# Delayed Hypertension and Bradycardia with Intranasal Dexmedetomidine and Oxymetazoline

**Tyson Smith DO and Radhamangalam J. Ramamurthi MD**

*Lucile Packard Children's Hospital, Stanford University Medical Center*

## Introduction

• Intranasal dexmedetomidine is used in the pediatric population for ease of noninvasive administration. Common adverse side effects with IV bolus include transient hypertension with bradycardia, hypotension, and bradycardia. We present a case of delayed hypertension and bradycardia with co-administration of dexmedetomidine and oxymetazoline.

## Case

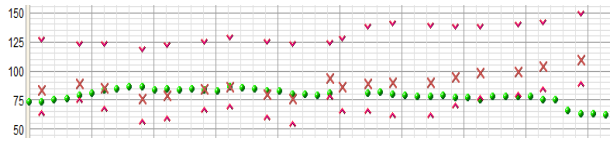
• A 5-year-old 15 kg male with history of chronic cough, asthma, and eczema presented for microdirect laryngoscopy and bronchoscopy with endoscopy. Preoperative vital signs were within normal limits.

• Preoperatively, 75mcg dexmedetomidine was given via nasal atomizer. Following inhalational induction, anesthesia was maintained utilizing TIVA with remifentanil and propofol infusions.

• Thirty minutes after surgical administration of nasal oxymetazoline, MAP began to slowly increase to a peak of 122 with a coinciding HR nadir of 55 recorded in PACU as the patient slept comfortably.

• Vital signs normalized spontaneously over 40 minutes and the patient was discharged home.

## Intraoperative Monitoring




Heart Rate = Green Dot  Mean Arterial Pressure = Red X

| | Dexmedetomidine | Oxymetazoline |
|---|---|---|
| Mechanism of Action | Primarily an alpha adrenoreceptor agonist with high alph-2 affinity 1620:1 | Primarily an alpha-1 adrenoreceptor agonist that acts peripherally |
| Clinical Effect | Sedation that imitates natural sleep and decreased sympathetic outflow | Vasoconstriction used mainly intranasaly for reduced mucosal bleeding/swelling |
| Metabolism | P450 liver metabolism with renal metabolite clearance. T ½ 2 hours | Mainly excreted unchanged by the Kidney. T ½ 5.2 hours |
| Clinical Side Effects | Hypotension, bradycardia, hypertension with IV bolus, sudden cardiac arrest | Hypertension, bradycardia, tachycardia, sudden cardiac arrest. |

## Discussion

• The side effects of hypertension and bradycardia are known for both dexmedetomidine and oxymetazoline. For dexmedetomidine, hypertension with bradycardia is reported as a transient immediately following IV bolus, but not after intranasal administration. Similarly for oxymetazoline, hypertension and bradycardia are reported as abrupt soon after administration.

• These associations are very unlike what was seen during this case where there was a gradual rise of the MAP peaking at 80 minutes post dexmedetomidine and 60 minutes post oxymetazoline administration.

• The mechanisms behind the delayed hypertension and bradycardia remain unclear. The exact interplays are impossible to know, but the authors would suggest that a possible higher than intended dosing with a slow rate of nasal absorption combined with dual activation of postsynaptic alpha-1 receptors may have caused the exaggerated and delayed response seen in this case.

## References

1. A comparison of intranasal dexmedetomidine for sedation in children administered either by atomizer or by drops. Li BL, Zhang N, Huang JX, Qiu QQ, Tian H, Ni J, Song XR, Yuen VM, Irwin MG. Anaesthesia. 2016 May;71(5):522-8.
2. An exaggerated hypertensive response to glycopyrrolate therapy for bradycardia associated with high-dose dexmedetomidine. Mason KP, Zgleszewski S, Forman RE, Stark C, DiNardo JA. Anesth Analg. 2009 Mar;108(3):906-8.
3. Oxymetazoline and hypertensive crisis in a child: can we prevent it? Latham GJ, Jardine DS. Paediatr Anaesth. 2013 Oct;23(10):952-6.