One Surgeon Looks at Human Heart Transplantation

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When much of what one has to say has been said often, one wonders if he should speak again for emphasis; speak differently to be heard better, or remain silent to avoid rejection. This explains some of the material and methods in this discussion, at times tedious, occasionally in poor taste, and frequently bearing only tenuous relevance to the subject at hand.

The myopic prediction of Sir Stephen Paget in 1896 stands as a warning:

"The heart alone of all viscera will not withstand surgery; no new method and no new techniques will overcome the natural obstacles surrounding a wound of the heart."

Kehn of Frankfort proved him wrong that same year by successfully suturing a stab wound. History has made him alined. This ugly monument is perhaps the most prominent vestige of a distinguished career! Nihilistic forecasts, with no time limit, render one defenseless against ridicule from too many for too long.

The era of human organ transplantation has been with us for nearly a decade; experimental heart transplantation for more than a decade: the current clinical experience with cardiac transplantation in man, not yet a year. However, these months of public participation in professional activity and patient privacy have had far reaching effects. There have been mixed dividends and we are obliged to reflect on these from time to time, that we may avoid remaking the painful parts of history.

One finds it difficult to avoid seduction into the dramatic possibility of attempting the most sensational multiple organ extravaganza of all time: at the Peter Bent Brigham Hospital now! Where would it be more logical than to have the descendents of Cushing provide the donor by proving brain destruction. The same men who did the first kidney transplant could use the two kidneys to help two patients (there is a waiting list). The surgeons who conducted the first liver transplantation could transfer the liver. The thoracic team regularly conducts two open heart operations simultaneously so they could support the circulation of the donor and safeguard the cardiac transplant recipient until his new heart accepted function. The same people who are controlling rejection in a large series of renal transplants would find no great burden in extending their steroids, azathioprine and antilymphocytic serum, to a few more recipients. The active bun service would have a right to the skin, the eye bank is always waiting, the orthopedists need bone and cartilage, and the blood bank is usually in short supply. The parathyroids are apparently not very antigenic, so they must be used, perhaps the thyroid too. The pancreas should not be wasted. The lungs have not done well in animals or man (but neither has the heart, especially without antilymphocytic serum). The petitions for hair and teeth are not without merit, but we must draw the line somewhere—or must we?!! Individually the above collection of organ transfer offers nothing new, but collectively from one individual, it is awesome. In contrast to Sir Stephen Paget, I predict that this will happen.

When this macabre cannibalistic conservation happens, there will be a) quite a newspaper story; (b) much head wagging over morals and ethics; (c) discussion about the great good purpose of death itself; (d) consternation over how many and what parts must die before death is pronounced; (e) new tissue banking problems; (f) a very busy hospital, and (g) serious doubt and reappraisal of the old fiction that "the best of medical care is and should be available to all."

Enough of this frivolous flirtation with science-fiction. It is allowed to remain as part of this discussion only because it may contain a message, perhaps one or more of the following:

1. Isn't it time to reappraise priorities in the expenditure of public funds? Should we not rethink subsidy of research to the greatest good? This could well emphasize preventive medicine. It might reveal simpler mechanisms for helping common problems. It might substitute reasonable investments in health, rehabilitation, and comfort for unreasonable expenditures with contrary purpose now siphoned off by munitions and the military. This thinking is urgent and action is in order, for just now government research grants are being suspended.

2. Reflection on direct communication of professional activity to the laity may prove to have evil domino effects (e.g., premature sensational reporting tends too often to be unsupported by subsequent critical experience, raising and dashing false hopes), possibly rendering inappropriate kudos to the wrong professional people, leading to reckless...
competition for "firsts" and "mosts," then degenerating to utilization of public relations methods of varying responsibility to secure personal or institutional support. This could deteriorate to paid "discret notices," then to competitive claims, and ultimately to frank advertising with no more basis in fact than the daily displays in our communications media. The aforementioned sequence could destroy medicine as a profession.

