

Comparative Study Of Efficacy Of Intraoperative I.V. Magnesium Sulphate Versus I.V. Paracetamol On Post Operative Analgesic Requirement In Major Surgeries Under General Anesthesia

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Abstract:

Aim; The aim of the study was to compare the efficacy of intravenous Magnesium to intravenous Paracetamol on postoperative analgesic requirement in major surgeries under general anaesthesia .,

Materials And Methods: After taking ethical committee approval 60 patients belonging to ASA grade 1 & 2 were randomly divided into two groups Group P and Group M. Group P received 15mg/kg of intravenous paracetamol and Group M received 20mg/kg of intravenous magnesium sulphate immediately after intubation.

Results: comparatively Group M, Group P patients had lower post operative pain and consumed less analgesic drugs during the first 48 hours. There is no significant variation in heart rate ,systolic and diastolic pressures in both groups.

Conclusion: Intraoperative use of paracetamol infusion proved to produce more postoperative analgesia than with use of intravenous magnesium sulphate.

Keywords: Postoperative analgesia, paracetamol, magnesium sulphate.

Date of Submission: 16-03-2018

Date of acceptance: 03-04-2018

I. Introduction

Pre-emptive analgesia is defined as a treatment that is initiated before surgery in order to prevent the establishment of central sensitization evoked by the incision and inflammatory injuries occurring during surgery and in the early postoperative period.¹ Owing to this 'protective' effect on the nociceptive system, pre-emptive analgesia has the potential to be more effective than a similar analgesic treatment initiated after surgery. As a consequence, pre-emptive analgesia can reduce immediate postoperative pain and also prevent the development of chronic pain by decreasing the altered central sensory processing.²

To pre-emptively cure pain we have a wide variety of armamentarium to suit to the needs of the patient.

To overcome acute postoperative pain the following drugs and routes are being used recently.

- Parenteral and oral non-steroidal anti-inflammatory drugs (NSAIDs)
- Sublingual and intravenous (IV) opioids
- Parenteral NMDA receptor antagonists

Local anaesthetics (LA) for neuraxial administration, peripheral blocks, wound infiltrations, and intra-peritoneal instillations. systemic anti-epileptics (GABA (gamma-amino butyric acid) analogues).

Magnesium (Mg) is the fourth most common cation in the body and it activates approximately 300 enzymes systems, including most of the enzymes involved in energy metabolism and nucleic acid synthesis. Magnesium is of importance in anaesthesia practice for several reasons. First, the ion is essential for many biochemical reactions and its deficiency may produce clinically important consequences during anaesthesia or in intensive care unit. Second, the extensive use of Magnesium sulphate in obstetric practice requires that anaesthesiologists be familiar with the pharmacological action of this drug and its interaction with anaesthetic agents. Third, few of its properties may be of value in certain areas of anaesthetic practice. Various studies have been done regarding role of Magnesium sulphate in postoperative analgesia. Since in literature there is no convincing evidence to support analgesic efficacy of Magnesium sulphate, therefore it was planned to study the role of Magnesium sulphate for postoperative analgesia.³

NSAIDs have the potential advantages over opioids having less respiratory depression, nausea, vomiting, having antipyretic, anti-inflammatory effect and provide equipotent analgesia. In mild to moderate pain NSAIDs may be adequate to provide optimal analgesia. NSAIDs and acetaminophen are the foundation of

multimodal analgesia. Intravenous route is a preferred route for the intra-operative and postoperative pain management. Whenever faster onset of analgesia is desired and patient is unable to take medications by mouth.

I.V Paracetamol is a centrally acting antipyretic and analgesic has less gastrointestinal and platelet inhibiting side effects and is clinically better tolerated. IV Paracetamol could potentially provide adequate perioperative analgesia as a single agent for mild to moderate pain.⁴

Diclofenac is a NSAID that mediate anti-inflammatory, analgesic and platelet inhibiting effects. This used as rescue analgesia in our study. NSAIDS are effective in perioperative setting for mild to moderate pain, but their usefulness may be limited due to their tendency to cause gastrointestinal and surgical site hemorrhage and renal failures in high risk patients.⁶

II. Aims & Objectives

AIM:

The aim of my study is to compare the efficacy of intra-operative I.V. Magnesium sulphate versus I.V. Paracetamol on post operative analgesic requirement in major surgeries under general anaesthesia.

