

Dexmedetomidine: where do we stand

Introduction

Dexmedetomidine is an α_2 -adrenergic receptor agonist agent that has sedative, analgesic, and anxiolytic properties with limited respiratory depression.

The drug was first approved for administration by the FDA in 1999 for sedation of patients in the ICU. It has also been approved for monitored anaesthesia care in adults.

Although only approved in adults dexmedetomidine continues to be used for procedural sedation and analgesia in children. It is administered intravenously, nasally, and orally for in-hospital procedures.

Studies on the use of Dexmedetomidine

Dexmedetomidine (DEX) is increasingly being used in combination with other agents e.g. ketamine¹. Kako et al published on the combined use of DEX and ketamine sedation for muscle biopsies in patients with Duchene muscular dystrophy. They found the combination to be safe and effective for moderately painful procedures.

Canpolat et al compared ketamine – propofol with ketamine – DEX for procedural sedation and analgesia (PSA) during paediatric burn wound dressings². The combination of ketamine-DEX was found to be excellent for wound dressing changes in children.

Tobias³ wrote a review article on the use of DEX and ketamine for PSA. He found the literature to be supportive regarding the use of a combination of ketamine- DEX for PSA.

Liang He⁴ et al evaluated the effect of DEX to reduce propofol injection pain. Seven groups of 30 patients received the experimental treatments intravenously over 10 minutes, prior to administration of propofol.

They conclude that pre-treatment with DEX 1 μ g/kg 5 minutes before injection of propofol, is effective and safe to reduce the incidence and severity of pain associated with injection of propofol.



SEDATION SOLUTIONS

Luan HF⁵ reported on the prevention of etomidate-induced myoclonus during anaesthetic induction by pre-treatment with DEX. Their study showed that pre-treatment of 0.5 and 1 µg/kg of DEX significantly reduced the incidence of etomidate-induced myoclonus.

Etomidate is widely used as an anaesthetic induction agent. It is however also used for PSA, some sedation practitioners use drug this when there is doubt about propofol allergy.

An interesting study by Yu et al⁶ compared the combination of DEX/fentanyl with midazolam/fentanyl for sedation and analgesia for unilateral impacted tooth extraction under local anaesthesia. The duration of analgesia after surgery was significantly longer in the DEX/fentanyl group. The sedation and surgeon satisfaction were also better in this group.

Nasal and buccal administration of DEX in children for PSA

In our search as sedation practitioners for the ideal oral/nasal drug for pre-sedation administration, DEX is being evaluated. It is an unique drug that is an sedative as well as an analgesic.

DEX is increasingly used off-label in children for various indications such as pre-sedation medication in the form of intranasal, buccal and oral solution, to prevent agitation, as a sedative/analgesic for MRI scans, and as an adjuvant to ropi- and bupivacaine for nerve blocks.

This article will provide readers with a guidance on how to use DEX for paediatric sedation.

Several studies below are available for the reader to click on and read. It makes interesting reading.

A Comparison of Intranasal Dexmedetomidine and Oral Midazolam for Premedication in Pediatric Anesthesia: A Double-Blinded Randomized Controlled Trial

Yuen, Vivian M. MBBS, FANZCA, FHKCA, FHKAM; Hui, Theresa W. MBBS, FANZCA, FHKCA, FHKAM; Irwin, Michael G. MBChB, MD, FRCA, FHKCA, FHKAM; Yuen, Man K. MBBS, FANZCA, FHKCA, FHKAM

<http://journals.lww.com/anesthesia->

[analgesia/Abstract/2008/06000/A_Comparison_of_Intranasal_Dexmedetomidine_and.17.aspx](http://journals.lww.com/anesthesia-abstract/2008/06000/A_Comparison_of_Intranasal_Dexmedetomidine_and.17.aspx)



SEDATION SOLUTIONS

Dexmedetomidine vs midazolam for premedication of pediatric patients undergoing anesthesia

Aynur Akin, Adnan Bayram, Aliye Esmaglu, Zeynep Tosun, Recep Aksu, Resul Altuntas & Adem Boyaci

<http://onlinelibrary.wiley.com/doi/10.1111/j.1460-9592.2012.03802.x/full>

Bioavailability of dexmedetomidine after intranasal administration

EudraCT 2008-008324-33 ClinicalTrials.gov identifier NCT00837187

Authors: Timo Iiro, M.D. * Sanna Vilo, M.D. * Tuula Manner, M.D., Ph.D. * Riku Aantaa, M.D., Ph.D. * Maria Lahtinen, Ph.D. ** Mika Scheinin, M.D., Ph.D., Professor ** Klaus T Olkkola, M.D., Ph.D., Professor

<http://link.springer.com/article/10.1007/s00228-011-1002-y>

Buccal administration of dexmedetomidine as a preanesthetic in children

Yoshio Sakurai • Toru Obata • Akio Odaka • Katsuo Terui • Masanori Tamura • Hideki Miyao

