

Intra-incisional injection of magnesium sulfate for post cesarean pain management

Maryam Bakir Mahmood*

Zay Nsaif Jasim**

Abstract

Background and objectives: cesarean section is estimated for about 30% of child births worldwide and it is one of the most common surgical procedures. Pain relief after cesarean delivery is especially important as the consequences of inadequate pain relief are expressed not only by the mother but by the newborn as well. Magnesium has been reported to produce important analgesic effects including the potentiation of morphine analgesia, attenuation of morphine tolerance and the suppression of neuropathic pain. The objectives of this study were to determine the efficacy of intra-incisional injection of magnesium sulfate for post cesarean pain management as in patient underwent elective cesarean section and the reduced need for extra analgesic use postoperatively.

Methods: a randomized, placebo controlled, single-blinded study with a total of 200 pregnant participants scheduled for cesarean section in Sulaimani maternity teaching hospital, from 1st of May 2016 to 15th of August 2016. Patients were randomly allocated to two groups, those with odd numbers were assigned to case group (100) received 750mg of magnesium sulfate and patients with even numbers assigned to the placebo group (100) received 20mg of normal saline.

Results: The mean Visual Analogue Score after 4 hours, 8 hours, 12 hours and 24hours was significantly less for the intervention (Magnesium sulfate) group when compared with the control (Normal Saline).

Conclusions: Subcutaneous administration of magnesium sulfate in post cesarean section pain management can be used as a successful modality or method for pain management.

Key words: Cesarean section, Pain, Magnesium sulfate

Introduction

Cesarean section is estimated for about 30% of child births worldwide and it is one of the most common surgical procedures.¹ Generally, post-cesarean pains are considered as unpleasant feelings caused by tissue damage and signaling the true or actual injury to the body.² Pain following cesarean sections has two main components: somatic and visceral pain. Visceral pain is originated from uterine incision and contractions while somatic pain arises from nociceptors within the

surgical wound.^{3,4} Pain relief after cesarean delivery is especially important as the consequences of inadequate pain relief are expressed not only by the mother but by the newborn as well.³⁻⁵ Therefore, effective pain management is critical to promote postpartum recovery and attainment of maternal role and family functioning.⁶ The mainstay analgesics in the post-cesarean section period are opioids but are avoided in the parturient since almost all opioids find their way in the milk predisposing the

*Obstetrics and Gynecology Department /lecturer
School of Medicine/University of Sulaimani, Sulaymaniyah/Iraq
Email: Maryam.mahmmud@univsul.edu.iq

**Obstetrics and Gynecology Department /GP/ Sulaimaniyah maternity teaching hospital, Sulaymaniyah/Iraq

neonate to their adverse effects.⁷ So, other modalities for pain relief are often selected. Recently, multimodal approach to pain relief is recommended so that adverse effects of individual drugs can be reduced. NSAIDs, neuraxial blocks, peripheral nerve blocks and local anesthetic infiltration of wound as well as incisional injections have all been used as part of multimodal approach.^{8, 9} Magnesium has been reported to produce important analgesic effects including the potentiation of morphine analgesia, attenuation of morphine tolerance and the suppression of neuropathic pain.¹⁰ Magnesium (Mg) is a non-competitive N-methyl-D-aspartate (NMDA) receptor antagonist with anti-nociceptive effects.^{10,11} NMDA antagonists have been shown to be useful in the reduction of acute postoperative pain, analgesic consumption, or both. NMDA

