Conclusions;** This study concludes that age group significantly influences ASA classification, with older age groups more likely to be in ASA 2. Gender did not affect ASA classification. Additionally, both intravenous morphine and paracetamol provided comparable pain relief, with no statistically significant differences in pain scores between the two groups.

### Introduction

After surgery, pain is the most common problem that people experience. Post-surgery pain can make patients feel worse and take longer to heal, which can lead to a longer hospital stay [1]. Managing pain after surgery is still a challenge for surgeons, anaesthetists, and patients. Poor pain control can lead to many issues, including stress, muscle breakdown, weakened immune response, nausea, vomiting, intestinal problems, breathing difficulties, increased heart demands, blood clotting issues, brain problems, fluid

balance changes, sleep problems, and fatigue [2]. When the pain pathway is activated, it triggers the release of hormones and chemicals that affect blood flow, like cortisol, vasopressin, and catecholamines. The release of these factors, known as the surgical stress response, is highest during the first few hours after surgery. The stress reaction can lead to high blood sugar, weaken the immune system, and break down fat and muscle [3]. Laparoscopic cholecystectomy is a minimally invasive surgery method used to remove a broken gallbladder. For regular cholecystomies, this

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### Keywords:

Postoperative Pain,  
Laparoscopic Cholecystectomy,  
IV Paracetamol,  
IV Morphine,  
ASA Classification.



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method has pretty much taken the place of the open surgery since the early 1990s [4]. Minimally invasive surgery (MIS) methods help patients get back to their normal lives faster by cutting down on the size of the cut and the length of time they have to stay in the hospital. With the help of new tools, doctors can do many treatments without the pain and stress of the old ways [5]. Problems that can happen during keyhole surgery During laparoscopic treatments, problems can happen during the surgery itself because of damage to the vascular system and the creation and management of pneumoperitoneum [6]. Morphine is a strong painkiller, but it can be hard to use because people can become resistant to it, have withdrawal symptoms, and abuse it easily. It is best for morphine to bind to delta, kappa, and mu-opioid receptors [7]. By connecting to the mu-opioid receptor in the brain and nerves, this drug's main job is to ease pain. It takes between 6 and 30 minutes for morphine to start working. Having vomiting is a regular side effect of morphine use. It makes the stomach empty more slowly and the intestines move less quickly. Some other common side effects are depression in the central nervous system, feeling sick, throwing up, and holding on to pee. One of the most serious side effects of opiates that is especially important to keep an eye on in people who have recently had surgery is respiratory depression [8,9]. Acetaminophen is a medicine used to relieve pain and reduce heat. IV paracetamol is a safe pain relief medicine. Doctors can use it alone for light to moderate pain or with an opioid or NSAID for serious pain. Acetaminophen works by affecting the cyclooxygenase (COX) system. It mostly affects the brain and spinal cord and can easily get into the brain from the blood [10,11]. Acute pain happens because of harmful things like injuries, illnesses, or problems with muscles or organs. Most types of sudden pain go away on their own or can be treated and get better in a few days or weeks. It is almost always nociceptive. Four physiological processes are involved: transduction, transfer, modulation, and awareness. The most common types of sudden pain are pain after an injury, pain after surgery, childbirth pain, and pain from sudden medical problems like a heart attack, pancreatitis, and kidney stones. Most types of sudden pain go away on their own or can be treated and get better in a few days or weeks. Pain becomes chronic when it doesn't go away due to poor healing or not getting the right care [12]. Acetaminophen is a medicine used to relieve pain and reduce heat. As a single drug for low to moderate pain or with an opioid painkiller for serious pain, doctors can give it to their patients[13]. Pain that lasts longer than the normal course of an acute illness or after a fair amount of time to heal, usually between one and six months, is called chronic pain. It's possible for chronic pain to be nociceptive, neuropathic, or a mix of the two.

