

This Week's Citation Classic

Ashbaugh D G, Petty T L, Bigelow D B & Harris T M. Continuous positive-pressure breathing (CPPB) in adult respiratory distress syndrome. *J. Thorac. Cardiovas. Surg.* 57:31-41, 1969. [Depts. Surg. and Med. & Respiratory Care Unit, Univ. Colorado Med. Ctr., Denver, CO]

The clinical syndrome of acute respiratory distress in the adult is defined both physiologically and pathologically. The use of CPPB in treatment of these patients has resulted in a dramatic improvement in morbidity and mortality. [The *SCI*[®] indicates that this paper has been cited over 205 times since 1969.]

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"This paper is one of a series of papers coauthored by myself and Thomas Petty, which dealt with the acute respiratory distress syndrome in older children and adults.¹ This was our first clinical paper in which the use of continuous positive pressure breathing (CPPB), or positive end expiratory pressure as it is now known, was stressed as an effective treatment modality.

"As is so often found in the understanding of clinical problems, our initial interest was stimulated by failure rather than success. Serendipitous observation eventually played a large role in identifying CPPB as a therapeutic tool that could be evaluated both clinically and in the laboratory. Recognizing the acute respiratory distress syndrome as a clinical entity was a major step forward in focusing attention on acute respiratory failure that arose following a variety of bodily insults.

"There had been, in the previous literature, a number of reports² describing isolated instances of progressive respiratory failure following trauma, fat embolism, excessive administration of blood, and shock. However, no one had seen or noticed the similarities in clinical presentation and course or had done much to investigate the medicine and surgery respectively, at the University of Colorado, were both interested

in providing better respiratory care for our patients and organized a joint medical and surgical respiratory care team. We had no designated space in the hospital and saw patients wherever they happened to be. By present day standards our equipment was meager and mostly begged, borrowed, or stolen.

"The first patient in which we observed acute respiratory distress was a 29-year-old man involved in an automobile accident who, despite being placed on a respirator, went on to develop severe and progressive respiratory failure and died within 48 hours. Our failure, in what we felt should have been a salvageable case, stimulated us to look for additional cases. A few weeks after our first case, a 12-year-old boy was admitted with a severe crushing chest injury. He too, began to follow a similar downhill course despite a tracheotomy and being placed on our only volume respirator, an Engstrom. Even with large volumes of air and 100% oxygen he was doing poorly. In desperation it was decided to try adding *end expiratory pressure*, which happened to be a feature of that model of Engstrom respirator. Dramatic improvement occurred in the patient's condition and he eventually went on to make a very good recovery. Several additional patients were then seen and treated with varying results.

"As we collected our data it became evident that these patients shared many common clinical features and also responded in a similar way to treatment. Our initial paper, presented in *Lancet* in August of 1967,³ suggested that CPPB might be effective. This paper was our follow-up to a much larger series with definite clinical, and by this time, laboratory evidence that continuous positive pressure breathing was beneficial in the treatment.

"Since that time many other authors and institutions have made important contributions to our understanding of the acute respiratory distress syndrome. Continuous positive pressure breathing or positive end expiratory pressure, however, remains a real cornerstone in the management of these patients."

1. Ashbaugh D G & Petty T L. Positive end expiratory pressure. *J. Thorac. Cardiovas. Surg.* 65:165-70, 1973.
2. Jenkins M T, Jones R F, Wilson B & Moyer C A. Congestive atelectasis, complication of intravenous infusion of fluid. *Ann. Surg.* 132:327-47, 1950.
3. Ashbaugh D G, Bigelow D B, Petty T L & Levine B E. Acute respiratory distress in adults. *Lancet* 2:319-23, 1967.