OBJECTIVES:

1. To identify and study the role of intra operative Magnesium sulphate infusion as perioperative analgesic
2. To compare the efficacy of Magnesium sulphate infusion with infusion of Paracetamol in the quality and duration of postoperative analgesia in patients undergoing major surgeries under GA
3. To study the side effects if any of Magnesium sulphate infusion and Paracetamol infusion during intra and postoperative periods

III. Patients & Methods

This was a prospective randomized control trial involving 60 parturients attending the Dept. of anaesthesiology & critical care, Siddhartha Medical college, Vijayawada. Institutional ethics committee and scientific committee approval was obtained.

All patients posted for surgery were counselled about the mechanism of the drugs and their adverse effects. The procedure was explained to the patient. Informed consent was obtained. Detailed history of the patient was collected. Complete routine investigations were done as per our hospital labour protocol. Patients fulfilling the inclusion criteria and who gave consent were then randomly allocated to one of the study groups.

Inclusion Criteria:

- a. ASA grade I & II patients
- b. Major surgeries under GA.
- c. Age 18-50yrs

Exclusion Criteria:

- a. ASA grade III and IV patients
- b. Emergency surgeries,
- c. Patient with known allergic to opioids

IV. Methodology:

After approval from the Departmental ethics committee and written informed consent from the patients, a randomized study was conducted on 60 patients posted for major surgeries under general anaesthesia. Patients are selected between 18-60 years of age comprising both sexes who had no systemic disorders of ASA I and II and are divided into 2 groups of each group containing 30 patients.

GROUP P: Paracetamol group.

GROUP M: Magnesium sulphate group.

Monitoring used: NIBP, Pulse oximeter, EtCo₂, Temperature.

DRUG DOSAGE USED: Paracetamol 15mg/kg iv over 10 min as infusion and Magnesium sulphate 50mg/kg i.v in 100ml NS over 10 min as infusion.

All the patients are allocated into 2 groups randomly. The patients in group 'P' received Paracetamol iv 15mg/kg over 10 min and patients in group 'M' received Magnesium sulphate 20 mg/kg in 100ml NS over 10 min immediately after intubation before starting of surgery.

A uniform standard technique of general anaesthesia with endotracheal intubation and controlled ventilation was given for all patients. Pre anaesthetic check-up was done for all patients and baseline

investigations were ordered as per requirement. 15 min before the scheduled time IV cannulation was done after shifting the patient into the waiting area of the operation theatre.

Patient was pre-medicated with Inj. Glycopyrolate 0.2mg, Inj Ondansetron 4mg, Inj. Fentanyl 1mcg/kg, Inj. Midazolam 0.02mg/kg given intravenously slowly.

On arrival into operation theatre patient was monitored for NIBP, pulse oximetry and ECG (electrocardiographic leads limb lead-2). Baseline PR, BP and Spo2 were recorded. After pre oxygenation of 3minutes with 8liters of oxygen the patient induction was done with Inj thiopentone sodium 5 mg/kg and endotracheal intubation was performed by using Inj suxamethonium 2mg/kg and with an appropriate size oral cuffed portex endotracheal tube after laryngoscopy

After intubation anaesthesia was maintained with Oxygen 33%, Nitrous oxide 66%, muscle relaxant Inj. Vecuronium 0.1mg/kg and Sevoflurane in the range of 0.2-1.5%. IPPV was given using circle absorbing system connected to anaesthesia work station at a rate of 14 breaths/mt and 8ml/kg tidal volume. ETCO2 maintained between 30-35 mm Hg. Intra operative IV fluids were given according to the protocol, blood loss. Patients were randomly allocated to receive one of the drug among the two (Inj Paracetamol I.V 15mg/kg over 10 min and Inj Magnesium sulphate I.V 20mg/kg in 100ml NS over 10 min before starting of surgical incision

Ringer lactate and Dextrose, NS were used for intraoperative fluid therapy. Vital data was recorded at induction, intubation and every 15 min interval during intraoperative period. The parameters recorded were pulse rate, SpO₂, systolic and diastolic blood pressures were noted

In all patients the duration of surgery was more than 90 minutes .After completion of surgery the neuromuscular blockade was reversed with Inj.Neostigmine 50mcg/kg and Inj.Glycopyrrolate 1mcg/kg. Vital data was recorded during recovery period. Patients were transported to the post-operative ward after confirming an adequate level of consciousness and intact reflexes and were observed for 6 hrs in postoperative period for analgesia, hemodynamics, and temperature.

