Effects of Two Different Doses of Intrathecal Dexmedetomidine on the Perioperative Clinical Profile of Bupivacaine-Induced Spinal Anesthesia for Cesarean Section

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Abstract

Introduction: Spinal anesthesia gained great popularity in cesarean delivery in the last decades. Different additives to bupivacaine were used to increase the duration of analgesia after spinal anesthesia specially opioids and α2 agonists e.g. dexmedetomidine. The best dose of intrathecal dexmedetomidine (DEX) with the least side effects was not determined before in the obstetric patient population.

Methods: A randomized controlled trial was done in Obstetric Department in Cairo University Hospitals during the year 2015. Sixty patients were involved where they are divided into two groups, one group received intrathecal bupivacaine plus 5 µg DEX (group BD5), and the other group received bupivacaine plus 15 µg DEX (group BD 15). The time to two sensory block segment regression, the peak sensory level of the block, the time to S1 level sensory regression, the intraoperative and early postoperative hemodynamic variables, and side effects e.g. nausea and vomiting were determined.

Results: The mean time to two segment dermatomal regression showed no statistically significant difference between the two groups (p-value >0.05). The mean time of sensory regression to S1 showed statistically significant prolongation in group BD 15 (383 ± 40.6) min compared to group BD 5 (317.3 ± 51.5) min (p=0.000). There was no significant difference between the two groups regarding hemodynamics, sedation and side effects.

Conclusion: The addition of DEX in two different doses as an intrathecal adjuvant to isobaric bupivacaine 0.5% in elective Caesarean section increased the durations of sensory and motor block clinically in a dose dependant manner without significant increase in side effects.

Key Words: Intrathecal Dexmedetomidine – Spinal anesthesia – Cesarean section – Neuraxial analgesia.

Introduction

NEURAXIAL analgesic techniques have become nearly the first choice in anesthesia for cesarean section. Data from the United Kingdom show that regional anesthesia is used in 94.9% and 86.7% for elective and emergent cesarean delivery; respectively [1]. The addition of opioids to the intrathecally administered local anesthetic provides an easy and effective approach to maintain the block for a longer period sufficient for the operation in addition to a period of postoperative analgesia. However, their routine use is often limited by the side effect profile e.g. delayed respiratory depression, pruritus, etc. [2].

Alpha 2-agonists are non-opioid adjuvants with a significant role in prolonging the duration of subarachnoid block [3]. When clonidine or Dexmedetomidine is added to intrathecal local anesthetics, the regression time of sensory and motor blocks increases in a dose dependent manner [4]. In the same context, a recent meta-analysis including seven randomized controlled studies reported an increase in the duration of analgesia and reduced morphine requirement after the concomitant subarachnoid administration of clonidine [5].

Histo-pathological examination proved that all of the nerves analyzed had normal axons and myelin at 24h and 14 days after the peri-neural administration of Dexmedetomidine in animal studies [6]. Several clinical trials confirmed the analgesic effect and safe neurological outcome of neuraxially injected Dexmedetomidine in the non-obstetric populations [7-12] while intrathecal clonidine proved to be a useful adjunct for spinal anesthesia in patients undergoing cesarean delivery [13-15].

To the best of our knowledge the optimum dose of intrathecal Dexmedetomidine added to bupivacaine-induced spinal anesthesia with the lowest side effect profile on the mother and fetus is not determined in medical literature.
Patients and Methods

The aim of this study is to evaluate the analgesic potentials and side effect profile of two different doses of Dexmedetomidine added to subarachnoid bupivacaine in full-term pregnant women undergoing elective Cesarean section (CS) using spinal anesthesia.

Sample size:

The primary outcome variable was the duration of sensory block defined as: “the time interval between intrathecal drug administration and two segments regression of the dermatomal sensory level”. Previous data indicated that mean (SD) of the time to two sensory segment regression is 70.0 (35.0) minutes after elective CS in patients receiving spinal anesthesia using hyperbaric bupivacaine and clonidine [16]. At an alpha error of 0.05, a sample size of 17 patients per group would provide 80% power to detect a 50% increase in the duration of analgesia with the addition of DEX. To compensate for possible dropouts, the final sample size in each group was 30 patients (Total number of patients in the two study groups was 60).

