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Editorial

Extubation bundle, is it applicable to reduce the rate of reintubation, among preterm neonates?

Mohammad Abdelmaaboud*
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*__Correspondence__: Professor and Head of Pediatrics Department, Minia University, Egypt
Email: dr-mohamed@gmail.com

Abstract

Respiratory support in the form of mechanical ventilation is a crucial intervention in premature neonates, with respiratory problems. However, prolonged mechanical ventilation and endotracheal intubation may be associated with major adverse effects, such as ventilation-associated pneumonia (VAP), pneumothorax, bronchopulmonary dysplasia (BPD) and periventricular hemorrhage.

To minimize such risks and complications, it is recommended to discontinue MV as soon as babies are able to maintain spontaneous breathing and achieve appropriate gas exchange with minimal respiratory effort. The ideal time for extubation is based on clinical and laboratory parameters assessed at the time of planned extubation. However, such parameters are not very objective, which makes extubation in NICUs a trial-and-error approach. Based on the morbidities associated with the long duration of MV in newborn babies, there is a clear need to establish objective criteria for extubation and avoid reintubation.

In this editorial, we will focus on the extubation bundle including modified spontaneous breathing trial (MODIFIED SBT) prior to extubation which can independently predict successful extubation in preterm babies.

Key words: Extubation, bundle, preterm, mechanical ventilation, neonates.

Introduction

Respiratory support in the form of mechanical ventilation is a crucial intervention in premature neonates, with respiratory problems. However, prolonged mechanical ventilation and endotracheal intubation may be associated with major adverse effects, such as ventilation-associated pneumonia (VAP), pneumothorax, broncho-pulmonary dysplasia (BPD) and periventricular hemorrhage. [1, 2]

To minimize such risks and complications, it is recommended to discontinue MV as soon as babies are able to maintain spontaneous breathing and achieve appropriate gas exchange with minimal respiratory effort. [2] The ideal time for extubation is based on clinical and laboratory parameters assessed at the time of planned extubation. However, such parameters are not very objective, which makes extubation in NICUs a trial-and-error approach. [2, 3]

Based on the morbidities associated with the long duration of MV in newborn babies, there is a clear need to establish objective criteria for extubation and avoid reintubation. [3, 7]

Failure of extubation has been associated with higher morbidity and mortality, increased length of hospital stay and more ventilator days. [8] Thus, identifying techniques for predicting successful extubation attempts may reduce mortality and morbidity associated with ill-timed extubation attempts.

Adequate brain maturity and lung function are prerequisites for successful transition from mechanical ventilation to spontaneous breathing among premature babies. In the absence of significant apneic episodes, bedside pulmonary function tests may be useful in conjunction with infant's clinical status and blood gas parameters to predict the success of extubation. [9, 10]

Data on pulmonary function tests prior to extubation in premature babies are

limited and conflicting. Most of the studies were conducted in babies with wide ranges of gestational age (GA), birth weight, and postnatal age at extubation and did not account for comorbidities such as patent ductus arteriosus (PDA), pulmonary hemorrhage, severe intracranial hemorrhage, atelectasis, and pneumonia after extubation that may contribute to the failure of extubation. [9-12]

Extubation bundle including modified spontaneous breathing trial (MODIFIED SBT) prior to extubation can independently predict successful extubation in preterm babies.

When the clinical team decides a newborn is ready for extubation based on the extubation bundle, a modified SBT (10 min) is used (Figure 1).

Extubation is considered successful when the babies are able to remain without invasive ventilatory support for 24 hours; extubation failure may be defined as the need for reintubation for any reason within 24 hours after extubation. The time for extubation is to be determined by the medical staff based on clinical assessment and a designed extubation bundle (Table 1).

A modified SBT is to be performed when ventilated babies are ready for extubation, if failed SBT to be repeated until successful.

Conclusions

Extubation bundle with modified spontaneous breathing trial (MODIFIED SBT) prior to elective extubation is recommended to be used in predicting successful extubation in premature babies. Guidelines for extubation among premature babies are needed in order to reduce unnecessary exposure to adverse effects of mechanical ventilation. Multicenter studies related to extubation guidelines in preterm babies are needed to improve the outcome and reduce morbidity and mortality in this age group.

Conflict of interest

The author has no conflict of interests to declare.