Postoperative pain assessment was done by using Visual Analog scale. Post operatively, the patients in both the groups were observed for 6 hours and recording were done at: 0 hours (as soon as the patient was shifted), 1hours, 2hours, 3 hours, 4 hours, 6 hours.Time of onset of rescue analgesia is noted. Inj Diclofenac sodium i.m is given if VAS >5.The results were noted, master chart prepared and statistically evaluated.

STATISTICAL ANALYSIS

In this study results of two groups were recorded by following methods Statistical Methods.

Data were collected, tabulated, coded and analyzed. Numerical variables were presented as mean and standard deviations (SD). For Quantitative variables Man Whitney U test was used for comparison between two groups. For categorical variables Chi square test. A difference with P value <0.05 was considered statistically significant.

The statistical software, **Epi Info™ 7** was used for the analysis of the data and Microsoft word and excel have been used to generate graphs and tables etc.

OBSERVATION AND RESULTS

The present study was conducted in Department of Anesthesiology, Siddhartha Medical college , Vijayawada, between August 2017 – February 2018 . After taking ehical committee approval, 60 patients belonging to ASA physical status I and II were randomly divided into 2 groups, 30 each based on computer generated randomization table.

Group P: Paracetamol 15mg/kg iv over 10 min as infusion and

Group M: Magnesium sulphate 50mg/kg iv in 100ml NS over 10 min as infusion.

AGE:

Age					
Group	N	Minimum	Maxim um	Mean	SD
M	30	18	60	33	11
P	30	20	60	40	12
Total	60	18	60	36	12

Table 1 AGE DI STURBUTION

The patient's age ranged from 18-60 years. The average age did not differ between the two groups. The mean age of Group-M was 33±11 years and that of group-P was 40±1. The difference was not statistically significant.

SEX DISTRIBUTION:

Group	Sex			
	Female		Male	
	Count	%	Count	%
M	21	70.0%	9	30.0%
P	16	53.3%	14	46.7%
Total	37	61.7%	23	38.3%

TABLE:2 SEX DISTRIBUTION

In our study Group M contains 53.3% of females and 46.7% of males. Group P contains 70.0% of females and 30.0% of males. These ratios are found to be statistically insignificant.

SURGICAL PROCEDURE:

Total number of surgeries performed 60 cases

NAME OF SURGERY	NO. OF NO. OF SURGERIES	
	SURGERIES	
	IN GROUP M	IN GROUP P
LAPROSCOPIC HYSTRECTOMY	6	1
LAPROSCOPIC TUBECTOMY	2	2
LAPROSCOPIC CYSTECTOMY	0	3
LAPROSCOPIC APPENDECTOMY	3	3
LAPROSCOPIC CHOLECYSTECTOMY	2	3
LAPROTOMY	1	1
THYROIDECTOMY	1	3
FIBROADENOMA	0	2
MAXILLARY FRACTURE ORIF	0	1
LAMINECTOMY	2	3
ORTHOPEDICS UPPER LIMB SURGERY	6	2
ENT SURGERIES	7	6
TOTAL	30	30

TABLE 3: TOTAL NO.OF SURGERIES IN EACH GROUP COMPARISON OF MEAN HEART RATE IN BOTH GROUPS

Time	M		P		P-value	Significance
	Mean HR	SD	Mean HR	SD		
0min	79	13	79	9		
15min	81	13	80	12	.60	NS
30min	79	12	78	10	.93	NS
45min	78	12	78	10	.15	NS
1Hr	77	12	77	10	.65	NS
1Hr15min	76	12	78	10	.58	NS
1Hr30min	76	11	78	10	.47	NS
1Hr45min	77	11	77	11	.91	NS
2Hr	75	16	76	11	.80	NS

NS: Notsignificant

TABLE:4 Comparison of mean Heart Rate (per minute) in two groups:

The rates of all patient was continuously monitored and readings were noted at regular intervals of 15 minutes for 2 hours for any change in the heart rate. In this study it was observed that heart rate variation is not statistically significant. ($p > 0.05$).

