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Original Research Article

## Adverse effects of spinal anaesthesia for caesarean section

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### ABSTRACT

**Background:** Obstetric anaesthetists while providing anaesthesia for caesarean sections, provide care for both the mother and the unborn baby. This study was performed to evaluate the adverse effects of spinal anaesthesia for Caesarean section.

**Methods:** The present study is a prospective observational study carried out on 100 full-term, low risk pregnant patients who had caesarean section under spinal anaesthesia at Varun Arjun medical college, Shahjahanpur, U. P., India from January 2022 to December 2022.

**Results:** In our study, 43 (43%) patients were between 26-30 years, 32 (32%) patients were between 31-35 years, 16 (16%) patients were between 36-40 years. The 62 (62%) patients were primigravida while 38 (38%) patients were multigravida. The 66 (66%) patients were delivered by emergency caesarean section while 34 (34%) were delivered by elective caesarean section. In our study, adverse anaesthetic effects were less. 12 (12%) patients had spinal hypotension, 11 (11%) patients had spinal headache, 10 (10%) patients had pruritus, 9 (9%) patients had shivering, 5 (5%) patients had nausea and vomiting, 4 (4%) patients had less visceral pain and neonatal Apgar score each, 3 (3%) patients had failed regional anaesthesia, 3 (3%) patients had bradycardia while 2 (2%) patients had high spinal anaesthesia, 10 (10%) patients had visceral pain.

**Conclusions:** In our study, combination of bupivacaine and a low dose of fentanyl (0.25 µg/kg) provided excellent surgical anaesthesia with short-lasting postoperative analgesia. There were very few adverse side effects.

**Keywords:** Bupivacaine, Spinal anaesthesia, Caesarean section, Shivering

### INTRODUCTION

After a caesarean section, women generally have strong incision pain and uterine involution pain. It affects the postoperative recovery as well as leads to a sympathetic nervous response. Thus, promoting the secretion of catecholamines which inhibits the release of prolactin affecting lactation.<sup>1</sup>

The choice of anaesthesia and anaesthetic drugs greatly influence the recovery of caesarean section women. Spinal

anaesthesia or combined spinal-epidural anaesthesia has a precise analgesic effect. It completely causes nerve block so is widely used in the caesarean section.<sup>2</sup>

Combined spinal-epidural anaesthesia is often added with adjuvant drugs to improve postoperative analgesia. It promotes early ambulation, reduces the dose of bupivacaine, thus reducing the occurrence of adverse reactions after anaesthesia.<sup>3</sup>

Fentanyl can be used as an adjuvant drug for spinal anaesthesia to prolong postoperative analgesia as it has fast

peaking, a strong analgesic effect, and a short half-life. It can cause many adverse reactions, like nausea, vomiting, urinary retention, and respiratory depression.<sup>4</sup>

### **Practice guidelines for anaesthesia for caesarean section by American society of anaesthesiologists (ASA)<sup>5</sup>**

Conduct a focused history and physical examination before providing anaesthesia care. For neuraxial anaesthesia, examine the patient's back. Recognition of significant anaesthetic or obstetric risk factors. A communication between obstetrician, anaesthesiologists, and other members of the multidisciplinary team. A platelet count should be individualized. A blood crossmatch if necessary. Foetal heart rate patterns should be monitored. Uncomplicated patient undergoing elective surgery may have clear liquids up to 2 h before induction of anaesthesia. She should undergo a fasting period for solids of 6 to 8 hours and antacids and/or metoclopramide for aspiration prophylaxis. Use dilute concentrations of local anaesthetics with opioids to produce less motor block. Use pencil-point spinal needles to minimize the risk of post-dural puncture headache. Treatment of potential complications should be available. Appropriate equipment and personnel should be available for recovery from any anaesthesia. The decision to use a particular anaesthetic technique should be individualized. Uterine displacement should be maintained until delivery regardless of the unesthetic technique. Consider selecting neuraxial techniques in preference to general anaesthesia for most caesarean deliveries. For urgent caesarean delivery, an indwelling epidural catheter may be used as an alternative to initiation of spinal or general anaesthesia. General anaesthesia may be the most appropriate choice in some circumstances. IV fluid preloading or coloadung may be used to reduce the maternal hypotension after spinal anaesthesia. Do not delay the initiation of spinal anaesthesia to administer a fixed volume. IV ephedrine or phenylephrine may be used for treating hypotension during neuraxial anaesthesia. In the absence of maternal bradycardia, consider selecting phenylephrine because of improved foetal acid-base status in uncomplicated pregnancies. For postoperative analgesia after neuraxial anaesthesia, neuraxial opioids should be used.

