ogist's fee ranged between $450 and $1,150 (average, $652), depending upon the length of the stay in the hospital. The average total cost for the entire group was $13,949 (72 percent for charges by the hospital, 16 percent for professional surgical fees, 7 percent for the anesthesiologist's fee, and 5 percent for the cardiologist's fee.

Discussion

The need for cost studies like the one presented has recently been emphasized in a study dealing with the cost of cardiac pacing. The data presented can be useful in predicting repercussions on our system for the delivery of health care. All patients included in this study were private patients, as opposed to being either veterans or welfare recipients. Similar charges are generated for welfare patients. The basic difference between private and welfare patients is the source of payments. In the group reported here, collections were at least 90 percent of the charges. All had insurance or independent means to cover the expenses. Professional collection was approximately 90 percent; collection by the hospital was close to 100 percent. Only 20 patients were reviewed in order to present a report reflecting a short period, since cost is continuously changing.

No account was kept on the patients' loss of income during illness, but a general assessment was made as far as potential for rehabilitation. At the end of a six-month follow-up period, all of the patients, except one individual previously retired, were back to work, 12 on a part-time basis and seven full time. Ten patients returned to their previous or similar jobs. Nine changed to a different and less demanding job.

In a recent review, Mundth and Austen stated that the cost for this type of surgery is $10,000 per patient. This figure falls far short of the costs uncovered by the present study and highlights the need for more studies in this area.

The fee charged by the hospital, which was 72 percent of the total cost, accounted for the greatest percentage of the total cost. The professional fees of surgeons, anesthesiologists, and cardiologists made up the remaining 28 percent. The surgeons' fees were related to the number of grafts, the anesthesiologists' fees to the duration of the operation, and the cardiologists' fees to the number of visits while the patient was hospitalized and a fixed fee for catheterization.

This study only addresses itself to the so-called "direct cost," which includes charges by the hospital and professional fees. If the average cost of $13,949 is multiplied by 70,000 operations per year, one arrives at the figure of $976,430,000, which represents the total cost in the present system for delivery of health care. Considering the potential number of patients who can benefit from this surgery, the cost would run into the billions.

This study attempts to provide information on the cost of coronary revascularization. It is not intended as a criticism of the high cost of medical care. It reflects the cost of coronary revascularization in our medical center, but the data could be applied to other areas of the country if regional differences in cost are considered.

In summary, the average charge by the hospital per patient was $10,103, and the professional fees were $3,826 (including fees of surgeons, cardiologists, and anesthesiologists). The charge by the hospital was 72 percent of the total cost, and 28 percent was professional fees. The information made available in this study could be utilized in the future to assess the impact of this surgery on the total system for delivery of health care and the cost to the public, and perhaps it could serve as a guide to reduction of costs.

Acknowledgment: I am grateful to Mr. Frank Mullin, B.S., for assisting in gathering the information presented in this report; to Miss M. Gonzalez for preparation of the manuscript; and to Ralph Lazzara, M.D., and Ellen Beteler, R.N., for review of the manuscript.

Benjamin Beteler, M.D., F.C.C.P.
Department of Medicine, Cardiology Division
University of Miami School of Medicine
and Veterans Administration Hospital, Miami, Fla

Reprint requests: Dr. Beteler, Veterans Administration Hospital, 1201 NW 18th St, Miami, Fla 33125

References

1 Effler DB: Myocardial revascularization: Current state of the art. Am J Cardiol 36:849-851, 1975
standing pulmonary parenchymal lesions of sarcoidosis without evidence of significant functional deterioration during a follow-up period averaging three years (as long as ten years in some cases). The need for or possible benefit from treatment with corticosteroids in most of these patients seems very questionable. A wiser course would be careful follow-up with periodic testing of pulmonary function, with treatment given if the condition of the patient deteriorates.

Also, radiologic criteria cannot be utilized alone to evaluate the course of pulmonary sarcoidosis and the effect of treatment, since the diffusing capacity may decrease, despite radiologic clearing. There are few situations in which the pulmonary function laboratory plays as important a practical role as in management of sarcoidosis.

Charlotte R. Colp, M.D., F.C.C.P.
Associate Clinical Professor of Medicine
and Attending Physician
Albert Einstein College of Medicine, New York

REFERENCES
3 Colp C: Sarcoidosis: Course and treatment. Med Clin North Am, to be published

To the Editor:

If one adheres to the policy that early treatment of pulmonary sarcoidosis is advisable, then the pulmonary function is irrelevant in terms of the decision to treat. A characteristic feature of sarcoidosis is its early asymptomatic (nondyspneic) phase, often with normal pulmonary function yet accompanied by gross pulmonary infiltration on the chest x-ray film. In stage 1, pulmonary function is usually within normal limits, or at most, there is a slight reduction in the carbon monoxide diffusing capacity. Hence, early disease, for practical purposes, is a roentgenographic phenomenon. As pointed out in my review, I obtain complete studies of pulmonary function at the onset and conclusion of treatment. If the chest x-ray film does not change sufficiently to ascertain a roentgenographic trend, I will then obtain studies of pulmonary function to determine a physiologic trend. I reiterate that, based on the population of patients with sarcoidosis whom I see, it is unusual for the abnormality of pulmonary function to worsen in the face of an improving chest x-ray film.