COMPARISON OF MEAN SBP IN BOTH GROUPS

Time	M		P		P-value	Significance
	Mean SBP	SD	Mean SBP	SD		
0min	119	12	128	8		
15min	118	11	131	12	.03	NS
30min	120	13	126	26	.12	NS
45min	119	13	125	13	.18	NS
1Hr	117	12	122	11	.67	NS
1Hr15min	115	12	119	9	.62	NS
1Hr30min	117	12	119	9	.80	NS
1Hr45min	116	12	118	9	.82	NS
2Hr	117	15	118	10	.56	NS

NS: Not significant

**Table 5 : Comparison of mean SBP in two groups: at different time intervals Intra operatively.
COMPARISON OF MEAN DBP IN BOTH GROUPS**

Time	M		P		P-value	Significance
	Me an DBP	SD	Mean DBP	SD		
0min	78	9	82	6		
15min	77	9	81	7	.82	NS
30min	77	11	79	9	.60	NS
45min	77	12	75	8	.5	NS
1Hr	75	10	76	8	.10	NS
1Hr15mi n	75	9	75	7	.87	NS
1Hr30mi n	76	11	75	7	.33	NS
1Hr45mi n	74	10	73	7	.60	NS
2Hr	74	11	73	7	.58	NS

NS: Notsignificant

Table 6 : Comparison of mean DBP in two groups: at different time intervals Intraoperatively

In both group diastolic blood pressure was not significant statistically ($p > 0.05$)

Sys tolic and diastolic blood pres sures wer e recorded in all patients at regular intervals of 1 5 minutes upto 2 ho urs. The results were tabulated (table no:6, 7) a nd were s ubjected to statistical analysis. It was found that th ere was no statisti cally differ ence invariation.

COMPARISON OF MEAN ETCO2 IN BOTH GROUPS

Time	M		P		P-value	Significance
	Mean ETCO2	SD	Mean ETCO2			
0min	36	4	36	4	-	
15min	36	4	36	4	.26	NS
30min	37	4	37	4	.33	NS
45min	37	4	36	4	.14	NS
1Hr	36	4	37	5	.60	NS
1Hr15min	37	3	36	5	.40	NS
1Hr30min	36	4	36	4	.80	NS
1Hr45min	35	4	36	4	.68	NS
2Hr	36	4	37	4	.86	NS

NS: Not significant

Table 7 : Comparison of mean ETCO₂ in two groups: at different time intervals Intra operatively
 End tidal carbondioxide pressures were measured in all patients at regular intervals of 15 minutes upto 2 hours. The result ranged between 35-37Hg and were subjected to statistical analysis. It was found to be insignificant statistically($p > 0.05$).

COMPARISON OF MEAN VAS IN BOTH GROUPS

Time	M			P			p-value	Significance
	Median	Mean VAS	SD	Median	Mean VAS	SD		
0min	4	4	1	2	2	1	-	
1Hr	4	4	2	3	3	1	.01	S
2Hr	5	5	2	3	3	1	.05	S
3Hr	5	5	2	3	3	1	.05	S
4Hr	6	6	2	4	3	2	.04	S
6Hr	7	7	1	5	5	2	.01	S

S.Significant

Table 8 : Comparison of mean VAS in two groups: at different time intervals Intra operatively