Compared to neuraxial anaesthesia, general anaesthesia for caesarean delivery is associated with significantly increased risks of maternal adverse events such as death, cardiac arrest, anaesthesia-related complications, or surgical site infection.<sup>6</sup>

The current general anaesthesia rate for caesarean delivery is 5.5%.<sup>7</sup>

Bupivacaine when used alone, 12 to 15 mg doses are needed for achieving satisfactory levels of sensory blockage for surgery. It avoids visceral pain of intraoperative peritoneal traction, and major adverse events like arterial hypotension and foetal.<sup>8</sup>

Low doses of bupivacaine with fentanyl, a lipophilic opioid, improve the quality of the blockade, prolong the duration of analgesia, and reduce the incidence of intraoperative nausea and vomiting.<sup>8</sup>

High doses of intrathecal fentanyl above 0.25 µg.kg<sup>-1</sup> do not improve the quality of analgesia and increase adverse effects.<sup>9</sup>

Combined spinal epidural anaesthesia (CSEA) has quick onset, good effect and controllable action time. It is the preferred anaesthesia method for caesarean section.<sup>10</sup>

Failure of intraspinal anaesthesia by a large abdomen, a non-ideal anaesthesia position, obesity and tissue oedema, and anaesthesia-related complications, like nerve injury, unsatisfactory anaesthetic effect and postpartum lumbago can be there. So, the success rate of CSEA for pregnant women, especially for obese patients should be improved.<sup>11</sup>

Enhanced recovery after surgery (ERAS) Guideline for perioperative care in caesarean delivery strong recommendations were for preoperative (antenatal education and counselling, use of antacids and histamine, H<sub>2</sub> receptor antagonists, 2-hour fasting and small meal within 6 hours surgery, antimicrobial prophylaxis and skin preparation, intraoperative (regional anaesthesia, prevention of maternal hypothermia, warmed intravenous fluids, perioperative (fluid management for euvolemia and delayed cord clamping), and postoperative (fluid management to prevent nausea and vomiting, antiemetic use, analgesia with nonsteroidal anti-inflammatory drugs/paracetamol, regular diet within 2 hours, tight capillary glucose control, pneumatic compression stocking for venous thromboembolism prophylaxis, immediate removal of urinary catheter).<sup>12</sup>

## **METHODS**

The present study is a prospective observational study carried out on 100 full-term, low risk pregnant patients who had caesarean section under spinal anaesthesia at Varun Arjun Medical college, Shahjahanpur, U. P., India from January 2022 to December 2022. The study was approved by the institution's research and ethics committees. Informed consent was taken.

### **Inclusion criteria**

Women of 18-40 years with pregnancy 37-40 weeks; with a live and single foetus. women who had undergone Caesarean section under SA. American society of anaesthesiologists (ASA) I and II. BMI less than 40 kg/m<sup>2</sup>. Patients willing to participate in the study.

postoperative pain, adverse reactions (hypotension, bradycardia, nausea and vomiting, pruritus, dizziness, intraoperative pain, urinary retention, chills, fever, diarrhoea, and headache).

### Exclusion criteria

Women with pregnancy complications, non-spinous or combined spinal-epidural anaesthesia, women with psychiatric disorders, history of drug addiction, acute or chronic foetal distress, contraindication for regional anaesthesia and patients willing to participate in the study were excluded.

Patients were fasting. In the operating room, all were continuously monitored with continuous ECG tracing, non-invasive blood pressure monitor, and pulse oximeter. After venous access with an 18 cannula, 500 mL of Ringer's lactate solution was infused. With the patient in the sitting position, spinal anaesthesia was performed with a 25G spinal needle in the L3-L4 interspace. Anaesthetic solution with combination of bupivacaine and a low dose of fentanyl (0.25 µg/kg) was manually injected. After the block, patients were placed in supine position. A wedge was used to displace the uterus to the left until foetal extraction. Oxygen was supplemented by a nasal cannula. Hydration was maintained with Ringer's lactate solution. Sensory and motor block were monitored.

Total duration of analgesia: interval between the end of the spinal injection and spontaneous complaint of pain were assessed. Quality of intraoperative analgesia was evaluated.

Maternal mean arterial pressure, heart rate, oxygen saturation were monitored.

Neonatal Apgar score was recorded at the 1<sup>st</sup> and 5<sup>th</sup> minutes. Maternal side effects like nausea, vomiting, pruritus was noted.

Data collected was entered into Microsoft excel, in SPSS version for analysis. Descriptive statistics were calculated in percentages.

### RESULTS

In our study, 43 (43%) patients were between 26-30 years, 32 (32%) patients were between 31-35 years, 16 (16%) patients were between 36-40 years 9 (9%) patients were between 21-25 years (Table 1).

**Table 1: Age distribution of study subjects.**

Age (Years)	N	Percentage (%)
21-25	09	9
26-30	43	43
31-35	32	32
36-40	16	16

**Table 2: Parity of study subjects.**

Parity	N	Percentage (%)
Primi	62	62
Multi 32 32%	38	38

**Table 3: Type of caesarean section.**

Type of caesarean section	N	Percentage (%)
Elective	34	34
Emergency	66	66

In our study, 66 (66%) patients were delivered by emergency caesarean section while 34 (34%) were delivered by emergency caesarean section (Table 3).

