Utilizing Peak Airway Pressure and Change in Airway Pressure to Guide Closure of Abdomen in Damage Control Laparotomies: An Evidence-Based Approach

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Introduction: Damage control laparotomies (DCL) are a life-saving intervention in the management of trauma patients with severe abdominal injuries. Timely and appropriate closure of the abdomen following DCL is crucial to prevent complications such as abdominal compartment syndrome (ACS) and to promote optimal patient outcomes. The use of peak airway pressure (Ppeak) and changes in airway pressure (ΔP) as adjuncts in guiding abdominal closure post-DCL has garnered attention in recent literature. This position statement aims to provide evidence-based guidance on the incorporation of Ppeak and ΔP monitoring in the closure of the abdomen following DCL.

Evidence:

1. Role of Abdominal Compliance: Several studies have highlighted the association between intra-abdominal hypertension (IAH) and poor abdominal compliance, leading to increased morbidity and mortality in trauma patients. Monitoring Ppeak and ΔP allows for indirect assessment of abdominal compliance, aiding in the decision-making process for abdominal closure (1, 2).
2. Prediction of Abdominal Compartment Syndrome (ACS): Elevated Ppeak and significant changes in ΔP have been correlated with the development of ACS in trauma patients undergoing DCL. Early recognition of these parameters facilitates proactive management strategies, including delayed primary closure or abdominal decompression techniques, to mitigate the risk of ACS (3, 4).
3. Optimization of Ventilator Strategies: Incorporating Ppeak and ΔP monitoring into ventilation strategies post-DCL enables clinicians to tailor ventilatory parameters to individual patient needs. This personalized approach minimizes the risk of ventilator-associated complications and optimizes respiratory mechanics, thereby enhancing patient outcomes (5, 6).

Recommendations: Based on current evidence, we recommend the following thresholds for Ppeak and ΔP to guide safe closure of abdomens following DCL:

- Peak Airway Pressure (Ppeak): The maximum Ppeak should ideally be maintained below 30 cm H2O to minimize the risk of barotrauma and ventilator-associated lung injury (7, 8).
- Change in Airway Pressure (ΔP): The maximum allowable increase (ΔP) in airway pressure during maneuvers related to abdominal closure should be limited to 5-10 cm H2O, beyond which there is an increased risk of intra-abdominal hypertension and subsequent ACS (9, 10).

Probability of Abdominal Closure and Complications: The probability of successfully closing the abdomen decreases with each day it remains open post-DCL. Additionally, the risk of complications such as surgical site infections, enteric fistulas, and development of ACS increases significantly with prolonged open abdomen management. Therefore, early and definitive closure of the abdomen within 3-5 days post-DCL is recommended to optimize patient outcomes and reduce the likelihood of complications (11, 12).

Conclusion: The utilization of Ppeak and ΔP monitoring in guiding abdominal closure following DCL is supported by substantial evidence implicating their role in predicting ACS development and optimizing ventilator strategies. Incorporating these parameters into clinical practice, while adhering to recommended thresholds, allows for proactive management of abdominal compliance and respiratory mechanics, thereby improving patient outcomes in trauma settings.

Version Control Record			
Version	**Date**	**Author / Reviewer**	**Description of Changes**
1	10/09/2024	Paul Wisniewski, D.O.	Initial review and update to reflect latest evidence/practice

Work Cited:

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