Colp's tacit advocacy of not treating before demonstration of worsening of pulmonary function is inconsistent with the concept of early treatment. In the first instance, one does not know how much of the infiltrate perceived on the chest x-ray film is potentially reversible active granuloma and how much is irreversible fibrosis. This, I submit, can only be tested by the administration of glucocorticoids. If, indeed, there is no roentgenographic improvement after a suitable course of therapy with glucocorticoids, one may then assume with greater confidence that what one observes is fibrosis and not amenable to further treatment. My experience has shown that the longer a pulmonary infiltrate persists without treatment, the greater the likelihood that fibrosis has ensued. To illustrate, one might use the formula of \( G \times T = F \), where \( G \) represents granulomatous reaction, \( T \) represents time, and \( F \) represents fibrosis. This concept speaks for early treatment such as I have advocated. The use of alternate-day therapy with glucocorticoids is safe, and the risk of significant side effects is less than the risk of progressive irreversible pulmonary damage. If a patient has abnormal pulmonary function, these changes at one time must have been progressive. Thus, by Colp's criteria, all patients with abnormal pulmonary function would be candidates for treatment, depending on when in the course of the disease the patient was first observed. The key question is: Is there yet reversible granuloma, or is it irreversible fibrosis? In other words, we should be interested in whether or not the patient will get better and not if he is getting worse. I know of no way to answer this question short of a trial of therapy with glucocorticoids. If the determination of the serum level of angiotensin-converting enzyme proves to be an accurate index of granulomatous activity, the sarcoidologist will have an additional measurement to use in making decisions about treatment of pulmonary sarcoidosis.

Richard A. DeRemee, M.D., F.C.C.P.
Mayo Clinic, Rochester, Minn

REFERENCE

Cost Analysis of Elective Myocardial Revascularization

To the Editor:

Myocardial revascularization with aortocoronary bypass grafts using saphenous veins has become the method of choice for the relief of angina pectoris in patients unresponsive to medical therapy. This operation is performed with increasing frequency and heads the list of cardiac operations. The total number of operations in the United States per year is unknown, although conservative estimates place this number at 70,000. Physiologically, this operation increases coronary perfusion to the areas bypassed. The present operative mortality is low, and relief of pain is accomplished in 70 to 80 percent of patients. There is good correlation between symptomatic improvement and patency of grafts, and even ventricular function has been shown to improve in a few cases.
Should the operation be shown to prolong life, the number of individuals needing surgery may increase dramatically.

Information regarding charges for this procedure is not available in the literature. The charges, including preoperative evaluation and surgery, to the last 20 private consecutive patients referred to me in a university medical center were analyzed. These data can provide a background for the planning of new facilities for open-heart surgery and to estimate the cost to patients, private third parties, or government, should the indications for such surgery greatly increase.

**MATERIALS AND METHODS**

The financial records of the last 20 consecutive patients having surgery in 1975 were reviewed. They were referred to me for cardiac catheterization and angiographic evaluation of the left ventricle and coronary arterial tree and subsequently underwent left ventricular revascularization. The data were gathered from the physicians involved, the surgeons, cardiologists, and anesthesiologists.

The patients were admitted to the hospital usually on the day before catheterization. All patients underwent surgery within a week. The patients were cared for by myself and the medical house staff while on the medical service and by a faculty surgeon and the surgical house staff while on the surgical service. The cardiologist served as a consultant while the patients were on the surgical service.

**RESULTS**

Information on the clinical status of the patients, their age, sex, functional class, number of grafts, complications, and days of hospitalization were carefully tabulated (Table 1). Although a breakdown of charges by the hospital was obtained in each case, they are reported as a whole. Such charges include the cost of a bed, nursing care, medications, laboratory tests, radiologic films, and care while in the various intensive care areas.

All patients survived the immediate postoperative period. Four had significant complications which prolonged their stay in the hospital. One patient had early osteomyelitis of the sternum, one had recurrent incisional pain, one had postoperative depression, and one had postpericardiectomy syndrome. The stay in the hospital ranged between 11 and 29 days (average, 17 days). If only the data from patients without complications are computed, the average stay is 16 days, for both the diagnostic admission and the surgery.

