THE APPLICATION OF A PRELOAD DECREASES THE STAIRCASE PHENOMENON AT THE FIRST DORSAL INTEROSSEUS MUSCLE WHEN MEASURED USING PHONOMYOGRAPHY

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INTRODUCTION: Phonomyography (PMG) is a novel method to monitor neuromuscular blockade. It is simple to use and can be applied to any muscle. It can be used interchangeably with mechanomyography (MMG). The staircase phenomenon has not been investigated at different muscles nor using different methods. The purpose of this work is to determine the influence of preload on this phenomenon.

METHODS: In 10 patients undergoing general anesthesia using a laryngeal mask airway without aid of neuromuscular blockade, one piezo-electric microphone was applied to the first dorsal interosseus muscle (FDI, with or without preload of 200 g/cm²), each. Supramaximal stimulation (1 Hz) was used at the ulnar nerves. All phonomyographic signals were simultaneously recorded for 30 min using Polyview software with a Grass model 15RX multichannel amplifier with a sample rate of 100 Hz. Data are presented as means (SD), comparisons were made using Student t test, $P < 0.05$.

RESULTS: In all ten patients, signals were recorded. The staircase phenomenon is significantly more pronounced without preload with a maximum mean increase of 57% (23%), than when a preload is applied with a maximum increase of 37% (17%) (Fig). After 320 s (with preload) and 440 s (without preload), there is no further significant increase of signal height in comparison with the signal eight at 30 min. Both potentiation curves show a plateau at 16 – 18 min.

CONCLUSION: The application of a preload decreases significantly the staircase phenomenon when monitored phonomyographically at the FDI.