Compartive Study between IV Acetaminophen (Paracetamol) and IV Morphine in preventing postoperative pain during laparoscopic cholecystectomy

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Abstract

Pain is "an uncomfortable sensory and emotional experience related to existing or potential tissue damage, or defined in terms of such damage," according to the International Association for the Study of Pain. Following a laparoscopic cholecystectomy, the patient experiences painful shoulder and abdominal pain. Peritoneal stretching and diaphragmatic irritation by increased intra-abdominal pressure brought on by pneumoperitoneum are two possible reasons of this pain. Presence of this pain may cause uses of analgesic drugs, to provide a better level of analgesia for patient undergoing laparoscopic cholecystectomy and reduce the consumption and the side effects of opioids

Sixty adults males and females (Male was 14 and female was 46) were involved in this study and they underwent a general anesthesia, In all selected patients, pain score was recorded by used numerical pain score and Wong-Baker FACES Pain Rating Scale, and After the full recovery of the patient, we record the pain score (combined numerical and face pain scale) for the patient each 5 minutes until 30 minutes (1min, 5min, 10min, 15min, 20min, 25min and 30 min).

There little difference between intravenous acetaminophen and intravenous morphine in control post-operative pain in laparoscopic cholecystectomy, in comparison between study group and American Society of Anesthesiologists (ASA) found at (10 min) there was little difference between group A&B in minimum with mean pain score (A=4.37, B=4.3) and at (15 min), there was little difference between group A&B in mean pain score (A=3.87, B=3.97).

the acetaminophen (paracetamol) can be used as alternative to morphine to reduce post laparoscopic cholecystectomy pain and reduce the consumption of opioids and the side effect associated with it.

***Keywords**: Acetaminophen, Morphine, cholecystectomy*

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P-ISSN: 2664-0562
E-ISSN:2664-0554

دراسة مقارنة بين أسيتامينوفين الوريدي (باراسيتامول) والمورفين الوريدي في الوقاية من آلام ما بعد الجراحة أثناء استئصال المرارة بالناظور

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الخلاصة

الألم هو مواجهة شعور او حساس غير مريح نتيجة لاحتمال تعرض انسجة الجسم الى التلف او يمكن ان يتم تعريفه على هذا النحو وفقا للجمعية الدولية لطب الألم. عادة بعد اجراء عملية استئصال للمرارة بواسطة الناظور قد يعاني المريض من بعض الالام في منطقتي البطن والكتف. قد يكون هذا الألم بسبب انسحاب الغشاء البريتوني نتيجة لادخال المنظار او نتيجة لزيادة الضغط داخل البطن بعد نفخها اثناء العملية. وجود هذا الألم قد يدفعنا لاستخدام أنواع من المسكنات تهدف هذه الدراسة الى الوصول الى اعلى مستوى من تسكين الالم المريض بعد عملية استئصال المرارة بالناظور من خلال استخدام المسكنات وأيضا تقليل استهلاك المواد الافيونية واثارها الجانبية. شارك في هذه الدراسة ستون بالغًا من الذكور والإناث (كان عمر الذكور 14 عامًا والإناث كانت تبلغ من العمر 46 عامًا) وخضعوا لتخدير عام ، وفي جميع المرضى الذين تم اختيارهم ، تم تسجيل درجة الألم من خلال درجة الألم العددية المستخدمة و مقياس وانك-بايكر لالم الوجه ، وبعد افاقة المريض من التخدير العام نقوم بتسجيل درجة الألم (مقياس رقمي ومقياس ألم الوجه) للمريض كل 5 دقائق حتى 30 دقيقة (1دقيقة، 5 دقائق، 10 دقائق، 15 دقيقة، 20 دقيقة، 25 دقيقة و 30 دقيقة). كانت النتائج تشير الى وجود اختلاف بسيط بين استخدام الاسيتومينوفين والمورفين في السيطرة على الألم بعد اجراء عملية استئصال المرارة، عند استخدام مقارنة المجاميع مع أنواع المرضى حسب الجمعية الامريكية لاطباء التخدير (1 و 2) وجد انه في الدقيقة (10) بعد الافاقة كان هناك اختلاف بسيط بين المجموعة A & B في الحد الأدنى مع متوسط درجة الألم (A = 4.37، B = 4.3). ، في حين في الدقيقة (15) ، كان هناك اختلاف بسيط بين المجموعة A & B في متوسط درجة الألم (A = 3.87 ، ب = 3.97).

