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COMPARATIVE STUDY OF INTRAVENOUS VERSUS INTRAPERITONEAL MAGNESIUM SULPHATE IN POST OPERATIVE PAIN MANAGEMENT AFTER LAPROSCOPIC CHOLECYSTECTOMY

By

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ABSTRACT

Background: Study of effective modality for postoperative pain management has remained a subject of ongoing clinical researches due to its uniqueness and associated complex physiological consequences with somatic, autonomic and behavioral manifestations. Poorly managed postoperative pain can also increase the incidence of persistent postoperative pain conditions.

Objectives: To compare between the effect of intravenous and intraperitoneal magnesium sulphate on postoperative pain outcomes, post-operative opioid consumption as well as intraoperative fentanyl consumption in patients undergoing laparoscopic cholecystectomy.

Patients and Method: This prospective randomized double blind clinical study was carried out on 80 adult patients, Undergoing laparoscopic cholecyctectomy at Al-Azhar University Hospitals. After approval by the Institutional Ethical Committee, and informed written consents were obtained from the patients. We randomly divided the patients into two equal groups: Group A received Magnesium sulphate (magnisol 50 mg/kg in 250 ml of isotonic 0.9% normal saline) intravenously over 30 minutes started with induction and Group B received Magnesium sulphate (50 mg/kg in 30 ml of isotonic 0.9% normal saline intra peritoneally (IP) at the end of surgery.

Results: The pain scores of IP group (intra-peritoneal group) were significantly lower than IV group. The total opioid consumption postoperatively in IP group was significantly lower than IV group. Also, there was a significant reduction in opioid-related side effects such as postoperative nausea and vomiting.

Conclusion: Instillation of 50 mg of magnesium sulphate intravenously after completion of laparoscopic surgery renders patientsof less pain at the first 24 hours after surgery, more pain free period and less consumption of analgesics in the post-operative period.

Keywords: Intravenous, Intraperitoneal Magnesium Sulphate, Post-Operative Pain Management, Laproscopic Cholecystectomy.

INTRODUCTION

Laparoscopy has changed the surgical approach to symptomatic gallstone disease. The first laparoscopic cholecystectomy was performed in Europe in 1987 using a pneumoperitoneum. Many studies have shown the preference of laparoscopic cholecystectomy over open cholecystectomy, and laparoscopic cholecystectomy has become the standard procedure for gallstone disease and was first called the ‘gold standard' in 1989 *(Maharjan and Shrestha, 2012)*.

However, pain is the most frequent complaint after LC in 17–41% of the patients and it is the main reason for staying overnight in the hospital on the day of the operation *(Maharjan and Shrestha, 2012)*.

Consequently, Postoperative pain should be effectively treated. Effective treatment serves to blunt autonomic, somatic and endocrine reflexes with a resultant potential decrease in perioperative morbidity. The most common treatment practice is a poly pharmacological approach *(Fredheim et al., 2011)*.

Pneumoperitoneum with carbon dioxide (CO_2) insufflation for laparoscopic surgery induces a cardiovascular response characterized by elevations of arterial pressure and systemic vascular resistance with no significant change in heart rate. These vasopressor responses are likely to be due to increased release of catecholamines, vasopressin, or both. On the other hand, magnesium sulphate ($MgSO_4$) blocks the release of catecholamines from both adrenergic nerve terminals and the adrenal gland, and intravenous (IV) magnesium sulphate inhibits catecholamine release associated with tracheal intubation. Moreover, magnesium produces vasodilatation by acting directly on blood vessels, and high-dose magnesium attenuates vasopressin-stimulated vasoconstriction and normalizes sensitivity to vasopressin *(Kamble et al., 2017)*.

Noxious stimulation leads to the release of glutamate and aspartate, which bind to various subclasses of excitatory amino acid receptors, including the N-methyl D-aspartate (NMDA) receptor. Activation of NMDA receptors leads to calcium and sodium influx into the cell, with an efflux of potassium and initiation of central sensitization and windup. Magnesium blocks NMDA channels in a voltage-dependent way, and its addition produces a reduction of NMDA-induced currents *(Shah and Dhengle, 2016)*.

