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POSITIONING AND "HEAD UP" DOES IMPROVE VENTILATION AND LUNG PROTECTION.

Emergency Medicine

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KEYWORDS

OBJECTIVES:-
Head-elevated body positioning, a default clinical practice, predictably increases end-expiratory transpulmonary pressure and aerated lung volume. In acute respiratory distress syndrome (ARDS), however, the net effect of such vertical inclination on tidal mechanics depends upon whether lung recruitment or over distension predominates. We hypothesized that in moderate to severe ARDS, bed inclination toward vertical unloads the chest wall but adversely affects overall respiratory system compliance (CRS).

Design:-
Prospective physiological study for Better Lung Ventilation.

Setting:-
SMS Hospital Emergency Medicine OPD & IPD (Emergency medical ICU)

Patients:-
60 patients with ARDS, predominantly moderate to severe.

Intervention:-
Patients were ventilated passively by volume control. We measured airway pressures at baseline (no inclined) and following bed inclination toward vertical by an additional 15°. At baseline and following inclination, we manually loaded the chest wall to determine if CRS increased or paradoxically declined, suggestive of end-tidal over distension.

MATERIALS AND METHODS:-
This Study was performed in SMS Hospital Emergency Medicine Department (OPD & IPD) and Emergency medical ICU with all data collected by the same investigative team between August and Sep 2022.

Patients:-
Only patients with ARDS, as defined by the Berlin consensus criteria, were enrolled and evaluated ([17]). All received invasive mechanical ventilation under controlled conditions, with passive breathing assured either by ongoing administration of neuromuscular blockers or deep sedation adequate to suppress all physical and monitored evidence of active breathing.

Ventilator Strategy:-
All patients received mechanical ventilation in volume regulated, control mode (decelerating waveform) using one of two ventilators: Puritan Bennett 980 (Medtronic, Carlsbad, CA) or Maquet Servo-i (Siemens, Bloomfield, CT). Baseline measurements were performed using the tidal volume (VT), set PEEP, and respiratory rate prescribed by the clinical team prior to study enrollment, which were left unchanged for its duration. Whenever consistent with acceptable gas exchange, clinical teams used lung protective VTs

Table 1. - Patient Characteristics

Subject	Duration of Hospitalization (d)	Duration of Intubation (d)	Pao 2/Fio 2	Pco 2 (mm Hg)	Set Tidal Volume (mL/kg Predicted Body Weight)	Set Positive End-Expiratory Pressure (cm H2O)
1	1	1	85	50.8	7	16
2	3	2	137.5	101	4.9	12
3	1	1	197	37	6.0	10
4	2	1	83	81.3	5.4	6
5	1	1	87	62.6	3.9	6
6	3	2	157.2	65.3	5.9	9
7	2	1	245	63.4	5.5	12
8	1	1	82.2	63.2	5.9	5
9	1	2	86.9	61.5	5.4	8
10	2	1	147	48.1	7	14

Positioning:-
All patients were supported on identical critical care beds ("In Touch" Stryker, Kalamazoo, MI). Measurements were obtained in the positions (either prone or supine) used by the clinical team; except for inclination, these were not altered for the purposes of data collection. When possible, study measurements were repeated in the opposite position within 24 hours, provided that the criteria for passive breathing were still met. In supine patients, "baseline" measurements were obtained at a semi-recumbent angle with the head of bed elevated to 30° from horizontal and lower extremities parallel to the floor. In prone patients, baseline measurements were initially obtained horizontally (0°) with no elevation of either the head of bed or lower extremities. Following baseline measurements in either supine or prone position, the entire bed was "inclined" by tilting its plane relative to the floor (15° reverse Trendelenburg) without adjusting the existing angulations of the head of bed. To minimize risk of excessive airway pressure or hemodynamic compromise, the inclined position was maintained only as long as needed for data collection.

MEASUREMENTS AND MAIN RESULTS:-
Inclination resulted in a higher plateau pressure (supine Δ: 2.8 ± 3.3 cm H_2O [$p = 0.01$]; prone Δ: 3.3 ± 2.5 cm H_2O [$p = 0.004$]), higher driving pressure (supine Δ: 2.9 ± 3.3 cm H_2O [$p = 0.01$]; prone Δ: 3.3 ± 2.8 cm H_2O [$p = 0.007$]), and lower CRS (supine Δ: 3.4 ± 3.7 ml/cm H_2O [$p = 0.01$]; prone Δ: 3.1 ± 3.2 mL/cm H_2O [$p = 0.02$]). Following inclination, manual loading of the chest wall restored cRS and driving pressure to baseline (preinclination) values.

CONCLUSIONS:-
In advanced ARDS, bed inclination toward vertical adversely affects CRS and therefore affects the numerical values for plateau and driving tidal pressures commonly targeted in lung protective strategies. These changes are fully reversed with manual loading of the chest wall, suggestive of end-tidal over distension in the upright position. Body inclination should be considered a modifiable determinant of transpulmonary pressure and lung protection, directionally similar to tidal volume and positive end-expiratory pressure.

REFERENCES:-

1. Department of Pulmonary and Critical Care Medicine, University of Minnesota School of Medicine, Minneapolis, MN., Department of Mathematics, Vanderbilt University, Nashville, TN., Department of Surgery, Regions Hospital, St. Paul, MN., Department of Surgery, University of Minnesota School of Medicine, Minneapolis, MN., Department of Anesthesiology, Emergency and Intensive Care Medicine, University of Gottingen, Gottingen, Germany., Department of Critical Care Medicine, Regions Hospital, St. Paul, MN.