نستخلص من ذلك انه يمكن استخدام الاسيتامينوفين (الباراسيتامول) كبديل للمورفين لتقليل الام المريض بعد عملية استئصال المرارة للحد من استخدام المواد الأفيونية وتقليل اثارها الجانبية.

الكلمات المفتاحية: *اسيتامينوفين، مورفين، استئصال المرارة .*

Introduction

The most frequent unfavorable result for patients who have surgical treatments is postoperative discomfort. Postoperative pain not only hurts patients, but it can also impede healing and lengthen hospital stays [1]. Control of postoperative pain is still a challenge and a source of concern for the surgeon, anesthesiologist, and patient. It has a profound psychological and organic impact in the form of stress, catabolism, immune dysfunction, nausea, vomiting, ileus, impaired pulmonary function, increased cardiac demand, coagulation fibrinolysis dysfunction, cerebral dysfunction, fluid homeostasis alteration, sleep disruption, and exhaustion [2].

The surgical stress response, also known as the production of hormones and vasoactive materials including cortisone, epinephrine, and catecholamines in response to the activation of the pain pathway, peaks in the first few hours following surgery.

P-ISSN: 2664-0562
E-ISSN:2664-0554

The breakdown of adipose and muscle tissue as well as hyperglycemia, immune system dysfunction, and the stress response are all effects [3]. A less invasive surgical operation called a laparoscopic cholecystectomy is used to remove a damaged gallbladder. Since the early 1990s, this approach has effectively taken the role of the open method during routine cholecystectomies [4]. The hospital stay and incision size are both decreased by minimally invasive surgical (MIS) techniques, allowing patients to resume their regular activities more quickly. Many surgeries can now be carried out by surgeons without the stress and discomfort of earlier methods [5].

Intraoperative problems during laparoscopic procedures might result from the development and maintenance of pneumoperitoneum as well as vascular damage caused by surgical instrumentation [6].

Although morphine is a strong analgesic, its usage is restricted because of dependence, withdrawal, and the possibility of addiction. Delta, kappa, and mu-opioid receptors are particularly responsive to morphine. The majority of the analgesic effects of this medication are produced through binding to mu-opioid receptors in the central nervous system (CNS) and peripheral nervous system (PNS). The onset of morphine takes 6 to 30 minutes. Constipation, reduced peristalsis, impaired stomach emptying, and central nervous system depression are some of the prevalent adverse effects of morphine use. Other side effects include nausea, vomiting, and urine retention. One of the more severe opiate-related side effects that is crucial to watch out for in the post - operative patient group is respiratory depression [7-9].

A non-opioid topical analgesic and antipyretic, acetaminophen is used to relieve fever and pain. Acetaminophen is a secure analgesic administered intravenously (IV). For low to moderate pain, clinicians can administer it alone; for severe pain, they can combine it with another opioid or NSAID analgesic. The cyclooxygenase (COX) mechanism is how acetaminophen works. It easily crosses the blood-brain barrier, and its activity seems to be primarily centralized [10,11].

The intensity of a patient's condition and their reaction to pain relief should be evaluated using validated scoring tools. These include the numerical rating scale (NRS), which typically uses 11-point scoring systems with 0 denoting no pain and 10 denoting the most excruciating pain imaginable [12], and the face pain rating scale, which uses the Wong-Baker face and was designed for use with children but is suitable for adult patients (especially poorly communicated people). The cartoon-like elements have made it more popular. To provide the adult an option in pain scale, it is preferred to combine the face scoring system with the (NRS) [13].

