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Can NOL index calibration help to individualize remifentanil TCI before skin incision?

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Background and Goal of Study: The NOL index (Medasense, Israel) is designed to define the optimal Nociception-AntiNociception (NAN) balance during general anaesthesia. The aim of the study was to assess if the remifentanil effect site concentration (Ce) required to abolish the NOL response to a tetanic noxious stimulus (Tetanos 100 Hz, 50 mamp during 30 seconds = TET100) could help to calibrate the NAN balance by predicting the Ce required for surgery.

Materials and Methods: This prospective pilot study was reviewed and accepted by the in-hospital ethics committee. We recruited 8 thyroidectomy and 8 CABG patients. After tracheal intubation under propofol-remifentanil TCI anaesthesia and rocuronium (0.6 mg/kg), a TET100 stimulus was delivered by two electrodes on the ulnar nerve (Algiscan, Idmed, Marseille, France) at a remifentanil Ce of 4 ng/ml (Minto set) when NOL was below 10. If the NOL index absolute value response exceeded 20, the Ce was increased by 1 ng/ml increment step until NOL response was abolished. This Ce served as reference and was targeted for skin incision and surgery. Propofol TCI was titrated to maintain a Bispectral Index between 40 and 60 at all times. Blood pressure was maintained within a 20% range of the pre-operative normal values of the patient using vasoactive agents if necessary.

Results and Discussion: The mean Ce calibration values to abolish the NOL response to TET100 was significantly lower in patients undergoing cardiac than thyroid surgery (see Table). Mean age between groups also differed significantly. Heart rate always remained in the 20% proposed range. One thyroid patient needed a bolus of vasodilator agent during surgery. There was a moderate linear correlation between the NOL variation observed after TET100 at a Ce of 4 ng/ml and the calibrated Ce (R-square = 0.535).

mean ± SD (median)	Thyroid	Cardiac	Mann-Whitney test, p-value
Age	48.7 ± 10.8 (47)	74.6 ± 10.9 (77.5)	0.0022
Calibrated Ce	5.9 ± 1.4 (5.5)	4.0 ± 0.6 (4)	0.006
Δ NOL first TET100	31.2 ± 13.7 (25)	15.4 ± 12.1 (13)	0.006

Conclusion(s): During propofol remifentanil TCI, a calibration NAN balance test using TET100 performed before skin incision could help to individualize the appropriate remifentanil Ce required to maintain adequate haemodynamic stability during surgery.