It is well known that the peritoneum is slightly sensitive, free from pain on sharp, cutting and puncture wounds. Moreover, it is highly sensitive to distension, tearing and separation. Preoperatively, stronger pain occurs due to distension of the parietal peritoneum, and after the surgery pain in the right shoulder and the shoulder blade is evident due to irritation of phrenic nerve *(Enes et al., 2011)*.

Studies related to magnesium sulfate ($MgSO_4$) administration revealed that the anesthetic and analgesia quality may improve. The true site of action of magnesium is probably at the spinal cord NMDA receptors. It has been used as intraoperative and postoperative analgesia. Several recent reports have described the efficacy of magnesium infusions in moderate dosage both during surgery and

in the postoperative period for decreasing postoperative analgesic requirements *(Shah and Dhengle, 2016).*

The present work aimed to compare intravenous magnesium sulphate with intra peritoneal magnesium sulphate as adjuvant to general anesthesia for pain intraoperative, hemodynamic, postoperative visual analogue scale management, occurrence of complication in laparoscopic cholecystectomy.

PATIENTS AND METHODS

This prospective randomized double blind clinical study was carried out on 80 adult patients, Undergoing laparoscopic cholecyctectomy in Al-Azhar University Hospitals. After approval by the Institutional Ethical Committee, and informed written consents obtained from the patients, we randomly divided the patients into two equal groups: Group A (IV group) received Magnesium sulphate (magnisol) 50 mg/kg in 250 ml of isotonic 0.9% normal saline (N.S) intravenously over 30 minutes started with induction and, Group B (IP group) received Magnesium sulphate 50 mg/kg in 30 ml of isotonic 0.9% N.S intra peritoneally (IP) at the end of surgery.

Patients were prepared by 8 hours preoperative fasting, receiving tablet Alprazolam 0.25mg and Omeprazole 20 mg at bed time of the day before surgery and morning of surgery.

Inclusion criteria:

1. ASA physical status I–II.
2. Both genders.
3. Patients age 18 to 60 years.

Exclusion Criteria:

1. Myathenia gravis
2. Presence of psychiatric diseases.
3. Obese patients with body mass index (BMI)>30 kg m2.
4. Heart block.
5. Renal impairment.
6. Severe chronic disease.
7. Those with an allergy to any of the study drugs
8. Patients with previous heart surgery, left ventricular ejection fraction of less than 40%, documented myocardial infarction within the previous six weeks, congestive heart failure, severe chronic obstructive pulmonary diseases and liver diseases.
9. Patients treated with calcium channel blockers and pregnancy
10. Patients with increased risk of regurgitation.

Preoperative assessment:

Routine preoperative assessment was carried out to fulfill patient's criteria for the study by full history taking, physical examination including chest and heart examination as well as reviewing the patient's investigations (CBC, S. creatinine, blood urea, SGOT, SGPT, PT, PTT, INR, ECG, and chest X-ray).

Equipments for general anesthesia (GA): IV line, I.V fluids, suction apparatus, airways, laryngoscope with different size blades, endotracheal tubes of variable sizes, electrical cardioversion (DC) and equipments for difficult intubation.

Drugs used in the study: Normal saline 0.9%, Magnesium sulphate (magnisol), Propofol, atracurium, Fentanyl, Isoflurane, Atropine and Neostigmine.

In the operating room, standard monitoring was used (ECG (dragger), heart rate (HR), oxygen saturation and noninvasive blood pressure) and end tidal CO2 was started. After sterilization, an intravenous line was secured with an 18-gauge cannula and all patients received an infusion of 0.9% saline 5 ml /kg before the start of the study. The intravenous group received Magnesium sulphate 50 mg/kg in 250 ml of isotonic 0.9% normal saline intravenously over 30 minutes started with induction. The intraperitoneal group received Magnesium sulphate 50 mg/kg in 30 ml of isotonic 0.9% normal saline intra peritoneal at the end of surgery.

After tracheal intubation and evaluation of intubation condition, anesthesia was maintained with 1.2 mac Isoflurane in O2 via a closed circuit system, and neuromuscular blockade maintained with atracurium 0.1-0.2mg/kg as on demand. Mechanical ventilation was provided by Dragger Fabius GS anesthesia machine, and the respiratory rate and tidal volume were adjusted to maintain the end-tidal CO2 around (30-40) mmHg.

