Characterization of Sugammadex Utilization at an Academic Pediatric Hospital

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Introduction

- Sugammadex (Bridion®) is a modified cyclodextrin that reverses the effects of steroidal non-depolarizing neuromuscular blockers by forming a complex in the plasma that is excreted in the urine
- Prior to the FDA approval of sugammadex in 2015, neostigmine, an acetylcholinesterase inhibitor, was the standard agent for neuromuscular blockade reversal
- Neostigmine is given in conjunction with glycopyrrolate to decrease unwanted effects including bradycardia, hypotension, and bronchoconstriction
- The combination of neostigmine and glycopyrrolate is available at a significantly lower cost but has a slower onset and more drug related adverse effects
- Sugammadex is theorized to be cost-effective by decreasing post-anesthesia care unit length of stay and the opportunity to increase surgical volume

- The FDA approved indication for sugammadex is broad, stating that it may be used for the reversal of rocuronium or vecuronium in adults undergoing surgery
- No formal guidelines are available that recommend indications and dosing for sugammadex
- Utilization is driven by institutional regulations and provider preference

- Children's Mercy Kansas City (CMKC) added sugammadex to formulary in 2017
- No regulations are in place at this time, leaving sugammadex utilization at the discretion of the anesthesiology team
- Sugammadex use is projected to double in 2019 from 2018 at CMKC

Objectives

- To characterize the utilization and dosing of sugammadex at CMKC

Methods

- Single centered, retrospective medication use evaluation conducted in patients receiving sugammadex between April 1 and June 30, 2019
- Due to a large number of identified patients, the time frame was narrowed to June 1 to June 30, 2019
- Approval was obtained by the CMKC Institutional Review Board.

Results

Table 1. Patient characteristics

Patient characteristics (N=305)	
Age, (years) – mean ± standard deviation	8.3 ± 5.6
Weight, (kg) – mean ± standard deviation	37.3 ± 28.4
Number of patients with respiratory conditions at baseline	67 (22%)
Number of female patients taking estrogen containing birth control (N=100)	7 (7%)
Procedure characteristics (N=312)	
Average duration, (range)	76 min (3 to 630 min)
Average rocuronium dose, (mg/kg), (range)	0.75 (0.05 to 2.5)
Average time between rocuronium dose and sugammadex dose, (minutes) ± standard deviation	57 ± 24
Train-of-four characteristics	
Documentation prior to sugammadex administration (N=312)	90 (28.8%)
Train-of-four based dose (N=90)	63 (70%)

Figure 1. Patient age and sex distribution (N=305)

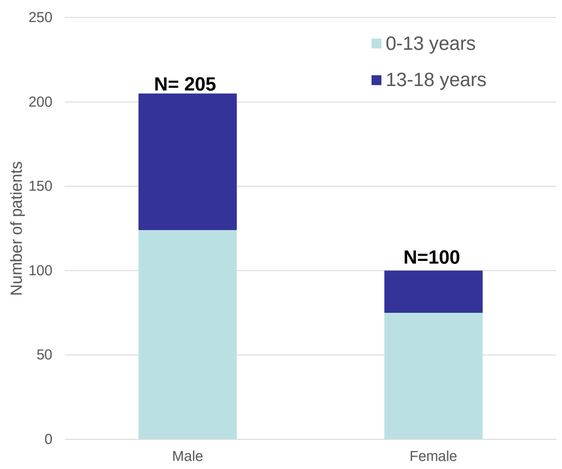


Figure 2. Sugammadex dosing (mg/kg) (N=305)

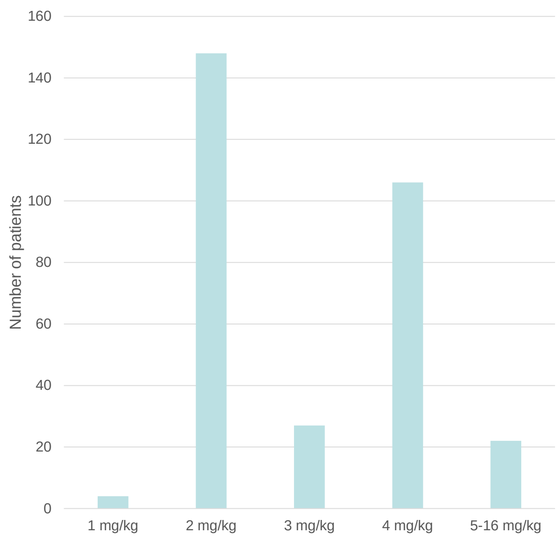
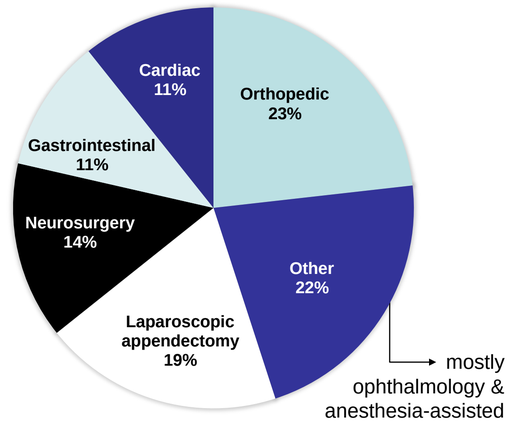


Figure 3. Procedure categories (N=312)



Discussion

- April 1 to June 30, 2019: 1032 patients administered sugammadex
- June 2019: 305 patients undergoing 312 procedures
- 62.6% of patients were admitted for less than 24 hours

- The low number of females with known drug interaction between sugammadex and estrogen containing contraception suggest that alternative or no reversal agents were used in this patient population
- The association of baseline respiratory conditions, most commonly asthma, and sugammadex use suggests the quick onset of sugammadex is desirable for rapid extubation in some cases

- Nearly all procedures had a documented train-of-four during the procedure, but providers infrequently documented train-of-four within 20 minutes of sugammadex administration
- Of procedures with documented train-of-four, the majority used the recommended dosing for the depth of blockade
- 46.7% of documented train-of-fours were four, the lightest degree of neuromuscular blockade

- Repeat sugammadex doses were given to four patients
- Three patients were given 16 mg/kg of sugammadex

- Average time between the last administered rocuronium dose and sugammadex: 57 ± 24 minutes

Conclusion

Current sugammadex utilization and dosing at Children's Mercy Kansas City is far from standardized. Providers who were monitoring train-of-four prior to sugammadex administration typically followed dosing recommendations.

Future Direction

The benefit of sugammadex with be evaluated in a subsequent study at CMKC. Its impact on post-anesthesia care and reversal agent related adverse effects will be compared to neostigmine and glycopyrrolate to determine if the increased use of sugammadex is justified and cost effective.

Disclosures

The authors of this presentation have nothing to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation.