Comparison of T-piece Resuscitator with Other Flow – Inflating Bags for Providing Positive Pressure Ventilation During Neonatal Resuscitation: A Systematic Review

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INTRODUCTION

- Around 10% of neonates require respiratory assistance at birth.1
- Out of these, around half need assisted ventilation, and less than 10% require extensive resuscitation.1
- For neonates failing to establish spontaneous breathing, effective positive pressure ventilation (PPV) is crucial for their successful resuscitation.2
- Various guidelines recommend flow-inflating bag, a self-inflating bag, or a pressure-limited T-piece resuscitator (TPR) for neonatal PPV.1,2
- Though the most commonly used manual ventilation devices for providing PPV for neonates are Self-inflating bags, TPR is gradually becoming more widespread for the same purpose these days.3
- There is unsatisfactory evidence regarding the optimal device for establishing effective PPV in neonates at birth.4

OBJECTIVES

- To compare the T-piece resuscitator (TPR) with other flow-inflating bags for providing positive pressure ventilation (PPV) during neonatal resuscitation.

MATERIALS & METHODS

- We searched Pubmed, EMBASE and Cochrane databases from the inception to June 2015 for randomized controlled trials with specific search terms.
- All studies published in English language which compared TPR with flow-inflating bags were eligible for inclusion.
- Primary outcome: intubation rate.
- Secondary outcomes: heart rate, oxygen saturations, APGAR scores at 5 minutes, number of days of mechanical ventilation, length of stay, and mortality rates
- Two reviewers independently performed study selection, data extraction and quality assessment procedures.

RESULTS

- A total of five studies with 1607 neonates were included in this review.
- In comparison with other groups, TPR group was associated with:
  - Less intubation rates (2 out of 4 studies, with significant results).
  - Better oxygen saturations.
  - Lesser mechanical ventilation days (2 out of 4 studies, with significant results).
  - Less mortality.
  - One study showed significant reduction in intubation rates in TPR group compared to self-inflating bags (OR 0.08, 95% CI 0.4-0.8).5

DISCUSSION

- Various devices are used to provide manual ventilation during neonatal resuscitation such as:
  - Self-inflating bag
  - Flow-inflating bag
  - TPR
  - Each device has its own advantages and disadvantages.
  - The most commonly used device is Self-inflating bag.4
  - Studies on Manikins have shown that TPR guarantees reliable pressure, irrespective of operator-dependent variables.5
  - TPR is a common device used for neonatal resuscitation.
  - It is considered easy to use, even for inexperienced operators.6
  - It is easier to deliver a sustained inflation and continuous positive airway pressure (CPAP) with TPR than with self-inflating and flow-inflating bags.
  - Usage of TPR often delivers the most consistent pressures than with other devices.
  - The pressures are set according to a built-in manometer.
  - The 2010 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations observes that no clinical studies support or refute the superiority of TPR over other modalities in improving outcome in newborns requiring PPV during resuscitation.7
  - However, the same guidelines also observe that in mechanical models, usage of TPR for PPV (in comparison with self-inflating bags or flow-inflating bags) was associated with:
    - More consistent achievement of target inflation pressures.
    - More consistent maintenance of PEEP and.
    - More sustained inflation.

CONCLUSIONS

- Neonatal resuscitation with TPR decreases the intubation rates, mechanical ventilation days and mortality.
- Further more trials with large sample size are warranted.

REFERENCES

5. Finner NN 2004
7. Finner NN 2004
9. Finner NN 2004

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