

Neuromuscular Blockade Monitor Dysfunction Associated with Patient Comorbidities: A Case-Control Study at One University Medical Center

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Background

The 2023 American Society of Anesthesiologists (ASA) Practice Guidelines emphasize the importance of using quantitative neuromuscular monitoring to ensure safe and effective management of neuromuscular blockade during general anesthesia. Clinical bedside tests, though commonly used, are not reliable indicators of adequate neuromuscular recovery. Quantitative monitoring has been linked to benefits such as more effective reversal of blockade, shorter post-anesthesia care unit (PACU) stays, and fewer postoperative pulmonary complications. Since the release of these guidelines, increased adoption of quantitative monitoring has enabled evaluation of patient-specific factors contributing to monitoring failure, prompting investigation into the impact of comorbidities.



TwitchView monitoring device. BlinkDC, n.d., <https://www.blinkdc.com/>

We hypothesize that patient comorbidities—specifically diabetes, neuropathy, and morbid obesity (BMI ≥ 40)—are associated with increased dysfunction in quantitative neuromuscular monitoring.

Methods

Design: Case-control study at a single University Medical Center (Jan 1–June 30, 2023) of surgical patients monitored with quantitative neuromuscular blockade monitors.

Cases (n=142): Patients with quantitative monitor dysfunction, defined as inaccurate or failed readings not caused by technical or procedural factors documented in EHR.

Controls (n=142): Randomly selected surgical patients from the same period without documented monitor dysfunction.

Exclusions: Surgeries without neuromuscular blockade; monitor dysfunction attributed to electrode dislodgement, surgical interference, or procedural requirements.

Exposures of interest: Documented preoperative diabetes (any type), neuropathy (any type), and morbid obesity (BMI ≥ 40).

Results

The presence of any of the three risk factors—diabetes, neuropathy, or morbid obesity—was significantly associated with increased odds of monitor dysfunction (OR 3.20; 95% CI: 1.97–5.20). Individually, diabetes (OR 2.94; 95% CI: 1.75–4.93) and neuropathy (OR 3.26; 95% CI: 1.90–5.60) were each independently significantly associated with dysfunction. Morbid obesity was not significantly associated (OR 1.06; 95% CI: 0.54–2.09).

Conclusions

- Diabetes and neuropathy are associated with increased likelihood of quantitative neuromuscular blockade monitor dysfunction.
- These associations may reflect impaired nerve conduction, reduced muscle responsiveness, or altered EMG signal transmission commonly seen in these conditions.
- Morbid obesity does not independently affect signal fidelity, despite posing potential technical challenges.
- Anesthesiologists should exercise increased vigilance when interpreting quantitative neuromuscular monitoring data in patients with neurologic comorbidities.
- Future work: Prospective studies with standardized testing protocols are needed to validate monitoring strategies for at-risk populations.

References

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