COMMUNICATIONS TO THE EDITOR

Extracorporeal Membrane Oxygenation for Pulmonary Assist in Patients with ARF

To the Editor:

Temporary extracorporeal support of (or substitution for) certain vital organs can sustain life for several hours to several months in patients suffering from acute respiratory failure. Furthermore, sufficient improvement in the condition of the afflicted vital organ can occur during this supported period of disability, so that ultimate recovery and relatively good health can be achieved by the patient for months or years after what would otherwise have proved a fatal acute interruption of vital organ function. Well-known prime examples are extracorporeal membrane dialysis for acute renal failure, cardiopulmonary bypass for open heart surgery, and cardiac massage for acute ventricular fibrillation or cardiac standstill. There is no question that many thousands of patients have lived, and are now living, productively and happily because of temporary mechanical support of vital cardiac or renal function during functional organ failure.

Because of recent improvements in extracorporeal oxygenators and more sophisticated perfusion techniques, pioneers such as Hill, Kolb, Landé, Drinker, Pierce, Zapol, among others, have shown convincingly that extracorporeal membrane oxygenation (ECMO) can adequately substitute for the vital pulmonary functions of oxygen and carbon dioxide transfer and associated acid-base regulation for several days in patients who are dying in acute pulmonary failure. In several centers, this mechanical substitution for the lungs—variously called ECMO, pulmonary assist, long term partial bypass—is being carried out in a rather routine manner on patients believed to have reversible acute pulmonary failure who are not responding favorably to intensive inhalation therapy. There is evidence that many hospitals with active surgical cardiopulmonary divisions are considering entering this new field of clinical ECMO pulmonary assist. To expedite evaluation of the efficacy of ECMO pulmonary assist for patients in acute respiratory failure, the NHLI has embarked on a nationwide collaborative three-year study involving nine medical centers with expertise in this field.

Before embarking on a program to develop this rather sophisticated, expensive, and elaborate treatment modality, it would seem advisable for hospitals and their administrations to investigate: (1) their capability and willingness to provide the staff and to carry out the laboratory animal experimental training programs necessary in order to properly perform this treatment; (2) their ability and willingness to provide the several hundred thousand dollars in additional funds required to establish and maintain a specialized pulmonary support intensive care unit where the prolonged bypass procedure could be carried out; and (3) the approximate number of patients in their hospital setting such treatment could be expected to serve.

In this context, we have reviewed the need for this form of treatment in the Latter-Day Saints Hospital in Salt Lake City. Our findings probably are fairly representative of the experience of many large acute surgical and medical teaching hospitals who may be considering entering the field of ECMO pulmonary assist. The conclusions of our study follow:

1. Acute respiratory insufficiency ranks fourth, numerically, as a cause of death in the modern hospital setting, accounting for about 10 percent (approximately 50 per year) of the 500 deaths at LDS Hospital.

2. In approximately 30 percent of the patients who died of acute respiratory insufficiency, the underlying primary pulmonary lesions were considered irreversible.

3. Approximately half the patients who died of acute respiratory insufficiency had other medical problems which would have contraindicated utilization of mechanical ECMO pulmonary assist, had it been available.

4. Forty-two percent of patients who died of acute respiratory insufficiency during 1971 and 1972—or about 20 patients per year—appear to have been of the type that could be considered potential candidates for mechanical ECMO pulmonary assist, had that form of treatment been available at the time.

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REFERENCES
Primary Lung Cancer and the Chilaiditi Syndrome

To the Editor:

After noticing some patients with coexisting primary cancer of the lung and the Chilaiditi syndrome (interposition of the colon and, eventually, of the small intestine between the liver and the diaphragm, with the characteristic image of hyperclarity between both organs), we considered making a statistical study—we wanted to know and to compare the incidence of the Chilaiditi syndrome: (a) in the general population; (b) among people affected with thoracic symptomatology; and (c) in those with primary lung cancer.* Certain observations and general conclusions we now wish to share with your readers.

The incidence of the Chilaiditi syndrome in the Orense province population has been studied with a spot check of 100,000 roentgenograms. These were taken from a random sampling (indiscriminately selected) of healthy or supposed-to-be-healthy population. The roentgenograms were secured from a chest x-ray campaign for uncovering thoracic infections in the people of the province. In 23 of these (0.23 per thousand), the Chilaiditi syndrome was traced. In all cases, the chest x-ray film findings were normal (negative).

The incidence among persons affected with thoracic or respiratory symptoms, was arrived at through a check of 19,000 clinical histories and their recorded roentgenograms. Among the 19,000 histories, we found 13 cases with Chilaiditi syndrome (0.7 per thousand). Of the 13, 3 had normal chest roentgenograms and clinical findings; 3 suffered from chronic bronchopathies; 2 from pulmonary tuberculosis; and 5 were diagnosed as having primary lung cancer.

In this same group of 19,000 clinic cases, the number of patients with primary lung cancer (to be selected for further study) was 326. Out of this number, the Chilaiditi syndrome was observed in five cases (15 per thousand), a much higher incidence than was found in the population in general (0.23 per thousand according to our sampling) or among carriers of chest diseases (0.7 per thousand).

The cases showing both primitive lung cancer and the Chilaiditi syndrome numbered, as we said, five. All were men. The location of cancer was on the right side in 4 cases (example given in Fig 1); on the left, in one patient. In the former, the hilus compromise was evident. In all five cases, diaphragmatic mobility on fluoroscopy was good. The coexistence of lung cancer and Chilaiditi syndrome was noticed in the first x-ray examination in 4 of the 5 cases; in the other case (Fig 1), the Chilaiditi syndrome was not discerned on first examination, but appeared later.

To sum up: in our survey of roentgenograms from the general populace and from pulmonary disease carriers, a pronounced increase in incidence of Chilaiditi syndrome was observed among carriers of primary lung cancer.

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*This study was the subject of an article by the same author, published in Revista Clinica Espanola (Spanish Clinical Review), vol 128, no 4, February 28, 1973.