Other Potential Uses for Cardiopulmonary Bypass

To the Editor:

The article by Gillinov et al (August 1996) was of interest to us and reminded us of several previous patients. The utilization of cardiopulmonary bypass (CPB) for procedures other than open cardiac cases, such as mitral and aortic valve replacement, has grown steadily over the past 30 years. It is now commonplace in a large number of university and community hospitals to utilize CPB for coronary artery procedures as well as major thoracic vascular problems, such as aortic arch and descending thoracic aortic procedures. The use of CPB for other procedures has not enjoyed such enthusiasm. However, reading the article in the journal reminded us of several patients that we cared for, especially in the 1960s. Therefore, we reviewed the records of our experience from 1967 to 1971 (25 years ago), utilizing hemodilution (nonblood perfusate) CPB (Table 1).

These patients all had surgery utilizing CPB in order to perform the necessary procedure. Three of the five emergency patients (1, 2, and 6) had massive acute bleeding, patient 8 had airway problems, and patient 1 had massive air embolus. The most interesting of all was patient 7, who during the record 27-inch snowstorm of 1967 had a perforated peptic ulcer, as a result of which he developed severe shock. Because of personnel inavailability and absence of blood bank support, he continued to deteriorate until we were asked to see the patient. He was placed on CPB with immediate improvement of his acid base and electrolyte condition. During the procedure for closure of his perforated ulcer, he was maintained on hemodilution CPB. Unfortunately, when this was discontinued, he died of profound sepsis and shock as a result of the perforation. Two patients (3 and 4) had elective surgery for either a primary tracheal tumor with airway difficulties or a massive pulmonary tumor with tracheal involvement. Patient 5 was operated on for control of vascular structures during a left pneumonectomy and resection of the carcinoma involving the aorta. The article by Gillinov et al.1

<table>
<thead>
<tr>
<th>Patient No.</th>
<th>Date</th>
<th>Emergency</th>
<th>Problem</th>
<th>Procedure</th>
<th>Diagnosis</th>
<th>Hospital</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7-17-67</td>
<td>Yes</td>
<td>Air embolus—massive bleeding, shock</td>
<td>Tracheostomy: right pneumonectomy</td>
<td>Carcinoid—malignant</td>
<td>Hines VA</td>
<td>Died</td>
</tr>
<tr>
<td>2</td>
<td>11-29-68</td>
<td>Yes</td>
<td>Massive bleeding</td>
<td>Exploratory: left thoracotomy</td>
<td>Metastatic adenocarcinoma of the kidney</td>
<td>Hines VA</td>
<td>Died</td>
</tr>
<tr>
<td>3</td>
<td>10-16-67</td>
<td>No</td>
<td>Ventilation</td>
<td>Tracheal resection: Silastic graft</td>
<td>Cylindroma</td>
<td>West Suburban</td>
<td>Home; died later of</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hospital</td>
<td>erosion of right subclavian artery</td>
</tr>
<tr>
<td>4</td>
<td>8-8-67</td>
<td>No</td>
<td>Ventilation</td>
<td>Anterior tracheal wall: resect and graft</td>
<td>Recurrent tracheal and bronchogenic carcinoma</td>
<td>Hines VA</td>
<td>Home; died later of recurrent carcinoma</td>
</tr>
<tr>
<td>5</td>
<td>8-31-67</td>
<td>No</td>
<td>Vascular control</td>
<td>Left pneumonectomy</td>
<td>Carcinoma; huge</td>
<td>Hines VA</td>
<td>Died</td>
</tr>
<tr>
<td>6</td>
<td>12-26-67</td>
<td>Yes</td>
<td>Massive postoperative bleeding due to pulmonary vein</td>
<td>Left pleural pneumonectomy</td>
<td>Mesothelioma</td>
<td>Hines VA</td>
<td>Died</td>
</tr>
<tr>
<td>7</td>
<td>1-67</td>
<td>Yes</td>
<td>Profound shock</td>
<td>Closure of perforation, correction of acid-base disorder</td>
<td>Perforated duodenal ulcer</td>
<td>Hines VA</td>
<td>Died of ulcer</td>
</tr>
<tr>
<td>8</td>
<td>5-18-71</td>
<td>Yes</td>
<td>Ventilation</td>
<td>Tracheocarinal resection with Dow prosthesis</td>
<td>Adenoid cystic carcinoma</td>
<td>West Suburban</td>
<td>Home; okay 6 months</td>
</tr>
</tbody>
</table>

Table 1—Patient Data
utilizing CPB for noncardiac conditions, was most interesting to us and further emphasizes the other potential uses for this modality.

