components, an outer cannula, a curette needle, and a hollow bevelled needle with an inner removable stylet. The shaving action of the cannula over the curette after it has engaged the pleura is the recommended technique of pleural biopsy. The Abrams' needle consists of two main concentric tubes: the outer hollow trocar has a deep notch proximal to the tip and the cutting action of the inner hollow tube as it is advanced samples the pleura. The absence of an outer cannula mandates that the Abrams' needle, unlike Cope's, must be removed and reinserted with each biopsy attempt.

We report a rare, although important complication of closed needle pleural biopsy—breakage or bending of the hooked end of Cope's needle that occurred recently on four separate occasions at our institution. In each case, difficulty was noted while trying to remove the curette from the cannula after closed pleural biopsy, prompting removal of the curette and cannula together. On one occasion, however, the tip of the curette broke off immediately after removal of the needle from the patient's chest (Fig. 1). In three other instances, the tip was visibly bent. Fortunately, none of these patients suffered any ill effects.

FIGURE 1. Broken curette and fractured Cope's needle.

A Medline search of the literature from 1966 through 1993 revealed two reports of breakage of the Abrams' needle, but only one fracture case of Cope's biopsy needle. In all cases described, including ours, fracture or bending occurred at the neck of the cutting window, the weakest point of the needle. We assume that fractures of this portion of the pleural biopsy needle resulted from metal fatigue. Undoubtedly, unsatisfactory biopsy technique or damage in handling could also be contributing factors.

We recommend that (1) physicians and trainees performing closed needle pleural biopsy should be familiar with the original technique described by Cope. Pleural tissue should be obtained by the forward movement of the cannula over the curette, not by the withdrawal of the curette into the cannula; (2) one should carefully inspect the biopsy needle before the procedure, cognizant of the fact that the curette can fracture, especially at the neck of the hook; (3) dropping the needle in handling should be avoided because if the distal end of the cannula is deformed, it will snag the hook of the curette during biopsy; and (4) institutions should monitor the number of times the biopsy needle is used before it is visibly damaged.

Philip Eng, M.B.B.S., F.C.C.P., and Henri G. Colt, M.D., F.C.C.P., Division of Pulmonary Medicine, University of California, San Diego, San Diego, California

REFERENCES
6 Barbour G. Hazard of the Cope biopsy needle. JAMA 1970; 211:831

Extracorporeal Life Support For Status Asthmaticus

To the Editor:

We recently read the account of the use of extracorporeal life support (ECLS) in the treatment of a patient with severe asthma in Chest. Use of ECLS in asthma has been the subject of at least three other previous reports.

However, increasing insights into ventilatory strategies for patients with severe asthma and recognition of the safety of permissive hypercapnia instead suggest that ECLS should rarely be required in asthma. In our experience of more that 80 mechanically ventilated asthmatics over 10 years, ECLS was never required. We are concerned that treatment of this patient before ECLS may not have been optimal and a better management plan may have been to optimize conventional therapy first.

Acute severe asthma is characterized by dynamic hyperinflation (DHI), which causes barotrauma, reduced cardiac preload, and cardiovascular compromise. DHI can be minimized by ventilatory strategies that include prolonged expiratory time (Te), usually achieved by high inspiratory flow rate (Vi), and decreased respiratory rate (RR). The initial ventilatory pattern used in this pattern (RR 32, tidal volume [VT] 0.4 L, inspiration to expiration ratio 1.15), resulted in a calculated respiratory minute volume of 12.8 L/min, inspiratory flow rate of only 30 L/min and an expiratory time of 1.125 s. In severe asthma, this pattern always causes significant DHI. Despite a low total ventilation, the high respiratory and the very low inspiratory flow rate combine to produce a very short expiratory time and a very high probability of significant DHI. Although minute volume (VT) 12.8 L/min may be considered only moderate, initial minute volume less than 10 L/min have been recommended and minute volume as low as 5 L/min may be required in some patients to avoid serious DHI in the reported patient, DHI is further suggested by very high peak inspiratory pressures (>65 mm Hg despite an inspiratory flow rate of only 30 L/min) and by the clinical evidence of barotrauma and circulatory compromise. Interestingly, this patient’s peak inspiratory pressures decreased by 50 percent when the respiratory rate was reduced to 20 at the time ECLS was commenced. During asthma, DHI increases directly with decreasing expiratory time, and the point at which serious complications become likely can be accurately and prospectively predicted by measurements of exhaled gas volume after changes in respiratory rate. In this patient, if inspiratory flow rate had instead been increased from 30 to 100 L/min, then expiratory time would have increased from 1.125 to 1.653 s and the inspira-

ion to expiration ratio would have changed to 1.68. This change alone would have produced a substantial reduction in DHI, in circulatory compromise and in risk of barotrauma. If DHI then continued to be a problem, then decreasing respiratory rate may have decreased DHI further.