3. While many conscientious physicians seem reluctant to emphasize the non-organic and intangible components in their relief of suffering, only the poorest of clinicians would gainsay their importance. Yet public discussion of these powerful healing forces gnaws at their substance as surely as agnosticism destroys the contribution of the clergy.

4. Public parade of the shortage and uneven distribution of excellent medical care may render the patient insecure, aggravate his suffering, and reduce the physician's effectiveness.

5. The silly ostrich pronouncement that "heart transplants make the doctor play God" fails to recognize that modern medicine and surgery have long outstripped the public's willingness and capability to furnish the doctor such facilities that he is no longer forced to play God. Is it new to the public that rehabilitation agencies have long been forced to husband their funds jealously? Does the public not know that these rehabilitation agencies must seek the most effective use of their funds when they cannot possibly help all who deserve support? For example, several men who should support families may regain that dignity and responsibility through simple repair of hernias for the same number of dollars required to replace a heart valve that would relieve the suffering of one childless 60-year-old woman. If we can't cover both, the choice is obvious. Does the public forget that there have never been enough real or artificial kidneys? If the selection of the recipients is "playing God," the role is far from new. Does the public not know that more people need heart valves than there are competent facilities for open heart replacement? When the decision is made to help one patient as opposed to another, is that "playing God"? These are only a few examples. Comparable problems antedate the memory of living physicians.

If this is "playing God," the mantle is at once old, uncomfortable, and worn with varying purpose and skill.

The problem is more serious in many foreign countries. In England, the long waiting lists are fraught with considerable attrition by death. The selection of patients is thereby influenced. For example, when large numbers of Group III and Group IV patients with mitral stenosis were waiting, it became necessary to accept only Group III patients for surgery; otherwise they waited so long as to deteriorate into the high risk Group IV category. This general type of problem is all too familiar throughout the world (including the U.S.A.). This is sacrificing the terminally ill group that more of the less critical may live. Is this "playing God"?

A double perversion of contraselection can be illustrated by matched case histories: two patients requiring the same type of mitral valve replacement. Let the reader reflect on the problem and imagine himself forced to decision. It may provide a new point of view about "playing God," about urgent public need, about the nature of Democracy.

Patient A is an alcoholic with a wife and seven children (on A.D.C.—Aid to Dependent Children). The patient does not and has not worked recently. His mitral insufficiency has contributed both to his unemployment and to his drinking that has made him unemployable. The cardiac insufficiency and the drinking have combined to cause his moderate liver cirrhosis.

This borderline derelict is on a ward where his condition has been well and usefully studied by a large number of students and house officers. They all want this man to have the operation that he needs. Conceivably, he might be "rehabilitated" to the point where he would be well enough to go back to work. It is doubtful (but uncertain) that he might earn enough to make his children lose their public support. Conversely, he might be only partially rehabilitated so that his own public dependency and that of his family will continue indefinitely. Certainly, the students and house officers will learn a great deal from following this patient's surgical care and convalescence. They would use that knowledge to help an indefinite number of other patients whom they might well not understand if patient A is not accepted for surgery. If patient B is accepted, patient A's many burdens and benefits degenerate to death. Who is patient B?

Patient B is the same age as patient A and has the same debilitating mitral insufficiency, but has courageously continued to work and support his three children. Like all solvent people, he has contributed more than his share in taxes, and like other contributors, rendered public service through his successful business and efforts for private causes. If he is rehabilitated, all of these good causes would continue to benefit from his service. If he dies in surgery, his insurance and savings will protect and educate his family. If he does not have surgery or has unsuccessful surgery, the attrition of his savings and earnings will lead to insolvency and welfare for him and his family, like Patient A. His surgical care will make less of a contribution to the learning experience of students and house officers.

