

Title: THE EFFECT OF MINUTE VOLUME ON PCO_2 USING THE BAIN CIRCUIT

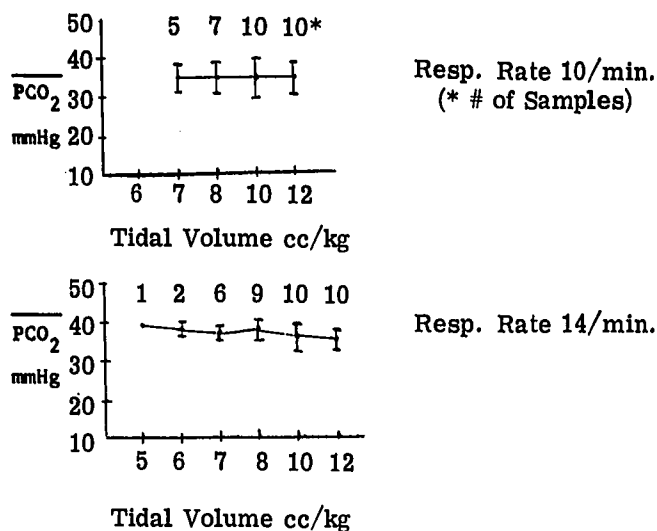
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The Bain circuit has become increasingly popular in recent years. One of the advantages claimed is the ability to maintain normocarbica even with the use of high respiratory minute volumes, particularly tidal volumes. Although Bain has stated that normocarbica will be obtained by any minute volume in excess of fresh gas flow, he recommends minute volumes which are markedly in excess of fresh gas flow (tidal volume equal 12-15 cc/kg, respiratory rate 10-12/minute, fresh gas flow 70 cc/kg/min.).¹ In this study we wish to determine the effect of lowering minute ventilation on pCO_2 .

Methods. Eighteen patients without respiratory disease whose ages ranged from 18 to 61 were studied. PaCO_2 was monitored in ten of the patients who had indwelling arterial lines for unrelated reasons and end expiratory pCO_2 was monitored in the other eight patients using a Godard capnograph. At least two arterial samples were obtained in each of the latter group of patients to confirm the capnograph values. The patients were divided into two sub-groups. The respiratory rate was maintained at 10 per minute in the first group and 14 per minute in the second group. In both groups the fresh gas flow rate was 70 cc/kg. If an initial tidal volume of 12 cc/kg yielded acceptable pCO_2 values, tidal volume was reduced by 1-2 cc/kg decrements until the minute volume was 70 cc/kg. Half hour intervals were allowed to establish each new steady state.

Results. Results are shown in Figures 1 and 2. The pCO_2 was virtually unaffected by the minute ventilation changes in either of the groups. In some patients, however, pCO_2 was in excess of 40 mmHg at all levels of minute ventilation.



Conclusions. Our results show that in adults normocarbica can be maintained when matching minute ventilation to a fresh gas flow rate of 70 cc/kg. We presume that this is due to preferential ventilation with fresh gas.

References.

1. Bain JA, Spoerel WE: Flow requirements for a modified Mapleson D system during controlled ventilation. *Canad. Anaesth. Soc. J.* 20:629, 1973.