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ORIGINAL RESEARCH

TO ASSESS THE EFFECT OF INTRAVENOUS DEXMEDETOMIDINE ON ANAESTHESIA DEPTH IN PATIENTS HAVING LOWER SEGMENT CAESAREAN DELIVERY UNDER GENERAL ANAESTHESIA

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Abstract

Aim: To assess the effect of intravenous dexmedetomidine on anaesthesia depth in patients having lower segment caesarean delivery under general anaesthesia.

Methods: The Department of Anaesthesiology conducted this prospective observational research. We included 90 full-term parturients aged 20-33 years who were scheduled for elective caesarean delivery for various reasons under General Anaesthesia. They were separated into two Category s using a sealed envelope technique: those who received 1mcg/kg IV dexmedetomidine 10 minutes before induction (Category A) (n=45) and those who did not (Category B) (n=45).

Results: There was no significant difference in age or weight between the two Category s. When comparing awareness in both Category, the BIS score in Category A was approximately 46-66 and the BIS score in Category B was around 59-85, with a statistically significant value of P <0.05. The BIS scores obtained throughout different stages of the process in both Categories A and B. There was no significant difference in Apgar score between the two Categories (P>0.05). Category A had a negative isolated arm reaction, whereas Category B received a good response. The hemodynamic variables recorded throughout the full anaesthetic process in both Categories.

Conclusion: We found that a loading dosage of 1mcg/kg IV dexmeditomedine is effective in preventing consciousness without influencing the APGAR score. When administered as a pre-anaesthetic drug and intraoperative infusion, dexmedetomidine reduces stress response to diverse painful stimuli while maintaining haemodynamic stability.

Keywords: Intravenous dexmedetomidine, anaesthesia, lower segment caesarean delivery

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Introduction

During general anaesthesia, awareness is a major complication. It has negative psychological consequences, which may need postoperative behaviour change.[1] The anesthesiologist's primary aim is to prevent pain and maintain consciousness during general anaesthesia. Adequate balanced anaesthesia may be established by utilising hypnotic, analgesic, and amnesic medications. [2] Because of the quick sequence induction, the avoidance of opioid analgesics and amnesic medications until foetal birth, and the low concentration of volatile agents, there is an increased incidence of consciousness during general anaesthesia during Cesarean section. [3,4] This may raise the likelihood of these people developing post-traumatic stress disorder. Achieving an acceptable depth of anaesthesia is an essential aim that warrants more investigation. [5] The present method for determining the level of anaesthesia is to evaluate hemodynamics and subjective indicators such as movement, sweating, and lacrimation, although they are insufficiently sensitive or specific. [6] The Bispectral Index (BIS) is an FDA-approved tool for determining the level of anaesthesia by analysing the patient's electroencephalogram (EEG). [7] As a result, the BIS may be utilised to avoid intraoperative consciousness in procedures using mild anaesthesia, such as C/S. [3] Dexmedetomidine (DEX) is a highly selective alpha II receptor agonist having sedative and analgesic properties. [8] Because dexmedetomidine offers hemodynamic stability, it may be administered as a sedative in nonintubated patients during surgical and other operations. [9] Dexmedetomidine was first used successfully during normal labour in 2009 because it offers maternal hemodynamic stability, drowsiness, an ecbolic effect, and a lower incidence of foetal distress owing to its high placental retention. [10] Several studies have shown that DEX is safe and effective as an adjuvant for general anaesthesia at 0.5-1 g/kg loading dosage and 0.5-1.0 g kg1 min1 infusion during intravenous or volatile drugs. [11]

Methods and materials

After receiving clearance from the protocol review committee and the institutional ethics committee, this prospective observational research was carried out at the Department of Anaesthesiology. We included 90 full-term parturients aged 20-33 years who were scheduled for elective caesarean delivery for various reasons under General Anaesthesia. They were separated into two Categories using a sealed envelope technique: those who received 1mcg/kg IV dexmedetomidine 10 minutes before induction (Category A) (n=45) and those who did not (Category B) (n=45). Patients with severe renal, hepatic, or cardiac sickness, neurological disease, dexmedetomidine allergy, or foetal compromise were excluded from the trial. Demographic information such as mother age and body weight were collected. Injection ranitidine 50 mg and injection perinorm 10mg i.v. were administered 30 minutes before induction for aspiration prevention. ECG, NIBP, pulse oximetry, and a BIS monitor were used for monitoring. The person in charge of the anaesthesia described the idea of the research to the patients and wrapped a sphygmomanometer cuff around the patients' right arm after wrapping it in a cotton bandage and inflating it to 200 mm Hg just before induction. The right sidearm was protected from the effects of neuromuscular inhibiting drugs using this strategy. The patient was then given the order "open and shut your right hand." This was repeated every thirty seconds until the surgery was completed and the patient was extubated. To avoid ischemia paralysis, the cuff was deflated every twenty minutes. After three minutes

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of preoxygenation and appropriate premedication with Inj. Glyco 0.2mg, Rapid Sequence Induction with Inj. thiopentone 4-5 mg/kg and Inj.suxa 1-2mg/kg was conducted. Cricoid pressure was then applied, and the patient was intubated with a suitable sized endotracheal tube. Until delivery, anaesthesia was maintained with 50 percent N_2O and 50 percent O_2 and sevoflurane at a dosage of 0.5 to 1%. Following the baby's birth, Inj.fentanyl 100mcg IV and Inj.midazolam 0.3mg/kg were administered. Sevoflurane administration was halted at the onset of subcutaneous closure, while N_2O administration was halted at the commencement of skin closure. The BIS values and isolated forearm responses were recorded. The Apgar score was also recorded.