At the end of surgery, inhalational anesthesia was stopped, then the residual neuromuscular block was reversed with Neostigmine (0.05 mg/kg) and Atropine (0.02 mg/kg), When the patient fulfilled extubation criteria the endotracheal tube was withdrawn and patients transferred to the postoprative care unite (PACU).

Arterial pressure and heart rate were measured before induction (baseline), after intubation (T in), before pneumoperitoneum (P 0), every 10 min after pneumoperitoneum for 30 min (P 10, P 20, and P 30), after extubation (T ex), and before discharge from the operating room.

Visual analogue scale (VAS): The patient was simply instructed and asked to correlate the degree of his pain on a scale for pain assessment graded from 0 to 10 (0 as "no pain" to 10 as "worst imaginable pain"). To indicate how much pain they are currently feeling. The far left end (0) indicates ‘No pain’ and the far right end (10) indicates ‘Worst pain ever’ *(Rania et al., 2015).*

The time to first analgesic administration, numbers of analgesic requests were in the first 24 h, and total analgesic requirement during the first postoperative 24 hours.

The occurrence of any adverse events, including hypoventilation (bradypnea respiratory rate (RR) <10 bpm), SpO2 reaching 92% or less, sedation, hypotension (mean arterial pressure (MAP) <55 mmHg), bradycardia (heart rate (HR) <60 bpm), nausea were assessed at the same intervals of VAS using a scoring system (0= none, 1 = mild, 2 = moderate, 3 = severe). Patients suffering from vomiting or who rated their nausea at level 2 or more received 4 mg intravenous ondansetron and their postoperative antiemetic needs were recorded. Sedation was also assessed at the same intervals of VAS using a four-point scale (0 = alert, 1 = quietly awake, 2 = asleep but easily aroused, and 3 = deep sleep).

Statistical Analysis:

Data were collected, revised, coded and entered to the Statistical Package for the Social Sciences (IBM SPSS) version 23. The quantitative data were presented as mean, standard deviations and ranges when parametric and were compared by independent t test, and median with inter-quartile range (IQR) when non parametric and were compared by Mann Whitney test. Also qualitative variables were presented as number and percentages and were compared by chi square test. The p-value was considered significant when $P < 0.05$.

RESULTS

There was no statistically significant difference found between group I and group II regarding gender, age and ASA classification with p-value = 0.361, 0.839 and 0.491 respectively **(Table 1)**.

Table (1): Comparison between group I and group II regarding demographic and characteristics of the studied patients

Parameters \ Groups		Group I (Intra venous) No. = 40	Group II (Intra peritoneal) No. = 40	P-value
Gender	Female	26 (65.0%)	22 (55.0%)	0.361
	Male	14 (35.0%)	18 (45.0%)	
Age	Mean ± SD	38.68 ± 9.51	39.05 ± 6.73	0.839
	Range	22 – 54	24 – 54	
ASA	I	26 (65.0%)	23 (57.5%)	0.491
	II	14 (35.0%)	17 (42.5%)	

There was a statistically significant increase in visual analogue scale (VAS) at different time of measurement in group II than group I **(Table 2)**.

Table (1): Comparison between group I and group II regarding visual analogue scale (VAS) at different time of measurement

Parameters \ Groups		Group I (Intra venous)	Group II (Intra peritoneal)	P-value
		No. = 40	No. = 40	
VAS1	Median (IQR)	2 (1 – 2)	5 (4 – 6)	<0.001
	Range	1 – 4	4 – 6	
VAS2	Median (IQR)	2 (2 – 2)	5 (4 – 6)	<0.001
	Range	1 – 4	4 – 6	
VAS3	Median (IQR)	2 (2 – 3)	5 (4 – 6)	<0.001
	Range	1 – 4	4 – 7	
VAS4	Median (IQR)	2 (2 – 3)	5 (5 – 6)	<0.001
	Range	1 – 5	4 – 7	
VAS5	Median (IQR)	2 (2 – 3)	6 (5 – 6)	<0.001
	Range	1 – 5	4 – 7	
VAS6	Median (IQR)	2 (2 – 4)	6 (5 – 7)	<0.001
	Range	2 – 5	4 – 8	
VAS12	Median (IQR)	3 (2 – 4)	6 (6 – 7)	<0.001
	Range	2 – 5	5 – 8	
VAS18	Median (IQR)	3 (2 – 4)	6 (6 – 7)	<0.001
	Range	2 – 6	5 – 8	
Vas 24	Median (IQR)	3 (2 – 5)	7 (6 – 7)	<0.001
	Range	2 – 6	5 – 9	