Interventions:

This prospective, randomized, double blinded study was conducted in obstetric department of Cairo University Hospitals after approval of Ethical Committee of Faculty of Medicine, Cairo University during the year 2015. It included 60 Full-term pregnant women scheduled for elective Cesarean section using spinal anesthesia. Written informed consent was obtained from all participants.

Inclusion criteria were: Age 18-35 years, singleton gestation, American Society of Anesthesiologists (ASA) physical status classes I and II and elective Cesarean section. Exclusion criteria were: patients who refused to participate, preterm pregnancy (<37 wks gestation), multiple gestation, cardiovascular abnormalities (e.g., preeclampsia, hypertension) and the use of antihypertensive medications, conditions that contra-indicate intrathecal anesthesia, a history of established chronic pain, drug addiction, a psychiatric disorder, inability to communicate effectively, asthma and allergy to non-steroidal anti-inflammatory drugs.

After an overnight fasting of minimum 6 hours, Patients were instructed on the use of the Visual Analogue Scale (VAS): 0=no pain and 10=maximal unbearable pain.

Upon arrival to the operating room, ECG, pulse oximetry (SpO2) and non invasive blood pressure (NIBP) monitoring was initiated. Lumbar puncture was performed in the sitting position at the L3-L4 or the L4-L5 level through a midline approach using a 23 or 25G spinal needle.

Study group allocation was generated by a computer-generated random number table and was sealed in opaque envelopes that were opened by an anesthesiologist not involved in the intra- or postoperative care of the parturient. The intrathecal injectate was prepared under complete aseptic conditions in an unlabeled syringe by an anesthetist not involved in intraoperative management or postoperative assessment. The parturient, the surgeon, the in-charge anesthesiologist responsible for intra-operative care, and the individual who performed the postoperative evaluations were blinded to the patient group assignment.

The following intrathecal injectate was administered according to the patient group assignment with 30 patients included in each group:
- Group BD 5 received 12.5mg isobaric bupivacaine 0.5% and 5 µg Dexmedetomidine.
- Group BD 15 received 12.5mg isobaric bupivacaine 0.5% and 15 µg Dexmedetomidine.

For preparation of the intrathecal injectate, under complete aseptic precautions, 0.4ml and 1.2ml of DEX solution containing 40 µg and 120 µg DEX respectively was added to each bupivacaine vial 20ml where each 2.5ml of the two vials would contain 5 µg or 15 µg DEX respectively.

Parturient were placed supine with a left lateral tilt immediately after the spinal block and were kept in this position until delivery. Subsequently, the neutral dorsal decubitus position was maintained until the end of surgery.

Sensory level testing was assessed by loss of pinprick sensation to a short-bevelled 23G hypodermic needle and dermatomal levels were tested bilaterally in the mid-clavicular line every 2min until the highest level had stabilized. Testing was then conducted every 10 minutes until the point of two segment regression of the block. Further testing was performed at 20 minutes intervals until the recovery of S 1 dermatome. If the patient complained of insufficient intraoperative analgesia, fentanyl was administered by IV route in incremental doses of 50 µg Motor blockade was assessed using the modified Bromage scale (Appendix 1) [17].

Between the intrathecal injection and the delivery of the child, NIBP was measured every 2 minute
for 15min and every 5min thereafter until the end of the procedure. Hypotension, defined as a decrease of systolic blood pressure by more than 30% from baseline or a fall below 90mmHg, was treated with incremental IV doses of ephedrine 5mg and additional IV fluid. Bradycardia, defined as heart rate <60 beat per min, was treated with IV atropine 0.6mg. The incidence of other adverse effects, such as nausea, vomiting, shivering, pruritus, and respiratory depression were recorded. The Apgar scores (Appendix 2) [18] of the newborn were recorded as usual at 1 and 5min after birth.

