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AIRWAY PRESSURES WITH JACKSON-REES CIRCUIT

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Introduction and Aims

Jackson Rees modification of Ayre's t-piece (Mapleson F) is an anaesthetic breathing system widely used in paediatric and neonatal anaesthesia.

Traditionally anaesthetists are taught to assess airway pressures generated by the feel of the reservoir bag. In our institution, there is no routine, objective continuous measurement of airway pressure. Trainees in anaesthesia typically rotate through paediatric theatres in 2-3 month blocks. During this time they learn to use the t piece.

Low airway pressure can lead to under ventilation and de-recruitment of alveoli.

High airway pressures can lead to over-ventilation, pressure and volume related lung damage and stomach insufflation with splinting of diaphragm if face mask / supraglottic device used.

Aims

1.   Objectively measure the inspiratory and expiratory pressures during bag and mask ventilation and compare with perceived pressures.

2.   Objectively measure pressure during CPAP with Jackson-Rees circuit and compare to the perceived pressure.

3.   To assess the difference in perception of objective measurements between consultants and trainees

Methods

Target population: Consultant Paediatric Anaesthetists (n=20); anaesthetic trainees (n=18) at LTHT, Leeds.

Measurement: Scenario simulated without patients, using a reservoir bag as test lung and CO_2 side channel of the HME filter connected to a manometer (cmH_2O)(1). Subjects asked to simulate performing BMV and CPAP. The perceived pressures noted, simultaneously taking objective measurements.

Data collection: Participants blinded, data collected by one individual on pro-forma

Analysis: Intra class correlation; t-test for mean of difference; Scatter and Bland Altman plots.

Results

Intra-class correlation in inspiratory, expiratory and CPAP respectively:

Consultants: 0.147 (p=0.367), 0.303 (p=0.221), 0.087 (p=0.426)

Trainees: 0.817 (p=0.001), 0.469 (p=0.098) and 0.233 (p=0.304).

Mean of difference (cmH20) in inspiratory, expiratory and CPAP respectively with 95% CI:

Consultants: 1.50 [-12.47 – 15.47], 0.90 [-7.98 – 9.78], 0.75 [-11.04 – 12.54].

Trainees: 1.00 [-12.04 – 14.04], 1.028 [-6.40 – 8.46], 0.28 [-14.25 – 14.80].

Not significant in any observations between consultants and trainees (t-test; $p > 0.8$)

Discussion and Conclusion

There is poor correlation between perceived and measured pressures among consultants or trainees as most values of Intra-class correlation are <0.7. Although the mean of difference in consultants and trainees are < 1.5 cmH20, the 95% confidence interval is too wide and the actual difference in individual observations are large. This suggests that both consultants and trainees are inaccurately perceiving the pressures they generate. The absence of significance between the means of difference between trainees and consultants suggests that consultants are no better than trainees at accurately perceiving pressures generated. Our suggestion is to use inline manometers to measure airway pressures more accurately when using the Jackson-Rees modification of Ayres t piece during paediatric and neonatal anaesthesia.

Reference:

1. Pediatric Anesthesia, 15, 256–260