Exploring the variability in response to rocuronium in routine clinical practice using GE-Navigator

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Background

Variability in response to drugs used in anaesthesia is often underestimated

Estimates of rocuronium ED₅₀ & ED₉₅ and duration have SD 20-30% of the mean ⁽¹⁾

Infusion studies suggest a constant response in an individual⁽²⁾

Commercial drug interaction displays such as GE-Navigator allow visualisation of drug kinetics in routine practice

Combining qualitative NMB monitoring and modelling allows evaluation of real time kinetics

The aim of this study was to explore inter- and intra-patient variability in response to rocuronium in a range of routine clinical cases

Methods

Regional Ethics Committee approval. Written consent.

Opportunistic sample. Patients >18yr with >1 dose of rocuronium anticipated

NMB monitored with GE-NMT (mechanosensor) TOF each 20sec

GE-Navigator used to model rocuronium concentrations

Observed spontaneous return of T2 of TOF & calculated mean average rocuronium concentration at this endpoint

Interquartile range (IQR) and Median Absolute Deviation (MAD) used as indices of group and individual variability

Subjects

42 subjects: 24F; 18M. Mean age 56 (SD17)yr

Weight 83 (SD19)kg M 84(17)kg; F 83(21)kg

BMI 30.0 (SD8.1)kg/m² M 30.7(7.2); F 29.6(9.4)kg/m²

First rocuronium dose: range 0.30-0.85mg/kg, (max 50mg) mean 0.53mg/kg

36 subjects with >1 spontaneous return of T2

Figure 1: Examples from Navigator relaxant panel

Fig 1a 10mg bolus at each return of T2

Fig 1b Infusion to maintain constant response

References

- Cooper RA, Maddineni VR, Mirakhur RK, et al Br J Anaesth 71:222-6
- Harrison MJ. Anaesthesia. 52:37–40.

Results

Responsiveness of individuals

We saw considerable variability in rocuronium level at return of T2

Mean 0.96 (sd 0.50) ng/ml

No effect of gender:
M 1.13ng/ml; F 0.91ng/ml.
p=0.56

Figure 2: Cumulative frequency distribution of the mean rocuronium level at return of T2 of the TOF for each subject

Inter- and intra-subject variability

Figure 3 and the Table illustrate the small variability in response to rocuronium compared with the variability between subjects

	Group	Individual mean (sd)
IQR	0.74	0.14 (0.10)
MAD	0.90	0.10 (0.06)

Figure 3: The distribution for the population is plotted along with the distribution of the mean IQR for individuals

Effect of covariates

Figure 4: Neither weight (left panel) nor age (right panel) predicted the rocuronium concentration at return of T2

Conclusions and comments

We found wide inter-individual variability in rocuronium effect

Individual response was not predicted by gender, age, weight or BMI

The response of an individual was relatively constant

These results reinforce the need to monitor response to NMB

Maintaining a constant rocuronium concentration maintains a constant effect

Using monitoring and modelling together can enhance NMB management