The level of sedation was assessed at 5-min intervals after delivery and until the block had worn off by using the modified Ramsay Sedation Score (Appendix 3) [19]. Oxygen supplementation was not routine to avoid masking of possible minor drug-induced respiratory events [20]. However, nasal prongs were provided (Oxygen 2L/min) when desaturation (defined as arterial oxygen saturation <92%) occurred. The incidence of desaturation during surgery or post anesthesia care unit (PACU) stay was recorded.

Patients were discharged from the PACU after sensory regression to S 1 dermatome and adequate recovery of their motor power. All durations were calculated considering the time of spinal injection as time zero.

Postoperatively, the pain score was assessed using VAS and recorded initially every 1h for 2h, then every 2h for the next 8h and then after every 4h till 24h. Diclofenac was given intramuscularly as rescue analgesia when VAS was >3. Intramuscular Meperidine (Pethidine) 1mg/kg was given as a second rescue analgesic with persistent pain as time zero.

Primary outcome parameter was the time to two sensory block segment regression. Secondary outcome parameters were: the time from intrathecal injection to peak sensory block level, the peak sensory level of the block and the time to S 1 level sensory regression, the oxygen saturation and the need for O2 supplementation, the intraoperative and early postoperative hemodynamic variables, the intraoperative and postoperative sedation scores, the intraoperative analgesic supplementation during operation, the time to first postoperative rescue analgesic request, the postoperative pain scores for 24 hours, the frequency and total dose of postoperative analgesics, the incidence of side effects: respiratory depression, and desaturation, nausea and vomiting, pruritus and shivering, and the Apgar score of the newborn at 1min and 5min post delivery.

**Statistical analysis:**

The normal distribution of the data was assessed using the Kolmogorov-Smirnov test. Continuous normally distributed data was expressed as means (SD). Ordinal data and continuous data not fitting to the normal distribution curve was presented as medians (inter-quartile range). Categorical data was reported as percentage of the total.

Unpaired t-test or Mann-Whitney test was used as appropriate to test for statistical differences between the two study groups. Categorical data was compared using Chi square or Fisher exact tests. For all statistical comparisons a p-value of <0.05 was considered significant. SPSS v15.0 for Windows software (SPSS, Inc, Chicago, II, USA) was used for statistical analyses.

**Results**

Sixty patients were enrolled in completed the study protocol and were included in the data analysis. Demographic characteristics in the two groups did not show any statistically significant difference (p-value >0.05) as shown in (Table 1). There was no statistically significant difference in the duration of surgery as well (Table 1).

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Weight (kg)</th>
<th>Height (cm)</th>
<th>Gestational age (week)</th>
<th>Duration of surgery (min)</th>
<th>ASA 1 : II</th>
<th>Previous CS</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>28.2±4.7</td>
<td>80.7±16.9</td>
<td>159.9±3.7</td>
<td>38.3±1.1</td>
<td>57.0±17.3</td>
<td>4 : 1</td>
<td>63.3%</td>
<td>0.79</td>
</tr>
<tr>
<td>26.2±4.2</td>
<td>83.0±13.3</td>
<td>160.4±3.0</td>
<td>38.4±1.2</td>
<td>63.0±26.7</td>
<td>14 : 1</td>
<td>70%</td>
<td>0.57</td>
</tr>
</tbody>
</table>

ASA = American society of anaesthesiologists.

BD 5 = Bupivacaine Dex 5 mg. BD 15 = Bupivacaine Dex 15 mg.

Values given in mean ± SD, the incidence of previous CS is presented as percentage of the total, and the ASA score is presented as ratio.

There was no difference between the two groups (BD5 and BD15) regarding the highest level of sensory block achieved or in the onset time to reach this peak level (Table 2).

The mean time to two segment dermatomal regression showed a statistically insignificant difference between the two DEX groups (p-value >0.05). The mean time of sensory regression to S1
showed statistically significant prolongation between the two groups ($p=0.000$) (Table 2).

