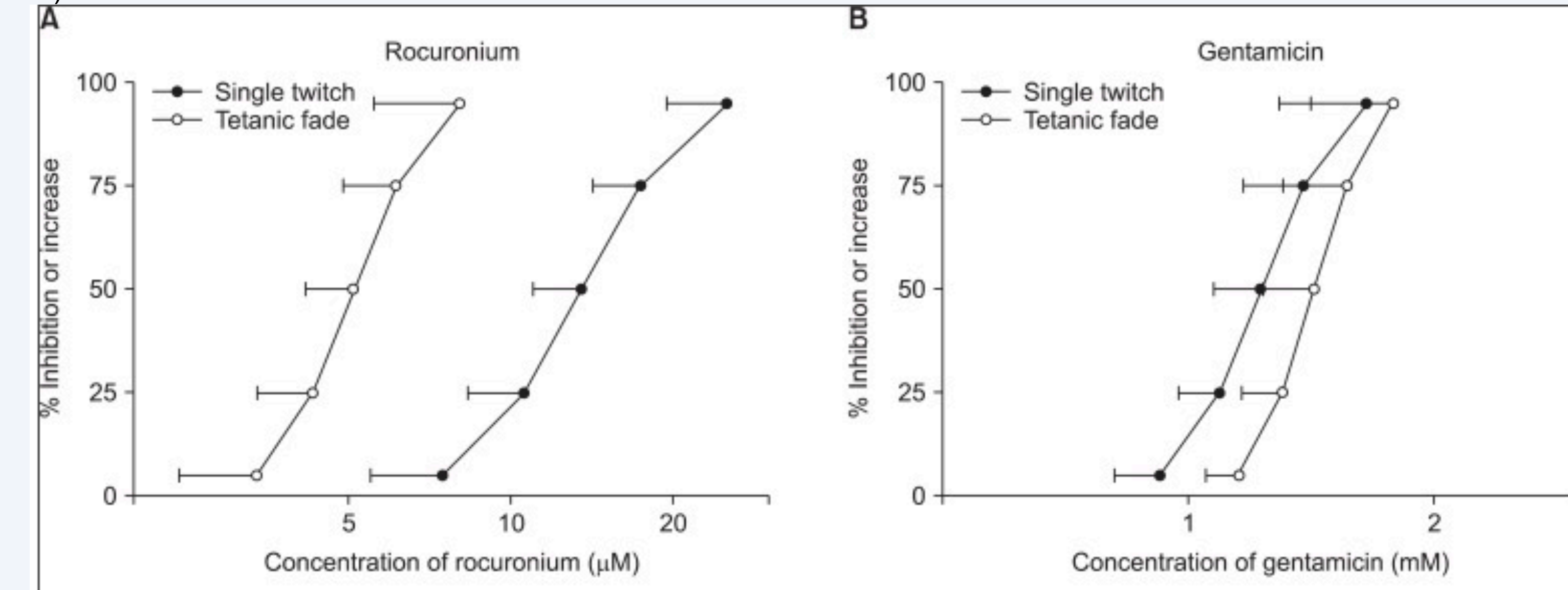


## Introduction

Antibiotics from the aminoglycoside, tetracyclins, and polymixins class are known to prolong the effects of paralytic agents, however, the extent of the prolongation is unknown. We present the case of a patient who received Gentamycin prophylaxis intraoperatively for laparoscopic appendectomy as she had a history of a previous allergic reaction to PCN. This patient had a significantly prolonged neuromuscular blockade after receiving a standard rapid sequence induction dose of Rocuronium. We aim to highlight this synergistic effect so when using these antibiotics, a careful consideration should be given to the timing and the dose of neuromuscular blocking agents.

