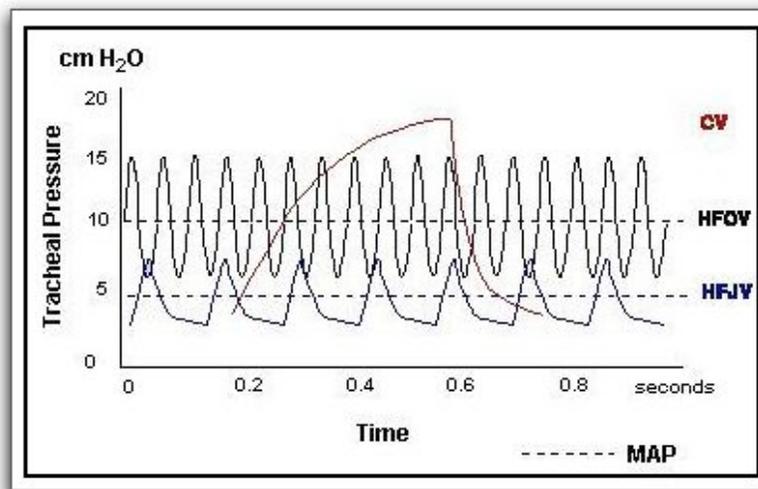


High Frequency Jet Ventilation, used for Treatment of Pneumothorax in Patient with PPHN

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Dr. Barbara Quissell, a neonatologist at Presbyterian/St. Luke's Hospital in Denver, can implement a variety of ventilatory treatment options for any pathophysiology. She is equipped with a number of conventional ventilators, Infant Star® high frequency ventilators, a SensorMedics® oscillator, and the Life Pulse™ High-Frequency "Jet" ventilator. Most of the options require either high volumes or high pressures to be effective. The Jet, however, has long been associated with the ability to use less pressure to achieve good blood gases¹. But, how important is this feature?



MAP, PIP and Delta P Comparison to Achieve Identical Blood Gases¹

Dr. Quissell was treating a 3 kg. congenital diaphragmatic hernia patient with an oscillator at a mean airway pressure of 22 cm H₂O and an amplitude of 28 to achieve the desired blood gases. Lung expansion was 7 to 8 ribs. Over the next several hours the patient required increasing amounts of cardiovascular support, including 400 ml of albumin and packed cells. The patient developed a pneumothorax. Two chest tubes were inserted.

As oxygenation began to worsen, Dr. Quissell carefully inched up the MAP until, at a MAP of 24 cm H₂O, the chest tube water seals were bubbling vigorously. Despite increasing MAP, the lung expansion decreased to 6 to 7 ribs. Dr. Quissell felt this decrease was due to pressure being exhausted out the chest tubes. How could she improve the infant's oxygenation and decrease pressure at the sites of the airleaks?

She placed the baby on the Life Pulse. Within the first few minutes of Jet ventilation, oxygenation soared at a MAP of 11 cm H₂O and a PIP of 28 cm H₂O. One of the chest tubes stopped bubbling and the next xray showed dramatic improvement in air leaks and lung expansion. According to Dr. Quissell, the patient "not only survived, but excelled on the Jet."

Dr. Quissell identified a need to achieve better blood gases using less mean airway pressure. She determined an effective and optimal lung volume strategy, and used the Jet to apply the strategy that would ultimately allow the air leaks to heal. Dr. Quissell stressed the importance of minimizing conventional support during HFJV for airleak syndromes.² In this case, she reduced the conventional ventilator to 5 bpm, a .35 sec Ti, a PIP of 28 H₂O and a PEEP of 2 cm H₂O. Although the Jet is proving to be effective using higher mean airway pressure, it is clear that, in many cases, less pressure is of vital importance.

1. Boros SJ, Mammel MC, Coleman JM, et al. A comparison of high-frequency oscillatory ventilation and high-frequency jet ventilation in cats with normal lungs. *Pediatric Pulmonology*. 1989;7:35-41.

2. Gonzales F, Harris T, Richardson P, et al. Decreased gas flow through pneumothoraces in neonates receiving high-frequency jet versus conventional ventilation. *The Journal of Pediatrics*. 1987;110,3:464-466.