Regarding motor block, there was no difference in the onset time to reach maximum Bromage motor block. But there was statistically significant difference in the motor regression time between the two groups ($p=0.000$). The characteristics of sensory and motor block are shown in (Table 2).

Table (2): Characteristics of spinal block.

<table>
<thead>
<tr>
<th></th>
<th>Group BD5 (n=30)</th>
<th>Group BD15 (n=30)</th>
<th>$p$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest sensory level</td>
<td>T3 (T2-T4)</td>
<td>T3 (T2-T4)</td>
<td>0.75</td>
</tr>
<tr>
<td>Time from injection to</td>
<td>3.4±1.1</td>
<td>3.8±1.8</td>
<td>0.31</td>
</tr>
<tr>
<td>highest sensory level</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(min)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time to 2 segment</td>
<td>130±27</td>
<td>123.3±21</td>
<td>0.29</td>
</tr>
<tr>
<td>regression (min)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time to S1 recovery</td>
<td>317±51.5</td>
<td>383±40.6</td>
<td>0.000</td>
</tr>
<tr>
<td>(min)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time to max Bromage</td>
<td>3.4±1.2</td>
<td>3.4±1.3</td>
<td>1</td>
</tr>
<tr>
<td>score (min)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time to full motor</td>
<td>271±42.7</td>
<td>315±35</td>
<td>0.000</td>
</tr>
<tr>
<td>recovery (min)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Values given in mean ± SD. Values of $p<0.05$ were considered statistically significant.

None of the patients in the two DEX groups required additional analgesics intraoperatively (Table 3). The difference in total analgesic requirement between groups BD 5 and BD 15 was statistically insignificant ($p$-value >0.05) (Table 3). The difference in time to rescue analgesia between the two groups was statistically insignificant ($p$-value >0.05) (Table 3).

There was statistically significant difference in the VAS scores between the two groups ($p<0.05$) at the hour six, sixteen and twenty four postoperatively as shown in (Table 4).

Table (3): Intraoperative and postoperative analgesic requirements.

<table>
<thead>
<tr>
<th></th>
<th>Group BD5 (n=30)</th>
<th>Group BD15 (n=30)</th>
<th>$p$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Diclofenac dose</td>
<td>87.5±28.4</td>
<td>82.7±23.2</td>
<td>0.48</td>
</tr>
<tr>
<td>in 1 24h (mg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Pethidine dose</td>
<td>55.7±16.2</td>
<td>51.7±9.2</td>
<td>0.27</td>
</tr>
<tr>
<td>in 1 24h (mg)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time to rescue analgesia</td>
<td>7.9±3.3</td>
<td>9.5±3.6</td>
<td>0.73</td>
</tr>
<tr>
<td>in hours</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intraoperative</td>
<td>0%</td>
<td>0%</td>
<td>1</td>
</tr>
<tr>
<td>supplemental analgesia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Fentanyl)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Values given in mean ± SD. Intraoperative supplemental analgesia (Fentanyl) is given in number and percentage.

A noticeable decrease in systolic and diastolic blood pressure was observed at 4min, 8min, 12min, 16min, 20min, 40min, 60min, 90min and 120min in the two groups relative to the baseline values ($p$-value = 0.000). No statistically significant differences in the haemodynamic variables were observed between the two groups as regard to blood pressure and heart rate at the same time assessment points ($p>0.05$) (Figs. 1, 2, 3). The difference in intraoperative ephedrine or atropine requirement between the two groups was statistically insignificant ($p>0.05$) (Table 6).

Table (4): Visual analogue pain scores.

