Analgesia nociception index potential use for chronic shoulder pain detection

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Introduction

Analgesia Nociception Index (ANI) is a new method used to measure acute pain while the patient is unconscious. ANI's greatest benefits include measuring surgical stress and preventing intensive pain in surgical and intensive care patients. ANI detection principle is monitoring heart rate variability by using electrocardiography. Technology uses algorithms analysing R-R complexes and breathing rate therefore assesses patient condition and his sympathetic and parasympathetic nervous systems activity. This innovative technology allows doctors to create an individual technique for dosing analgesic drugs to every patient. Although ANI shows good results in the detection of acute pain when the patient is being unconscious, currently the trials for chronic pain detection are still in progress.

Objective

The aim of this pilot study was to determine the usefulness of ANI for chronic pain intensity detection. It was hypothesized that ANI may be used for chronic pain detection and as an indicator of the effectiveness of therapy.

Placement of ANI electrodes on chest
Picture nr.1.

Methods

A total of nine patients suffering from chronic shoulder pain participated in this study. ANI was monitored for a total of 40 minutes for each patient in dedicated time cuts. Initially, it was measured while rested, after pain provocation tests, then before and every 5 minutes after suprascapular nerve blockade, a total of 20 minutes after nerve block. Then pain provocation tests were repeated again. For suprascapular nerve block every patient received similar medication with similar doses: sol.Bupivacaine (20mg), sol.Methylprednisolone (80mg).

Results

In eight (88,8%) out of nine patient's significant changes took place (95% CI [-27, -7.4]). Figure nr.1. indicates that Analgesia Nociception Index increased significantly 20 minutes after peripheral nerve block**:** 58 ±7 comparing with results before peripheral nerve blockade 40,8 ±11 (p=0.004). On average, ANI scores before blockade were -17.2 lower than after blockade that shows good peripheral nerve blockade effectiveness for chronic pain treatment.

Discussion and conclusion

In summary, it has been concluded that ANI technology at pain detection works effectively and could be a potentially useful tool for measurement and treatment of chronic pain. However, to apply it to patients being conscious, a much broader and more detailed study is needed to be able to objectively assess all aspects affecting ANI. This study theoretically could encounter problems with the patient's psycho-emotional state and stress about the procedure, which might give false-positive results by initially increasing heart rate and decreasing ANI. Also, variable ANI values before and after blockade affect patients etiological reasons for chronic pain.

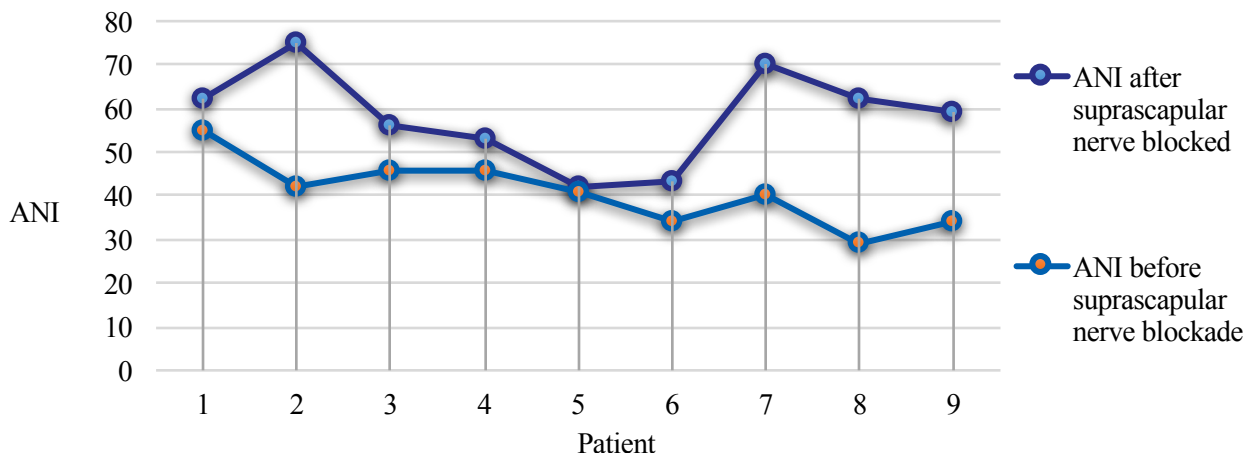Changes in ANI value after pain provocation tests before and 20 minutes after suprascapular nerve blockade

Figure nr.1.