The second major concern in this patient is whether the degree of hypercapnic acidosis requires ECLS. The PaCO2 levels of up to 120 mm Hg are now accepted as safe both in asthma and in adult respiratory distress syndrome. Permissive hypercapnia in severe asthma is actually well tolerated, is associated with...
increased cardiac function, probably from vasodilation, and is also associated with very high venous oxygen saturation (>85 percent). A mixed venous oxygen saturation of 59 percent in this patient is therefore quite low and probably reflects decreased cardiac output from decreased venous return—a result of DHI. The likelihood of impaired cardiac output in this patient is increased by recognition of the large metabolic contribution to this patient's acidosis (calculated base deficit = -19). This metabolic component was probably lactate acidosis due to impaired tissue perfusion from decreased cardiac output, although excessive parenteral beta sympathomimetics (adrenaline), may also have contributed. The severe acidosis in this patient may therefore have been better treated by improving venous return (decreasing DHI) and by decreasing parenteral adrenaline, than by bicarbonate infusion.

In conclusion, although ECLS may be of value in occasional patients with severe asthma, ECLS is expensive, invasive, very labor intensive, and is best preceded by a careful review of conventional management strategies. Conventional strategies that limit DHI and allow hypercapnia are associated with negligible risk of barotrauma, of cardiovascular compromise, and of patient mortality. We believe that ECLS is rarely indicated in patients with acute severe asthma.

D. James Cooper, B.M.,
David V. Tuxen, M.B.,
and
Alfred Hospital,
Melbourne, Australia; and
Malcolm M. Fisher, M.B.,
Royal North Shore Hospital,
Sydney, Australia

REFERENCES
1 Shapiro M, Kleveland A, Bartlett R. Extracorporeal life support for status asthmaticus. Chest 1993; 103:1651-54
5 Tuxen D, Williams T, Scheinkestel C, Czarny D, Bowes G. Use of a measurement of pulmonary hyperinflation to control the level of mechanical ventilation in patients with severe asthma. Am Rev Respir Dis 1992; 146(5):1136-42
8 Tuxen D, Lane S. The effects of ventilatory pattern on hyperinflation, airway pressures, and circulation in mechanical ventilation of patients with severe airflow obstruction. Am Rev Respir Dis 1987; 136:572-79
11 Cooper T, Cailes J, Scheinkestel C, Tuxen D. Does bicarbonate improve cardiac or respiratory function during respiratory acidosis and acute severe asthma [abstract]. Am Rev Respir Dis 1993; 147:A614

Indications for ICU Admission

To the Editor:

Dr. Bone et al have done an admirable job of reviewing the literature regarding critical care admissions, and the current general emphasis of medicine on outcomes and patient autonomy is evident. The article published in the December 1993 issue of Chest states that the "primary issue is risk of death." Alternatively, the primary issue is the amount of care the patient will need, regardless of possible outcome. Unless accompanied by directives to reduce care, it is faulty systems thinking to suppose that the transfer of a patient who requires intensive nursing care to some other area of the hospital will result in efficiencies. In fact, care of other patients might suffer as the floor nurse tries to meet the needs of one patient.

No benefit from ICU admission was found in the "low risk of death" patient. In my experience, these are precautionary—to observe directly the patient "in case something happens." Even if a serious adverse event or outcome is remote, lawsuits are based on individual, not average, outcomes. The practicing physician is looking for a 100 percent guarantee of a good outcome before chancing a lesser level of care.

Finally, minimal or no benefit may accrue to patients with a high risk of death or persistent vegetative state. Unfortunately, "high risk" has little meaning to families or patients. The usual lack of any direct financial impact on the family, patient, or physician encourages the "high tech, high cost" option. Lacking the perfect outcome indicator, patients and families will readily accept a small chance of survival as a mandate to carry on at all costs.

In response, the indication for ICU admission should be based on the real need for the unique nursing care and equipment that a critical care unit provides. Better tools to measure nursing resource use and outcome based criteria for invasive monitoring should be developed. Intensity of nursing service probably correlates with severity of illness, but this is an area for further research. Specific advanced directives may be our best current tool to prevent surrogate decisions to prolong the end of life. Additionally, society should decide whether to restrict certain medical interventions (such as transplants or dialysis). At this time, patients, families, physicians, attorneys, and society will not accept a mortality driven critical care admission or discharge system.

Michael J. Zia, M.D.,
Southern Illinois University,
School of Medicine,
Decatur, Illinois

REFERENCES

To the Editor:

We appreciate your comments regarding our article on "Analysis of Indications for Intensive Care Unit Admission" (Chest 1993; 104:1807-11).