

## Clinical Image

# Utility of Newborn Infant Parasympathetic Evaluation (N.I.P.E.) for Monitoring of Successful Intraoperative Regional Block

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## INTRODUCTION

Assessing regional blocks in infants and neonates can be difficult and especially under general anaesthesia, so a more objective evaluation for the level of pain would be useful. The NIPE monitor (Newborn Infant Parasympathetic Evaluation) can quantify the well-being state of these paediatric patients by analyzing the parasympathetic heart rate variability [1], and could be an effective tool to assess the success and safety of regional blocks. The analysis of the parasympathetic tone variation is based on the R-R interval study of the ECG giving a range of values from 0 to 100. Values below 50 are considered as a nociceptive stimuli during intraoperative period under sevoflurane anaesthesia in neonates [2].

We have studied 12 infant patients (between 3 and 5 weeks of age and 2.7 and 3.5 kg of weight) who were scheduled for pyloromyotomy and were performed, under general anaesthesia, a rectus sheath block located using the ultrasound at the right supraumbilical area (see image 1). General anaesthesia was induced with sevoflurane, propofol 2 mg/kg, atracurium 0.5mg/kg and 1 mcg/kg of fentanyl. After orotracheal intubation the block was performed by locating with the ultrasound the posterior rectus sheath and administering 0.2 ml/kg of 0.33% l-bupivacaine in plane. NIPE, SpO<sub>2</sub>, HR and arterial pressure values were assessed.

NIPE median levels were 60.8 +/- 6.3 during abdominal incision, reaching values of 30.8 +/- 8.2 when the pylorus was manipulated and 64.7 +/- 7.9 during abdominal closure (p<0.05). Median values during pylorus manipulation were statistically lower than those for abdominal incision (T-Student Test T = 5,376; p<0.0001) and abdominal closure (Student test T = 6,122; p<0.0001) (\*ANOVA F<sub>2,178</sub> = 23,731; p<0.0001). A representative case of NIPE screen during a surgery is shown in image 2.

Abdominal muscle relaxation was optimal in all cases. Patients remained haemodynamically stable and did not reach

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Figure 1 Typical image Rectus abdominis muscle block guided by ultrasound in newborns.

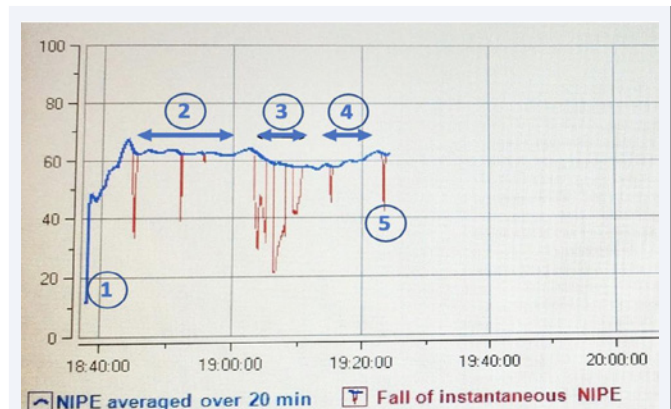


Figure 2 NIPE screen during a representative case of pyloromyotomy surgery: (1) Endotracheal intubation; (2) Surgical incision, (3) Pyloric olive manipulation; (4) Abdominal wall closure; (5) Extubation.

any value above 2 on a LLANTO behavioural scale for pain with no needs for extra analgesia within the 6-10 hours after surgery.

The rectus sheath block assessed by the NIPE monitor is a helpful technique for pyloromyotomy in children. As assessed

by the monitor in our study, it offers good quality of analgesia except for the pylorus manipulation that is innervated by visceral fibers.

The NIPE monitor could be especially useful to evaluate the success of a regional technique in children under general anaesthesia. It gives a 3 minutes mean value (Instantaneous NIPE values) and a 20 minutes mean value (NIPE averaged values), based on the analysis of the variations of the R-R interval in the ECG, known as the sinus respiratory arrhythmia, that is related to the parasympathetic system and correlates with level of pain. The median NIPE values remained stable in all cases during the entire procedure without reaching any level below 40 although instantaneous values dropped significantly when pylorus were manipulated. This instantaneous drop is caused by activation of the pain visceral fibers that innervate the pylorus and were not block with the abdominal regional technique. However, average values of NIPE during abdominal wall closure had good correlation with optimal levels of postoperative analgesia and no extra doses of opioids were needed postoperatively.

As a conclusion, assessing the level of intraoperative

analgesia in infants and newborns when performing a regional technique can be interesting since it allows to confirm the success of the technique, decreases the administration of intraoperative opioids, thus allowing a faster extubating, and could also correlate with good level of postoperative analgesia in the Post-Anesthetic Care Unit [3].

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