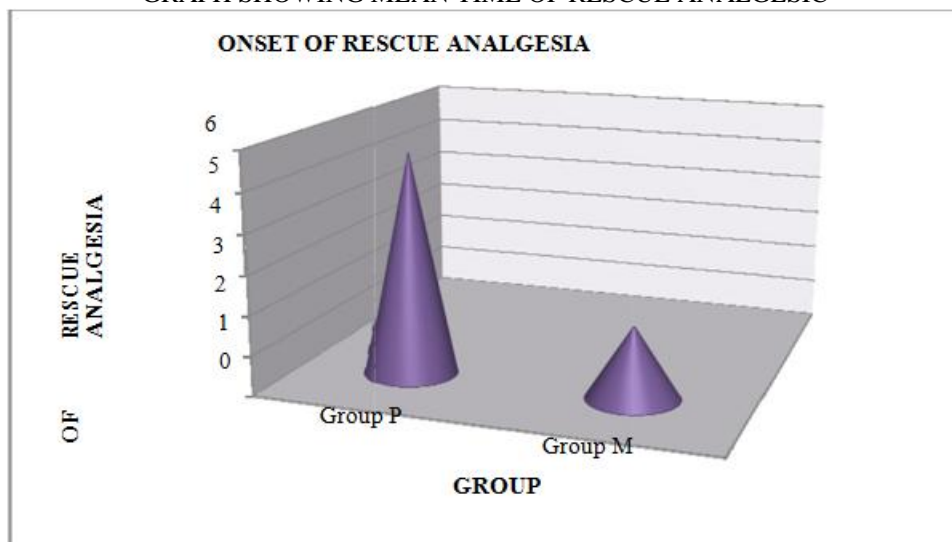
The value of group M (Magnesium sulphate infusion) is statistically significant than the patients in group P (Paracetamol infusion). This denotes that analgesic efficacy of Magnesium sulphate infusion is less than that of Paracetamol infusion. ($p < 0.05$)

COMPARISON OF TIME OF ONSET OF RESCUE ANALGESIA IN BOTH GROUPS

GROUP	MEAN TIME OF ONSET OF RESCUE ANALGESIA(Hr)	SD	p-value
P	5.6	2.47	Highly Significant <0.01
M	1.8	1.76	

Table 9: Comparison of MEAN TIME OF ONSET OF RESCUE ANALGESIA

GRAPH SHOWING MEAN TIME OF RESCUE ANALGESIC



Patients in group P had a mean time of onset of rescue analgesia at 5.6 ± 2.47 hours, whereas patients included in group M had a mean time of onset of rescue analgesia as 1.8 ± 1.76 hours. These results were tabulated and were subjected to statistical analysis. The p-value came out to be ($p < 0.01$) which is highly significant.

V. Discussion

This study was undertaken to compare the efficacy of intraoperative I.V. Magnesium sulphate versus I.V. Paracetamol on post-operative analgesic requirement in major surgeries under general anaesthesia. Patients were divided into two groups with 30 patients in each group. Group P patients received iv Paracetamol 15mg/kg. Group M patients received iv MgSO₄ 20mg/kg.

AGE :

The patient's age ranged from 18-60 years. The average age did not differ between the two groups. The mean age of Group-M was 33 ± 11 years and that of group-P was 40 ± 12 . The difference was not statistically significant.

SEX:

In our study Group M contains 53.3% of females and 46.7% of males. Group P contains 70.0% of females and 30.0% of males. These ratios are found to be statistically insignificant, nullifying the gender bias.

SURGICAL PROCEDURES:

In our study a total of 60 patients were included in two groups whose nature of surgeries were enumerated in table no.4. Minimum duration of each surgery was more than 90 minutes in all patients. All the surgeries were conducted under GA with placement of Oral/Nasal cuffed endotracheal tubes. Each patient was monitored carefully by using multiparameter monitoring perioperatively.

HEART RATE:

Heart rates of all patients were continuously monitored and readings were noted at regular intervals of 15 minutes for 2 hours for any change in the heart rate / arrhythmias. In this study it was observed that heart rate variation is not clinically and statistically significant. No arrhythmias were observed on ECG in any patient of two groups.

In **T.O.seyhan et al.**¹⁰ this study shows magnesium sulphate dosage didn't offer any advantage but induced haemodynamic consequences.

Shashi kiran et al.⁵ In this study patients were not found any evidence of adverse effect and hemodynamic changes owing to I.V. Magnesium sulphate.

In the present study there is no change in heart rate intraoperatively and post-operatively.

BLOOD PRESSURE:

Systolic and diastolic blood pressures were recorded in all patients at regular intervals of 15 minutes upto 2 hours. The results were tabulated (table no:6, 7) and were subjected to statistical analysis. It was found that there was no clinically and statistically difference in variation. This denotes both the drugs under study does not cause any hemodynamic disturbances.

In **T.O.seyhan et al.**¹⁰, this study shows magnesium sulphate dosage didn't offer any advantage but induced haemodynamic consequences.

Shashi kiran et al.⁵ In this study patient were not found any evidence adverse effect and hemodynamic changes owing to I.V. Magnesium sulphate.

