



Intrapulmonary Percussive Ventilation (IPV) Improves Atelectasis in Intubated Pediatric Patients More Effectively Than Percussion with Postural Drainage (P&PD).

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Introduction: Atelectasis is a significant problem for ventilated pediatric patients that may prolong the need for mechanical ventilation and increase intensive care unit length of stay. This study compared intrapulmonary percussive ventilation (IPV) and percussion with postural drainage (P&PD) for the treatment of atelectasis in intubated pediatric patients.

Methods: Intubated patients with atelectasis were randomly assigned to receive IPV or P&PD treatments within four hours of atelectasis identification on chest radiograph. Four to seven treatments were given during the 24 hour study period. IPV treatments were delivered using the IPV-1/ Impulsator (Bird Products Corp., Palm Springs, CA.). Maximum pressure of 8 CmH₂O greater than the baseline PIP, frequency cycles from 300 down to 100 per minute and 20 cc of normal saline were used during each 20 minute IPV treatment. The 20 minute P&PD regimen included three different clapping positions. Standardized ventilator settings were used during each treatment and non-treatment ventilation was determined by the clinical team. A radiologist blinded to the treatment modality scored atelectasis for pre-study and post-study chest radiographs using a four point scale. (0 = no atelectasis and 4 = multilobar atelectasis)

Results: IPV resulted in a greater improvement in atelectasis score than P&PD (two-sided Fishers Exact Test, $p < 0.001$). All patients receiving IPV ($n=17$) had a reduction in atelectasis score and 12 of 17 (71%) IPV patients had an improvement in score of ≥ 2 . None of the patients receiving P&PD ($n=16$) demonstrated improvement and the atelectasis score worsened in four of 16 (25%) P&PD patients. Average pre-treatment atelectasis score was higher in the IPV group (2.9 vs 1.9, $p = .001$). There was no difference between groups in highest PEEP, number of treatments, age, diagnosis or sex. No complications were identified in either group.

Conclusions: P&PD was not effective in the treatment of atelectasis in this population of intubated, mechanically ventilated pediatric patients. Atelectasis improved in the patients treated with IPV suggesting that IPV may be an effective treatment of atelectasis in the ventilated pediatric patient. Further research investigating the treatment of atelectasis should compare IPV with standard ventilation strategies and other recruitment methods.

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