Table 1 also shows charges by the hospital, which ranged from $6,525 to $22,142 (average, $10,103). The average cost for the group without immediate postoperative complications was $9,242. The surgeon’s fee ranged between $2,000 and $2,400 (depending on the number of grafts), averaging $2,200. The anesthesiologist’s fee varied between $670 and $1,515 (average $974), depending on the duration of the operation. The cardiol-

<table>
<thead>
<tr>
<th>Case, Sex, Age (yr)</th>
<th>Class</th>
<th>No. of Grafts</th>
<th>Days in Hospital</th>
<th>Surgeon’s Fee</th>
<th>Anesthesiologist’s Fee</th>
<th>Cardiologist’s Fee</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, M, 57</td>
<td>3</td>
<td>2</td>
<td>11*</td>
<td>7,405</td>
<td>2,000</td>
<td>860</td>
<td>10,800</td>
</tr>
<tr>
<td>2, M, 66</td>
<td>3</td>
<td>2</td>
<td>29</td>
<td>22,142</td>
<td>2,000</td>
<td>980</td>
<td>26,272</td>
</tr>
<tr>
<td>3, M, 55</td>
<td>3</td>
<td>2</td>
<td>15</td>
<td>9,666</td>
<td>2,000</td>
<td>1,515</td>
<td>13,916</td>
</tr>
<tr>
<td>4, M, 60</td>
<td>4</td>
<td>15</td>
<td>15</td>
<td>7,661</td>
<td>2,000</td>
<td>1,220</td>
<td>11,331</td>
</tr>
<tr>
<td>5, M, 65</td>
<td>3</td>
<td>19</td>
<td>19</td>
<td>7,557</td>
<td>2,000</td>
<td>1,195</td>
<td>11,277</td>
</tr>
<tr>
<td>6, F, 60</td>
<td>3</td>
<td>20</td>
<td>9,299</td>
<td>2,400</td>
<td>765</td>
<td>570</td>
<td>13,034</td>
</tr>
<tr>
<td>7, M, 49</td>
<td>4</td>
<td>3</td>
<td>19</td>
<td>8,165</td>
<td>2,400</td>
<td>1,105</td>
<td>12,315</td>
</tr>
<tr>
<td>8, M, 64</td>
<td>3</td>
<td>3</td>
<td>14**</td>
<td>12,924</td>
<td>2,400</td>
<td>835</td>
<td>16,864</td>
</tr>
<tr>
<td>9, M, 53</td>
<td>2</td>
<td>3</td>
<td>15</td>
<td>7,267</td>
<td>2,400</td>
<td>670</td>
<td>10,887</td>
</tr>
<tr>
<td>10, F, 62</td>
<td>3</td>
<td>3</td>
<td>19</td>
<td>12,705</td>
<td>2,400</td>
<td>950</td>
<td>16,835</td>
</tr>
<tr>
<td>11, M, 87</td>
<td>3</td>
<td>3</td>
<td>18</td>
<td>13,741</td>
<td>2,400</td>
<td>1105</td>
<td>17,948</td>
</tr>
<tr>
<td>12, M, 57</td>
<td>3</td>
<td>2</td>
<td>17</td>
<td>11,675</td>
<td>2,000</td>
<td>710</td>
<td>15,025</td>
</tr>
<tr>
<td>13, M, 60</td>
<td>3</td>
<td>3†</td>
<td>13</td>
<td>8,400</td>
<td>2,400</td>
<td>1,215</td>
<td>12,525</td>
</tr>
<tr>
<td>14, M, 66</td>
<td>3</td>
<td>3</td>
<td>16</td>
<td>8,120</td>
<td>2,400</td>
<td>980</td>
<td>11,950</td>
</tr>
<tr>
<td>15, M, 38</td>
<td>3</td>
<td>3</td>
<td>12†</td>
<td>6,525</td>
<td>2,400</td>
<td>870</td>
<td>10,435</td>
</tr>
<tr>
<td>16, M, 57</td>
<td>3</td>
<td>2</td>
<td>24</td>
<td>7,961</td>
<td>2,000</td>
<td>990</td>
<td>11,671</td>
</tr>
<tr>
<td>17, F, 58</td>
<td>3</td>
<td>2</td>
<td>17†</td>
<td>12,602</td>
<td>2,000</td>
<td>1,300</td>
<td>16,482</td>
</tr>
<tr>
<td>18, F, 60</td>
<td>3</td>
<td>2</td>
<td>16</td>
<td>10,520</td>
<td>2,000</td>
<td>750</td>
<td>13,995</td>
</tr>
<tr>
<td>19, F, 59</td>
<td>3</td>
<td>2</td>
<td>14</td>
<td>9,832</td>
<td>2,000</td>
<td>715</td>
<td>13,222</td>
</tr>
<tr>
<td>20, M, 54</td>
<td>4</td>
<td>3</td>
<td>15</td>
<td>7,840</td>
<td>2,400</td>
<td>840</td>
<td>11,790</td>
</tr>
<tr>
<td>Mean</td>
<td>...</td>
<td>...</td>
<td>20</td>
<td></td>
<td></td>
<td>10,103</td>
<td>2,200</td>
</tr>
</tbody>
</table>

*Complication of osteomyelitis of sternum.

**Complication of incisional pain.

†Two venous grafts and anastomosis of internal mammary and left anterior descending arteries.

‡Complication of postoperative depression.

§Complication of postpericardiectomy syndrome.

||Mean for 16 patients without postoperative complications was 16 days.