There was no statistically significant difference found between group I and group II regarding heart rate at baseline and TIN with p-value = 0.332 and 0.097 respectively. While there was statistically significant increase in heart rate in group II than group I from discharge to 24 hours **(Table 3)**.

Table (2): Comparison between group I and group II regarding heart rate at different time of measurement

Parameters \ Groups		Group I (Intra venous) No. = 40	Group II (Intraperitoneal) No. = 40	P-value
HR base	Mean±SD	64.03 ± 7.75	62.55 ± 5.60	0.332
	Range	50 – 79	55 – 78	
HR TIN	Mean±SD	68.03 ± 7.61	65.55 ± 5.39	0.097
	Range	55 – 80	56 – 80	
HR TEX	Mean±SD	66.38 ± 6.02	74.85 ± 7.57	<0.001
	Range	57 – 80	57 – 88	
HR DIS	Mean±SD	67.10 ± 6.30	77.08 ± 7.19	<0.001
	Range	57 – 80	60 – 88	
HR 1	Mean±SD	54.80 ± 3.95	67.10 ± 5.24	<0.001
	Range	48 – 67	56 – 83	
HR 2	Mean±SD	58.80 ± 5.57	67.13 ± 7.19	<0.001
	Range	50 – 68	53 – 88	
HR 3	Mean±SD	60.58 ± 4.84	66.45 ± 6.71	<0.001
	Range	54 – 71	53 – 78	
HR 4	Mean±SD	58.20 ± 3.67	68.13 ± 7.00	<0.001
	Range	52 – 67	55 – 80	
HR 5	Mean±SD	59.73 ± 4.14	70.93 ± 6.97	<0.001
	Range	55 – 66	60 – 90	
HR 6	Mean±SD	58.23 ± 3.29	72.90 ± 5.87	<0.001
	Range	55 – 66	60 – 88	
HR 12	Mean±SD	56.73 ± 3.20	73.40 ± 5.26	<0.001
	Range	50 – 66	60 – 79	
HR 18	Mean±SD	56.63 ±2.40	71.70 ± 5.85	<0.001
	Range	50 – 60	60 – 80	
HR 24	Mean±SD	60.75 ± 2.43	73.88 ± 5.83	<0.001
	Range	55 – 66	62 – 82	

There was no statistically significant difference found between group I and group II regarding mean artrial pressure at baseline and TIN with p-value = 0.825 and 0.258 respectively. While there was statistically significant increase in mean artrial pressuer in group II than group I from discharge to 24 hours except at 4 hours there was no statistically significant difference between them with p-value = 0.186 **(Table 4)**.

Table (3): Comparison between group I and group II regarding mean arterial pressure at different time of measurement

Parameters \ Groups		Group I (Intra venous)	Group II (Intraperitoneal)	P-value
		No. = 40	No. = 40	
MAPbase	Mean±SD	62.30 ± 5.59	62.58 ± 5.47	0.825
	Range	53 – 75	54 – 77	
MAP TIN	Mean±SD	67.63 ± 5.68	69.20 ± 6.64	0.258
	Range	60 – 77	57 – 87	
MAP TEX	Mean±SD	59.70 ± 4.87	64.50 ± 4.09	<0.001
	Range	50 – 70	55 – 69	
MAP DIS	Mean±SD	58.20 ± 4.54	61.38 ± 3.40	<0.001
	Range	50 – 67	53 – 68	
MAP 1	Mean±SD	67.73 ± 5.75	71.60 ± 6.64	0.007
	Range	60 – 77	57 – 88	
MAP 2	Mean±SD	63.20 ± 6.16	66.60 ± 6.92	0.023
	Range	53 – 75	55 – 78	
MAP 3	Mean±SD	60.33 ± 5.38	63.35 ± 5.60	0.016
	Range	52 – 70	53 – 74	
MAP 4	Mean±SD	60.40 ± 5.00	61.83 ± 4.53	0.186
	Range	53 – 69	54 – 70	
MAP 5	Mean±SD	58.13 ± 4.32	62.68 ± 4.82	<0.001
	Range	50 – 66	55 – 70	
MAP 6	Mean±SD	57.95 ± 4.44	63.45 ± 4.58	<0.001
	Range	50 – 69	55 – 72	
MAP 12	Mean±SD	60.88 ± 3.53	65.78 ± 3.83	<0.001
	Range	55 – 69	55 – 78	
MAP 18	Mean±SD	60.78 ± 3.90	67.50 ± 6.31	<0.001
	Range	55 – 67	55 – 78	
MAP 24	Mean±SD	58.95 ± 4.05	70.43 ± 8.45	<0.001
	Range	55 – 68	55 – 79	