Often, psychological or external factors, or both, play a big part. The most common types of chronic pain are those that are caused by joint illnesses and chronic visceral disorders [14]. Morphine, the main alkaloid of opium, was first obtained from poppy seeds in 1805. It is a strong painkiller, but its use is restricted because people can become tolerant, depend on it, or misuse it. Morphine is still commonly used today, along with other semi-synthetic opioids that have different strengths, like codeine, fentanyl, methadone, hydrocodone, hydromorphone, meperidine, and oxycodone. Morphine takes 6 to 30 minutes to start working [15,16].

### Methodology

#### General Information

From December 2018 to February 2020, this study took place at Al Imam Ali Hospital in Baghdad, Iraq. Sixty adult patients (14 males and 46 females) with ASA physical status I and II, undergoing laparoscopic cholecystectomy under general anesthesia, participated in the study.

#### Collections

People in the study were 18 to 54 years old and weighed 50 to 120 kg. We looked at the patient's medical history, gave them a physical exam, and did normal lab tests on them before surgery. These included a full blood count, clotting tests, an ECG, blood sugar levels, and liver function tests. Before surgery, people didn't eat for 8 to 10 hours. The surgeries took 45 to 90 minutes, and the patients' heart rate and blood pressure were checked the whole time.

#### Medications

Tramadol (1.5 mg per kg), Dexamethasone (0.1 mg per kg), Metoclopramide (0.1 mg per kg), Ranitidine (0.9 mg per kg), Dexamethasone (0.1 mg per kg), and Dexamethasone (0.1 mg per kg) Give the patient Propofol (1.5 to 2.5 mg/kg), Ketamine (0.5 mg/kg), and either Atracurium (0.5 mg/kg) or Rocuronium (0.6 mg/kg) to make them asleep. Use oxygen (7.5–8 L/min for men and 6.5–7 L/min for women) and isoflurane (1.2–2.5%), for maintenance.

#### Before Extubation

Group A received 2 mg of intravenous Morphine, and Group B received 1 g of intravenous Acetaminophen. For recovery: Atropine (1.2 mg) with Neostigmine (2.5 mg) in NaCl 0.9%, and Oxygen (8 L/min).

#### Drug Preparation

Morphine preparation: 1 ampoule (10 mg/ml) diluted to 10 ml NaCl 0.9%, resulting in 1 mg/ml concentration.

#### Fluid Requirements

IV crystalloid fluid (0.9% NaCl) was administered based on maintenance fluid requirements (1.5 ml/kg/hr), NPO deficit, and third-space losses (3-4 ml/kg/hr).

#### Statistical Analysis

Statistical analysis is a way to look at numbers, explain data, and come to simple findings about both



continuous and categorical data. As part of the process, data is collected to see if there is a link between two sets of information. Every number in this study is given as a frequency or percentage. This was done with SPSS version 26 and factors that had a normal distribution. We did both dependent and independent t-tests. We used the Mann-Whitney U test, the Wilcoxon test, and the Chi-square test to look at factors that were not spread out regularly. A number less than 0.05 is thought to be statistically significant.

#### Ethical Approval

The human ethics commission of Anesthesia Techniques Department, Alsalam University College accepted the study; everyone who participated was informed about it and requested to sign a consent form. Additionally assured was the patient that his data would be kept secret.