In present study there is no change in blood pressure intraoperatively and post operatively.

ETCO2:

End tidal carbon dioxide pressures were measured in all patients at regular intervals of 15 minutes upto 2 hours. The result ranged between 35-37 mm Hg and were subjected to statistical analysis. It was found to be insignificant clinically and statistically. This denotes CO₂ elimination from the body is not altered by either drugs under study.

VISUAL ANALOG SCALE (VAS):

Each patient under study explained before surgery about expression of pain by using visual Analog score. VAS was recorded after extubated patients was fully conscious and then every hourly till 6 hours. A VAS scale was used to get the severity of pain numerically from the patients. All the results were tabulated and subjected to statistical analysis. The value of group M (Magnesium sulphate infusion) was clinically and statistically significant than the patients in group P (Paracetamol infusion). This denotes that analgesic efficacy of Magnesium sulphate infusion is less than that of Paracetamol infusion.

TIME OF ONSET OF RESCUE ANALGESIA:

All the patients in the study were observed for first demand rescue analgesia dose upto 6 hours post operatively. When the VAS score > 5, rescue analgesia of I.V infusion of Inj. Diclofenac sodium was given (Inj.Justin AQ 75mg). Patients in group P had a mean time of onset of rescue analgesia at 5.6±2.47 hours, where as patients included in group M had mean time of onset of rescue analgesia as 1.8±1.76 hours. These results were tabulated and were subjected to statistical analysis. The p-value came out to be (p < 0.01) which is highly significant. This denotes duration of post operative analgesia with Paracetamol is significantly longer than that of Magnesium sulphate infusion promising.

In 2007 Martin R. Trame`r et al⁵ The randomized adults undergoing ambulatory ilioinguinal hernia repair or varicose vein operation under general anesthesia (Propofol, fentanyl, isofluraneN2O) to receive Magnesium sulfate 4 g IV or physiological saline after induction. All patients preoperatively received diclofenac 100 mg rectally and those undergoing hernia repair had a postoperative ilioinguinal-iliohypogastric nerve block done. Pain, analgesic consumption, and adverse effects were recorded in the recovery room and, using a questionnaire, up to 3 days postoperatively. In patients undergoing ambulatory ilioinguinal hernia repair or varicose vein operations under general anesthesia supplemented with other analgesic adjuvants, pretreatment with IV Magnesium sulfate 4 g has no impact on postoperative pain and analgesic consumption.

In **T. O. Seyhan et al**⁶ Eighty women were allocated to four equal groups. The control group received normal saline; Magnesium groups received 40 mg kg⁻¹ of Magnesium before induction of anaesthesia, followed by I.V. infusion of normal saline, Magnesium 10 mg kg⁻¹ h⁻¹ or Magnesium 20 mg kg⁻¹ h⁻¹ for the next 4 h. Propofol infusion was targeted to keep bispectral index values between 45 and 55. Postoperative analgesia was achieved using PCA with morphine. They concluded that Magnesium 40 mg kg⁻¹ bolus followed by 10 mg kg⁻¹ h⁻¹ infusion leads to significant reductions in intraoperative Propofol, Atracurium and postoperative morphine consumption. Increasing Magnesium dosage did not offer any advantages, but induced haemodynamic consequences.

In **Christopher Lysakowski, MD et al**⁷ Randomized trials have reached different conclusions as to whether Magnesium is a useful adjuvant to postoperative analgesia. These trials do not provide convincing evidence that Perioperative Magnesium may have favorable effects on postoperative pain intensity and analgesic requirements. Perioperative Magnesium supplementation prevents postoperative hypomagnesemia and decreases the incidence of postoperative shivering. It may be worthwhile to further study the role of Magnesium

as a supplement to postoperative analgesia, since this relatively harmless molecule is inexpensive, and the biological basis for its potential antinociceptive effect is promising.

In present study the post operative analgesia in I.V Magnesium sulphate was short lived and average duration was 1.8 ± 1.76 hours when rescue analgesia was administered.