P-ISSN: 2664-0562
E-ISSN:2664-0554

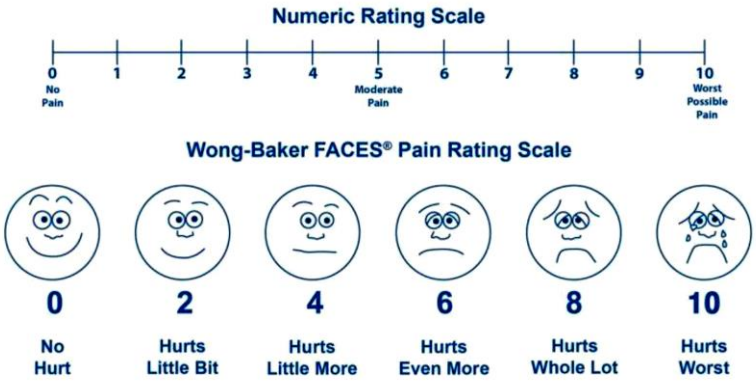

Fig. (1): Numerical pain rating scale and Wong-Baker FACES Pain Rating Scale.

Materials and methods

Sixty adults males and females (Male was 14 and female was 46, age ranged between 18-54 years old and weight ranged between 50-120 kg) were involved in this study and they underwent a general anesthesia with American society of anesthesiologists (ASA) physical status I and II.

Preoperatively medical history were recorded, physical examination performed and routine laboratory investigations: (complete blood count, coagulation profile, electrocardiogram, blood sugar, and liver function tests). All patients fast for 8-10 hours before proposed time of surgery. Blood Pressure and Heart Rate checked in both groups. All patients were monitored continuously from time of induction anesthesia until discharge from recovery unit.

Patients are divided into two groups, Group A (30 patients given intravenous Morphine) and Group B (30 patients given intravenous Acetaminophen). All patient were anaesthetized with (Tramadol (50–100 mg), Dexamethasone (8 mg), Metoclopramide (10 mg) Ranitidine (50 mg), Oxygen for 3min (8-10 L/Min)) as pre-induction and Propofol (1.5-2.5mg\kg), Ketamine (0.5 mg\kg) Atracurium (0.5 mg\kg) or Rocuronium (0.6 mg/Kg) as induction and Isoflurane (1.2-2.5%) and Oxygen, male (7.5-8 L/Min), Female (6.5-7 L/Min) as maintenances and Atropine (1.2 mg) mixed with Neostigmine (2.5mg) diluted to 10ml (NaCl 0.9%) as recovery. Morphine prepared by 1 ampoule at concentration of 10 mg\ml used with dilution.1 ampoule of morphine diluted to 10ml (NaCl 0.9%), that's mean 1ml equal 1mg (in Group A), and acetaminophen 1 gram for each patent (in Group B).

After recovery, we record the pain score (combined numerical and face pain scale) for the patient each 5 minutes until 30 minutes (1min, 5min, 10min, 15min, 20min, 25min and 30 min).

P-ISSN: 2664-0562
E-ISSN:2664-0554

Results

The following statistical data analysis approaches were used in order to analyze and assess the results of the study under application of the statistical package (SPSS) Ver (Spss 18).

Sixty adults males and females were involved in this study and they underwent a general anesthesia with American society of anesthesiologists (ASA) physical status I and II. In table (1), show the cases in age group distribution, it shows 60 of Cases are between Less than 20 years old and upper than 39 years old, also it shows the total cases of ASA1 are 27 (45%) and the total cases of ASA2 33 (55%).Also this table shows highly statistically significant between the Age and ASA.

Table (1): Distribution of group study by Age groups (year) and American Society of Anesthesiologists (ASA).

N=60			ASA 1	ASA 2	Total
Age group	<20-24	No.	12	4	16
		%	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%

P.value<0.01, Highly significant.

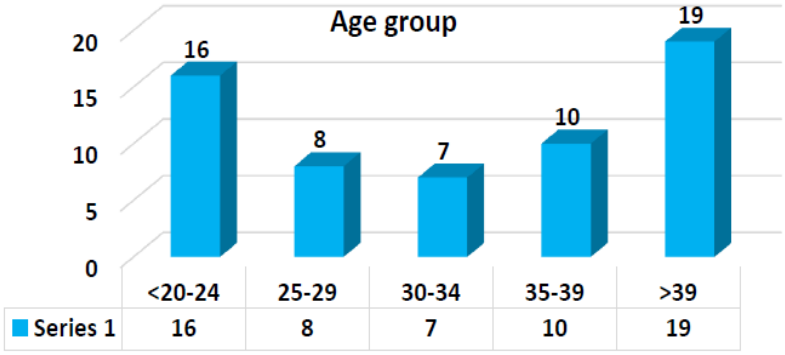

Fig. (2): chart distribution of group study by Age groups

Table (2) show distribution of group study by Gender and (ASA), it shows 46 (76.7%) females divided into 20 cases ASA1 and 26 cases ASA2. Also 14 (23.7%) males divided into 7 cases ASA1 and 7 cases ASA2.