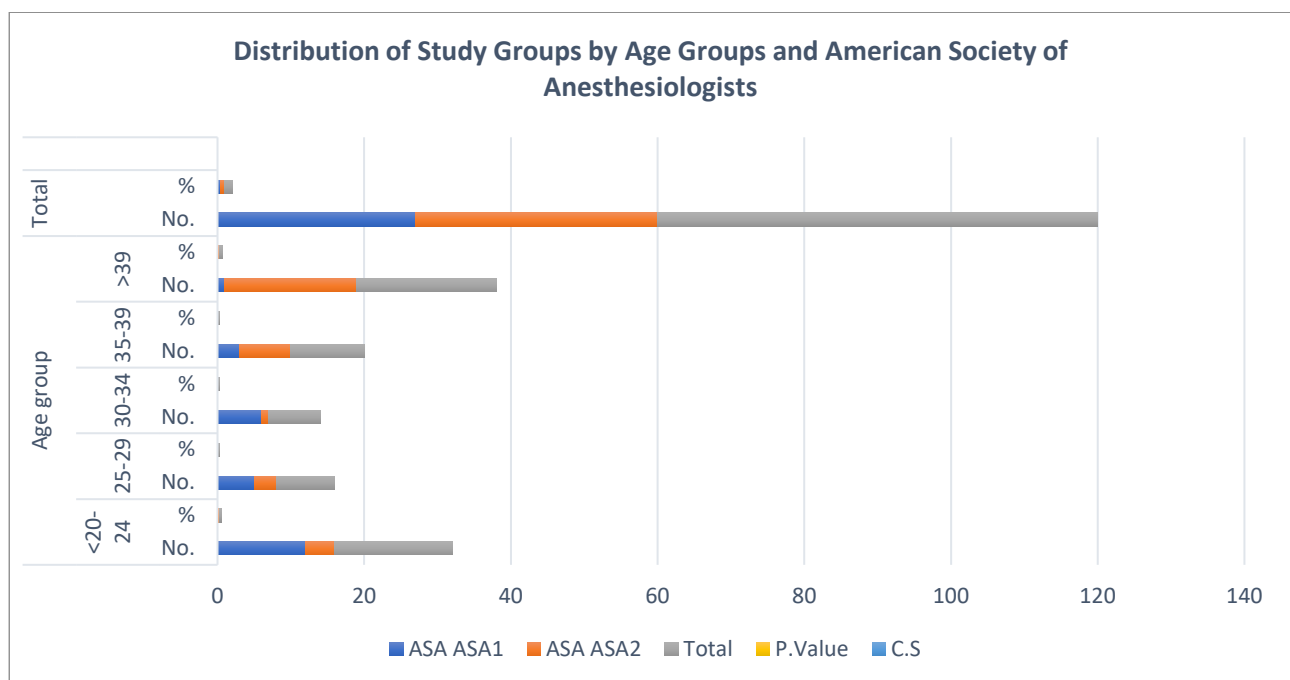
#### Results

##### Distribution of Study Groups by Age Groups and American Society of Anesthesiologists (ASA) Classification

The findings revealed a notable dispersion of patients in the research according to American Society of Anaesthesiologists (ASA) categorisation and age categories. Of the patients, 45% fell into the ASA 1 group and 55% into the ASA 2 group. Of the patients in the 20 to 24 year age range, 6.7% fell into the ASA 2 category and 20% into the ASA 1 category. Among later age categories, those over 39 accounted for thirty percent of the ASA 2 group. There were meaningful changes between the age groups and ASA, with a p-value of less than 0.01. This shows that ASA significantly affects how patients are spread across the age groups.

**Table 1: Age Distribution and ASA Classification of the Study Groups (N=60)**

N=60			ASA		Total	P.Value	C.S
			ASA1	ASA2			
Age group	<20-24	No.	12	4	16	P<0.01	HS
		%	20%	6.7%	26.7%		
	25-29	No.	5	3	8		
		%	8.3%	5%	13.3%		
	30-34	No.	6	1	7		
		%	10%	1.7%	11.7%		
	35-39	No.	3	7	10		
		%	5%	11.7%	16.7%		
	>39	No.	1	18	19		
		%	1.7%	30%	31.7%		
Total		No.	27	33	60		
		%	45%	55%	100%		