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Author's details

[1]MD, Professor and Head of Pediatric Department, Minia University, Egypt

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Table 1: Extubation Bundle Elements

Extubation Bundle Elements						
Discuss readiness for extubation	Baby triggering well (Adequate respiratory drive)		Mean Airway Pressure < 9 cm H20	FiO2 < 30%	VT < 5 ml/kg	MODIFIED SBT Done
	Caffeine citrate	Weaned from sedation				

FiO2: fractionated inspired oxygen, VT: Tidal volume, MODIFIED SBT: modified spontaneous breathing trial

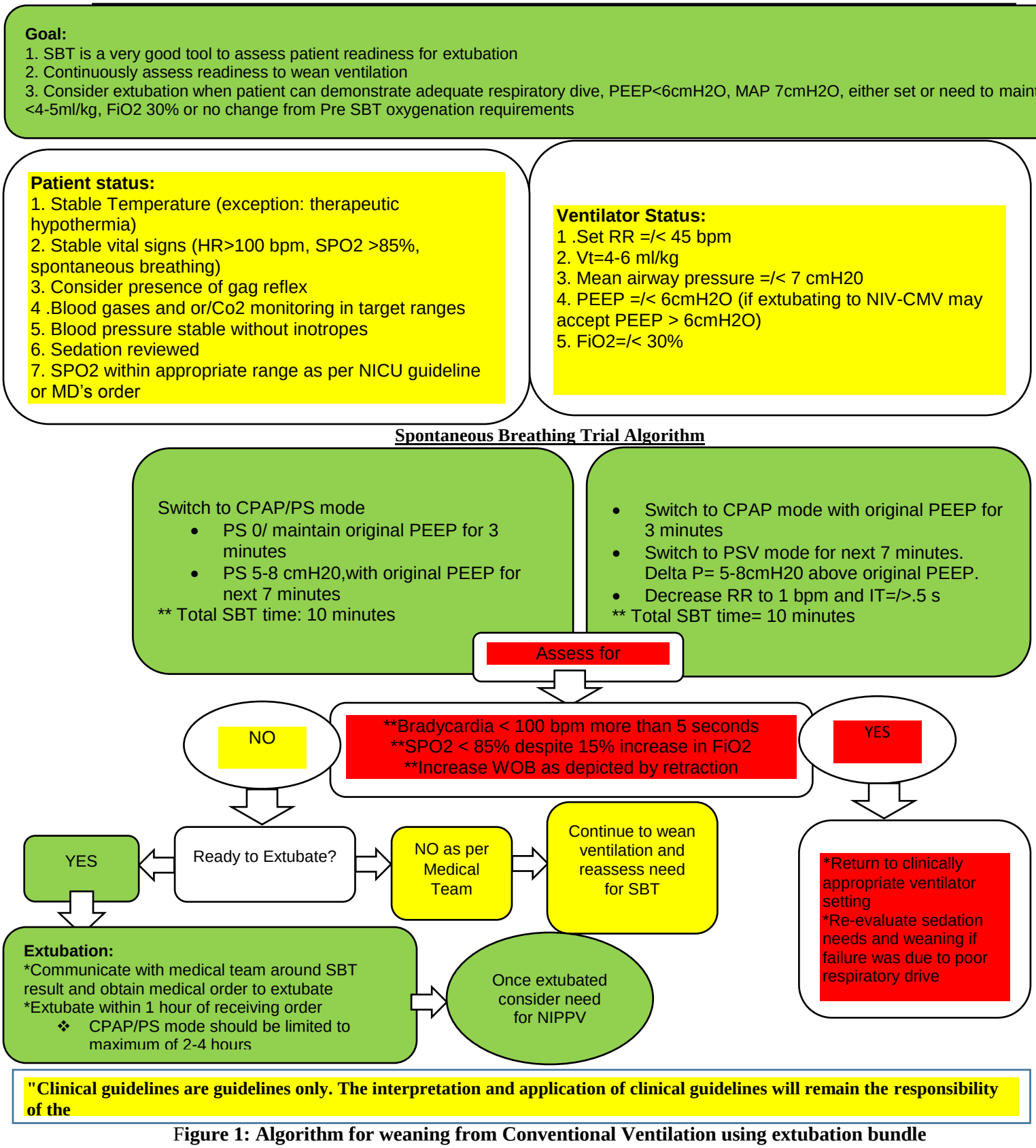

Figure 1: Algorithm for weaning from Conventional Ventilation using extubation bundle

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