There was statistically significant increase in the time to first analgesic administration, number of analgesic requests in the first 24 hours and total analgesic requirement during the first postoperative 24h in group II than group I with p-value < 0.001 **(Table 5)**.

Table (4): Comparison between group I and group II regarding time to first analgesic administration, number of analgesic requests in the first 24 hours and total analgesic requirement during the first 24 hours postoperative

Parameters / Groups		Group I (Intra venous) No. = 40	Group II (Intra peritoneal) No. = 40	P-value
Time to first analgesic administration	Mean ± SD	2.28 ± 2.04	5.55 ± 2.83	<0.001
	Range	0 – 10	1 – 10	
Number of analgesic requests in the first 24h	Mean ± SD	1.40 ± 1.15	2.70 ± 1.81	<0.001
	Range	0 – 3	0 – 5	
Total analgesic requirement during the first postoperative 24h	Mean ± SD	1.31 ± 0.52	2.03 ± 0.73	<0.001
	Range	0 – 3	0 – 2.5	

That there was no incidence of postoperative complications found in the two study groups with no statistically significant difference between them with p-value = 1.000 **(Table 6)**.

Table (5): Comparison between group I and group II regarding incidence of postoperative complications

Groups / Complication	Group I		Group II		P-value
	No.	%	No.	%	
Negative	40	100%	40	100%	1.000
Positive	0	0%	0	0%	

DISCUSSION

This study showed that there was no statistically difference between intravenous and intraperitoneal groups as regard age, sex, ASA grading.

Heart rate showed that there was no statistically significant difference found between group I and group II regarding heart rate at baseline and TIN, while there was a statistically significant increase in heart rate in group II than group I from discharge to 24 hours. Mean artrial pressure showed that there was no statistically significant difference found between group I and group II regarding mean artrial pressure at baseline and TIN, while there was a statistically significant increase in mean artrial pressure in group II than group I from discharge to 24 hours except at 4 hours with no statistically significant difference between them. There was no bradycardia associated with the bolus magnesium given IV group after its administration immediately or later on.

Kamble et al. (2017) administered magnesium sulphate ($MgSO_4$) 50 mg/kg intravenously before pneumoperitoneum in patients undergoing laparoscopic

cholecystectomy and found that a close relationship exists between increases in plasma levels of catecholamines and vasopressin and arterial pressure during pneumoperitoneum. Furthermore, the administration of magnesium sulphate before pneumoperitoneum effectively attenuated arterial pressure increases in subjects undergoing laparoscopic cholecystectomy.

Changes in heart rate and mean blood pressure after single bolus of magnesium sulphate as in IV group in the present study was studied by *De Oliveira et al. (2013)* who found that there was no differences in hemodynamic variables as regards heart rate and blood pressure before and immediately after magnesium injection in a study done on adult patients undergoing ambulatory ilioinguinal hernia repair or varicose vein operation under• general anesthesia where the magnesium was given as a bolus of 4 grams after induction of anesthesia. Intravenous instillation of magnesium sulphate ($MgSO_4$) attenuated the hemodynamic stress response to pneumoperitoneum, as well as reduced postoperative pain, nausea, and vomiting in patients undergoing laparoscopic cholecystectomy *(Rania et al., 2015)*.