**Table 4: Anaesthetic adverse effects in study subjects.**

Adverse anaesthetic effects	N	Percentage (%)
Spinal hypotension	12	12
Spinal headache	11	11
Pruritus	10	10
Shivering	9	9
Nausea and vomiting	5	5
Visceral pain	4	4
Less neonatal Apgar score	4	4
Failed regional anaesthesia	3	3
Bradycardia	3	3
High spinal	2	2

In our study, adverse anaesthetic effects were less. 12 (12%) patients had spinal hypotension, 11 (11%) patients had spinal headache, 10 (10%) patients had pruritus, 9 (9%) patients had shivering, 5 (5%) patients had nausea & Vomiting, 4 (4%) patients had less visceral pain and neonatal Apgar score each, 3 (3%) patients had failed regional anaesthesia, 3 (3%) patients had bradycardia while 2 (2%) patients had high spinal anaesthesia, 10 (10%) patients had visceral pain (Table 4).

### DISCUSSION

In our study, 43 (43%) patients were between 26-30 years, 32 (32%) patients were between 31-35 years, 16 (16%) patients were between 36-40 years 9 (9%) patients were between 21-25 years (Table 1).

Contrast to our study, Silva IG et al found that out of 88 patients, most patients were between 20 and 29 years, 46.59% (n= 41), and 30 to 39 years, 42.05% (n=37).<sup>13</sup>

In our study, 62 (62%) patients were primigravida while 38 (38%) patients were multigravida (Table 2).

Gupta et al reported that maximum no. of caesarean sections was in multiparous females (53.82%).<sup>14</sup>

In our study, 66 (66%) patients were delivered by emergency caesarean section while 34 (34%) were delivered by emergency caesarean section (Table 3).

Gupta et al reported that 62.08% CS were done as emergency procedure.<sup>14</sup>

In our study, adverse anaesthetic effects were less. 12 (12%) patients had spinal hypotension, 11 (11%) patients had spinal headache, 10 (10%) patients had pruritus, 9 (9%) patients had shivering, 5 (5%) patients had nausea and vomiting, 4 (4%) patients had less visceral pain and neonatal Apgar score each, 3 (3%) patients had failed regional anaesthesia, 3 (3%) patients had bradycardia while 2 (2%) patients had high spinal anaesthesia, 10 (10%) patients had visceral pain (Table 4).

Liu X et al found that the incidence of shivering during anaesthesia was significantly lower in the case than control group (OR, 0.389; 95% CI, 0.240–0.632;  $p < 0.001$ ). Bupivacaine combined with 5 mg of DEX in SA was associated with a lower incidence of shivering (OR, 0.259; 95% CI, 0.136–0.491;  $p < 0.001$ ). No significance differences were found in the other subgroups and no differences were observed in hypotension (OR, 1.197; 95% CI, 0.607–2.358), bradycardia (OR, 1.423; 95% CI, 0.440–4.607), nausea/vomiting (OR, 1.246; 95% CI, 0.649–2.391), or pruritus (OR, 0.894; 95% CI, 0.354–2.260).<sup>15</sup>

Karacaer et al found that no significant difference was found in the incidence of hypotension in the saline and ondansetron groups ( $p = 0.767$ ). Episodes of hypotension and norepinephrine consumptions were significantly greater in study group ( $p = 0.009$ ) ( $p = 0.009$ ). There was no significant difference in the adverse effects between the two groups.<sup>16</sup>

Manouchehrian et al found that mean  $\pm$  SD of anxiety VAS scores was  $1.77 \pm 1.5$  in the experimental group. It was  $3.12 \pm 1.73$  in the control groups ( $p = 0.003$ ). The mean  $\pm$  SD of pain VAS scores of the experimental and control groups were  $0.82 \pm 1.5$  and  $1.64 \pm 1.45$ , respectively ( $p = 0.042$ ) and no significant differences were seen regarding blood oxygen saturation, neonate Apgar scores, total used ephedrine, operation time, delivery time, nausea, and vomiting.<sup>17</sup>

Frolich et al found that maternal analgesia and sedation with fentanyl ( $1 \mu\text{g}/\text{kg}^{-1}$ ) and midazolam ( $0.02 \text{ mg}/\text{kg}^{-1}$ ) immediately prior to spinal anaesthesia is not associated with adverse neonatal effects like Apgar score, neurobehavioral scores, continuous oxygen saturation.<sup>18</sup>

## CONCLUSION

In our study, combination of bupivacaine and a low dose of fentanyl ( $0.25 \mu\text{g}/\text{kg}$ ) provided excellent surgical anaesthesia with short-lasting postoperative analgesia. There were very few adverse side effects.

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