Patients and methods

This is a randomized, placebo controlled, single-blinded study carried out in Sulaimani maternity teaching hospital, from 1st of May 2016 to 15th of August 2016. Total participant of 200 pregnant women aged 18 to 40 years old admitted to maternity teaching hospital and scheduled for elective caesarian section (CS) were enrolled. Random allocation was done, odds number were for the intervention group (n=100) and even number for the control group (n=100). All patients received 75 mg of Lidocaine 5% as a spinal anesthesia. Intervention group received (750) mg of magnesium sulfate diluted in 20 ml of normal saline and control group received 20ml of normal saline injected intra-incisionally into the subcutaneous tissue at the end of operation and before closure of the skin and the control group received 2ml of normal saline intra-incisionally into the subcutaneous tissue at the end of operation and before closure of the skin. The patients remained blind during the study time. patients with systemic diseases such as heart, kidney, liver, chronic hypertension, mental health problems, pre-eclampsia, opioid dependent

receptor is blocked by the presence of a centrally positioned magnesium ion. Magnesium can be considered as a physiological blocker of NMDA receptors.^{9,10} This antagonism alters pain processing and reduces the induction and maintenance of central sensitization from nociceptive stimulation. The analgesic properties of magnesium are believed to stem from regulation of calcium influx into the cell and other Magnesium Postsynaptic N-methyl D-aspartate (NMDA) calcium channel blocker properties but the exact mechanism of its action is not well understood.^{2,13} The aim of study was to measure the efficacy of incisional magnesium sulfate in decreasing pain after cesarean section and reduce the extra analgesic use in first 24 hours postoperatively.

patients and patients who were on calcium-channel-blockers, drug allergy and patients with allergy to magnesium sulfate were carefully handled and were excluded in our study. Other exclusions included those who had to be prescribed with magnesium sulfate postoperatively. General patient characteristics including age, gestational age and indication of cesarean were recorded appropriately in the case sheets. Both groups were followed up for pain score evaluation using Visual Analogue Scale (VAS). A VAS consists of a line, often 10 cm long, with verbal anchors at either end, similar to an NRS (e.g., “no pain” on the far left and “the most intense pain imaginable” on the far right)^{1,3} the patient places a mark at a point on the line corresponding to the patient’s rating of pain intensity. The line may be depicted with a horizontal or vertical orientation, though a horizontal line is generally preferred.³ Intramuscular analgesia was administered every four hours for patients with severe pain (VAS >5) during the first 24 hours of postoperative period. Statistical Package for Social Sciences (SPSS) version 22, which is a statistical software program, and

Microsoft excel spreadsheets (2013) were used for data entry, calculations, and data interpretations. Descriptive statistics and up-to-date statistical methods were used in the evaluations. P -values ≤ 0.05 were

considered statistically significant. The study was approved from the ethical committee, college of Medicine, University of Sulaimani.

Results:

The mean age of the patients in intervention group was 26.5 years with a standard deviation (SD) of 5.1 years and in the control group, the means age was 28.3 years with a standard deviation of 4.9 years. The Mean duration of operations in the intervention group was 41.1 minutes and a

standard deviation of 7.05 minutes, while mean duration of operation in the control group was 43.6 minutes and a standard deviation of 7.3 minutes. There was no statistically significant difference between the two groups regarding patients' characteristics Table (1).

Table (1): Patient characteristics in both intervention (magnesium sulfate) and control (normal saline) groups

Characteristics	Magnesium sulfate group (N=100) Mean± SD	Normal Saline group (N=100) Mean± SD	P-value
Age (yrs.)	26.5±5.1	28.3±4.9	0.07
Weight (kg.)	67.2±13.6	65.9±14.1	0.63
Height (cm.)	155.8±7.8	157.3±6.5	0.29
Gravity	2.4±1	2.1±0.95	0.12
Parity	0.93±0.82	0.97±0.86	0.81
Number of cesarean Sections	0.89±0.83	0.91±0.82	0.9
Duration of Operations (mins)	41.1±7.05	43.6±7.3	0.084

After 4 hours of cesarean sections, the mean Visual Analogue Score (VAS) was 5.8 and a standard deviation of 1.9 for the intervention group, but in the control group, VAS was 9 and a standard deviation of 2.1. As the sense of pain have decreased with time, the mean VAS after 8 hours of operations in the intervention group was 3 and a standard deviation of 2.2, while the mean VAS and standard deviation in

control group after the same time period were 5.7 and 1.5 respectively. After 12 hours, mean and standard deviation in magnesium sulfate group was 2.6 and 1.45, in control group these values were 4.3 and 1.9 respectively. Visual Analogue Scores were all significantly lower in intervention group than control group and the p -values were less than 0.05 as both groups Table (2).