In this study, magnesium sulphate ($MgSO_4$) improved the quality of analgesia, with fewer requirements for postoperative analgesics, and improved postoperative pain after laparoscopic cholecystectomy. Statistically significant increase in visual analogue scale (VAS) at different times of measurement in group II than group I and total analgesic requirement during the first 24 hours postoperative in group II than group I.

In agreement with this results *Kiran et al. (2011)* studied that the administration of intravenous magnesium sulphate 50 mg/kg preoperatively significantly reduces postoperative pain in patients undergoing inguinal surgery. *Banihashem et al. (2015)* study agreed with our study in that Magnesium sulphate as adjunct, parenterally or intraperitoneally improves analgesic efficacy in postoperative period without any unwanted effects. *Heydari et al. (2017)* studied that the administration of intraperitoneal NMDA receptor antagonists like magnesium significantly reduces postoperative pain in patients undergoing laparoscopic cholecystectomy.

Magnesium decreases calcium influx to the cell, and also antagonizes NMDA receptors, which have an important role in neuronal signaling and pain processing in the central nervous system. By blocking this receptor, magnesium sulphate ($MgSO_4$) decreases postoperative pain due to blockage of both somatic and visceral pain fibers *(Marks et al., 2012)*.

Studied the effect of NMDA receptor antagonists in patients undergoing laparoscopic cholecystectomy improved well being, delayed the need for analgesic, and decreased thermal induced hyperalgesia *(Martin et al., 2019)*.

The noticeable prolongation of the analgesic effect beyond the duration effect of study drugs might be related to the prevention of spinal or peripheral hypersensitivity or inhibition of NMDA receptors *(Zhou et al., 2011)*.

This study agreed with *De Oliveira et al. (2013)* study which found that there was a similar analgesic effect of magnesium in patients undergoing elective abdominal surgery.

Anjum et al. (2015) study showed that Magnesium sulphate 50 mg/kg in 250 ml of isotonic 0.9% sodium chloride solution administered intravenously over 15 to 20 minutes in the preoperative room solution alleviate postoperative pain throughout the first day after laparoscopic cholecystectomy under balanced general anesthesia significantly and reduce opioid consumption as well. Which agreed with our study as regard IV group (group 1).

Saadawy et al. (2010) reported that IV lidocaine and magnesium improved post-operative analgesia and reduced intraoperative and post-operative opioid requirements in patients undergoing laparoscopic cholecystectomy.

Moharari et al. (2016), studied the postoperative analgesic effects of intraperitoneal NMDA receptor antagonist, magnesium sulphate and ketamine in patients undergoing laparoscopic cholecystectomy. They used 30 mg/kg of magnesium sulphate in patients receiving intraperitoneal 0.25% bupivacaine and 1 mg/kg of ketamine along with 0.25% bupivacaine and concluded that demand for first analgesia in NMDA receptor antagonist was around 130 minutes after surgery.

As regards the time for first request of analgesia non- steroidal anti-inflammatory drugs (Diclofenic sodium 50 mg), it was found that in IP group it was significantly longer than IV group demonstrating that the intraperitoneal magnesium sulphate prolonged the time for first demand of analgesia and the intraperitoneal magnesium is more effective than the intravenous.

As for total analgesic consumption either NSAID or opioids it was found that IP group significantly consumed more analgesics than IV group which means that NMDA receptor antagonists decreased the consumption of post-operative analgesics.

Banihashem et al. (2015) showed that the usage of Magnesium sulphate as adjunct, parenterally or intraperitoneally improves analgesic efficacy in postoperative period without any unwanted effects.

Patients in IV group required more time to discharge from the PACU. Also having higher sedation score in the 1st 2 hours postoperative than IP group.

In our study we used magnesium sulphate 50mg/kg which was safe as we did not observe any signs of magnesium toxicity.

Magnesium sulphate had been used in several studies without any side effects in accordance with our results such as *Maharjan and Shrestha (2012)* who reported no evidence of adverse effect owing to magnesium sulphate was reported. Recovery and postoperative analgesia in laparoscopic cholecystectomy as well as in thoracotomies have shown favorable results using magnesium sulphate.