In Zeinab Ahmed Elseify et al⁸ Sixty American Society of Anesthesiology (ASA) physical status I and II adult patients who were scheduled for anterior cruciate ligament reconstruction were included in this study. Patients were allocated into three groups: group I patients received 1g intravenous Paracetamol after induction and another 1 g 4 h later, group II received 40 mg parecoxib after induction, while group III received combination of both drugs (Paracetamol 1 g and parecoxib 40 mg). Pain during rest and mobility was assessed in the immediate postoperative period, 2 h and 8 h successively using visual analog scale (VAS). Patient satisfaction was rated according to satisfaction score. They concluded that Combination of intravenous Paracetamol and parecoxib provided better analgesia and higher patient satisfaction than each drug when used separately.

In Alex Konstantatos et al⁹ We tested this hypothesis by conducting a prospective randomized, double-blind clinical trial in patients undergoing ambulatory surgery. A total of 145 patients were randomized to pre and postoperative placebo (50), intravenous (IV) operative and postoperative oral Acetaminophen (49), and pre and postoperative oral Acetaminophen (48). The primary end point; visual Analog scale mean pain intensity over 24 hours. They concluded that the addition of intraoperative IV Acetaminophen to a standard analgesia regimen in patients undergoing ambulatory surgery did not significantly improve pain control or discharge times after surgery compared with pre and postoperative oral Acetaminophen or placebo.

In Esra Caliskan et al¹⁰ Sixty children scheduled for elective lower abdominal surgery under spinal anesthesia were randomized to receive either intravenous Paracetamol 15 mg/kg, dipyron 15 mg/kg or isotonic saline. The primary outcome measure was pain at rest, assessed by means of a visual analog scale 15 min, 30 min, 1 h, 2 h, 4 h and 6 h after surgery. If needed, pethidine 0.25 mg/kg was used as the rescue analgesic. They concluded that after lower abdominal surgery conducted under spinal anesthesia in children, intravenous Paracetamol appears to have similar analgesic properties to intravenous dipyron, suggesting that it can be used as an alternative in the early postoperative period.

In Gousheh SM et al.¹¹ This is a randomized double- blind clinical trial study. 30 patients ASA class I, aged 18 to 50 years, candidate for laparoscopic cholecystectomy were recruited, and randomly divided into two equal groups. Group A (Paracetamol group) received 1 gr Paracetamol and group B received placebo ten minutes after the induction of anesthesia. 0.1mg/Kg Morphine was administered intravenously based on patients compliant and pain score > 3. Pain score and the opioids consumption were recorded in the first six hours postoperative. Patient's pain was measured by the VAS (Visual Analog Scale). They concluded that Paracetamol (1gr) had caused a better pain relief quality but it is not a suitable analgesic for moderate pain control in acute phase after surgery alone.

In Bright Jebaraj et al.¹² This study concluded that postoperative intravenous Paracetamol is a safe and effective component of multimodal analgesic regimen, and it reduces postoperative opioid consumption after orthopedic surgery, but at present there is insufficient data to decide whether Paracetamol reduces opioid-related adverse effects or not.

In Simin Atashkhoyi et al. 2013,¹³ One-hundred American Society of Anesthesiologists (ASA) I or II status parturient scheduled for elective cesarean section under spinal anesthesia. Patients received 1gr iv Paracetamol into 100 ml normal saline (study group; n=50) or normal saline alone (placebo group; n=50) 20 minutes before the end of operation. Pain scores were lower in the study group in the Post anesthesia care unit (PACU) ($p < 0.001$) and up to 4h after operation ($p < 0.001$). Cumulative analgesic consumption was lower in the study group ($p < 0.001$). They concluded that preventive administration of 1gr iv Paracetamol reduces the intensity of pain in the PACU and until 4h after operation and analgesic consumption following Caesarean section.

In present study it has been found I.V Paracetamol administration before onset of surgery resulted in long duration of post operative analgesia requiring rescue analgesia 5.6 ± 2.47 post operatively. When compared to 1.8 ± 1.76 in Magnesium sulphate group. The values are statistically significant. There are no significant changes heart rate, blood pressure and $ETCO_2$ in both the groups. No other significant side effects were found in any of the groups.

VI. Conclusion

1. In our study I.V Paracetamol infusion is observed to be superior analgesic drug for perioperative analgesia than Magnesium sulphate infusion.
2. Both groups does not have any changes in haemodynamics of the patients.
3. Both groups maintained stable ET_{CO}₂ values throughout surgery.
4. There are no significant side effects in any of the group patients.

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