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## Comparison of the TOF-Cuff<sup>®</sup> and TOF-Watch SX<sup>®</sup> During Spontaneous Recovery From Neuromuscular Blockade

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*Introduction:* The TOF-Cuff<sup>®</sup> (RGB Medical Devices, Madrid, Spain) is a new 2-in-1 device that allows monitoring of the depth of neuromuscular blockade as well as blood pressure. It is simple to use and requires no additional devices to measure the neuromuscular function by using the “Cuff-method.” However, the usefulness of the TOF-Cuff<sup>®</sup> has rarely been reported. We have previously reported that the TOF-Cuff<sup>®</sup> responded more rapidly and less variably than acceleromyography, by using the TOF-Watch SX<sup>®</sup> (Nihon Kohden, Tokyo, Japan) for assessing the depth of neuromuscular blockade after muscle relaxant administration. Here, we compared the performance of the TOF-Cuff<sup>®</sup> and the TOF-Watch SX<sup>®</sup> during natural recovery from neuromuscular blockade.

*Methods:* This study was a prospective, observational study, approved by the Ethics Committee of Yamagata University Faculty of Medicine. We recruited adult ASA 1-2 patients undergoing elective surgery. Patients with BMI >35, and liver, renal, or neuromuscular dysfunction were excluded. We acquired informed consent in writing from all patients included in this study. We fitted the TOF-Cuff<sup>®</sup> to one arm of the patients and the TOF-Watch SX<sup>®</sup> to the other arm before induction of anesthesia. We used propofol, remifentanyl, and fentanyl for induction and maintenance of anesthesia. Neuromuscular blockade was induced with 0.6 mg/kg rocuronium (Rb) and measurement started. No additional Rb was administered before measurement was finished. We recorded the TOF ratio at 30-s (TOF-Cuff<sup>®</sup>) or 15-s (TOF-Watch SX<sup>®</sup>) intervals, according to the minimum value of each monitor. The time to TOF > 0.7 and TOF > 0.9 was recorded for each device. Patient characteristics were also recorded. TOF-Cuff<sup>®</sup> (“C” group) and TOF-watch SX<sup>®</sup> (“W” group) were compared by the paired t-test. We verified normal distribution using the Shapiro-Wilk test. Statistical analysis was performed using R and EZR software (version 3.1.1, R Foundation for Statistically Computing, Vienna, Austria), and differences with a  $p < 0.05$  were considered statistically significant.

*Results:* From July to October 2016, 22 patients, including 9 men and 11 women (age:  $35 \pm 15$  years, height:  $162.5 \pm 6.5$  cm, weight:  $57.3 \pm 8.3$  kg) were enrolled. The mean amount of Rb administered was  $34.2 \pm 4.8$  mg. Both time to TOF > 0.7 and TOF > 0.9 of the C group were significantly shorter than that of the W group (TOF > 0.7: 45.4 vs. 50.9 min,  $p < 0.001$ , TOF > 0.9: 51.7 vs. 58.0 min,  $p < 0.001$ ). The values of the C group were also less scattered than those of the W group.

*Discussion:* We found more rapid recovery from neuromuscular blockade and greater repeatability with the TOF-Cuff<sup>®</sup> than with the TOF-Watch SX<sup>®</sup>. Our results may be owing to differences in the measurement methods used, or differences in the muscles measured. Further studies in a larger number of patients and various conditions are necessary to confirm the accuracy and usefulness of the TOF-Cuff<sup>®</sup>.

*Conclusions:* The TOF-Cuff<sup>®</sup> showed more rapid recovery and greater repeatability than the TOF-Watch SX<sup>®</sup>. Further research is required to verify the accuracy of the TOF-Cuff<sup>®</sup>.