CONCLUSION

Instillation of 50 mg of magnesium sulphate intravenously after completion of laparoscopic surgery rendered patients less pain in first 24 hours after surgery, more pain free period, and less consumption of analgesics in post-operative period. Magnesium sulphate is considered safe with almost no side effects such as vomiting, pruritis and

respiratory depression that may occurs with narcotics.

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دراسة مقارنة بين الحقن الوريدى للماغنسيوم سيلفات و الحقن البروتونى لتقليل نسبة الألم بعد عمليات المرارة بالمنظار

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خلفية البحث: إن دراسة الوسائل الفعالة لعلاج آلام مابعد العمليات الجراحية لاتزال قيد البحث بسبب تفرده (كونه استثنائياً) وبسبب الآثار الفسيولوجية المعقدة المرتبطة به إما بمظاهر جسدية أو لاإرادية أو سلوكية، وإذا عولج هذا الألم بصورة سيئة من الممكن أن تزيد من احتمالية استمراره.

الهدف من البحث: المقارنه بين تاثير عقار سلفات الماغنسيوم عن طريق الحقن الوريدي وبين تأثيره بالحقن داخل الغشاء البريتوني أثناء التخدير العام لعلاج آلام استئصال المراره بالمنظار وتأثير كل منهما علي سرعة الافاقه والخروج من غرفة العمليات وكذلك غرف الافاقه كما تم تقييم الاحتياج للمسكنات في كلا المجموعتين.

المرضي وطرق البحث: تم اختيار 80 مريضاً خضعوا لجراحة استئصال المرارة بالمنظار، وتقسيمهم عشوائيا إلي مجموعتين متساويتين: المجموعة الأولي (مجموعة الحقن الوريدي) تتلقي 50 مجم/كجم من وزن المريض من عقار سلفات الماغنسيوم يتم وضعهم علي 2 50مل من محلول الملح ويمرر ببطء علي مدار من 20 دقيقة الي 30 دقيقة قبل البدء في التخدير الكلي ، وتلقت المجموعة الثانية (مجموعة الحقن داخل الغشاء البريتوني) 50 مجم/كجم من وزن المريض من عقار سلفات الماغنسيوم علي أن يتم حقن هذه الكمية داخل الغشاء البريتوني بعد استئصال المرارة بالمنظار.

نتائج البحث: قياسات الألم في المجموعة التي تم إعطاؤها عقار سلفات الماغنسيوم عن طريق الحقن البريتوني اكثر من القياسات في المجموعة التي تم اعطائها عقار سلفات الماغنسيوم عن طريق الحقن الوريدي وذات مدلول

إحصائي، كما اظهرت النتائج أن معدل إستهلاك المسكنات الأفيونية بعد العمليات الجراحية في مجموعة الحقن البرتوني أيضا كانت اكثر بكثير من معدل إستهلاكها في مجموعة الحقن الوريدي، كما أن معدل حدوث الآثار الجانبية المصاحبة لاستخدام المسكنات الأفيونية مثل الشعور بالغثيان وحدوث قيء، لوحظ أنه أكثر بكثير في المرضى الذين تم إعطاؤهم عقار سلفات الماغنسيوم عن طريق الحقن البريتوني. كما لوحظ أيضاً أن معدل مقياس الرضا عند المرضى الذين تم إعطاؤهم عقار سلفات الماغنسيوم عن طريق الحقن البريتوني أعلى بكثير من مرضى مجموعة الحقن الوريدي وكانت هذه المعدلات كلها ذات مدلول إحصائي. وأشارت النتائج أيضاً إلى أن إستخدام عقار سلفات الماغنسيوم بهذه الجرعة 50 مجم /كجم ولا يؤدي إلى أي مضاعفات.

الاستنتاج: الحقن داخل الغشاء البريتونى لعقار سلفات الماغنسيوم هو طريقة سهلة وقليلة التكاليف وآمنة والتي قدمت تسكينا جيدا للألم وخصوصاً في الفترة الأولى بعد الجراحة وبدون أن يكون هناك أي أضرار على المريض.

الكلمات الدالة: كبريتات المغنيسيوم داخل الغشاء البريتوني، إدارة الألم بعد الجراحة، استئصال المرارة بالمنظار.