Function of the Neuromuscular Junction in critically ill patients and reliability of the Train-Of-Four monitoring in the Intensive Care Unit

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Argomento: Neuroanestesia e neurorianimazione

Background:

The spreading use of Neuromuscular Blocking Agents (NMBAs) has led to the introduction of the Train-Of-Four (TOF) monitoring in Intensive Care Units (ICUs); however, there is a lack of information on its reliability in critically ill patients.
Some conditions related to critical illness, like the Intensive Care Unit Acquired Weakness (ICU-AW), could make TOF monitoring unreliable. It is known that the ICU-AW is associated with neuropathy and myopathy, but no studies have ever investigated the Neuromuscular Junction (NMJ), whose alterations would compromise the results of TOF.
The aim of this study was to estimate the prevalence of a hypothetical NMJ disease and to assess the reliability of TOF in critically ill patients.

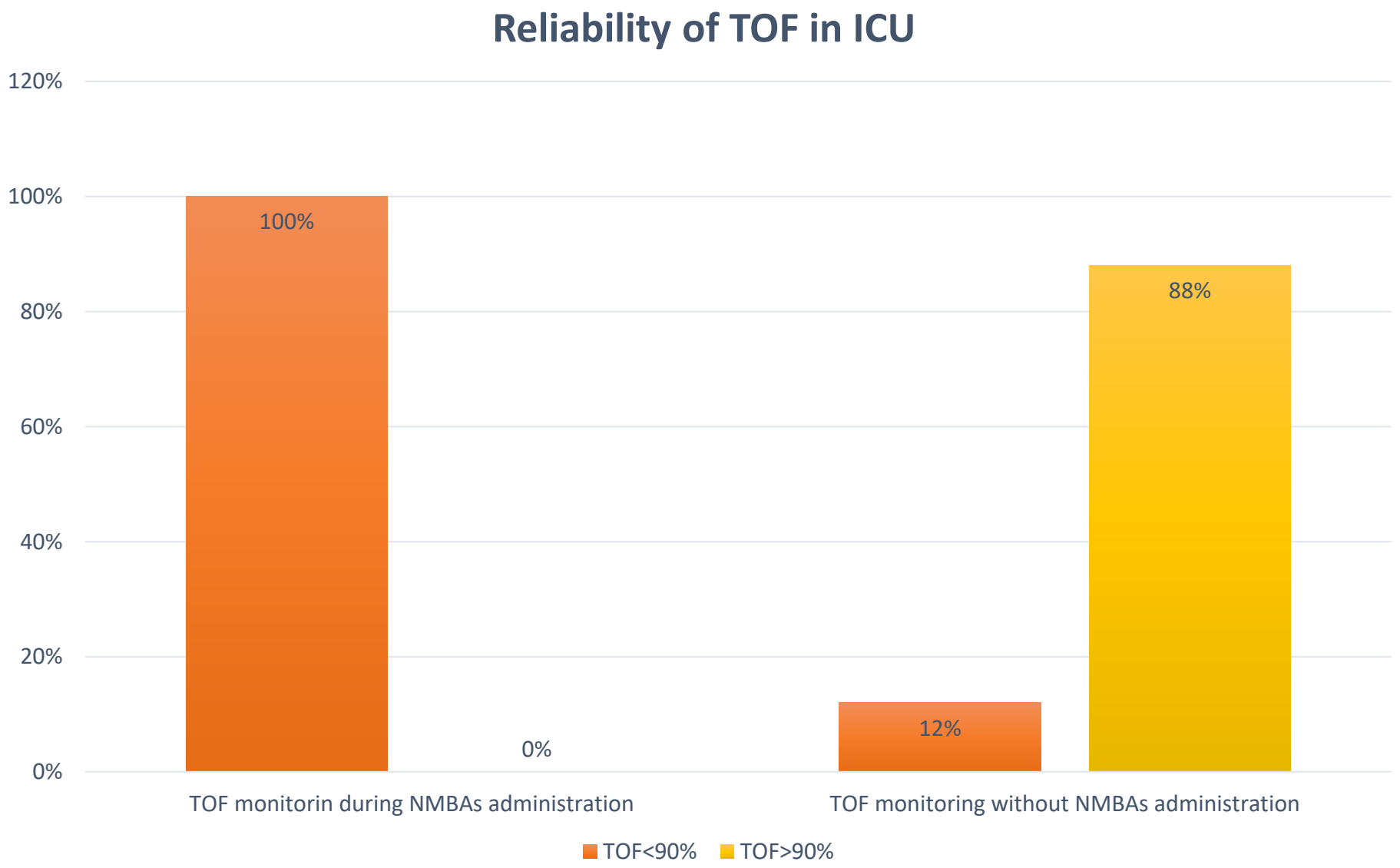
Materials and Methods:
This is an observational study performed in a general ICU from January 2016 to June 2018.
Every patient underwent two sessions of analysis: the former within 24 hours from the ICU admission, to detect a potential pre-existing NMJ disease, and the latter once the ICU-AW was diagnosed.
The same tests were also performed in patients who needed NMBAs administration (before, during and after that therapy).
Each analysis session included the following tests:

- Repetitive Nerve Stimulation (RNS), to evaluate the NMJ function;
- TOF.

The prevalence of the NMJ disease was measured with the exact binomial test; the reliability of TOF was estimated as specificity and sensitivity for the diagnosis of neuromuscular blockade.

Results:
159 patients were enrolled. The RNS results were never abnormal; therefore, the estimated prevalence of the NMJ disease in ICU patients was <7,4% (CI97,5%: 0%-7,4%). TOF monitoring was unreliable in 12% of patients (specificity: 88%; sensitivity: 100%); in those cases, TOF values were <90%, although none NMBAs were administered.

Conclusions:
Critical illness does not seem to lead to NMJ disease.
TOF monitoring is not reliable in 12% of ICU patients.


Reliability of TOF in ICU
120%
100%
80%
60%
40%
20%
0%
100%
0%
12%
88%
TOF monitorin during NMBAs administration
TOF monitoring without NMBAs administration
TOF<90%
TOF>90%