ORIGINAL RESEARCH PAPER

Volume-7 | Issue-1 | January-2018 | PRINT ISSN No 2277 - 8179

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

A PROSPECTIVE OBSEVATIONAL STUDY FOR USE OF INTRANASAL DEXMEDETOMIDINE IN PAEDIATRIC SEDATION FOR DIAGNOSTIC MAGNETIC RESONANCE IMAGING STUDIES.

Anesthesiology

Dr. Atul Malik Resident, Anaesthesia, Teerthankar Mahaveer Medical College, Moradabad.

Dr. Mukesh Kumar Prasad* M.D. Associate Professor, Anaesthesia Teerthankar Mahaveer Medical College, Moradabad *Corresponding Author

Dr. Tannu Gupta Resident, Medicine, Mata Chanan Devi Hospital, New Delhi.

Dr. Saurabh Gupta M.D. Anesthesiology, Guru Gobind Singh Hospital, New Delhi

ABSTRACT

Context: Children undergoing MRI often require sedation to avoid motion artifacts and anxiety attacks. Dexmedetomidine is a highly selective α2 adrenoceptor agonist that has sedative and analgesic effects.

Aim: This study was conducted to determine whether intranasal Dexmedetomidine 2 µg/kg offered effective sedation in children posted for diagnostic MRI studies.

Methods: This prospective pilot study was conducted on 30 ASAI/II patients aged upto 12 years posted for Magnetic Resonance Imaging Studies. In this study all patients were administered with intranasal dexmedetomidine 2 µg/kg in the presence of parents, 30 minutes before scheduled MRI scan. The time of administration and reaction of children were noted. Children were observed in holding area with standard monitors applied. The degree of sedation was assessed at 15 and 30 minutes by using University of Michigan Sedation Scale (UMSS). Recovery time and recovery score were noted according to Modified Aldrete recovery score and quality of MRI is also observed.

Statistical analysis: The data was entered in MS EXCEL spreadsheet and analysis was represented as mean plus standard deviation.

Results: Mean sedation scores after 15 minutes and after 30 minutes were 1.20±1.8 and 2.80±0.7 respectively. Mean discharge time according to modified Aldrete score was 82.42±32.68 minutes. There were no adverse events. No sneezing or coughing episodes were observed during drug administration.

Conclusion: Dexmedetomidine is a useful agent for sedation of children undergoing MRI studies.

KEYWORDS

Pediatrics, Sedation, Dexmedetomidine, MRI

Key Messages: Intranasal Dexmedetomidine can be used as an agent for sedation of children undergoing short radiological procedures.

Introduction: Sedation is frequently required in children during MRI and other non-invasive radiological imaging to avoid motion artifacts and anxiety attacks.[1,2]. There are many routes to achieve sedation but intranasal administration of medications is one of the easiest techniques. It is indicated to achieve rapid sedation, anxiolysis, pain control, uncooperative patients or control of seizure activity when iv access is not available. Medications which are most commonly given via intranasal route are fentanyl, midazolam, ketamine and dexmedetomidine.[3] Historically, phenobarbital and choral hydrate have been the drug of choice in pediatric patients in radiological department worldwide but these agents are less likely to be used due to their long duration of action with prolonged recovery times and sedation related morbidity.[4] Dexmedetomidine is a highly selective α2 adrenoceptor agonist that has sedative, anxiolytic and analgesic effects. It is a relatively recent drug in the field of paediatric anaesthesia that has raised great interest because of its sedative property without respiratory compromise. It can be also less damaging to the developing brain than other currently used anaesthetic drug. It seems particularly well suited for painless procedures that require a motionless patient for e.g., radiology procedures.[5] It is approved by FDA in 1999 for short term use for analgesia and sedation in mechanically ventilated patient but later in 2008, FDA approved a new indication for non-intubating patient requiring sedation before and during small diagnostic procedure.[6]. Our aim of the study is to to determine whether intranasal Dexmedetomidine 2 µg/kg offered effective sedation in children posted for diagnostic MRI studies.

