**The Obesity Paradox and Problems of Respiration in Obese Patients**

Scientific Review

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In 2016, 1.9 billion adults worldwide were overweight (defined as a BMI over 25) with 650 million of them being obese (BMI>30). An estimated 20% of ICU patients are obese. Due to increased thoracic wall weight and abdominal fat mass, pulmonary compliance and airway management in these patients can be seriously compromised. Those patients are prone to lung de-recruitment and atelectasis, and are more likely to develop ARDS in the post-operative period. However, mortality due to ARDS in obese and overweight patients is lower than that in the general population. This correlation has been referred to as The Obesity Paradox. These facts have necessitated the many research papers on the specifics of respiration in the obese patient and the development of a series of recommendations on airway management and ventilation in such patients.

One of the possible explanations for the obesity paradox is that obese patients are more likely to be classified by clinicians as high risk of worse outcome, which results in earlier admission to the ICU for monitoring purposes and increased use of prophylactic measures such as early mobilization, more cautious pressure ulcer prevention, stricter glycemic control and more attention paid to mechanical ventilation parameters. Recent evidence has emerged in support of the hypothesis of the pre-conditioning cloud in overweight patients. According to it, higher body mass puts the body in a constant state of low-level inflammation, which creates a protective environment that limits the detrimental effects of a more aggressive second hit, such as ventilator-induced lung injury and sepsis.

High chest wall elastance is thought to redistribute regional transpulmonary pressure, possibly reducing the potential negative effects of mechanical ventilation in an inhomogeneous lung. A higher wall weight facilitates the formation of atelectasis. This is only exacerbated by the obligatory supine position and mechanical ventilation in anesthesia. Recommendations for ARDS prevention and management in an overweight patient include calculating end tidal volume using ideal body weight, rather than the actual weight, employing higher positive end-expiratory pressure (PEEP) to prevent atelectasis, using additional monitors of anesthesia and a reverse Trendelenburg position.

It is hoped that this scientific review will be of use for clinicians when making decisions on therapy for the overweight and obese patients in their care.