<table>
<thead>
<tr>
<th></th>
<th>Group BD5 (n=30)</th>
<th>Group BD15 (n=30)</th>
<th>$p$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAS 1h</td>
<td>0.0±0.0</td>
<td>0.0±0.0</td>
<td>1</td>
</tr>
<tr>
<td>VAS 2h</td>
<td>0.5±1.8</td>
<td>0.2±0.6</td>
<td>0.3</td>
</tr>
<tr>
<td>VAS 4h</td>
<td>2.1±2.1</td>
<td>1.4±2</td>
<td>0.23</td>
</tr>
<tr>
<td>VAS 6h</td>
<td>4.4±2.7</td>
<td>2.8±1.2</td>
<td>0.007</td>
</tr>
<tr>
<td>VAS 8h</td>
<td>5.3±2.2</td>
<td>4.8±1.8</td>
<td>0.41</td>
</tr>
<tr>
<td>VAS 12h</td>
<td>5.2±2.5</td>
<td>4.4±1.5</td>
<td>0.16</td>
</tr>
<tr>
<td>VAS 16h</td>
<td>4.4±2.7</td>
<td>6.5±3.1</td>
<td>0.006</td>
</tr>
<tr>
<td>VAS 20h</td>
<td>4±2.2</td>
<td>4.2±2.4</td>
<td>0.73</td>
</tr>
<tr>
<td>VAS 24h</td>
<td>4.5±2.5</td>
<td>2.8±1.2</td>
<td>0.002</td>
</tr>
</tbody>
</table>

Values are means (SD). Values of $p<0.05$ were considered statistically significant.
No statistically significant difference was observed in the sedation scores of the patients in the two groups over the whole spectrum of the intraoperative and postoperative assessment duration having score of 1 or 2 \( (p>0.05) \) (Table 5).

Table (6) shows the comparative incidence of various side effects in the two groups which were observed in the intraoperative and postoperative periods including nausea, vomiting, shivering, itching, sedation, respiratory depression, bradycardia and hypotension. The difference in incidence of nausea was significantly lower in group BD5 as compared to the other group \( (p=0.003) \). Otherwise, there was no significant difference in any other side effect. All the babies delivered had Apgar scores \( \geq 7 \) and \( \geq 9 \) in the first and fifth minutes, respectively in the two study groups with no statistical difference \( (p>0.05) \).

### Discussion

The current study showed that there was no difference between the two groups regarding the highest level of sensory block achieved or in the onset time to reach this peak level. The difference in mean time of sensory regression to S 1 was statistically significant between the two groups \( (p=0.000) \). The full regression of motor block was also more prolonged in group BD15 compared to group BD5 \( (p=0.000) \). These findings were in concordance with the results of Hala et al. [21] showing no difference in the onset time in patients...
receiving 10 µg-DEX (7.7±3.6min), 15 µg-DEX (8±2.5min) and hyperbaric bupivacaine alone (8.7±3.3min) (p=0.67).

However the onset times observed in the studies conducted by Hala et al. [21] were relatively longer than those observed by us, this can be attributed to the rapid cephalad spread of intrathecal local anesthetic in full term pregnant patients due to increase in the lumbar lordosis [22] or perhaps due to an effect of the gravid uterus causing aortocaval compression and engorgement of the epidural venous plexus [23] or through a progesterone-mediated increase in neuronal sensitivity [24].

On the other hand, the absence of difference in the onset time of motor and sensory block in our study was on contrary to Al Mostafa et al. [25] who found that the mean time of sensory block to reach T10 dermatome was 4.7±2.0 minute in DEX 10 µg group, 6.3±2.7 minute in DEX 5 µg group and 9.5±3.0 minute in control group. The mean time to reach bromage 3 scales was 10.4±3.4 minute in DEX 10 µg group, 13.0±3.4 minute in DEX 5 µg group and 18.0±3.3 minute in control group. They concluded that DEX has dose dependent effect on onset time for the sensory and motor block.

In similarity to our results, Al-Mustafa et al. [25] and Hala et al. [21] observed dose dependent prolongation of motor and sensory blockade with reduced analgesic requirement with increasing dosages of intrathecal DEX (5, 10, and 15 µg). Al Mostafa et al. [25] revealed that the regression time to reach S1 dermatome was 338.9±44.8 minute in DEX 10 µg group, 277.1±33.2 minute in DEX 5 µg group and 165.5±32.9 minute in control group. Full regression time of motor block was 302.9±36.7 minute in DEX 10 µg group, 246.4±24.7 minute in DEX 5 µg group and 140.1±32.3 minute in control group.