Table (2): Mean VAS and standard deviation in both magnesium sulfate and normal saline groups in 4 hrs., 8 hrs., 12 hrs., and 24 hrs.

Time and VAS	Magnesium sulfate group (N=100) Mean± SD	Normal Saline group (N=100) Mean± SD	P-value
After 4 hrs.	5.8±1.9	9±2.1	0.0001*
After 8 hrs.	3±2.2	5.7±1.5	0.0001*
After 12 hrs.	2.6±1.45	4.3±1.9	0.0001*
After 24 hrs.	1.8±1.3	3.8±1.6	0.0001*

(*) significant differences (P-value < 0.05)

Fewer patients in intervention groups needed extra analgesic use Table (3). No any unwanted side effects were observed in those patients who received medications.

Table (3): The number of cases that needed extra analgesia in both groups

Cases	Magnesium-sulfate group (N=100) No. , %	Normal-Saline group (N=100) No. , %	P-value
Needed Analgesia	15 , 15 %	96 , 96%	<0.005
Did Not need	85 , 85%	4 , 4%	<0.003
Total	100 , 100%	100 , 100%	

Discussions:

As we compared VAS scores in both groups, it has come to our attention that the sense of pain in the postoperative intervention (magnesium sulfate) group was significantly less as compared to the control group (normal Saline) no matter of the postoperative time. An important part of post-cesarean pain is because of incision in the anterior abdominal wall.¹⁴ Full stop after citation number a variety of local anesthetic techniques have been introduced and implemented for post-cesarean pain management with regard to somatic pain control.¹⁵ Considering the importance of postoperative pain control and fast rehabilitation and recovery after the surgery this study shows the affectivity of magnesium sulfate on decreasing pain in postoperative patients and confirms the efficiency of magnesium sulfate when

applied and injected to the skin subcutaneously after wound closure. Other studies also showed the efficacy of magnesium sulfate in post cesarean pain management, a similar study was conducted by Pazoki et al.¹⁶ In their prospective, randomized clinical trial, Pazoki and colleagues recruited 196 females with elective CS and concluded that incisional injection of magnesium sulfate in post-cesarean section pain management is safe and useful and the mean of VAS score in the magnesium sulfate group was significantly lower than the control group in all the evaluations.¹⁶ Few other studies were conducted to test the efficacy and strength of magnesium sulfate in postoperative pain management after operations such as elective cesarean section and patients with abdominal

hysterectomy. These results share similar characteristics with theirs. Mireskandari.¹⁷ in a double blind randomized clinical trial, prior to induction of general anesthesia, randomly assigned fifty elective cesarean candidates in to one of two groups, placebo or magnesium sulfate. After surgery, visual analogue scale (VAS) and infused morphine by patient controlled analgesia (PCA) during 24 hrs were recorded. They found that VAS was significantly lower

among patients in the magnesium sulfate group; another randomized clinical trial was conducted by Rezae.¹⁸ they randomly assigned and divided seventy pregnant women who underwent elective cesarean section into two groups. The pain scores at rest and upon movement were evaluated up to 24 hrs post operatively. They claimed that post-operative pain scores were significantly lower in magnesium sulfate group.

Conclusions

Magnesium sulfate is a safe and effective drug when it comes to postoperative pain management. Subcutaneous administration of magnesium sulfate in post cesarean section pain management can be used as a successful modality or method. Success and

recommendation of incisional administration of magnesium sulfate and its local and systemic side effects depend on conducting further clinical trials and researches in the future.

Conflict of interest

The author reports no conflicts of interest.

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