P-ISSN: 2664-0562
E-ISSN:2664-0554

Table (2): Distribution of group study by Gender and (ASA).

N=60			ASA 1	ASA 2	Total
Gender	Female	No.	20	26	46
		%	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%

P.value >0.05, Non-significant

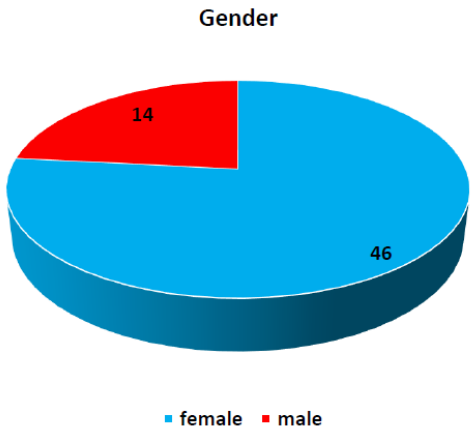

Fig. (3): Pie chart Distribution of group study by Gender.

Table (3) show the difference of mean pain score between paracetamol and morphine for half hour to each group (0 min – 30 min). At (1 min) there was Non difference between group A&B in minimum (A=3, B=3), maximum (A=6, B=6) and mean pain score (A=4.83, B=4.83). At (5 min) there is Non difference between group A&B in minimum (A=3, B=3), maximum (A=6, B=6) but there are little difference in mean pain score (A=4.77, B=4.73). At (10 min) there was little difference between group A&B in minimum (A=2, B=3), maximum (A=7, B=6) And mean pain score (A=4.37, B=4.3). At (15 min), there was little difference between group A&B in minimum (A=2, B=3), maximum (A=7, B=6) but there was found difference in mean pain score (A=3.87, B=3.97). At (20 min) there was Non difference between group A&B in minimum (A=2, B=2), there was difference in maximum (A=7, B=5) And little difference in mean pain score (A=3.57, B=3.6). At (25 min) there was Non difference between group A&B in minimum (A=2, B=2), there was little difference in maximum (A=7, B=6) And there was found difference in mean pain score (A=3.47, B=3.57). At (30 min) there was Non difference between group A&B in minimum (A=2, B=2), there was little difference in maximum (A=7, B=6) And there was Non difference in mean pain score (A=3.5, B=3.5).

P-ISSN: 2664-0562
E-ISSN:2664-0554

Table (3): Comparison between the pain score from the studied groups.

Drugs Group	Time	Minimum of Pain Score	Maximum of Pain Score	Mean of Pain Score	SD
Morphine (Group A)	1 min	3	6	4.83	1.085
	5 min	3	6	4.77	1.135
	10 min	2	7	4.37	1.066
	15 min	2	7	3.87	1.074
	20 min	2	7	3.57	1.104
	25 min	2	7	3.47	1.074
	30 min	2	7	3.5	1.075
Paracetamol (Group B)	1 min	3	6	4.83	0.699
	5 min	3	6	4.73	0.691
	10 min	3	6	4.3	0.651
	15 min	3	6	3.97	0.765
	20 min	2	5	3.6	0.675
	25 min	2	6	3.57	0.858
	30 min	2	6	3.5	1.075

