

Use of Dexmedetomidine in Cochlear Implant -A Study of Two Cases.

Dr.Priyamvadagupta¹,Dr.Nipunlamba², Dr.Durgajethava³,Dr.D.D.Jethava⁴

¹M.D.Professor,²iiiyr.Postgraduate Student,³M.D.Professor HOD,⁴M.D.Professor;Dept.Of Anaesthesiology,Mahatma Gandhi Medical College & Hospital, Jaipur,Rajasthan.

Abstract: Anesthesia for cochlear implantation in pediatrics mandates deliberate hypotension to provide a better surgical field. We are reporting two paediatric cases of a 7yr old male and 8yr old female, scheduled to undergo cochlear implant, where dexmetomidine was used and its effect on clinical outcome was noted. Both patients had no history of trauma, fever or any medication uptake by mother during pregnancy and no past medical or surgical history. It was found to stabilize haemodynamic parameters: heart rate, blood pressure and provided relatively clear bloodless surgical field. It also reduced MAC(minimal alveolar concentration) of sevoflurane and decreased requirement of neuromuscular blocking agents. This surgery was performed for the first time at our institute.

Key words: dexmedetomidine, cochlear implant, sensorineural deafness.

I. Introduction

Cochlear implant is used to treat congenital sensorineural hearing loss. Unlike hearing aids, which make sounds louder, cochlear implant bypasses damaged hair cells of cochlea to provide sound signals to brain. Anesthesia for cochlear implantation in pediatrics mandates deliberate hypotension to provide a better surgical field. Dexmedetomidine is α_2 adrenoceptor agonist that provides adequate sedation with high cardiovascular stability. Dexmedetomidine is an α_2 adrenergic agonist with a sedative and analgesic effect. It does not cause respiratory depression even at supramaximal plasma levels¹. It suppresses sympathetic activity and decreases airway and circulatory responses during intubation and extubation².

II. Case Report

A 7 year male weighing 32 kg and a 8 year female weighing 36 kg with congenital sensorineural hearing loss were posted for cochlear implant surgery under general anaesthesia. On preanaesthetic evaluation, there was no significant finding in either case.

Case 1

On receiving the patient in the operating room, 7 year old patient was having heart rate of 130 / min and BP of 128 / 86 mm Hg.

After attaching the pulse oximeter and all basic monitoring, patient was preoxygenated for 2 min then induced with inj propofol and intubated with inj succinylcholine. Maintenance was on inhalation of oxygen: nitrous oxide 60:40 and sevoflurane. Inj. vecuronium bromide was used as muscle relaxant. Inj fentanyl was administered intravenously in dose of 1 μ g/kg for analgesia.

After intubation the HR was persistently 140 /min and BP was 148 / 96 mmHg. To maintain haemodynamic stability the dial setting of sevoflurane was adjusted and intermittent boluses of propofol were given but adequate effect was not achieved. Even inj. metoprolol was administered intravenously in bolus doses of 0.5 mg still no significant reduction in heart rate and blood pressure could not be achieved. Thereafter infusion of inj dexmedetomidine was commenced in maintenance dose of 0.4 μ g/kg/hr intravenously. Within 10 minutes heart rate settled to around 72/min and blood pressure around 114 / 72 mmHg. Also there was reduced requirement of MAC for sevoflurane (it was reduced from 1.8 to 1.2) and requirement of muscle relaxant was also reduced from 15 min repeat interval to 22 min. Inj ondansetron was given in 0.1mg/kg dose intravenously. VAS(visual analogue scale) and ramsay sedation score were noted in the post anaesthesia care unit 30 minutes after extubation. VAS for this patient was 3 and ramsay sedation score was 2.

Case 2

Second 8 year male patient was having heart rate of 90 / min and blood pressure of 110 / 74 mmHg. Anaesthesia technique was similar in both patients. In this patient dexmedetomidine infusion was started from start of surgery in maintenance dose of 0.4 μ g/kg/hr intravenously. She was haemodynamically stable throughout surgery and the surgical field was relatively bloodless. The MAC requirement was 1 for sevoflurane

and relaxant was given at 35 min interval. For this patient VAS visual analogue scale was 2 .ramsay sedation score was 1 at 30 min post extubation.

III. Discussion

Dexmedetomidine is a potent α_2 adrenergic agonist with a distribution half-life of 8 min and a terminal half-life of 3.5 hours. Its short half-life provides easy titration, quick recovery and less adverse events related to prolonged sedation. It provides adequate sedation with high cardiovascular and respiratory stability³. It offers several advantages over conventional anaesthetic technique⁴. It helps in stabilizing heart rate, blood pressure, provides relatively bloodless surgical field, reduced requirement of inhalation agents and muscle relaxants. During emergence and extubation also patients were found to be relatively calm. This is in accordance with the observations of Mason et al.³ They were the first who studied the sedative effect of dexmedetomidine on pediatric patients for radiological imaging studies. They reported that dexmedetomidine produced a reduction of HR and MAP(mean arterial pressure) which was clinically acceptable for the pediatric age group. These findings coincide with the results of the present study. Similarly Feld et al. reported that dexmedetomidine provided stable postoperative analgesia thus reducing the use of morphine in the postoperative period when comparing fentanyl and dexmedetomidine combined with desflurane for bariatric surgery⁵. However Ali et al. reported significantly higher incidence of nausea and vomiting in pediatric patients receiving fentanyl in comparison with those receiving dexmedetomidine during extracorporeal shock wave lithotripsy⁶. Also, the same results were reported by Turgut et al.⁷ in adult patients undergoing lumbar laminectomy. Attenuation of pressor response with preoperative dexmedetomidine in a dose of 1 $\mu\text{g}/\text{kg}$ not only provides stable hemodynamics during induction and intraoperative period enabling a smoother control to provide a bloodless field during surgery but also decreases the requirement of anesthetic drugs in the perioperative period.⁸ The incidence of postoperative shivering can also be reduced to a large extent by the use of perioperative dexmedetomidine.⁹

IV. Conclusion

Dexmedetomidine in maintenance dose of 0.4 $\mu\text{g}/\text{kg}/\text{hr}$ intravenously is helpful for attaining haemodynamic stability, reducing requirement of anaesthetic agents and muscle relaxants. It also provides bloodless surgical field.

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Conflict of interest : None

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