**Figure 1: Distribution of Group Study by Age Groups (Year) and (ASA)**



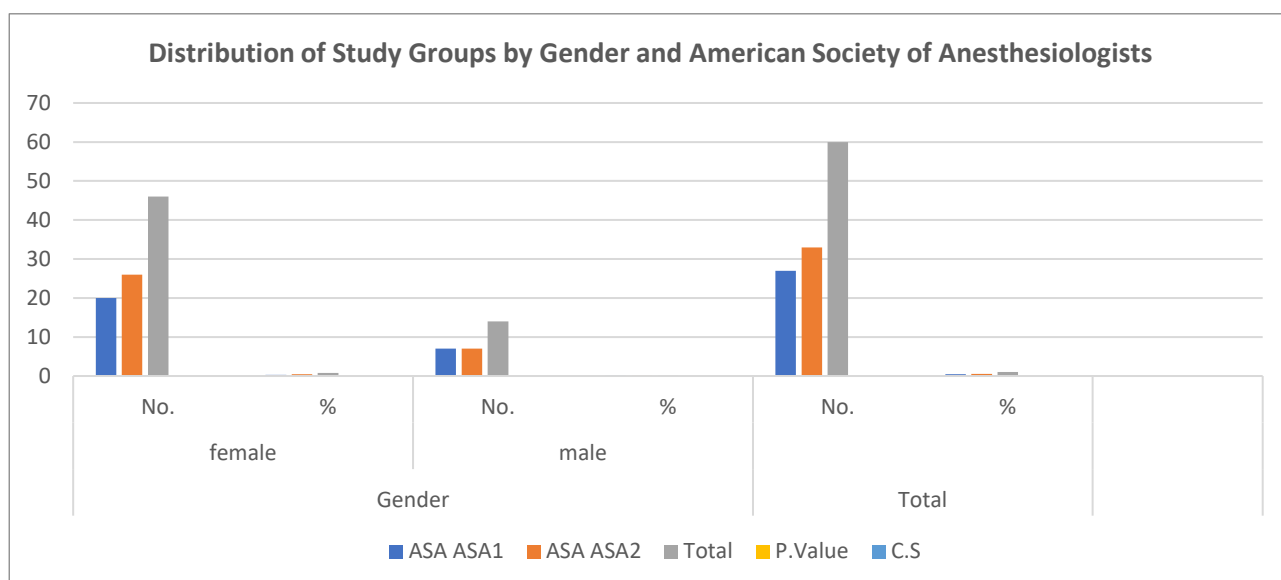
### Distribution of Study Groups by Gender and American Society of Anesthesiologists (ASA) Classification

The study results showed a nearly equal distribution between males and females in the groups according to the American Society of Anesthesiologists (ASA) classification. Of the 46 females in the study, 33.3% were in the ASA 1 group and 43.3% in the ASA 2 group.

Among the 14 males, 11.7% were in the ASA 1 group and 11.7% in the ASA 2 group. The results of the statistical test showed no significant differences between the sexes ( $P > 0.05$ ), indicating that there was no significant effect of gender on the ASA classification in this study.

**Table 2: Gender Distribution and ASA Classification of the Study Groups (N=60)**

N=60			ASA		Total	P.Value	C.S
			ASA1	ASA2			
Gender	female	No.	20	26	46	P>0.05	NS
		%	33.3%	43.3%	76.7%		
	male	No.	7	7	14		
		%	11.7%	11.7%	23.3%		
Total		No.	27	33	60		
		%	45%	55%	100%		



**Figure 2: Distribution of Group Study by Gender, this Chart Show 14 Cases Males and 46 Cases Females**

### Comparison of Pain Scores Between Study Groups Using Morphine and Paracetamol

The results showed a comparison between the two study groups (morphine group and paracetamol group) regarding pain scores over different time periods. Pain scores did not differ significantly between the two groups in the first minutes. In the morphine group

