Comparison of the effect of dexmedmotidine and ketamine on controlling pain after cesarean section via intra-peritoneal method

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Introduction

Pain is a completely mental experience, which produces adverse hemodynamic and metabolic responses in patients.1,2 Millions of people around the world undergo surgery and then experience post-surgical pain. Postoperative pain leads to harmful effects, such as atleticas, thrombosis, ischemic myocardium, cardiac arrhythmias, water and electrolyte disorders, urinary retention and ileus.3,4 One of the most commonly used surgical procedures is cesarean section. Caesarean section is used in cases where delivery is impossible or if there is a risk to the mother and the baby. This procedure has played an important role in reducing maternal and fetal deaths and complications over the last century.5,6 Cesarean section is performed in two ways, including general anesthesia or regional anesthesia.7 One of the problems of cesarean section is acute postoperative pain that causes unpleasant psychological responses such as anxiety, sadness, aggression, insomnia, and lack of logical connection with the physician and nurse. It may also reduce breastfeeding and mother’s tolerance for breastfeeding.8,9 One of the most important issues in cesarean section is to reduce postoperative pain. By reducing the pain, mothers will be able to perform their motherhood duties well, leading to earlier breastfeeding and mother’s tolerance for breastfeeding.

Methods

Objective The present study aimed to compare the effect of dexmedmotidine and ketamine on controlling pain after cesarean section via intra-peritoneal method.

Inclusion Criteria

1. Aged 18–35 years.
2. ASA (American Society of Anesthesiologists).
3. Female candidates for cesarean section.
4. Candidates for cesarean section who entered the study were randomly divided into two groups (dexmedmotidine and ketamine).

Outcome measures

Pain score was measured on the basis of the visual analog pain scale during the recovery at 4, 6 and 12 h after the surgery. The data were then analyzed by SPSS (version 20).

Results

A total of 70 patients participated in the study. The results showed that the mean pain scores were the same in different postoperative hours in patients (P ≥ 0.05). The mean opioid use in the ketamine group was lower than inter-peritoneal dexmedmotidine (P = 0.03). Moreover, the mean postoperative analgesia in the ketamine group was higher than that of inter-peritoneal dexmedmotidine (P = 0.04).

Conclusion

According to the results, the mean opioid consumed in the ketamine group was less than inter-peritoneal dexmedmotidine. Additionally, the mean postoperative analgesia in the ketamine group was higher than that of inter-peritoneal dimethomidine. Therefore, it can be concluded that ketamine has a better effect on reducing pain after cesarean section.

Materials and Methods

This double-blind clinical trial was carried out on all patients who underwent cesarean section. All candidates for cesarean section referred to Taleghani Hospital in Arak, Iran. The candidates for cesarean section who entered the study were randomly divided into two groups (dexmedmotidine and ketamine).

Inclusion Criteria

1. Aged 18–35 years.
2. ASA (American Society of Anesthesiologists).
3. Female candidates for cesarean section.
Exclusion Criteria

1. Having a history of allergy to dexmedmotidine and ketamine.
2. Having heart and respiratory disease.
3. Emergency cesarean section.

At first, all patients provided informed consent. Then, 5 mg/kg ketamine and 1 mg/kg dexmedmotidine were injected in the ketamine and dexmedmotidine group, respectively. In both groups, the normal saline solution mixed with drugs was injected into the patient’s peritoneum. The pain was measured according to the Visual Analog Scale (VAS) at 4, 6, and 12 h after the operation. In this scale, zero expresses the lowest value and the 10 represents the highest value. It should be noted that the data were measured and recorded by a gynecologist who was unaware of the groupings. The drugs in each group were prepared by an anesthetist.

The sample size and number were calculated as follows:

\[ N = \frac{Z_{1-\alpha} + Z_{1-\beta}}{\left(\delta_1^2 + \delta_2^2\right)} = 70 \]

Patients were divided into two groups (n = 35).

Data analysis

The data were analyzed using SPSS (version 20), while descriptive statistics and t-test were used to analyze parametric and nonparametric data.

Ethical considerations

1. Obtaining a letter of introduction from the university’s authorities to be introduced to the research centers.
2. Obtaining a letter of introduction from the authorities of the researcher centers.
3. The purpose of the study was described for all research units and written consent was obtained from them.

Results

A total of 70 patients were included in the study, who were classified into two groups. They were evaluated in terms of mean age. According to the results, the mean age in the dexmedmotidine group and ketamine group was 34.4 ± 3.1 and 35.1 ± 4.7 years, respectively (P = 0.6). There was no significant difference between the two groups in terms of mean age. It can be said that the mean age of patients was similar in the two groups.

Table 1 shows the comparison of pain scores between the two groups. Given the fact that P < 0.05, there was no significant difference between the groups in scores of pain 4, 6, and 12 h after the recovery. The mean pain score was almost similar in patients at different hours after the surgery.

According to Table 2, there was a significant difference between the two groups in terms of drug abuse in 12 h after the surgery (P = 0.03), indicating that the mean drug in the ketamine group was lower than that of dexmedmotidine.