There are not enough operating facilities for both. A choice must be made. Is this "playing God"? Does God want the good citizen to be rewarded by desertion? Does denying surgery to the "ward" patient sacrifice a learning experience to the students? Does not operating on their ward patient and choosing the "private" patient raise ugly questions in the mind of the students? The surgeon finds himself...
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defensive, pondering imponderables such as how good a case can be made for operating the derelict? Should he contrive surgical contraindications for selecting A or B? What ratio of ward patients can the hospital and the physician carry? Should the cirrhosis or alcoholism be considered? Would it not be easier to let public subsidy cover all patients, even though it would certainly further reduce the limited service? Then the surgical service could take patients in the order of arrival. Certainly, the waiting list would lengthen, patients would die waiting, but the "you can't cure everyone" philosophy would become even more prevalent. That's it, that's easier, just go ahead and choose Patient A—or is it B?

These are not hypothetical situations. Is this "playing God"? Is it not time to have more research and more facilities, to avert some cruel choices? Until this situation is corrected, should we widen or narrow the existing gap between what is known and what is practiced? Should we declare a moratorium on developing more complex procedures? At least at the moment it is defensible for any competent group to conserve their facilities for the greater good to the immediate greater number while extending the frontiers of investigation and service in areas that simplify and expedite.

6. To derive the maximum learning experience for all, an International Heart Transplant Registry is sorely needed. This could be patterned after the Kidney Transplant Registry and perhaps sponsored by the American College of Cardiology.

On the other hand, to focus specifically on human heart transplantation, the surgeon and physicians involved must make two primary basic and several secondary, decisions. The first decision is whether to direct substantial heart surgical facilities to transplantation and if so, when? This is a policy matter. The second follows if the first is affirmative, and involves the selection of the donor and recipients.

The conditions requisite to a decision to enter into a human heart transplant program embrace:

1. The technical facility for transferring the heart is assumed and readily mastered by any surgical team accustomed to valve replacement or aneurysm surgery. However, there must be specific laboratory and autopsy experience in heart transplantation. At least, "off the pump" survival of a few hours is mandatory and important in appraisal of operative technique. Long term animal survival is desirable for the study of rejection and its treatment. Both animal laboratory and operating room preparations must include methods for graft preservation. Donor or donor heart care may involve independent cardiopulmonary bypass, cold arrest, coronary perfusion, membrane balancing solutions (e.g., Brechtschneider's solution) or other combinations of techniques.

2. Hospital services (operating room, intensive care, blood bank, nursing, laboratory) that will be improved by the challenge and excitement of an extraordinary effort rather than exhausted, demoralized, and diluted by the attending new burdens.

3. Surgical, medical, neurosurgical, and anesthesia personnel must be uniformly eager and aggressive about supporting a new enterprise that will be demanding, exhausting, and often disappointing.

4. Hospital administration must be willing to extend, rather than divert facilities to embrace the new activity. Otherwise surgeons must be disturbed at further compromise of patient care responsibility.

5. The operating room facilities should include enough personnel and equipment for two simultaneous cardiopulmonary procedures. Although some centers are willing to forego this, optimal management of donor and recipient entails choice.

6. Medical competence and experience with rejection control should include tissue typing, steroid, azathioprine, and antilymphocytic globulin or serum administration. At this point some facts about kidney transplants may be helpful.

Renal transplantation must not be taken to represent heart transplantation. However, there may be some relevant data that can help formulate a point of view in a review of the Renal Transplant Registry of May 2, 1968.

Look only at transplants functioning at the 13- to 15-month period. After all, a transplant (particularly a heart) ought to work at least a year to be worthwhile. Furthermore, if the transplant survives a year, its subsequent prognosis is greatly enhanced. To take advantage of the best techniques of both surgery and rejection control, selection is not from 1,413 registered transplants with a one year plus Cumulative Probability of Success (C.P.S.) of 0.247, but rather only those performed since January 1, 1965. Of these, in the last 53 months the one year plus (13- to 15-month survival) has been:

<table>
<thead>
<tr>
<th>Category</th>
<th>C.P.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>siblings (128)</td>
<td>0.717</td>
</tr>
<tr>
<td>parents (199)</td>
<td>0.630</td>
</tr>
<tr>
<td>spouse, unrelated living or obligatory nephrectomy (58)</td>
<td>0.382</td>
</tr>
<tr>
<td>cadaver (398)</td>
<td>0.345</td>
</tr>
</tbody>
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Tissue typing and antilymphocytic serum (or globulin) may well improve this. However, it must be emphasized that neither antilymphocytic serum nor globulin is, to date, stable in preparation, potency, reactions, response, use, or degree of efficacy.