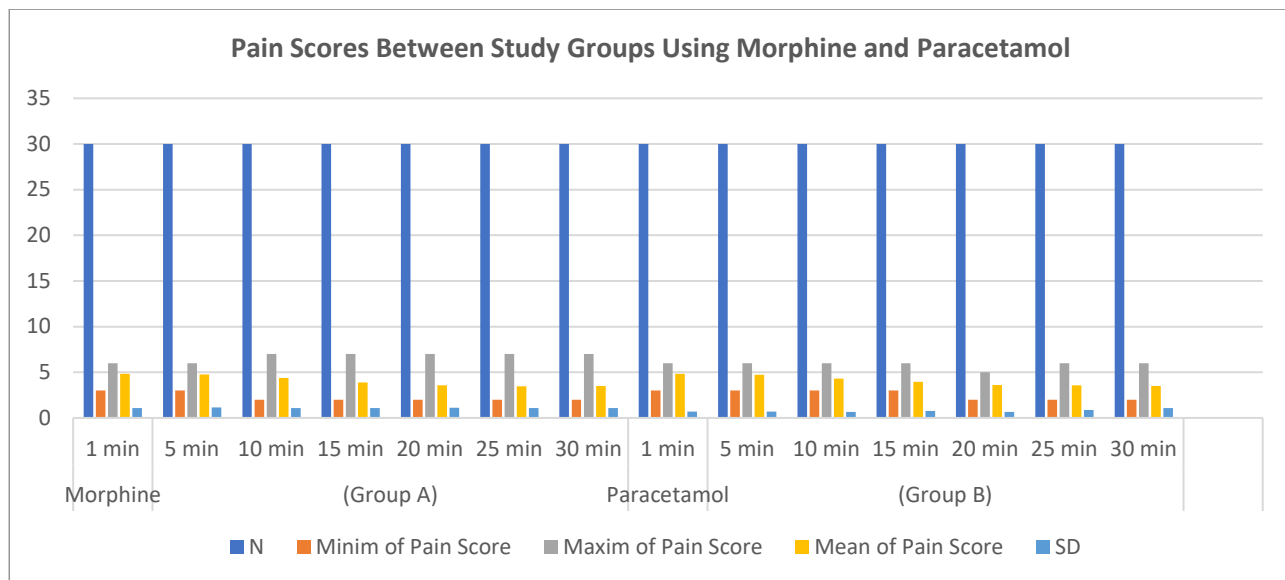
(group A), pain scores were lower over time, ranging from 4.83 in the first minute to 3.5 in the 30th minute. While in the paracetamol group (group B), scores also gradually decreased from 4.83 in the first minute to 3.5 in the 30th minute, with a slight variation in standard deviation.

**Table 3: Pain Score Distribution in Group A (Morphine) vs. Group B (Paracetamol) Over Time**

Drugs Group	Time	N	Minim of Pain Score	Maxim of Pain Score	Mean of Pain Score	SD
Morphine (Group A)	1 min	30	3	6	4.83	1.085
	5 min	30	3	6	4.77	1.135
	10 min	30	2	7	4.37	1.066
	15 min	30	2	7	3.87	1.074
	20 min	30	2	7	3.57	1.104
	25 min	30	2	7	3.47	1.074



	30 min	30	2	7	3.5	1.075
Paracetamol (Group B)	1 min	30	3	6	4.83	0.699
	5 min	30	3	6	4.73	0.691
	10 min	30	3	6	4.3	0.651
	15 min	30	3	6	3.97	0.765
	20 min	30	2	5	3.6	0.675
	25 min	30	2	6	3.57	0.858
	30 min	30	2	6	3.5	1.075



**Figure 3: Histogram Show the Difference of Mean Pain Score between Paracetamol and Morphine for Half Hour to Each Group (0 min – 30 min)**

#### Significance of Mean Pain Score and Time for Studied Groups

The results showed that the differences in pain scores between the morphine (group A) and paracetamol (group B) groups were not statistically significant across

all time periods studied (from 1 min to 30 min). The P values at all time periods were more than 0.05, indicating that there was no statistically significant difference between the two groups in pain scores during these periods.

