

# Alveolar recruitment maneuvers in ventilated children: Caution required

Sir,

Recruitment is a physiological process of re-aeration of a previously gasless lung region by positive pressure ventilation.<sup>[1]</sup> Alveolar recruitment maneuvers (RMs) are done to open up collapsed alveoli by using continuous or repetitive application of increased levels of distending pressure usually much higher than recommended for ventilation in children. By increasing the lung volume, RMs may render ventilation more homogeneous, improving gas exchange and limiting distention of healthy lung units.<sup>[1]</sup> RMs are performed in conditions with severe hypoxemia like in cases of acute lung injury (ALI) and acute respiratory distress syndrome (ARDS). Numerous methods have been employed to carry out RM. They range from prone positioning to complicated manipulation of airway pressures.

Following initial reports that RMs improve oxygenation and decreases the incidence of atelectasis in children, performing them has increased in intensive care units.<sup>[2]</sup> Although most of the studies were done in adults, the principle was extrapolated for pediatric use as well. Despite recent advances, optimal recruitment strategies in ARDS have not been well-established and considerable uncertainty remains regarding the appropriateness of RMs and its long-term outcome.<sup>[3]</sup> Moreover, presence of numerous RM strategies and lack of consistent universal consensus makes evidence from individual trials incomparable. Concerns prevail about the long-term outcome as RMs can worsen lung injury and release cytokines into circulation.<sup>[4]</sup>

A study done on eight mechanically ventilated children found that RMs are effective in preventing airway closure.<sup>[5]</sup> Another study done on 32 ventilated pediatric intensive care patients found that sustained inflations as RM was safe and associated with a significant reduction in oxygen requirements ( $\text{FiO}_2$ ) by 6.1% lasting up to 6 hours.<sup>[6]</sup> However, a RCT done in 48 children with heterogeneous lung pathology found that RMs had no immediate or short-term benefits on ventilation or gas exchange when compared with controls.<sup>[7]</sup> Animal studies have shown that RMs in the presence of alveolar edema can promote inflammatory response leading to alveolar epithelial injury and worsened pulmonary function.<sup>[8]</sup> RMs can also cause frequent hemodynamic compromise, desaturation, new air leaks, dissemination of intratracheal organisms and bacteremia.<sup>[9]</sup>

Since RMs achieve the short-term goal of maintaining oxygen saturation, one may be tempted to perform the procedure frequently. As most of these concepts are assumed from adult studies, there is an urgent need for RCTs to find out the efficacy of RMs and its long-term outcome in ventilated children. Results from RCTs to assess outcome should be viewed with caution because of innumerable confounding factors which can have a direct bearing on the outcome. Assessing the isolated effect of RMs on long-term outcome can be difficult. With the current available evidence, RMs should be reserved for cases with refractory hypoxemia despite high pressures and  $\text{FiO}_2$  and its routine use in all ventilated children with ALI or ARDS should be discouraged.

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10.4103/0972-5229.83005