



Original Research Article

Study on evaluating the effect of Intravenous dexmedetomidine on depth of anaesthesia in patients undergoing lower segment cesarean section under general Anaesthesia

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ARTICLE INFO

Article history:

Received 11-02-2019

Accepted 29-08-2019

Available online 20-11-2019

Keywords:

Cesarean section

Dexmedetomidine

BIS score

General Anaesthesia

Apgar score

ABSTRACT

Introduction & Aims: Awareness and recall causing posttraumatic stress disorder are the major hazards of General Anaesthesia in cesarean section because of exclusion of Benzodiazepines and opioids in the anaesthetic management before baby delivery. In this study, dexmedetomidine is used as a sedative & anxiolytic to abort awareness which was measured using BIS monitor.

Materials and Methods: This study was carried on 50 parturient who were scheduled for elective cesarean section. They were divided into 2 groups. Group A patients received dexmedetomidine 1mcg/kg IV as an infusion 10 min before induction. Group B patient received normal saline. Trend of BIS scores were observed at baseline, induction, intubation, skin incision, delivery, closure & extubation. Apgar score at 1 & 5 minutes were recorded. Isolated arm response by placing sphygmomanometer cuff on Right forearm which was inflated before induction was also used to substantiate the presence of conscious awareness.

Results: A median BIS score of 55 ranging from 42-68 with statistically significant value of $P < 0.05$ was recorded on all occasions during surgery in the dexmedetomidine group. No statistical significance was observed in Apgar scores between 2 groups. Negative isolated arm response was noted in the dexmedetomidine group.

Conclusion : The currently used GA technique was found to be inadequate to abort awareness before baby delivery. Thereforeby comparing the clinical outcomes like good apgar score and hemodynamic stability, the use of dexmedetomidine to abolish the awareness during caesarean section was considered as safe.

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1. Introduction

Being Aware during General Anaesthesia is the biggest problem which is on increasing trend on recent studies,^{1,2} in particular during cesarean section³⁻⁵ because of withdrawal of opioids, sedatives, using low concentration of nitrous oxide & volatiles due to sedative effect & respiratory depression in neonates, until delivery .

Dexmedetomidine, a highly selective α_2 agonist which has sedative, analgesic & antisympathetic effect and produce conscious sedation without respiratory depression. Placental transfer and fetal metabolism of dexmedetomidine have been reported but there are no adverse effects on

neonates, shown by apgar score.

In this study, dexmedetomidine is used to prevent awareness which was measured using BIS score & isolated forearm technique.⁶

2. Materials and Methods

After obtaining ethical committee approval, an informed written consent obtained from all participants. This study included 50 full term parturients in the age group 21-30 years who were posted for elective cesarean section for different indications under General Anaesthesia. They were divided into 2 groups by sealed enveloped technique to receive 1mcg/kg IV dexmedetomidine 10 minutes before induction (Group A) or to not receive dexmedetomidine,

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control group (Group B) (n=25). Patients with medical illness excluding PIH /severe renal, hepatic, cardiac illness, neurological disease, allergy to dexmedetomidine and fetal compromise were excluded from the study.

Demographic data were recorded including maternal age & body weight

For prophylaxis against aspiration, Inj. ranitidine 50 mg &Inj.perinorm 10mg i.v.were given 30 minutes before induction. Monitoring was done using ECG, NIBP, pulse oximetry, BIS monitor.

The person who supervised the anaesthesia ,explained the concept of study to patients and placed sphygmo-manometer cuff around the Right arm of the patients after placing the cotton bandage and inflated it to 200 mm Hg immediately before induction. This technique isolated the Right sidearm from the effects of Neuromuscular blocking agents. Then the patient was presented with command, “open and close your Right hand”. This was done every thirty seconds throughout the procedure til extubation. The cuff was deflated every twenty minutes to prevent ischemic paralysis.

After three minutes of preoxygenation, after adequate premedication with Inj. Glyco 0.2mg, Rapid Sequence Induction performed with Inj.thiopentone 4-5 mg/kg and Inj.suxa 1-2mg/kg.

Cricoid pressure then applied andpatient intubated appropriate sized endotracheal tube. Anaesthesia was maintained with 50% N₂ O and 50% O₂ and sevoflurane with concentration of 0.5 – 1 %, until delivery.