**Table 4: Comparison of Pain Scores Over Time in Group A (Morphine) and Group B (Paracetamol)**

drugs		Value	C.S
Morphine Group (A)	1 min	P>0.05	NS
	5 min	P>0.05	NS
	10 min	P>0.05	NS
	15 min	P>0.05	NS
	20 min	P>0.05	NS
	25 min	P>0.05	NS
	30 min	P>0.05	NS
Paracetamol Group (B)	1 min	P>0.05	NS
	5 min	P>0.05	NS
	10 min	P>0.05	NS
	15 min	P>0.05	NS
	20 min	P>0.05	NS
	25 min	P>0.05	NS
	30 min	P>0.05	NS



## Discussion

The successful management of postoperative pain is important for optimal recovery in surgical patients, and pain relief is considered to be a fundamental human right [85]. Our study shows that intravenous paracetamol and intravenous morphine are equally effective as an analgesic after laparoscopic cholecystectomy. These findings are coherent with those of 17- Schreuder. (2020), which indicated rather comparable results to their comparison of these two analgesics [17]. Our study further demonstrated that intravenous acetaminophen and morphine were similarly effective at relieving pain within 30 minutes of administration. This finding is consistent with that of Imani.m (2011) [18], who revealed that there was no significant difference between the two drugs as regards therapeutic advantage for postoperative pain control. Notably, our study indicates that intravenous acetaminophen may be a successful alternative to morphine for treating acute pain, as it provides similar analgesic benefits while minimizing the risk for the adverse effects associated with morphine. The findings in this research support earlier research on postoperative patients by Montazer.m (2018) which found lower side effects for acetaminophen than morphine [19]. Our results also show that a single 1-gram intravenous dose of paracetamol had pain-relieving effects similar to intravenous morphine sulphate. This supports the conclusions made by Esmailian., (2015) [20], who also found similar effects in patients who had a laparoscopic cholecystectomy. Talebi (2015) [21] did a similar study and found that there was no significant difference in pain scores between patients in an emergency room who were given 1g of IV paracetamol or 10mg of IV morphine. These patients were in mild to serious pain. There is extensive literature on the benefits of intravenous paracetamol. It has been reported to be a good analgesic, and according to Jalili (2016), said that paracetamol when administered intravenously has been shown to enhance analgesia and decrease opioids consumption with the potential of providing greater patient satisfaction and less opioid-associated adverse effects [22,23]. In an emergency department setting, an effective and safe option for emergency treatment of renal colic was also intravenous paracetamol, as noted by Sinatra et al., (2005) [24]. However, to our knowledge that the results from our study are contradictory to those of Olonisakin. (2012) [25], who concluded that paracetamol (4g within the 24 hours) was not sufficient for postoperative pain relief especially at the first 6 hours postoperatively. Rescue doses of meperidine were needed during this interval in Alimian's study, but after eight hours analgesia was comparable in the two groups [25] In addition, we proved in our study that 1 single 1g dose of intravenous

paracetamol is enough for the effective insufficient of analgesia in the acute postoperative period in laparoscopic cholecystectomy patients. These results contrast with Bektas. et al. (2009) [26], who found less effective pain control with paracetamol in similar settings. Similarly, a single preemptive dose of 1g paracetamol in abdominal surgery, in addition to perioperative epidural analgesia, was found by Gousheh., (2013) not to have a significant effect on postoperative analgesic consumption or pain intensity [27].

## Conclusion

This study concludes that age significantly impacts ASA classification, with older patients (especially those over 39) being more likely to fall into the ASA 2 group. Gender did not influence ASA classification, as the distribution between males and females was nearly equal across ASA groups. When comparing the effectiveness of intravenous morphine and paracetamol for postoperative pain relief in laparoscopic cholecystectomy, both drugs provided similar pain relief, with no statistically significant differences in pain scores at any time point. Pain scores decreased gradually over time for both morphine and paracetamol, indicating that both medications are effective options for managing postoperative pain. These findings suggest that both drugs can be used as viable alternatives for pain control in similar surgical settings.

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