

**Notice:** This editorial is being published early (on August 14, 2001). It will appear in the October 11 issue of the *Journal*.

## *Editorial*

### **SURGERY FOR EMPHYSEMA — NOT FOR EVERYONE**

**T**HE diagnosis of emphysema is bad news. There are very few effective treatments for this common condition<sup>1</sup> and those that are available do not address the chronic hyperinflation of the lung caused by the destruction of alveoli. Patients with advanced emphysema end up struggling for breath when they perform simple tasks such as climbing stairs or carrying groceries. Many are desperate for a treatment that will allow them to engage in, perhaps even enjoy, the activities of daily life without feeling that they are suffocating.

Given this grim outlook, it was not surprising that the publication of the results of an uncontrolled surgical series demonstrating that the removal of areas of emphysematous lung led to substantial improvements in lung function<sup>2</sup> was greeted with great fanfare and widespread acceptance. The operation, termed lung-volume–reduction surgery because it removed areas of hyperinflated lung, was a 1990s revision of a 20-year-old procedure<sup>3</sup> in which emphysematous blebs were removed. In the 1990s revision, the resection of emphysematous lung is done by median sternotomy or by video-assisted thoracoscopic surgery. Although the physiology behind the operation is still not completely understood, the general idea is that the removal of excess lung tissue enhances pulmonary elastic recoil, leaving the patient with a smaller, but more functional, lung. Despite the lack of proof that it worked, the operation was an immediate hit. Within months after the publication of the report by Cooper et al.,<sup>2</sup> Medicare had already paid for over 700 lung-volume–reduction surgeries, with the likelihood that tens of thousands of such procedures would soon be performed each year.<sup>4</sup>

As the operation was performed at more and more centers, two problems emerged. The first was medical. The results of many operations were not as good as one would have expected on the basis of the published literature. In fact, after surgery, many patients languished in intensive care units — not sick enough to die, but without adequate lung function to breathe on their own. The second problem was economic. The nation's burden of emphysema was substantial, and if everyone with moderately advanced emphysema demanded the operation, there would be a shortage of surgeons to perform the operation and a shortage of funds to pay for it. These dual problems demanded a creative solution.

In 1996 the National Institutes of Health (NIH) and the Health Care Financing Administration

(HCFA), the agency responsible for Medicare, decided in a unique joint venture that data from controlled clinical trials were needed before rational decisions could be made about the most judicious use of lung-volume–reduction surgery. A request for applications from academic investigators skilled in the performance of the procedure was made, and within 18 months, the National Emphysema Treatment Trial, a multicenter, controlled clinical trial comparing lung-volume–reduction surgery and medical management of emphysema, was under way. One key factor set this trial apart: Medicare would no longer pay for the operation if it was performed outside the trial. Thus, prospective patients who were also Medicare recipients had only two choices if they wanted lung-volume–reduction surgery: participate in the trial or pay for the operation themselves. The decision to participate in the trial was thus complicated because of the long wait for the operation in the 50 percent of patients who were assigned to the medically managed control group.

Although there has been controversy about this approach to organizing a study,<sup>5,6</sup> in my opinion it was a wise decision. We needed a well-done but adequately controlled clinical trial to provide evidence that lung-volume–reduction surgery actually worked. As more operations were being performed, it became clear that the operation was of great value for some patients and seemed to do more harm than good in others. Thus, the trial needed to do more than show that the operation provided benefit; it had to be undertaken in such a way as to define who would — and who would not — benefit from the surgery. To address this issue, the committee designing the trial used the strategy of measuring multiple physiological and clinical variables before the intervention and then systematically sifting through the data as the trial progressed to see whether there were definable groups of patients who did or did not benefit from the intervention.

The first report of the outcome of the interventional phase of the National Emphysema Treatment Trial, published in this issue of the *Journal*,<sup>7</sup> outlines the clinical characteristics of a group of patients for whom the surgery did more harm than good. These are patients who had a forced expiratory volume in the first second (FEV<sub>1</sub>) that was 20 percent or less of their predicted value and either a carbon monoxide diffusing capacity that was 20 percent or less of their predicted value or evidence on computed tomography of a uniform pattern of emphysema throughout the lungs. About one in eight enrollees met these criteria, and in such patients, surgical intervention resulted in a higher risk of death during the first 30 days than did medical therapy. There were small but not clinically meaningful benefits among the surgical survivors. Thus, the operation harmed some patients and did not benefit those who survived. On the basis of

these data, the investigators are continuing to enroll patients, but patients whose emphysema meets these specifications are no longer considered candidates for the National Emphysema Treatment Trial.

These findings are important. They demonstrate, through the use of data from a controlled clinical trial, that rational bounds can be placed on clinical practice. Some patients who were disappointed when they discovered they were in the control group can now be thankful that this assignment may have saved their lives. At this time, it does not make any sense to use lung-volume–reduction surgery in patients whose emphysema is so severe that they meet these new exclusion criteria; indeed, in my opinion it does not make sense for anyone to undergo lung-volume–reduction surgery outside a controlled trial.

There is one question whose answer must await the completion of the trial. It is possible that the patients with severe emphysema who survived the surgery will do better during long-term follow-up than the cohort of patients receiving medical therapy. Although this seems unlikely to me, it will be important to know what the survival curves (shown in Figure 1 of the article) look like in three years' time. For now, we can prevent iatrogenic suffering by not performing lung-volume–reduction surgery in patients with emphysema whose FEV<sub>1</sub> is no more than 20 percent of their

predicted value and who have a low carbon monoxide diffusing capacity ( $\leq 20$  percent of their predicted value) or whose disease appears radiographically uniform. In evaluating the appropriateness of surgery for emphysema, we would do well to remember that sometimes doing nothing is the best approach.

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## REFERENCES

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