Hala Eid et al. [21] showed a dose dependent increase of 2 segment regression time by increasing the dose from 10 µg to 15 µg of intrathecal DEX (103±28.7 minutes, 200±30.9 minutes respectively). This dose dependant prolongation in 2 segment regression time in our study was statistically insignificant between the two DEX groups (p>0.05).

The difference in time to rescue analgesia between the two DEX groups in our study was statistically insignificant (p>0.05) on contrary to Hala et al. [21] who observed that the analgesic effect of DEX was more pronounced with the dose of 15 µg and that 15 µg-DEX but not 10 µg-vas associated with lower 24-hours analgesic requirements and desirable level of sedation.

In the current study, none of the patients in the two DEX groups required additional analgesics intraoperatively. This was in agreement with Hanoura and colleagues [26] who observed that in the DEX-bupivacaine-fentanyl Group, all women did not need any supplementary analgesic throughout the operation, while, in the bupivacaine-fentanyl group, 6 patients needed supplementary fentanyl (p=0.03) for complaining intraoperative pain or discomfort (defined as VAS >4).

In the current study, a noticeable decrease in systolic and diastolic blood pressure was observed in the two groups relative to the baseline values (p-value = 0.000). This can be attributed to the special characteristics of our population being pregnant females where many of the physiological changes that occur during pregnancy increase the effect of a local anaesthetic injection on the hemodynamics, including the aorto-caval compression by the gravid uterus on the inferior vena cava and the lower aorta when the patient lies supine, this reduces venous return to the heart leading to a fall in pre-load, cardiac output and consequently a fall in blood pressure aggravating the hypotensive effect of regional anaesthesia with pooling of blood in the lower extremities by abolishing the sympathetic response increasing the risk of supine hypotension [24].

However, no significant differences in the haemodynamic variables were observed between the two groups as regard to blood pressure and heart rate throughout the intraoperative and postoperative periods. Also the difference in intraoperative ephedrine or atropine requirement between the two groups was statistically insignificant (p>0.05). These results were in agreement with the recent Meta analysis done in 2014 [27] that recorded the intra-operative ephedrine and atropine consumption and revealed no group difference between neuraxial DEX and placebo group, suggesting an overall stable hemodynamic and that these changes were easily reversed.

In agreement to our results, Al-Mustafa et al., [25] using 5 µg and 10 µg-DEX, found a dose dependent, but still insignificant, decrease on the mean blood pressure when compared to the bupivacaine (control) group.

In the current study, no significant difference was observed in the sedation scores of the patients in the two groups over the whole spectrum of the intraoperative and postoperative assessment duration having score of 1 or 2.
The lack of increase in the sedation scores observed in the current study is in agreement with a previous study that utilized 10 µg intrathecal DEX in patients undergoing transurethral resection of prostate [28]. This was also in agreement with Abdelhamid and El-Lakany [28] who observed absence of sedation in both the DEX group and the placebo group. Kanazi et al. [29] also stated that the level of sedation were similar with low sedation scores in the three groups intra-operatively and post-operatively though patients have even received 5mg of diazepam orally as a pre medication. Also, Mohamed and colleagues [30] showed no significant differences in postoperative sedation scores among all the study groups including the DEX group, the DEX-fentanyl group and the control group.

This result may be supported by the hypothesis that administration of an α2-agonist via an intrathecal or epidural route provides an analgesic effect in postoperative pain without severe sedation due to the sparing of supra spinal CNS sites from excessive drug exposure, resulting in robust analgesia without heavy sedation [31].

This finding was on contrary to Hala et al. [21] who observed that sedation scores were significantly higher with 15 µg dose and attributed this to the systemic absorption of DEX after intrathecal injection and its vascular redistribution to higher centers or cephalad migration in CSF.

