

全麻手术患者使用非侵入呼吸量监测系统的情况评估

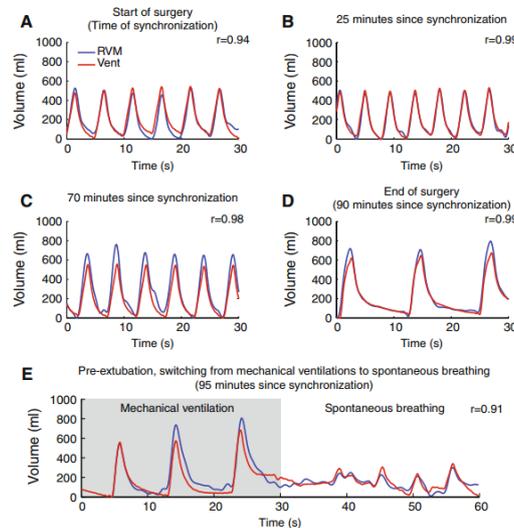
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研究机构	<ul style="list-style-type: none"> ● Brigham and Woman's Hospital ● Harvard Medical School ● West Virginia University, Morgantown ● Massachusetts General Hospital

摘要:

术后护理期间持续评估拔管后呼吸功能是尤为重要的。阿片类药物的使用和残余麻醉药导致呼吸抑制及其带来不良后果的可能性增加。一款非侵入呼吸量监测系统 (RVM) 能够持续、实时测量每分钟通气量 (MV), 潮气量 (TV) 和呼吸频率 (RR)。先前研究证实 RVM 与标准肺功能测定相比的准确性, 以及 RVM 用于术后患者阿片类药物反馈。本研究评估全麻期间 MV, TV 和 RR 的 RVM 测量值与呼吸机测量值的相关性。

比较了 10 位全麻手术患者(62.6±7.4 岁; BMI: 28.6±5.2kg/m²)呼吸机和 RVM 的呼吸曲线和两者的测量值, 计算 RVM 的误差、精确度和准确度。RVM 和呼吸机 MV 平均差值为 0.10 L/min (bias: -1.3%, precision: 6.6 %, accuracy: 9.0%), TV 平均差值为 40mL (bias: 0.4%, precision: 7.3%, accuracy: 9.1%)。RR 平均差值为-0.22 次/min(bias: -1.8%, precision: 3.7%, accuracy: 4.1%)。比较各点 RVM 和呼吸机曲线相关性, 整体相关性>0.90。

结合本研究证实的插管患者呼吸机测量值相关性与之前研究证实的非插管患者肺量计测量值相关性的结果, RVM 能够提供拔管后连续通气监测。实时连续的通气数据可以驱动术后和拔管后治疗方案, 提早干预治疗并提高患者安全。



Parameter	All statistics are reported as average ± SD across patients		
	MV	TV	RR
Absolute difference	-0.10 ± 0.45 (L/min)	0.04 ± 35.1 (mL)	-0.22 ± 0.16 (b/min)
Bias (%)	-1.3 ± 7.0	0.4 ± 7.0	-1.8 ± 1.3
Precision (%)	6.6 ± 1.8	7.3 ± 1.5	3.7 ± 1.5
Accuracy (%)	9.0 ± 3.0	9.1 ± 2.6	4.1 ± 1.5

The Evaluation of a Non-invasive Respiratory Volume Monitor in Surgical Patients undergoing Elective Surgery with General Anesthesia

Abstract: Continuous respiratory assessment is especially important during post-operative care following extubation. Respiratory depression and subsequent adverse outcomes can arise due to opioid administration and/or residual anesthetics. A non-invasive respiratory volume monitor (RVM) has been developed that provides continuous, real-time, measurements of minute ventilation (MV), tidal volume (TV), and respiratory rate (RR) via a standardized set of thoracic electrodes. Previous work demonstrated accuracy of the RVM versus standard spirometry and its utility in demonstrating response to opioids in postoperative patients. This study evaluated the correlation between RVM measurements of MV, TV and RR to ventilator measurements during general anesthesia (GA).

Continuous digital RVM and ventilator traces, as well as RVM measurements of MV, TV and RR, were analyzed from ten patients (mean 62.6 ± 7.4 years; body mass index 28.6 ± 5.2 kg/m²) undergoing surgery with GA. RVM data were compared to ventilator data and bias, precision and accuracy were calculated. The average MV difference between the RVM and ventilator was -0.10 L/min (bias: -1.3% , precision: 6.6% , accuracy: 9.0%). The average TV difference was 40 mL (bias: 0.4% , precision: 7.3% , accuracy: 9.1%). The average RR difference was -0.22 breaths/minute (bias: -1.8% , precision: 3.7% accuracy: 4.1%). Correlations between the RVM traces and the ventilator were compared at various points with correlations >0.90 throughout.

Pairing the close correlation to ventilator measurements in intubated patients demonstrated by this study with previously described accuracy compared to spirometry in nonintubated patients, the RVM can be considered to have the capability to provide continuity of ventilation monitoring post-extubation. This supports the use of real-time continuous RVM measurements to drive post-operative and post-extubation protocols, initiate therapeutic interventions and improve patient safety.