Results

There was no significant difference in age or weight between the two Categories. Table 1.

Table 1: Age and weight distribution between the two Categories A &B

	Category A	Category B	'p' value
Age	24.68±4.75	25.8±3.88	0.41
Weight	51.16±10.26	52.88±10.66	0.21

When comparing awareness in both Category s, the BIS score in Category A was approximately 46-66 and the BIS score in Category B was around 59-85, with a statistically significant value of P <0.05. Table 2 shows the BIS scores obtained throughout different stages of the process in both Category s A and B.

Table 2: BIS values recorded during various period in both Categories A and B

Parameter	Category A	Category B
Base	89	89
Induction	36	57
Intubation	41	62
SI	46	66
Delivery	56	71
Close	64	76
Extubation	76	86

Table 3: Apgar Score between two Categories

APGAR Score	Category A	Category B
1 min	7	7
5min	8	8

There was no significant difference in Apgar score between the two Category s (P>0.05) (Table 3)

Table 4: Isolated forearm Test Response obtained in Categories A & B

Isolated forearm test	Response	P-value
Category A	8(17.78%)	<0.5
Category B	32(71.11%)	

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Category A had a negative isolated arm reaction, whereas Category B received a good response.

Table 5: Systolic BP variation recorded in Categories A & B

Parameter	Category A	Category B
Base	87	83
Induction	78	87
Delivery	88	95
Extubation	89	96

Table 6: HR Variation recorded in Categories A & B

Parameter	Category A	Category B
Base	82	83
Induction	67	72
Delivery	79	87
Extubation	81	92

Tables 5 and 6 show the hemodynamic variables recorded throughout the full anaesthetic process in both Categories.

Discussion

The amount of anaesthetics given to patients and their arousal state must be balanced for successful anaesthesia. Critical imbalances between anaesthetic requirement and actually administered anaesthetics can result in either a light plane of anaesthesia or a deep plane of anaesthesia, both of which can lead to a poor outcome. Among patients undergoing CS under general anaesthesia, awareness ranges from 0.13 to 17 percent. Several studies have found that DEX is an effective adjuvant during general anaesthesia because it provides hemodynamic stability, cerebral, cardiac, and renal protection. [12] In this study, it was discovered that dexmedetomidine significantly reduced awareness while maintaining hemodynamic stability and had no effect on the APGARscore.[13] There have been few studies on the use of dexmedetomidine for caesarean section.[14-16] Dexmedetomidine, sold under the brand names Precedex and others, is a sedative that can also be used as an analgesic. It is notable for producing sedation without causing significant respiratory depression (unlike propofol, fentanyl, and midazolam), and it can provide cooperative or semi-arousable sedation. [17]

Dexmedetomidine stimulates the presynaptic 2 -AR, inhibits or reduces Norepinephrine release, and inhibits pain signal transduction. It also stimulates postsynaptic 2 -AR, causes neural cell membrane hyperpolarization, and inhibits norepinephrine release and sympathetic activity. Dexmedetomidine stimulates the nucleus ceruleus arousal response's presynaptic 2 -AR. 2-Adrenergic Receptor Agonists, such as dexmedetomidine, produce clinical effects after binding to G-Protein-coupled 2 adrenergic receptors, of which there are three alpha subtypes (A, B, and C), each with distinct physiological and pharmacological functions. These subtypes can be found in the nervous systems of the peripheral, central, and autonomic nervous systems, as well as major organs and blood vessels. [17]

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Dexmedetomidine is the d-enantiomer of medetomidine with high alpha2 selectivity (alpha2:alpha1=1600:1). Neither dexmedetomidine nor clonidine are completely selective for any of the 2receptor subtypes, however dexmedetomidine seems to have higher 2A and 2C receptor affinity than clonidine. [18] The sedative action is mediated by the locus ceruleus of the brain stem, while the analgesic action is mediated by the spinal cord, both via the 2A receptor. [19]

The primary activity of the 2 adrenergic receptor in the heart is to lower heart rate by inhibiting the cardiac accelerator nerve through subtype 2A and vagomimetic action. There is sympatholytic induced vasodilation and smooth muscle receptor mediated vasoconstriction in the peripheral vascular tissues. It is difficult to determine if a patient is cognizant or awake when under general anaesthesia. 20 Mechanisms in the central nervous system that govern higher processes such as memory and awareness may be effectively anaesthetized, but spinal cord mechanisms that restrict movement in response to surgical stimulation may not be adequately anaesthetized. Rather of monitoring hemodynamic changes or movement responses, a direct way of measuring awareness is required. A machine or monitor that monitors physiologic changes related to consciousness would be an advance above present approaches, which rely on responses that only indirectly reflect awareness. The bispectral monitoring system, based on electroencephalogram data, was presented for clinical use in October 1996 as a tool for evaluating the level of anaesthesia generated by hypnotics and sedatives, as well as a guide for the intraoperative administration of different medicines. [21,22]

Conclusion

We found that a loading dosage of 1mcg/kg IV dexmeditomedine is effective in preventing consciousness without influencing the APGAR score. When administered as a pre-anaesthetic drug and intraoperative infusion, dexmedetomidine reduces stress response to diverse painful stimuli while maintaining haemodynamic stability.

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