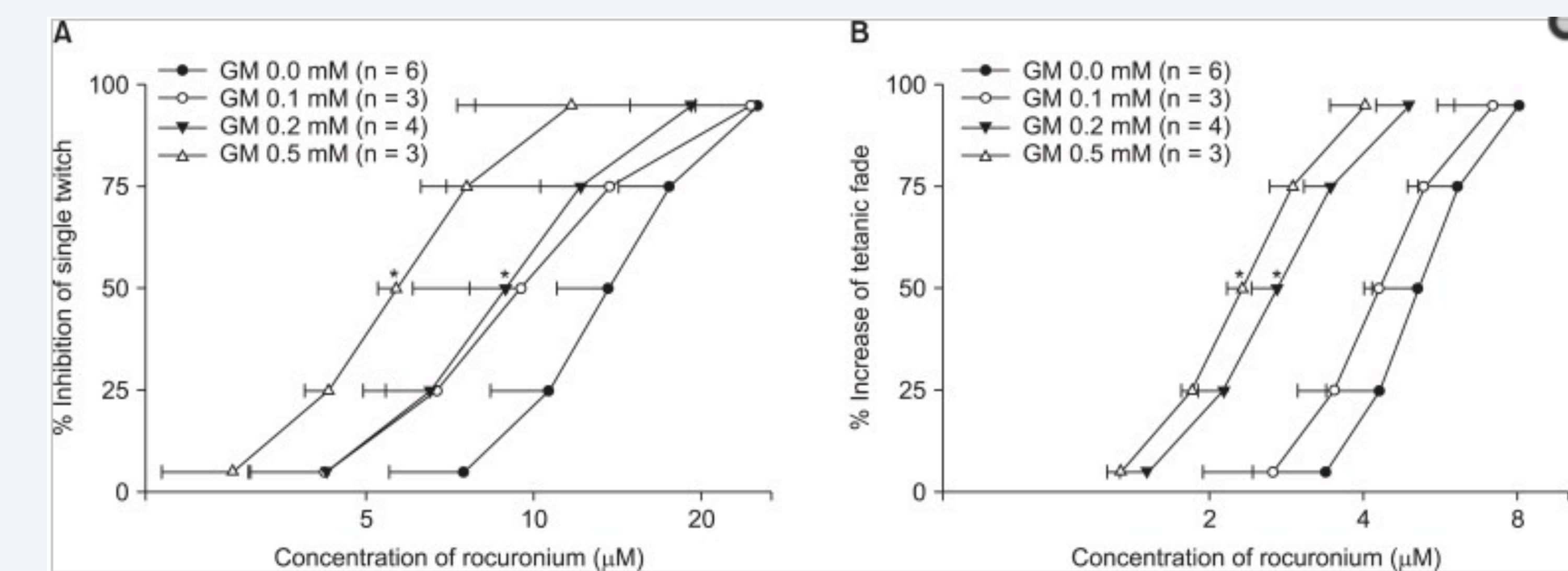
### Figure 1

Cumulative concentration-response curve of Rocuronium (A) and Gentamicin (B) on single twitch at 0.1Hz and tetanic fade at 50 Hz for 1.9s. Rocuronium and Gentamicin reduced single twitch and increase tetanic fade (Lee et al)



### Figure 2

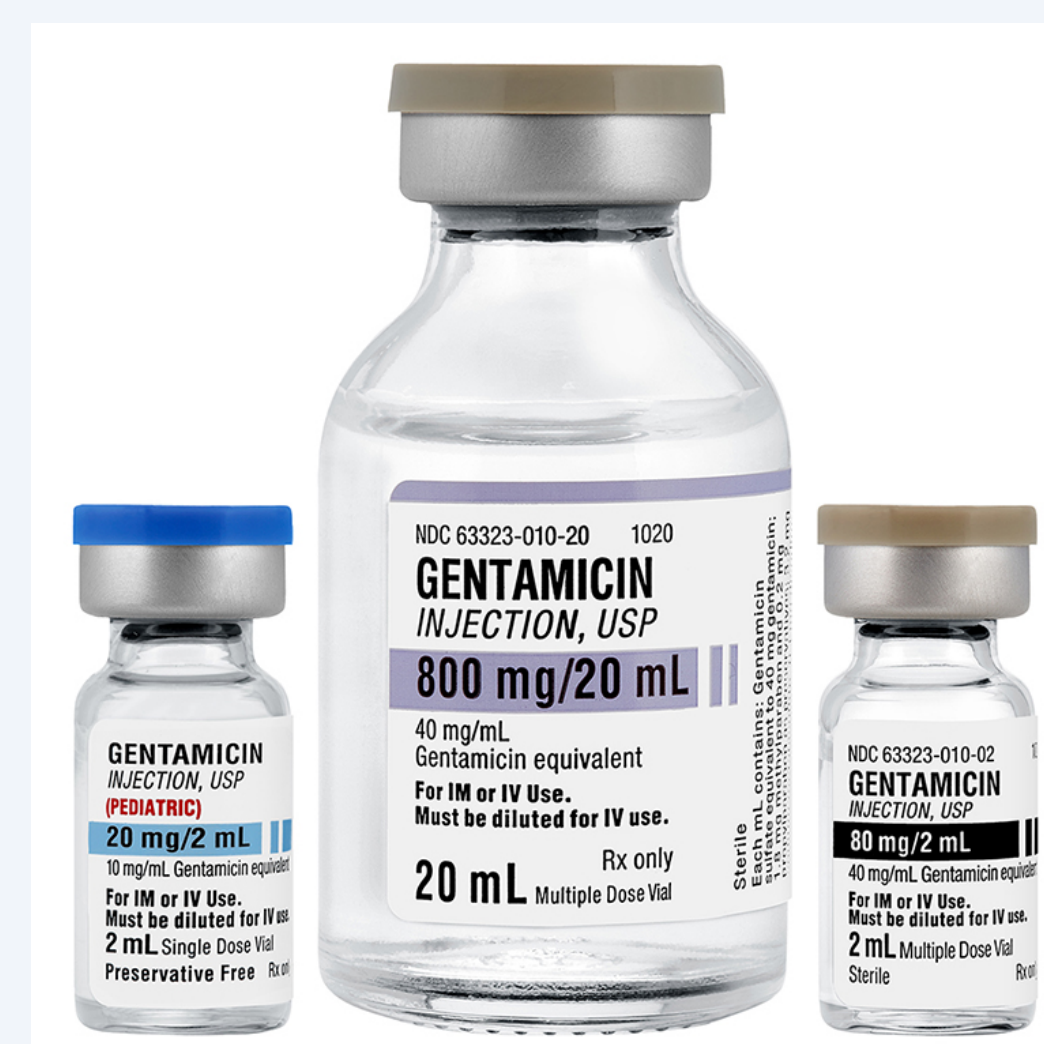
Gentamicin shifts the concentration-response curves to the left and increases the potency of Rocuronium for single twitch and tetanic fade.



