

Title : PHYSICAL VENTILATORY WEANING PARAMETERS IN NEONATES AND INFANTS

Authors : K.G. Belani, M.B.B.S., I.J. Gilmour, M.D., R.C. McComb, R.R.T., T.R. Thompson, M.D.

Affiliation: Departments of Anesthesiology, Respiratory Therapy and Pediatrics, University of Minnesota Medical School, Minneapolis, Minnesota

Introduction. A study was performed in neonates and infants under one year of age to establish criteria for and determine the efficacy of three bedside respiratory weaning parameters, namely, peak inspiratory negative pressure (PINP), inspiratory capacity (IC), and minute ventilation (VE). These criteria have been well studied in adults (1, 2) but similar data are lacking in this age group.

Methods. All patients requiring transtracheal intubation and respiratory support in the neonatal intensive care unit (NICU) were studied prior to extubation to measure these three parameters. The results of these measurements were not communicated to the personnel involved in deciding to extubate. The decision to extubate was based on other parameters, namely, clinical status, Downes' score (3), and blood gases which have been well described (4, 5).

PINP was measured with the use of a Bell and Howell 4-327-I physiological pressure transducer which was connected in series with a Tektronix 414 portable patient monitor and a Siemens Mingograf 34 strip chart recorder (Fig. 1). The system was standardized with the zeroing mechanism available in the Tektronix monitor and adapted to fit the endotracheal tube hub. The PINP was measured by allowing the patient to inspire from end expiration for three breaths against a closed system and the highest PINP was noted.

IC and VE were measured by means of a #1 Fleisch pneumotachograph connected in series with a Siemens Siregnost FD10 electronic integrator and a Siemens Mingograf recorder (Fig. 2). The system was standardized by injecting and aspirating known volumes of air with a graduated syringe and adapted to fit the patient's endotracheal tube hub. The IC was measured by noting the highest volumes recorded following a crying maneuver (7). For VE, the baby was allowed to achieve a steady state; VE was then calculated by multiplying mean tidal volume over 15 breaths by the respiration rate in breaths per minute. The relationship between two mutually dependent variables was estimated by determining the coefficient of correlation (r).

Results. Initial data indicate that neonates have the ability to generate high PINPs. The lowest PINP recorded was 17 torr in a 28 week gestational age infant (710 gm) which although higher than that reported as adequate for adults (1, 2) was not associated with successful extubation. Successful extubation was associated with PINPs >30 torr. PINPs correlated excellently with IC ($r=0.83$;

$p<0.05$) when IC was corrected for surface area. Similarly IC had an excellent degree of correlation with VE ($r=0.75$; $p<0.05$) and with PaCO₂ ($r=0.68$; $p<0.05$). VE had only fair correlation with PaCO₂ ($r=0.49$).

Discussion. Bedside assessment of physical respiratory weaning parameters can offer useful information prior to extubation of infants requiring respiratory support. Of the 3 parameters measured, PINP and IC are more predictive. This has also been found true for adults (8).

Conclusion. It appears that infants should exhibit PINPs of at least 30 torr and an IC of at least 100 ml/M² for successful extubation.

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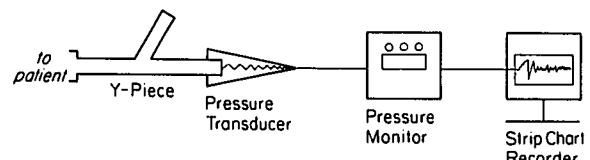


Figure 1. Inspiratory Force Measurement (PINP)

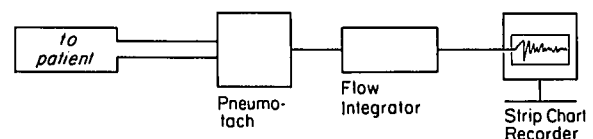


Figure 2. Inspiratory Capacity and Minute Volume Measurement