In Table 3, the mean duration of analgesia was evaluated and P = 0.04 was significant in two both. This indicates that the duration of analgesia in the ketamine group was greater than that of dexmedmotidine.

Discussion

Cesarean section refers to the removal of the embryo from the abdominal wall and the uterus. This is done to ensure the health of the mother and the baby. Cesarean section is characterized by acute post-operative pain. Effective management of post-operative pain is part of the surgical process and involves a multifaceted approach in which different drugs are used with different mechanisms and prescriptions. The administration of non-opioid analgesics is an essential component of multi-faceted pain management programs. Therefore, the present study aimed to investigate the effect of dexmedmotidine and ketamine, using intra-peritoneal method, in order to control postoperative pain in patients who underwent cesarean section. In this study, there was no significant difference between the two groups in terms of the pain scores at different hours after surgery (P ≥ 0.05). Furthermore, the mean pain scores were similar in patients at different hours after surgery. In this study, there was a significant difference between the two groups in terms of drug abuse 12 h after the surgery (P = 0.03). Moreover, the mean opioid use in the ketamine group was lower than that of dexmedmotidine. Similarly, Shariat Moharari et al. investigated the effect of ketamine and bupivacaine on analgesia after laparoscopic cholecystectomy. Shariat Moharari et al. found that the duration of extubation in the ketamine group was higher. Moreover, pain was significantly lower in the ketamine group 6 h after surgery. The total amount of meperidine consumed within the 24-h period was lower in the ketamine group. In addition, the drug demand decreased. There was an increase in the duration of extubation. In this study, there was a significant difference between the two groups (dexmedmotidine and ketamine) in terms of mean postoperative anesthesia. Moreover, the mean postoperative

\begin{table}[h]
\centering
\caption{Comparison of pain scores} \\
\begin{tabular}{|c|c|c|c|}
\hline
\textbf{Pain} & \textbf{Dexmedmotidine} & \textbf{Ketamine} & \textbf{P} \\
\hline
\text{VAS} & Mean ± SD & Mean ± SD &  \\
\hline
\text{VAS 4 h after the surgery} & 1.1 ± 3.7 & 0.98 ± 3.8 & 0.6  \\
\text{VAS 6 h after the surgery} & 1.1 ± 3.7 & 0.98 ± 3.8 & 0.6  \\
\text{VAS 12 h after the surgery} & 1.1 ± 3.7 & 0.98 ± 3.8 & 0.6  \\
\hline
\end{tabular}
\end{table}

\begin{table}[h]
\centering
\caption{Comparison of drug abuse 12 h after the surgery} \\
\begin{tabular}{|c|c|c|}
\hline
\textbf{Drug use 12 h after the surgery (mg)} & \textbf{Dexmedmotidine} & \textbf{Ketamine} & \textbf{P} \\
\hline
\text{Mean ± SD} & \text{Mean ± SD} &  \\
\hline
35 ± 4.4 & 20.4 ± 3 & 0.03  \\
\hline
\end{tabular}
\end{table}

\begin{table}[h]
\centering
\caption{Comparison of the mean postoperative analgesia} \\
\begin{tabular}{|c|c|c|}
\hline
\textbf{Postoperative mean pain (h)} & \textbf{Dexmedmotidine} & \textbf{Ketamine} & \textbf{P} \\
\hline
\text{Mean ± SD} & \text{Mean ± SD} &  \\
\hline
12.6 ± 2.8 & 5.1 ± 13.3 & 0.04  \\
\hline
\end{tabular}
\end{table}
analgesia in the ketamine group was significantly higher than that of dexmedetomidine \((P = 0.04)\). Oza et al. aimed at comparing the effects of intraperitoneal anesthesia of bupivacaine and dexmedetomidine only after laparoscopic surgery. Oza et al. investigated the duration of analgesia in the dexmedetomidine group. They found that the rate of intake of analgesics in the dexmedetomidine and bupivacaine was 1.76 and 2.56, respectively. This difference was significant \((P \geq 0.05)\). The mean analgesia was lower in the 24-h period in the dexmedetomidine group \((P\text{-value of } -0.05)\). There was a significant difference the two groups in terms of pain up to 12 h after the surgery, and the pain was lower in the dexmedetomidine group \((P < 0.05)\). Bupivacaine and dexmedetomidine increased the duration of analgesia. They also reduced the number of applications for postoperative analgesia.\(^{19}\) Chiruvella et al. used dexmedetomidine and rupivacaine to manage the postoperative pain after hysterectomy. The pain was lower in the rupivacaine and dexmedetomidine groups. The duration of analgesia was higher in this group. They stated that interferon dexmedetomidine can reduce pain and drug use.\(^{20}\) Their results are not consistent with those of our study. In our study, the mean duration of analgesia was lower in the intraperitoneal ketamine group. In our study, ketamine and dexmedetomidine were given intraperitoneally.

**Conclusion**

According to the results, the mean opioid use in the ketamine group was lower than that of dexmedetomidine. Moreover, the mean postoperative analgesia in the ketamine group was higher than that of dexmedetomidine. Therefore, it can be concluded that ketamine has a better effect on pain relief after cesarean section.

**Conflicts of Interest**

None.

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