After delivery of the baby, Inj.fentanyl 100mcg IV & Inj.midazolam 0.3mg/kg given. Sevoflurane administration stopped at start of closure of subcutaneous and N₂O was then stopped at start of closure of skin.

BIS values & Isolated forearm responses were monitored. Apgar score were also recorded.

3. Results

Age and weight statistics (Demographic) data showed no significant difference between two groups. (Table 1)

Table 1: Demographic data distribution between the two groups A &B

	Group a	Group b	'p' value
Age	26.16±5.54	27.5±5.01	0.42
Weight	51.86±10.28	54.33±10.72	0.18

Comparing awareness in both group, in Group A the BIS score was around 49-68 and in Group B BIS score was around 62-88, with statistically significant value of P< 0.05. BIS Scores recorded during various period of the procedure in both Groups A and B shown in Chart 1.

No statistical difference between both groups in Apgar score (P>0.05)(Table 2)

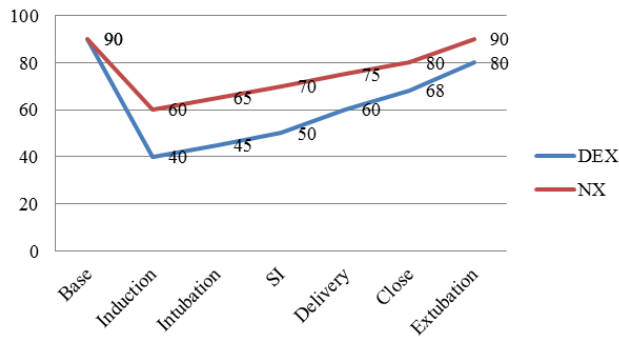


Chart 1: BIS values recorded during various period in both Groups A and B

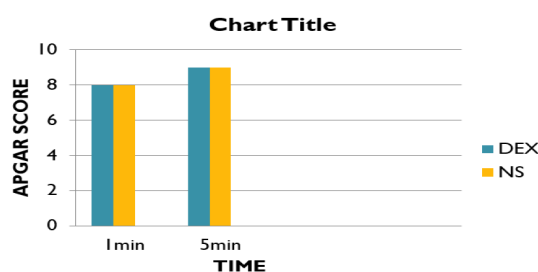


Chart 2: Apgar Score between two groups A & B

Negative isolated arm response in Group A, positive response obtained in Group B.

Table 2: Isolated forearm Test Response obtained in Group A & B

IFT	Response
Group A	4(0.16%)
Group B	18(72%)
P value	<0.05

Haemodynamic variables recorded during the entire anaesthesia procedure in both groups shown in Charts 2 and 3.

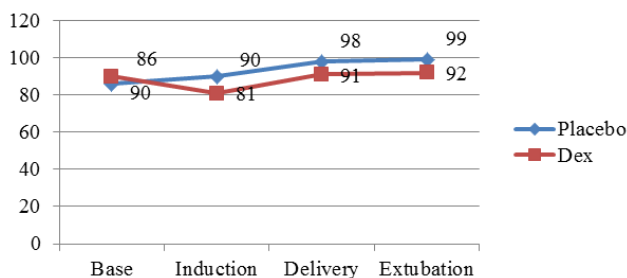


Chart 3: Systolic BP variation recorded in Group A & B

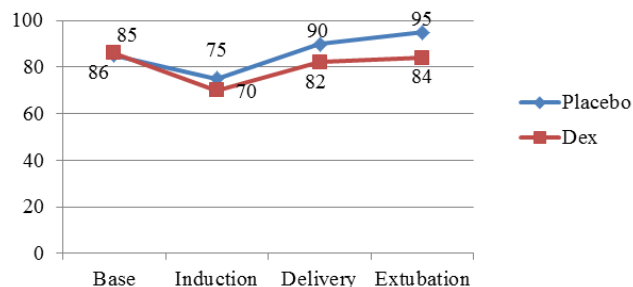


Chart 4: HR Variation recorded in Group A & B

4. Discussion

In this study, it was found that dexmedetomidine succeeded significantly in aborting awareness & maintaining hemodynamic stability^{7,8} & didn't affect the APGAR score.