## Case Report

A 16 year old, 52 kg, otherwise healthy, female presented with acute appendicitis and active nausea/vomiting was scheduled for a laparoscopic appendectomy. She was allergic to PCN with a reaction of angioedema.

- She was induced with Fentanyl, Lidocaine, Propofol and Rocuronium 1.0mg/kg and a modified rapid sequence intubation was performed.
- Due to her Penicillin allergy and per hospital protocol, she was given Gentamicin 2.5mg/kg and Flagyl 500mg IV prior to incision.
- The case proceeded uneventfully and the surgery was done 1.5 hours later. Rocuronium was not re-dosed since the initial induction dose.
- At the end of the case, she had no discernible twitches on TOF. We used 2 different twitch monitors and checked all of the sites for a response (ulnar, facial, posterior tibial).
- After another 30 minutes (2 hours since initial dose), she finally recovered 1 very weak twitch and after another 15 minutes, 2 twitches were appreciated.
- Neostigmine 0.07mg/kg and glycopyrrolate 0.014 mg/kg was given (2 hours and 15 minutes later from initial dose of Roc).
- She was extubated successfully after she was fully awake with a five second head life and spontaneous respiration with TV 400 ml.
- She encountered no issues in the PACU.



## Conclusions

According to a study by Paradelis et al, aminoglycoside has intrinsic neuromuscular blocking activity that is not reversed by neostigmine but is reversible with calcium administration, leading to the hypothesis that the antibiotic is involved in blocking Ca<sup>2+</sup> channels at motor nerve terminal leading to decrease release of Ach.<sup>1</sup>

In a study by Lee et al, Gentamicin potentiated rocuronium-induced muscle relaxation. The higher the gentamicin concentration, the greater the rocuronium potency (figure 2) In fact, Gentamicin has the greatest neuromuscular blocking effect of all of the antibiotics.<sup>2</sup>

Pediatric patients hold special considerations in that the use of routine succinylcholine for RSI may not be prudent in the very young for concerns of undiagnosed muscular dystrophy and the use of Suggamadex is currently not approved for pediatric patients by the FDA.

As a result, prolonged blockade is an anesthetic concern with an indefinite timeline toward twitch recovery when rocuronium is used with antibiotics from these classes.

Schultz et al study showed that with a 1.2mg/kg dose of Rocuronium, the average recovery time for the first response (T1) in TOF is 26.1 mins<sup>3</sup>.

Anecdotally, our time until first twitch was 120 minutes, leading to a 400% increase in duration of action due to a single dose of Gentamicin.

Our experience highlights the synergistic interactions between Rocuronium and Gentamicin and has implications in pediatric anesthesia as both drugs are commonly given together in pediatric surgical cases and can be an issue if the case is short in duration.

## References

1. Paradelis, AG. "Neuromuscular blocking activity of aminoglycoside antibiotics. Methods Find Exp Clin. 1980 Feb;2. <https://www.ncbi.nlm.nih.gov/pubmed/6121961>
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3. Schultz, P. "Onset and duration of action of rocuronium – from tracheal intubation, through intense block to complete recovery." Acta Anesthesiol Scand. 2001 May;45(5):612-7 <https://www.ncbi.nlm.nih.gov/pubmed/11309014>