Acute Flaccid Myelitis from an Anesthetic Perspective

An Integrated Research Review and Quality Improvement Project Concerning the Prevention of Residual Muscle Weakness and Prolonged Ventilation in Acute Flaccid Myelitis Patients

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ABSTRACT

Objective. The objective of this study was to identify anesthetic strategies that prevent perioperative residual muscle weakness and prolonged ventilation in acute flaccid myelitis (AFM) patients so that an educational presentation could be developed, and anesthesia providers' knowledge enhanced.

Background. Recent statistics indicate that the incidence of AFM has risen in the past decade and will continue to rise. As a result, it is expected that there will be an increase in surgical patients diagnosed with AFM. This also means that anesthesia providers will encounter this disease more than ever before. Therefore, it is crucial that anesthesia providers have adequate knowledge of the disease and its implications so they can provide anesthesia that optimizes patient outcomes. It is also crucial that they are aware of the primary anesthetic concerns in this population and equipped with strategies to prevent these complications.

Design. An integrative research review (IRR) was conducted for research and a Quality Improvement (QI) Project was developed to improve providers' knowledge.

Methods. Databases utilized for this search included EBSCO, Academic OneFile, MEDLINE (Ovid), Google Scholar, Science Direct, and PubMed. The search range was limited to studies less than 6 years old with a date range parameter of 2014-2020. Due to AFM research being scarce, a variety of populations were included. For disease understanding, highly reliable sources and credible health agencies or organizations such as the Centers for Disease Control and Prevention were utilized. For outcomes and intraoperative recommendations, peer-reviewed meta-analyses, literature reviews, randomized control trials, and non-randomized studies were considered. For the QI project, a pretest posttest design was utilized with anonymous participation.

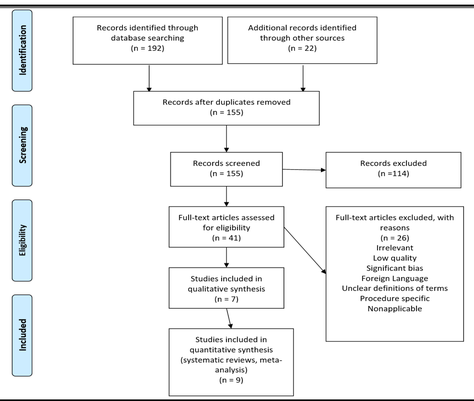
Results. Although this population has very few direct studies, the IRR findings indicate that the primary intraoperative concerns for this patient population are residual muscle weakness and prolonged ventilation. With studies on AFM patients being nearly nonexistent, many of the results were extrapolated from other populations. Studies found that inflammatory mediator prevention and neuromuscular blocking agent management are crucial in preventing residual muscle weakness and prolonged ventilation. Results also indicate that AFM patients would benefit from rapid sequence induction, early preoxygenation, lung protective ventilation (LPV), lung recruitment maneuvers (LRMs), avoidance of depolarizing muscle relaxants (DMRs), reversal with Sugammadex, awake extubation, and postoperative admittance to the ICU. A QI educational presentation was used to present these findings. After the presentation, there was a significant improvement in participants' understanding of AFM anesthetic management as indicated by a pretest M=38, posttest M=93.33, and a t-value of 8.869 with a p value < 0.00001 at a significance of $p < 0.05$.

Conclusions. While the findings of this research provide foundational knowledge and strategies for the anesthetic management of AFM patients, more studies must be completed on the population to fully understand the applicability and effectiveness of these findings.

*References are available upon request

INTRODUCTION

- Acute Flaccid Myelitis (AFM) is a polio-like condition with rising prevalence in the U.S.
- Often occurs after viral respiratory infections, especially enteroviruses
- Causes independent neurological and muscular alterations as well as neuromuscular interaction changes
  - Hypotonia and hyporeflexia are dominant issues
  - Spinal cord gray matter lesions
  - Brainstem gray matter alterations
  - Ventral horn alterations
  - Cranial nerve VI and VII dysfunction
  - Bulbar dysfunction
  - Neuralgia
  - Muscle atrophy and deformity
  - Decreased Vital Capacity
  - Reduced FRC
- Often mistaken for other neuromuscular conditions
- Alterations are lifelong with only minimal recovery noted



METHODS

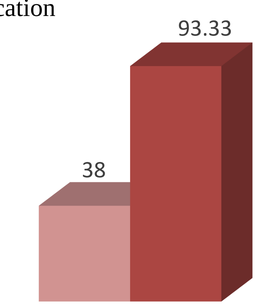
- IRR
  - The PRISMA Reporting Items for Systematic Reviews and Meta-Analyses Guideline was utilized
  - Total # of articles selected: 16
  - Databases:
    - EBSCO, Academic OneFile, MEDLINE (Ovid), Google Scholar, Science Direct, and PubMed
  - Search Range:
    - < 6 years old with a date range of 2014-2020
  - Population: variety (due to AFM research being scarce)
  - Disease Understanding:
    - Highly reliable sources and credible health agencies or organizations (e.g. Centers for Disease Control and Prevention)
  - Outcomes and Intraoperative Recommendations:
    - Peer-reviewed meta-analyses, literature reviews, randomized control trials, and non-randomized studies
- QI Project
  - Design: pretest posttest
  - Participation: anonymous
    - Total participants: 16
    - Withdrawn participants: 1
    - Analysis participants: 15
  - Education Method: electronic presentation
  - Data Analyses: paired-samples t-test

IRR RESULTS

- While there is very limited research directly addressing this unique population, knowledge of the disease allows us to identify priority intraoperative risks.
  - Prolonged ventilation
  - Residual muscle weakness
- Strategies for preventing residual muscle weakness
  - Avoid Succinylcholine
  - Use low dose NDMRs with nerve stimulator
  - Use Sugammadex for reversal
  - Prevent inflammatory mediator release and proteolysis via cox inhibitors, steroids, and histamine antagonists
- Strategies for preventing prolonged ventilation
  - Prepare for OSA event during induction
  - Optimize preoxygenation
  - Use RSI for ETT placement
  - Utilize LPV with low Tv and moderate PEEP
  - Utilize LRMs prior to extubation, preferably sustained LRMs
  - Utilize residual muscle weakness prevention strategies
  - Extubate awake with LRMs applied
  - Admit to ICU for postop monitoring

QI PROJECT RESULTS

- There is currently an inadequacy in anesthesia providers' knowledge of AFM that can be improved by research and education
- Pretest
  - M = 38
  - SD = 23.3605
- Posttest
  - M = 93.33
  - SD =10.4654
- Comparison
  - Diff-M = 55.33 with a Sq. Dev = 8,173.33



CLINICAL PRACTICE RELEVANCE

The strategies identified in this IRR can be used to improve outcomes in AFM patients until further studies can be completed for further specificity. An electronic educational presentation would be an effective way of educating anesthesia providers about AFM and these strategies so integration into practice can occur.