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ORIGINAL ARTICLE

Weaning by gradual pressure support (PS) reduction without an initial spontaneous breathing trial (SBT) versus PS-supported SBT: A pilot study

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KEYWORDS
Mechanical ventilation;
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Abstract
Background and aim: Studies on weaning strategies have yielded conflicting results regarding the superiority of different methods. The aim of this RCT was to compare the efficacy of gradual pressure support (PS) reduction without an initial spontaneous breathing trial (SBT) with PS-supported SBT.
Methods: Patients mechanically ventilated for >24 h were randomized to weaning by gradual reduction of PS without an initial SBT versus once daily SBT (PS 7 cm H_2O). The primary outcomes were the rates of successful weaning trial and time to successful extubation. The secondary outcomes were the ICU and hospital length of stay, hospital mortality and the occurrence of ventilator-associated pneumonia (VAP).
Results: Of the 120 patients (61 males, median age 35 years), 58 were assigned to PS and 62 to the SBT group. The median (IQR) duration of ventilation prior to weaning was 80.2 (50.5–175.6) h. The baseline characteristics were similar in the two groups except the PaO_2/FiO_2 ratio, which was significantly higher in SBT group. The rates of successful weaning trial (89.7% versus 69.4%) were significantly higher in the PS group. The median duration of weaning (66 h versus 81.5 h, $P = 0.05$) and the median duration of ICU stay (8 days versus 9.4 days, $P = 0.027$) were lower in the PS group. There was no difference in hospital stay, mortality rates or occurrence of VAP in the two arms. On multivariate analysis, the duration of ventilation prior to weaning, baseline SOFA score and the weaning method were predictors of successful extubation.
Conclusions: Gradual reduction of PS without an initial SBT was found to be associated with better outcomes compared to once daily PS-supported SBT.

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PALAVRAS-CHAVE
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ARDS

Desmame por redução gradual da pressão de suporte (PS) sem uma prova de respiração espontânea (SBT) inicial versus PS apoiada pela SBT: um estudo piloto

Resumo
Antecedentes e objetivo: Os estudos sobre estratégias de desmame tiveram resultados controversos em relação à superioridade de métodos diferentes. O objetivo deste RCT foi comparar a eficácia da redução gradual da pressão de suporte (PS) sem uma prova de respiração espontânea (SBT) inicial com a PS apoiada pela SBT.
Métodos: Os pacientes ventilados mecanicamente por >24 horas foram aleatorizados para desmame por redução gradual da PS sem uma SBT inicial versus a SBT uma vez por dia (PS-7 cm H_2O). Os principais resultados foram as taxas de sucesso do teste de desmame e o tempo até a extubação bem sucedida. Os resultados secundários foram o tempo em que estiveram na UCI e no hospital, mortalidade hospitalar e ocorrência de pneumonia associada ao ventilador (VAP).
Resultados: Dos 120 pacientes (61 homens, média de idade de 35 anos), 58 foram atribuídos ao grupo de PS e 62 ao grupo de SBT. A duração média (IQR) da ventilação antes do desmame foi de 80,2 (50,5–175,6) horas. Os parâmetros basais foram semelhantes nos dois grupos, exceto a taxa PaO_2/FiO_2, que foi significativamente superior no grupo de SBT. As taxas de testes de desmame bem-sucedido (89,7% versus 69,4%) foram significativamente superiores no grupo de PS. A duração média de desmame (66 versus 81,5 horas, $p = 0.05$) e a duração média de tempo na UCI (8 versus 9,4 dias, $p = 0,027$) foi inferior no grupo PS. Não se registaram diferenças no tempo em que estiveram no hospital, taxas de mortalidade ou ocorrência de VAP nos dois grupos. Numa análise multivariada, a duração de ventilação antes do desmame, o índice SOFA basal e o método de desmame foram preditores de uma extubação bem sucedida.
Conclusões: Descobriu-se que a redução gradual da PS sem uma SBT inicial estava associada com melhores resultados comparados com PS apoiada pela SBT uma vez por dia.

Introduction

Weaning from mechanical ventilation allows patients to resume their spontaneous breathing.[1] Almost 40–50% of the total duration of mechanical ventilation is spent on the weaning process.[2] Delayed weaning not only exposes the patient to increased cost of intensive care but also increased risk of complications.[3–5] Hospital mortality increases with prolonged mechanical ventilation, in part because of complications like ventilator-associated pneumonia (VAP) and airway trauma.[5] On the other hand, premature weaning is associated with difficulty in re-establishing artificial airway, compromised gas exchange, high incidence of VAP and increased mortality.[6] The major factor in successful weaning is resolution of the precipitating illness. Other factors include the comorbid illnesses, cause of acute respiratory failure (ARF), protocol and the method of weaning. Among these, the method of weaning is an important variable because of the potential to intervene. The major weaning studies have been conducted using spontaneous T-piece trials and pressure support (PS) ventilation.[7,8] In these studies, readiness to wean has been assessed by an initial 2 h T-piece trial; patients who tolerate this trial are extubated whereas those failing this trial are randomized to different weaning methods. The reintubation rates of the initial spontaneous breathing trials (SBTs) have ranged from 10 to 20%.[7–11]

Since the inception of our respiratory intensive care unit (RICU), it has been the practice to wean patients by gradual PS reduction without employing an initial SBT. No study has compared the efficacy and safety of a weaning method without an initial SBT as the initial strategy. We hypothesized that weaning would be more physiological once PS is gradually decreased, and could potentially result in better outcomes than initial SBTs. The aim of this randomized controlled trial (RCT) was to examine the efficacy and safety of two different weaning methods viz. gradual reduction of PS without an initial SBT versus SBTs using low-level PS.

Material and methods

The study was conducted between January 2008 and June 2009 in the RICU of this institute, and was approved by the Ethics Committee (PGIMER Ethics Committee; VS/1353). An informed consent was taken from all the patients or their relatives. All data in the RICU were entered prospectively into a computer program specifically designed for this purpose as previously described.[12]

Inclusion criteria

Patients with ARF requiring mechanical ventilation for more than 24 h were included. The severity of the underlying illness and the quantum of the organ dysfunction/failure appearing after RICU admission were scored using SOFA scores.[13] New-onset organ dysfunction/failure was computed using ΔSOFA score, by subtracting the SOFA score at admission from the maximum SOFA during the ICU stay.[14] All patients received volume-targeted assist control mode