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RESEARCH ARTICLE

COMPARATIVE STUDY OF PRESSURE CONTROL VENTILATION VERSUS VOLUMECONTROL VENTILATION IN PEDIATRIC ICU PATIENTS NEEDING MECHANICALVENTILATION

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Abstract

Introduction:-

Pneumonia accounts for 19 percent of under five mortality.(1) A large percentage of these pneumonia patients require mechanical ventilation due to respiratory failure. Further, mortality rate in ventilated PICU children can be quite high- Lee et al recently found that 56% the ventilated children died .(2) Hence Mechanical ventilation is an important aspect of management of children in pediatric intensive care unit.(3) There is a paucity of literature about the preferred mode of ventilation in children.

Aims and Objectives:-

To evaluate whether in pediatric patients requiring mechanical ventilation does volume control ventilation as compared to pressure control ventilation decrease mortality and morbidity .

Objectives:-

Primary Objective – To compare mortality in pediatric ICU patients ventilated by Volume controlled ventilation versus Pressure controlled ventilation

Secondary Objective –To Compare following outcome measures between PICU patients ventilated by volume control ventilation and pressure control ventilation

1. Length of stay in ICU
2. Duration of ventilation
3. Peak airway pressure
4. PaO2/FiO2 ratio
5. PCO2
6. Development /presence of other complications like

a) Shock
b) Ventilator associated pneumonia

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Materials And Methods:-

After taking approval from the institutional ethics committee, written informed valid consent was taken from patients' relatives after explaining the study protocol. We enrolled 65 patients of either sex, 3 months to 12 years , having respiratory failure and requiring mechanical ventilation . Computer generated table of random numbers was prepared allotting equal number of patients in both groups. In the VC group 3 patients were excluded due to less than 12 hours of ventilation and 4 patients were excluded in the PC group as duration of ventilation was less than 12 hours . Ultimately 62 study participants were enrolled in VC group and 61 participants were enrolled in the PC group .

Volume control ventilation Volume-controlled mechanical ventilation is delivered with a constant inspiratory flow, resulting in increasing airway pressure through inspiration. To maintain this fixed rate of gas flow the pressure must rise through inspiration. The actual preset tidal volume remains constant as lung compliance and resistance change. High inspiratory flow during volume-controlled ventilation has detrimental effects on lung ventilation. Therefore, low inspiratory flow rates should be used to keep the peak ventilator pressure as low as possible. This ensures more homogeneous ventilation.

The baseline demographic parameters like age , sex for all the study participants were entered in datasheet and the baseline parameters for SAPS scoring like heart rate , systolic blood pressure , temperature , urine output , blood urea , total leucocyte count, serum potassium , serum sodium , serum bicarbonate , serum bilirubin , GCS score were also recored . After 12 hours of ventilation the outcome parameters like PaO2/FiO2 ratio , peak airway pressure and pCO2 were recorded and the final outcome like length of stay in hospital , duration of mechanical ventilation , moortality and complications like shock and ventilator associated pneumonia were noted .

Results:-

All the baseline parameters for the study pariticipants in both groups like age , sex , heart rate , systolic blood pressure , temperature , urine output , blood urea , total leucocyte count, serum potassium , serum sodium , serum bicarbonate , serum bilirubin , GCS score and SAPS scoring were analysed and were found to be comparable in both the groups .

The results of outcome variables were suggestive of improved oxygenation but raised airway pressure in VC group compared to PC , but there was no significant difference in the duration of ventilation , duration of hospital stay , mortality and complication rate like shock , ventilator associated pneumonia between the two groups . The possible mechanism for the ventilator induced lung injury like barotrauma and volutrauma might not be the only mechanism behind ventilator induced lung injury .(4) There might be release of inflammatory mediators due to mechanical ventilation ,which might be a major contributing factor for mortality and morbidity in mechanically ventilated patients and this might be a possible explanation for the similar rate of mortality in both modes of ventilation.(5) However further research is needed to confirm the exact mechanism behind the complications of mechanical ventilation .

Conclusion:-

The present study was conducted to compare the clinical parameters and outcome between two modes of ventilation SIMV –VC and SIMV –PC and the results obtained from the study concludes that though SIMV – VC mode improves oxygenation in the form of better PaO2/FiO2 ratio and SIMV –PC mode maintains lower airway pressure but the final outcome in the form of mortality , complication rate , length of hospital stay and duration of ventilation are similar and there is no statistically significant difference between the two groups in these parameters . However more research needs to be done regarding quantification of inflammatory mediators to confirm their possible corelation . From the study we can conclude that the mode of ventilation needs to be chosen wisely according to the clinical profile of the patient and proper ventilatory settings in both volume and pressure controlled modes give similar clinical outcome .

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