Raymond A. Dieter, Jr., MD, FCCP
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REFERENCES

Medical Meetings: A Chance For Braindusting

To the Editor:

I commend Dr. Rubin for his editorial (December 1996) concerning the importance of attending medical meetings. To be a good physician, whether it be as a clinician, academic physician, or a pure researcher, one must alter one’s routine periodically in order to stimulate the mind, and medical meetings serve this purpose. They are not only venues, as Dr. Rubin emphasizes, for interacting with colleagues and “schmoozing,” but they also provide clinicians the opportunity to interact with experts in their fields. In addition, meetings stimulate thinking in all attendees, and this is extremely important. Certainly we think every day, but meetings motivate us to think in a different way. They expose us to opinions which are contrary to our established paradigms and encourage us to contemplate changes in our fields.

I am not certain what Sir William Osler would have had to say concerning HMOs and managed care, but I know that he would have spoken out strongly in favor of continuing medical education, especially for the clinician. In his essay, The Student Life, he emphasizes the importance of clinicians breaking free from their normal routine to stimulate their minds. He states, “The student-practitioner requires at least three things with which to stimulate and maintain his education, a notebook, a library, and a quinquennial braindusting. . . . The third essential [the quinquennial braindusting] will often seem to him the hardest thing to carry out. . . . Harken not to the voice of old ‘Dr. Hayseed,’ who tells you it will ruin your prospects. . . . To him it seems preposterous. Watch him wink when you say it is a speculation in the only gold mine in which the physician should invest—Grey Cortex!” Osler was referring to minisabbaticals which he encouraged all physicians to take at their own expense to expand their mind and renew their education. Is the present day Dr. Hayseed the managed-care corporation? Let us hope not. While most of us cannot afford to take sabbaticals, we certainly cannot afford not to attend medical meetings. These are our means of “braindusting,” and they are an essential part of our continuing education.

I certainly look forward to my next medical meeting. Who knows? At the next conference, I might get the chance to schmooze with Dr. Rubin.

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Oxygen Deficit During Exercise Testing

To the Editor:

We read with appreciation and concern the article, “Oxygen Deficit During Exercise Testing in Heart Failure,” by Cross and Higginbotham (April 1995). The authors have provided clinically relevant information that is familiar to most cardiologists but may not be familiar to other specialists.

The term oxygen deficit can be used to describe the adaptation of the organism to constant work load exercise. In this case, the oxygen deficit is the difference between the oxygen demand (which theoretically increases as a square from the onset of the load) and the oxygen uptake measured. It represents the amount of oxygen that is replaced by biochemical processes not requiring external oxygen (such as oxygen stores, macoerog phosphates, and transient anaerobic processes) until the oxygen transport system can meet the total energy demand again by oxygen uptake. Thus, oxygen deficit describes a transient metabolism between two totally aerobic states. This is the case during any onset of constant work below the anaerobic threshold, when the oxygen uptake rises with single exponential characteristic until it reaches the new steady state of oxygen uptake level. However, the oxygen uptake has different kinetics above the anaerobic threshold when, in addition to the first exponential component, a second exponential or linear component can be determined.

This means that oxygen uptake does not reach steady state but rises continuously during work (as can be seen in Figure 1 of the article). The anaerobic processes and lactate generation are permanently present during work above the anaerobic threshold; thus, to characterize the change between two steady states, we would suggest separating the transient and permanent biochemical processes.

It is likely that some of the patients with New York Heart Association class 2 congestive heart failure exceeded the anaerobic threshold at a work intensity of 25 W. If so, their oxygen deficits would contain the permanent part of anaerobic energy generation in contrast with the oxygen deficits of the others. It is questionable if one could use the term oxygen deficit at all in this situation, because there could not be an oxygen steady state at the end of the workload; the oxygen uptake shows a permanent rise. The oxygen deficit will be greater because the patients are above the anaerobic threshold. We would compare different situations to describe the same oxygen transport system. For the sake of better comparability, we suggest the use of only those exercise tests where the anaerobic threshold was not exceeded at 25 W. Otherwise, we agree with both the aim and the conclusion of this excellent work by Cross and Higginbotham.

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REFERENCES
1 Rubin B. Of no significant benefit [editorial]. Chest 1996; 110:1379