

Title: PHARMACODYNAMICS OF VECURONIUM IN TWO MUSCLE GROUPS: VOCAL CORD VERSUS THENAR NEUROMUSCULAR BLOCKADE IN MAN

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**Introduction.** Microlaryngeal surgery requires optimal operating conditions. These can only be obtained by sufficient relaxation of the vocal cord musculature. We utilized vecuronium (V) for this purpose. Even though thumb twitch was completely depressed, motion of the vocal cord could be observed during surgical stimulation. Therefore, an attempt has been made to quantify differences in vocal cord and thenar neuromuscular (nm) blockade after relaxation with V.

**Methods.** 5 patients undergoing partial cord resection (ASA I-II, mean age 52 a) were investigated after having signed the institutionally approved protocol. Following premedication with lorazepam 2 mg p.o., anesthesia was induced with thiopental 5 mg/kg and fentanyl 5 ug/kg. Jet ventilation was imposed through an Injectoflex cannula. Parameters used were O<sub>2</sub>:N<sub>2</sub>O 3:7 l/min, rate 12/min, I:E 1:2, outlet pressure 1-1.5 bar. Physiological variables monitored were heart rate, O<sub>2</sub>-saturation and invasive blood pressure. Electrical stimulation of N. laryngeus recurrens via surface electrodes placed 3 cm above jugulum (square wave 0.2 msec, 80-100 mA) and ulnar nerve (0.2 msec pulses, 30-70 mA). Recording techniques: A needle electrode was inserted into the unaffected vocal cord, evoked thenar EMG was recorded by surface electrodes placed at the respective motor point. Thenar MMG was measured isometrically (preload 200-400 g). Responses from the peripheral muscle group were processed via a special relaxation monitor, vocal cord EMG was amplified by a DISA electromyograph, synchronized to the relaxation monitor. Thenar and vocal cord EMG were displayed both for visual observation and stimulus artefact removal before subsequent signal evaluation. Depression in nm transmission was manually calculated from strip-chart and oscilloscope tracings. A bolus dose of V (60 ug/kg; ED 95<sup>1</sup>) was given. Nm depression was monitored up to the moment when 25% recovery in vocal cord response was noted.

**Results.** The circulatory and ventilatory parameters remained stable during the entire investigation period. Thenar EMG was completely suppressed in all but one cases, MMG indicated 94-100% block. However, vocal cord EMG was blocked from 60-85% only, time interval between relaxant administration and development of maximal block tended to be shorter in the vocal cord (see table and figure).

**Discussion.** When using a special measurement technique to quantitate nm depression of the laryngeal musculature in man, the degree of vocal cord paralysis differed markedly from peripheral nm depression after an ED 95 bolus of V. To explain these observations, several facts must be considered: Structural differences between thumb and vocal cord musculature, variable innervation density and regional perfusion<sup>2</sup>. In addition, the relaxant's specificity should be taken into account<sup>3</sup>. In con-

clusion, in spite of nearly complete block of the adductor pollicis vecuronium 60 ug/kg resulted only in approximately 74 % nm depression of the vocal cord. This fact has to be taken into consideration when discussing intubation scores<sup>4</sup>.

Table. Pharmacodynamics of vecuronium induced neuromuscular block (n=5)

M. vocalis EMG	Thenar EMG	Thenar MMG
mean	range	mean range
74	60-85	97 94-100
Maximal block (%)		
99	96-100	97 94-100
Onset time (sec)		
235	210-300	220 160-310

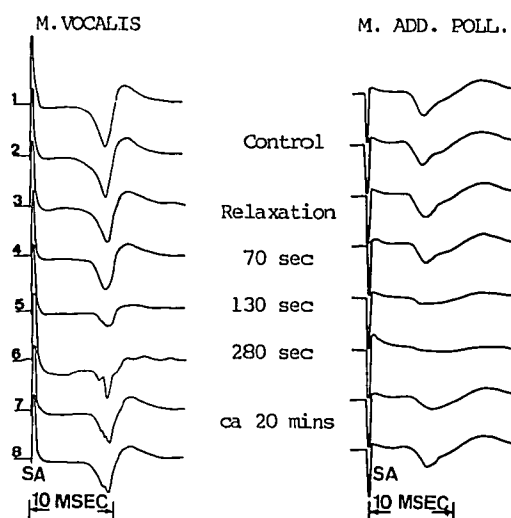


Figure. Evoked electrical responses of M. vocalis and M. adductor poll. at times of measurement as indicated in the figure following 60ug/kg iv (patient S. J. 59a, male). SA stimulus artefact. Note distinct different degrees in relaxation in the 5<sup>th</sup> panel. Panel 6, left: gain increased 4-fold. During offset of nm block the thenar EMG recovery lags behind that of vocal cords (7<sup>th</sup> and 8<sup>th</sup> panel).

#### References.

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