

Investigating the influence of a tracheostomy on the evaluation with the Nociception Coma Scale – Revised

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Objective

Disorders of consciousness (DOC)

After a severe brain injury, some patients can remain in a state of impaired consciousness (Disorders of Consciousness), in which they are unable to communicate. Therefore, they are also unable to report the experience of pain.

Nociception Coma Scale – Revised (NCS-R)

This scale developed to assess nociception in DOC patients, encompasses 3 subscales, evaluating motor, verbal and facial expressions, each one ranging from 0 to 3. [1,2] Recently, a cut-off score of 2 was identified to detect responses related to nociceptive stimuli. [3]

Tracheostomy

The (frequent) presence of a tracheostomy tube by-passing the vocal chords, results in a low to null score on the verbal subscale.

This study investigates the influence of a tracheostomy tube on the verbal subscale and on the NCS-R total score. We also aimed to replicate the previously defined cut-off of 2 and to investigate if it would be different in a subgroup of patients with a tracheostomy.

Methods

Procedure

The NCS-R was administered in two conditions: (1) baseline and (2) noxious condition. During baseline, we observed the patient's spontaneous behaviors for 60 seconds. During the noxious condition, we applied pressure on the nailbed of the middle finger of the right and left hand for a minimum of 5 seconds and stopped as soon as a behavioral response was observed. Patients' level of consciousness was assessed with the Coma Recovery Scale-Revised (CRS-R).

Statistics

(1) U Mann-Whitney tests were used to investigate the difference in NCS-R verbal subscores and total scores in response to noxious stimulation between patients with and without a tracheostomy tube. Significance was set at $p < 0.05$ (one-tailed).

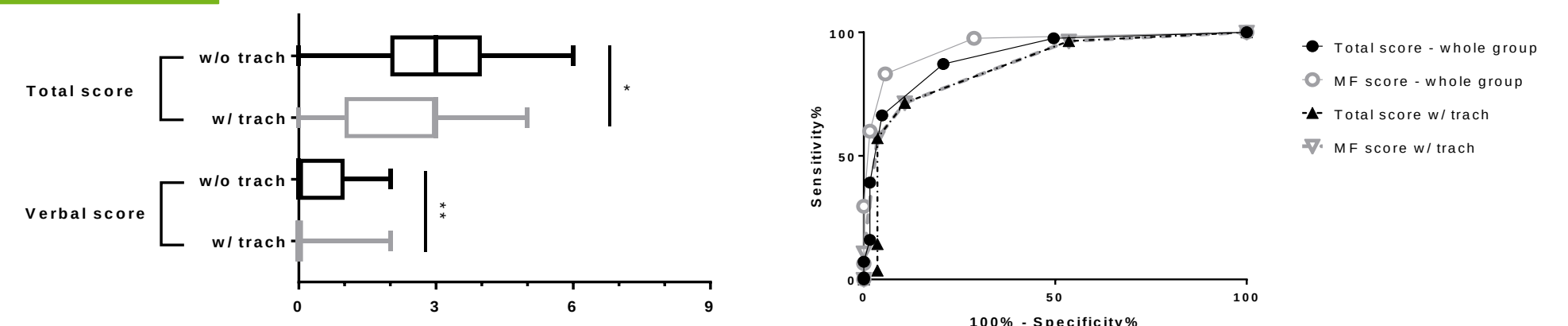
(2) Receiver operating characteristic (ROC) analyses were used to determine the best cut-off score allowing to differentiate the noxious condition versus baseline using the NCS-R total scores and the sum of only the motor and facial expression subscales (excluding the verbal one).

Results

(1) For the first step, 65 patients were included, of which 28 had a tracheostomy. Lower scores were observed on the NCS-R verbal subscores ($p = 0.002$) and total scores ($p = 0.039$) in the tracheostomy group as compared with patients without a tracheostomy in response to noxious stimulation.

(2) For the second step, we included 125 DOC patients. The ROC analyses reported a score of 2 as the best threshold (Sensitivity=87.2% & Specificity=79.2%) for differentiating noxious condition from baseline. Removing the verbal subscale did not modify the cut-off score of 2 (Sensitivity=83.2% & specificity=92.4%).

On a sample of 28 patients with tracheostomy we identified the same cut-off score of 2 at the NCS-R total score, with a lower sensitivity (71.43%) and specificity (89.29%), while removing the verbal subscale lead to the same results.



Conclusion

- ❑ The presence of a tracheostomy is associated with a lower score on the verbal subscale, resulting also in a lower total score.
- ❑ We replicated the previously reported cut-off score of 2 to identify nociception, which remained the same after removal of the verbal subscore and in a subgroup of patients with tracheostomy.
- ❑ The presence of a tracheostomy still allows the use of the NCS-R but the presence of a non-speaking tracheostomy should be clearly mentioned when assessing patients with the NCS-R.

References:

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- 2 Chatelle C, Majerus S, Whyte J, et al. A sensitive scale to assess nociceptive pain in patients with disorders of consciousness. J Neurol Neurosurg Psychiatry 2012;83(12), 1233–7.
- 3 Chatelle C, Hauger SL, Martial C et al. Assessment of Nociception and Pain in Participants in an Unresponsive or Minimally Conscious State After Acquired Brain Injury: The Relation Between the Coma Recovery Scale-Revised and the Nociception Coma Scale-Revised. Arch Phys Med Rehabil. Published Online First: 10 April 2018. doi:10.1016/j.apmr.2018.03.009.