<http://link.springer.com/article/10.1007/s00540-009-0863-z>

Comparison of buccal and nasal dexmedetomidine premedication for pediatric patients

Z. Serhan Cimen, Ayse Hanci, G. Ulufer Sivrikaya, Leyla T. Kilinc & Melahat K. Erol

<http://onlinelibrary.wiley.com/doi/10.1111/pan.12025/full>



SEDATION SOLUTIONS

Comparison between intranasal dexmedetomidine and intranasal ketamine as premedication for procedural sedation in children undergoing MRI: a double-blind, randomized, placebo-controlled trial

Prakhar Gyanesh • Rudrashish Haldar • Divya Srivastava • Prashant Mohan Agrawal • Akhilesh Kumar Tiwari • P. K. Singh

<http://link.springer.com/article/10.1007/s00540-013-1657-x>

Intranasal dexmedetomidine premedication reduces the minimum alveolar concentration of sevoflurane for tracheal intubation in children: a randomized trial

Yusheng Yao MD (Attending)^{a,b,1}, Bin Qian MD (Attending)^{c,1}, Yanqing Chen MD (Professor)^b, Lijuan Zhou MD (Resident)^b, Jin Liu MD (Professor and Chairman)^a,

<http://www.sciencedirect.com/science/article/pii/S0952818014000592>

Is dexmedetomidine superior to midazolam as a premedication in children? A meta-analysis of randomized controlled trials

Yu Sun, Yi Lu, Yan Huang & Hong Jiang

<http://onlinelibrary.wiley.com/doi/10.1111/pan.12391/full>

Optimal timing for the administration of intranasal dexmedetomidine for premedication in children

V. M. Yuen,¹ Theresa W. Hui,² M. G. Irwin,³ T.-J. Yao,⁴ G. L. Wong¹ and M. K. Yuen¹

<http://onlinelibrary.wiley.com/doi/10.1111/j.1365-2044.2010.06453.x/full>



SEDATION SOLUTIONS

Pre-anesthetic medication with intranasal dexmedetomidine and oral midazolam as an anxiolytic. A clinical trial

B. Linares Segovia a,b, , M.A. García Cuevasb, I.L. Ramírez Casillas b, J.F. Guerrero Romerob, I. Botello Buenrostrob, R. Monroy Torresa y X.S. Ramírez Gómeza

<http://www.sciencedirect.com/science/article/pii/S1695403313005250>

Intranasal dexmedetomidine vs midazolam for premedication in children undergoing complete dental rehabilitation: a double-blinded randomized controlled trial

Saad A. Sheta¹, Maha A. Al-Sarheed² & Ashraf A. Abdelhalim³

<http://onlinelibrary.wiley.com/doi/10.1111/pan.12287/full>

Short Duration Large Dose Dexmedetomidine in a Pediatric Patient During Procedural Sedation

David A. Rosen, MD, Jason T. Daume, MD

http://journals.lww.com/anesthesia-analgia/Abstract/2006/07000/Short_Duration_Large_Dose_Dexmedetomidine_in_a.13.aspx

A comparative evaluation of analgo-sedative effects of oral dexmedetomidine and ketamine: a triple-blind, randomized study

Charanjeet Singh¹, Ramesh K. Pandey², Anil K. Saksena³ & Girish Chandra⁴

<http://onlinelibrary.wiley.com/doi/10.1111/pan.12493/full>



Is dexmedetomidine superior to midazolam as a premedication in children? A meta-analysis of randomized controlled trials

Yu Sun, Yi Lu, Yan Huang & Hong Jiang

<http://onlinelibrary.wiley.com/doi/10.1111/pan.12391/full>

A Double-Blind, Crossover Assessment of the Sedative and Analgesic Effects of Intranasal Dexmedetomidine

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Libby H. Y. Lee, MBBS, FANZCA, FHKCA, FHKAM

http://journals.lww.com/anesthesia-analgesia/Abstract/2007/08000/A_Double_Blind,_Crossover_Assessment_of_the.17.aspx

How to administer DEX: a practical approach

Intranasal DEX can be used in a dose of 3mcg/kg. Children are usually asleep in 20 – 30 minutes. In a small percentage of children a second dose may be necessary. Children usually sleep for 60 minutes after administration of DEX.

The above dose is usually indicated in children under the age of 3 years. It has been reported that DEX is useful for children with behavioural problems e.g. autism.

The level of sedation with the above dose is somewhere between moderate and deep sedation.

Conclusion

Based on the best evidence that we have DEX looks like a promising drug for various indications. However we still need good quality paediatric trials to determine the safety profile.

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<http://dx.doi.org/10.1590/1414-431X20144100>.
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