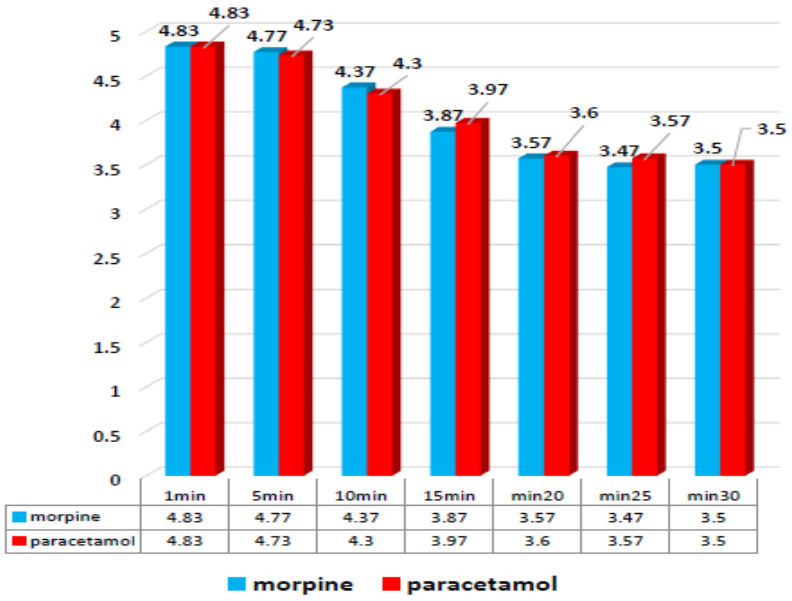

Fig. (4): chart distribution mean of pain score according to the time of studied

P-ISSN: 2664-0562
E-ISSN:2664-0554

Discussion

The best postoperative pain management is crucial for surgery patients' care. Pain management is actually a fundamental human right [14]. In our research, we found that intravenous paracetamol and intravenous morphine had similar or negligible effects on postoperative pain following laparoscopic cholecystectomy. And this confirms the findings of Montazer, S.H. (2018) [15].

According to Esmailian, M. [16], both intravenous acetaminophen and morphine provide the same treatment effect in reducing pain over the course of 30 minutes following medication delivery. Additionally, intravenous acetaminophen seems to be a good substitute for intravenous morphine for the treatment of acute pain since it consistently produces analgesia levels that are on par with those of intravenous morphine. Furthermore, it seems that acetaminophen has fewer side effects than morphine, which is in accordance with Talebi Doluee, M. (2015) [17]. A single (1 gram) dose of intravenous paracetamol given similar in nature to level of analgesic effect of morphine (10mg), which is in accordance with Jalili, M. (2016) [18], despite the fact that intravenous morphine sulfate is useful for pain treatment in individuals with laparoscopic cholecystectomy. Acetaminophen is an effective and safe nonopioid analgesic.

In a study conducted in a UK emergency room, Craig, M. (2012) compared the effectiveness of 1g of intravenous paracetamol to 10mg of intravenous morphine in patients between the ages of 16 and 65 with moderate-to-severe pain and found that there was almost no difference in pain levels.

The advantages of IV paracetamol are discussed by numerous researchers. For instance, Olonisakin, R. P. (2012) notes that intravenous paracetamol enhanced analgesic effect and decreased the amount of morphine usage in the immediately following surgery with reduction the opioid adverse effects and better patient satisfaction [21]. Sinatra, R. (2005) found it to be an effective analgesic. Additionally, the study by Bektas, F. (2009), in a placebo-controlled trial, assesses the analgesic safety and effectiveness of intravenous single-dose paracetamol and morphine for the therapy of urinary colic, and finds that both drugs are safe and effective [22].

Despite the paracetamol (4 g in 24 hours) is insufficient for postoperative pain management, particularly in the first six hours after surgery, as demonstrated by the study by Alimian, M. (2014), patients still need rescue doses of meperidine after eight hours [23].In our study we find that the Intravenous paracetamol (1g) has caused a good pain relief quality in Laparoscopic Cholecystectomy and it is a sufficient analgesic for controlling moderate pain in the immediate aftermath of surgery alone, contrary to what Gousheh, S. M. (2013) [24] found.

P-ISSN: 2664-0562
E-ISSN:2664-0554

Using 1g of paracetamol as a single intravenous preemptive dosage in laparotomy with perioperative epidural analgesia did not diminish the need for analgesics or the severity of pain in the recovery period, according to a study by Borisov, D. B. (2007) [25].

Conclusion

Based on the findings of this study, we found there is equal or little difference between intravenous acetaminophen and intravenous morphine in control post-operative pain in laparoscopic cholecystectomy, so the use of acetaminophen as alternative to morphine to reduce the opioids use.

P-ISSN: 2664-0562
E-ISSN:2664-0554

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P-ISSN: 2664-0562

E-ISSN:2664-0554