Material and Methods

This prospective obsevational study was conducted in Teerthankar Mahaveer Medical college, Moradabad after institutional ethics committee approval. Written informed consent was taken for sedation by intranasal dexmedetomidine from the parents of children, aged up to 12 years prior to MRI procedure. Patients were kept NPO as per standard guidelines. The following exclusion criteria were taken into consideration: Age > 12 years, known allergy to the drug, presence of otorhynological diseases and children with major respiratory and cardiac diseases and general contraindications for MRI i.e. ferromagnetic implants etc. This study was conducted on 30 ASAI/II patients aged upto 12 years posted for Magnetic Resonance Imaging Studies. Intranasal dexmedetomidine 2 µg/kg was administered 30 minutes before scheduled MRI scan in the presence of parents. Childrens were applied standard monitors and observed in holding area. The time of administration of drug and response of children were observed and noted. The degree of sedation was assessed at 15 and 30 minutes by using University of Michigan Sedation Scale [Table1]. [7]

Table 1: University of Michigan sedation scale(UMSS)

Score	
0	Awake and alert
1	Minimally sedated: Tired/sleepy, appropriate response to verbal conversation and/or sound
2	Moderately sedated: Somnolent/sleeping, easily aroused with light tactile stimulation or a simple verbal command
3	Deeply sedated: Deep sleep, arousable only with significant physical stimulation
4	Unarousable

A score of 2 was considered optimal for child parent separation in our study. All the patients were separated after 30minutes of administration of drug and response was observed. Children with scores less than 2 and who became uncooperative during the procedure received rescue sedation in the form of intravenous midazolam in titrated doses . These cases were labeled as failed cases.

MRI image quality of each examination was observed and assessed using the following five grade scale (Table 2)

Table 2

Grade 0 or 1	If the examination was of no or very little diagnostic usefulness because of extensive motion artifacts.
Grade 2	Allowed us to make the diagnosis, but some motion artifacts were still present.
Grade 3 and 4	Included a good or excellent image quality, with no or almost absent motion artifacts.

Modified Aldrete recovery score was used to observe the total recovery time and recovery score 8. Modified Aldrete recovery score of 9 and above were required for recovery to be confirmed.

Statistical analysis: The data was entered in MS EXCEL spreadsheet and analysis was represented as mean plus standard deviation.

Results: In our study 30 cases between age group one month to twelve years received Dexmedetomidine as per above protocol .The average weight was 12.8±8.2 kgs .(Table 3)

Table 3: Demographic Data	
Age	1Month- 12 Years
Weight (kg)	12.8±8.2

According to UMSS the mean sedation scores after 15 minutes and after 30 minutes were 1.20 ± 1.8 and 2.80 ± 0.7 respectively. According to modified Aldrete score mean discharge time was 82.42±32.68 minutes. (Table 4)

Table 4. Sedation score, and Discharge time	
UMSS score after 15 minutes	1.20±1.8
UMSS score after 30 minutes	2.80±0.7
Discharge time (minutes)	82.42±32.68

10 children were supplemented with intravenous midazolam and were considered as failed cases. This indicates a success rate of over 60%. Parental separation was very well accepted by all the children. Brain Imaging consisted most of MRI studies and only 5 examinations were for imaging of the chest and abdomen. Average screening image timing was 11 minutes. Drug administration was smooth and no coughing or sneezing were observed in any cases . No adverse events were noted in any cases.