We found that the difference in shivering was statistically insignificant (p>0.05) between the two groups. The α-2 adrenergic agents were known to have anti shivering property as observed by Talke et al. [32]. The α2 receptor agonists are known to prevent shivering to a moderate extent without any associated respiratory depression as with other anti shivering drugs like meperidine, DEX reduces shivering by lowering vasoconstriction and shivering thresholds [33]. However, the anti shivering effect of DEX may be more pronounced with the use of intravenous DEX rather than with intrathecal DEX. Usta et al. [34] stated in their study that intravenously administered DEX infusion inhibited shivering under spinal anaesthesia. Karaman et al. [33] showed that intravenous loading dose followed by infusion of DEX decreased incidence of shivering compared to placebo. Moreover, the intensity of shivering in the 3 observed cases was lower in the DEX group than in the placebo group (p>0.05).

As regards the incidence of side effects observed in our study, the incidence of bradycardia was statistically insignificant between the two groups (p>0.05), also the incidence of hypotension was statistically insignificant between the two groups (p=0.105). In agreement with this, Al-Mustafa et al., [28] using 5 µg, and 10 µg DEX, found no effect on the mean blood pressure.

Nausea with or without vomiting was associated with the hypotensive episodes so it was also lower in group BD5 (36.7%) compared to group BD15 (73.3%) showing statistical significance p=0.003. This may be explained by the fact that increased vagal activity after sympathetic block causes increased peristalsis of the gastrointestinal tract, which leads to nausea [35]. This was also observed by Hanoura and colleagues [26]. In agreement with our results also, Kang et al. [36] showed that incidence of intra operative nausea during spinal anesthesia for Caesarean section correlated well with hypotension.

The safety of the use of DEX on neonatal outcome is a very important issue. The neonatal outcome in our study was normal in the two groups. All the babies delivered had Apgar scores > 7 and > 8 in the first and fifth minutes, respectively. These were the same results observed by Abdelhamid and El-Lakany [28] during Caesarean section and Ogan et al. [37] during normal labour. Experimental study on acute exposure of rats to DEX at the anticipated delivery time recorded absence of any adverse effects on perinatal morphology of pups, their birth weight, crown-rump length, physical growth, and postnatal behavioural performances and concluded that DEX did not affect those parameters [38]. Others studied the transfer of clonidine and DEX across the isolated perfused human placenta and concluded that DEX disappeared faster than clonidine from the maternal circulation, while even less DEX was transported into the fetal circulation [39]. Some case reports concluded that DEX has no harmful effects during Caesarean delivery [40,41].

Although this study adds to the current knowledge on DEX, as it compares two different doses of DEX as an intrathecal adjuvant to local anesthetic involving specific type of population which is the pregnant females, the results should be considered cautiously taking in account the obvious limitations: the population involved includes young otherwise healthy patients with specific nature and the effect in older patients with cardiovascular co morbidities are yet to be investigated especially with higher doses as 15 µg. This study also lacks an active control for systemic DEX effect. Thus further studies that compare the effect of intrathecal and intravenous DEX on spinal bupivacaine may also
be warranted. From the limitations of this study also the lack of follow-up of patients after 24 hours following discharge from hospital to detect long term side effects of DEX such as new onset of back, buttock or leg pain or any neurological impairment related to the spinal anesthesia. Further trials focusing on long-term outcomes are needed.

Thus, as the renewed interest in regional anesthesia techniques grows, especially for the prolongation of excellent quality of intraoperative and postoperative analgesia with minimal side effects, use of intrathecal DEX as an adjuvant to local anesthetics is evolving gradually and further clinical studies are proving its efficacy and safety and will be determining the suitable dosages of DEX required for supplementation of spinal local anesthetics.

Conclusion:

Our study emphasized that the addition of DEX in two different doses as an intrathecal adjuvant to isobaric bupivacaine 0.5% in elective Caesarean section increased the durations of sensory and motor block clinically in a dose dependant manner without significant increase in side effects.

References


37. OGAN S.F., JOB O.G. and ENYINDAH C.E.: Comparative Effects of Single Shot Intrathecal Bupivacaine with Dexmedetomidine and Bupivacaine with Fentanyl on Labour Outcome. ISRN Anesthesiology, 8: 169-84, 2012.