Studies on the use of dexmedetomidine for cesarean section^{9–11} are sparse. The available literature Nosaiba K.EZ Z El-Arab, salama I . EI- Hawary, Ashraf E.El-Zeftawy, RebabM. Mohammed 2017 , 220.225 shows use of dexmedetomidine with median BIS of 50 & didn't affect apgar score.

Dexmedetomidine, under the trade name Precedex among others, is an anxiety reducing, sedative, and also as an analgesic sometimes. Its is notable for its ability to produce sedation without producing much respiratory depression (unlike propofol, fentanyl and midazolam) and can provide cooperative or semi-arousable sedation.¹²

Dexmedetomidine excite the presynaptic α_2 -AR, inhibit or reduce Norepinephrine release & stop pain signal transduction. It also excite postsynaptic α_2 -AR, lead to hyperpolarisation of neural cell Membrane & inhibit Norepinephrine release & inhibit sympathetic activity. Dexmedetomidine excites the presynaptic α_2 -AR of the nucleus ceruleus arousal response.

α_2 -Adrenergic Receptor agonists like dexmedetomidine produce clinical effects after binding to G-Protein-coupled α_2 adrenergic receptors, of which there are three alpha subtypes (A, B, and C) with each having different physiological functions and pharmacological activities. These subtypes are found in peripheral, central, and autonomic nervous systems, as well as in major organs and blood vessels.¹²

Dexmedetomidine is d-enantiomer of medetomidine¹³ with highly selective alpha2 action (alpha2:alpha1=1600:1). Neither dexmedetomidine nor clonidine is totally selective for any of the α_2 receptor sub types, but dexmedetomidine seems to have increased α_2A receptor and α_2C receptor affinity compared to clonidine.

Locus ceruleus of the brain stem is responsible for the sedative action, and spinal cord is the principal site for the analgesic action, both acting through α_2A receptor.¹⁴ In the heart, the predominant action of α_2 adrenergic receptor is a decrease in heart rate through blocking

cardioaccelerator nerve through subtype 2A and through vagomimetic action. In the peripheral vascular tissues, there is sympatholytic induced vasodilatation and smooth muscle receptormediated vasoconstriction.

Finding out whether a patient is conscious or awake while undergoing general anesthesia pose a major problem.¹⁵ The limitations of current clinical methods to assess anesthetic adequacy have been well known. Mechanisms in the central nervous system that control higher functions like memory and consciousness may be anesthetized adequately, whereas spinal cord mechanisms that suppress movement to surgical stimulus may not be anaesthetised adequately. A direct method of evaluating consciousness is needed, rather than the current practice of monitoring hemodynamic changes or movement responses.

A machine or monitor that measures physiologic changes associated with the conscious state would be an improvement on current methods, which are dependent on responses that only indirectly reflect consciousness.

The bispectral monitoring system, an Electroencephalogram derived data was introduced for clinical use in October 1996, as a technique for measuring depth of anaesthesia^{16,17} induced by hypnotics and sedatives and as a guide for the administration of various drugs intraoperatively. Its use in clinical practice is increasing all over the world to prevent intraoperative awareness and is also recognised beyond the operating room to critical care units, accident and emergency units.

The isolated forearm technique, was originally described by Tunstall, in contrast to BIS detects the return of consciousness.^{18,19} The use of this technique to identify recovery of response, in response to verbal commands along with the BIS monitoring enabled study of the association between return of consciousness and a quantitative, measurement of anesthetic adequacy.

5. Conclusion

The study concluded that loading dose of IV dexmedetomidine 1mcg/kg is effective in aborting awareness without affecting APGAR score. Dexmedetomidine, when given as a pre-anaesthetic medication and intraoperative infusion, decreases stress response to various noxious stimuli and maintains haemodynamic stability.

6. Source of Funding

None.

7. Conflict of Interest

None.

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Cite this article: Jeevapriya GK, Selvakumar R. Study on evaluating the effect of Intravenous dexmedetomidine on depth of anaesthesia in patients undergoing lower segment cesarean section under general Anaesthesia. *Indian J Clin Anaesth* 2019;6(4):519-522.