Introduction: Several indices have been recently used to monitor nociception intensity under general anesthesia (GA), most of them based on a single parameter. The PMD monitor (Medasense Biometrics, Israel) uses the NOL index, a multiparametric index derived from heart rate (HR), HR variability, plethysmograph wave amplitude, skin conductance, skin temperature and its fluctuations. The index ranges from 0 (no pain) to 100 (max pain). The PMD monitor has been recently shown to have a high sensitivity and specificity to discriminate nociception under GA. With the latest version PMD-200, we tested the NOL response during noxious stimuli at various doses of remifentanil (RF). The hypothesis was an inverse correlation between RF dose and NOL alteration.

Methods: After Ethic Committee approvals, 26 patients received desflurane-RF based GA with an epidural analgesia (EA) for laparotomy. A tetanic stimulation was applied to the forearm of the patients at 4 RF doses (0.005 µg/kg/min before and after EA loading, 0.05 and 0.1 µg/kg/min). Intubation and incision were processed at 0.05 µg/kg/min RF dose. Pre- and post-stimulation NOL mean values were compared. ROC curves were constructed to assess the ability of the individual parameter to discriminate between noxious and non-noxious state at RF 0.005 µg/kg/min. Correlation between RF dose and post-stimulation NOL values was assessed.

Results: AUC for discrimination between noxious and non-noxious states for NOL was 0.92 vs 0.69, 0.71, 0.64 for HR, MBP and BIS respectively. Pre-stimulation NOL values ranged for 5 to 8 with no significant difference when RF infusion increased. Post-stimulation values at RF doses of 0.005 before and after epidural load, 0.05, and 0.1 µg/kg/min were, respectively, 24, 21, 14 and 7, significantly higher than the pre-stimulation values (p< 0.0083). Post-stimulation values significantly decreased when RF dose was higher. Correlation test between NOL values and RF doses was r = -0.584 (p< 0.0001).

Discussion: In this study, NOL index was the only parameter responding to all noxious stimuli under general anesthesia, regardless to RF dosage. NOL was better for discriminating a noxious from a non-noxious state compared to single measures. NOL values after stimulus decreased with the high dose of RF, showing a significant inverse correlation between opioid dose and NOL index. The high sensitivity and specificity of the NOL index in this study suggests it has great potential as a monitor of nociception intensity during anesthesia.
References:


Receiver operating characteristics curve analysis: discrimination of experimental noxious stimulus period from non-noxious stimulus period at minimal remifentanil dosage (0.005 mcg/kg/min). NOL: Nociception Level index; HR= Heart Rate; MBP= Mean arterial Blood Pressure; BIS= Bispectral index.