7. Clear appreciation of the precise position of
human heart transplantation in the developmental spectrum (I-IV) to wit:

I. Experiment
II. Experimental-Therapy
III. Therapeutic-Experiment
IV. Therapy

Heart transplantation is now in Category II.

8. Medical (as opposed to surgical) selection of recipient for whom there is currently not only no reasonable therapy but (a) no therapy available, (b) the recipient's life is a burden, or (c) as an emergency effort when following a standard heart surgical procedure the patient cannot be taken off the heart-lung machine; heart transplantation might then be a terminal alternative to abandoning resuscitation.

Diagnosis of an inoperable heart tumor, multiple transmural infarctions, myocardial aneurysm, etc., are not necessarily adequate conditions until criteria (a) and (b), or (c) above are considered. The judgment of meeting these criteria is a joint medical and surgical decision of involved people, not a detached, uninvolved selection committee.

9. Neurosurgical selection of the donor demands anatomic evidence of brain death by brain destruction. The criteria need not necessarily be met, but the report of the ad hoc committee of the Harvard Medical School to examine the definition of brain death may constitute helpful guidelines.

10. Current standards of informed consent on the part of the recipient and his immediate family and the donor's responsible next of kin must be met. Appropriate documentation of this and all relevant preoperative, operative, and postoperative records must be made to each learning experience maximal. This can only be predicated on meticulous prior planning and protocol preparation.

In closing, there is some relevance and considerable historic perspective in a paragraph from Plato's Republic, 400 B.C.:

"Therefore our political Asclepios may be supposed to have exhibited the power of his Art only to persons who, being of a generally healthy constitution and habit of life, have a definite ailment. Such as these he cures by purges and operations and bids them live as usual, herein consulting the interests of the State. But bodies that disease has penetrated through and through, he will not have attempted to cure by gradual processes of evacuation or infusion. He does not want to lengthen out good-for-nothing lives or to have weak fathers begetting weaker sons. If a man is not able to live in the ordinary way, he has no business to cure him, for such a cure would be of no use, either to himself or to the State."

1. Conditions requisite to surgical centers entering upon human heart transplantation programs are outlined: by definition and by inference.

2. Hopefully, the role of "the doctor playing God" is placed in realistic perspective. The public's duty is restated toward reducing the burdens of this dangerously flexible, but very old responsibility. Public responsibility in determining priorities in the expenditure of public funds and the serious limitations of existing clinical and research facilities are related to human heart transplantation, public health, and preventive medicine.

3. Some consequences of premature overexposure in the communication media may: mix the dangers and benefits of competition, be constructive or destructive to the medical image and, directly and indirectly, alter the efficacy of the physician and the quality of medical care.

4. Moral and legal discussions are found helpful if they clarify, and harmful if they over-restrict. The conscience of the medical personnel predicated on enlightened patient- and self-interest remain the bulwark of patient and public protection. If legalistic and moral dogma move toward euthanasia or delay through committee bureaucracy, they constitute harmful forces.

Legal Regulation of Heart Transplants

Richard P. Bergen

The morality of heart transplants is a matter of conscience for the individual guided by his religious precepts, if any, and advised by the religious or lay leader for whose moral judgment he has respect. The medical aspect of heart transplants is a matter of scientific study, investigation, skill and judgment. Countless questions arise in each of these areas.

In comparison, the legality of heart transplants is a relatively easy subject. The legal questions which arise can, I believe, be answered under well-established rules of law governing medical practice. The law has ready answers to these crucial and novel questions although some lawyers may disa-