Discussion: Intranasal administration is an effective way to administer sedation to children. It is a relatively easy and noninvasive route with a high bioavailability. [9] Dexmedetomidine, a selective alpha 2 adrenoceptor agonist, is a relatively recently used drug with sedative, anxiolytic, sympatholytic and analgesic properties. It is painless, odorless, and tasteless and may be administered by oral, buccal, nasal, rectal, subcutaneous, intramuscular and intravenous routes. It has raised great interest because of its sedative property and very well tolerated therapeutic window with respect to respiratory depression.[10] Cedric E. Sottasa and Brian J. Andersonb in 2017 stated that Dexmedetomidine is useful in different areas in paediatric anaesthesia where its sedative properties are useful for premedication, fibreoptic intubation and radiologic procedures which is similar to our study [5]. Feline F.J.A. ter Bruggen et al also observed that dexmedetomidine as a potential sole sedative agent in small diagnostic and therapeutic procedures in view of respiratory safety in the procedures involving children which supports our study [6]. Janakibabu K et al also stated that Intranasal Dexmedetomidine is well tolerated without producing any side effects which is similar to our study.[9] The median onset time of sedation was 25 minutes and the median duration was 85 minutes when Intranasal Dexmedetomidine of 1 µgkg-1 was used for premedication in children.[11] These data supports the obsevations in our study however dose administered was relatively low in above study. In a study by Mark D talon *et al*. it was found that intranasal Dexmedetomidine (2 µgkg-1) has an onset of action of approximately15 minutes when administered with a meter-dozed atomizer.[12]Bioavailability of atomized sprays has been found superior to administration by drops into the nose.[13] Mason et al. in their pilot study for paediatric sedation for CT studies using intravenous Dexmedetomidine 2 µgkg-1 concluded that Dexmedetomidine may provide a reliable and effective method of providing sedation. [14] In our study, we used intranasal dexmedetomidine 2 µg/kg and no adverse events are seen which is similar to previous study that makes dexmedetomidine a useful agent for sedation of children undergoing MRI studies.

The limitations of the study are that it is a observational study, no of children are less and there is no comparison between different age groups.

Conclusion: Better bioavailability , short-half life of intranasal dexmedetomidine makes it easier to titrate and has less sedation related adverse events which make it a useful agent for sedation of children undergoing MRI studies.

REFERENCES

1. Uday S Ambi, Joshi C, Ganeshnavar AK, ES Adarsh. Intranasal dexmedetomidine for paediatric sedation for diagnostic magnetic resonance imaging studies. IJA. 2016;56(6):587-588
2. Jacob R, Ilamurugu K, Amar N. Paediatric Procedural Sedation - A review and an update .IJA.2007 ;51 (3) : 169-175.
3. Intranasal (IN) Medication Administration MBED Clinical Practice Guideline.
4. Keira P. Mason Nina B. Lubisch Fay Robinson Rudolph Roskos. Intramuscular Dexmedetomidine Sedation for Pediatric MRI and CT.AJR 2011.197:720-725.
5. Cedric E. Sottasa and Brian J. Andersonb. Dexmedetomidine: the new all-in-one drug in paediatric anaesthesia. Curr Opin Anesthesiol 2017, 30:441–451
6. Feline F.J.A. ter Bruggen et al Efficacy of Dexmedetomidine as a Sole Sedative Agent in Small Diagnostic and Therapeutic Procedures: A Systematic Review World Institute of Pain 2016 1530-7085
7. Malviya S, Voepel-Lewis T, Tait AR, Merkel S, Tremper K, Naughton N. Depth of sedation in children undergoing computed tomography: Validity and reliability of the University of Michigan Sedation Scale (UMSS). Br J Anaesth 2002;88:241-5.
8. Aldrete JA. The post-anaesthesia recovery score revisited.J ClinAnesth 1995;7:89-91.
9. Janakibabu K, Shakeela Rajababu P G Vinya. A Double Blinded Comparative Study of Intranasal Dexmedetomidine as a Premedicant in Children.JDMS.2016;15.(2):56-60
10. Jasper Deena, Yzabel Vandevivereb, and Peter Van de Putteb Challenges in the anesthetic management of ambulatory patients in the MRI suites Curr Opin Anesthesiol 2017, 30:000–000
11. Yuen VM, et al. Optimal timing for administration of intranasal dexmedetomidine for premedication in children, Anaesthesia, 65:922-929
12. Talon MD, Woodson LC, Sherwood ER, Aarsland A, McRae L, Benham T. Intranasal dexmedetomidine premedication is comparable with midazolam in Burn children undergoing reconstructive surgery. J Burn Care Res 2009;30:599-605.
13. Wolfe TR, Bernstone T. Intranasal drug delivery: An alternative to intravenous administration in selected emergency cases. J EmergNurs 2004;30:141-7.
14. Mason KP, Zgleszewski SE, Dearden JL, Dumont RS, Pirich MA, StarkCD, et al. Dexmedetomidine for pediatric sedation for computed tomography imaging studies. AnesthAnalg 2006;103:57-62.