



## A Baylor milestone: Combined heart/lung-heart “domino” transplant

Peter A. Alivizatos

To cite this article: Peter A. Alivizatos (2018) A Baylor milestone: Combined heart/lung-heart “domino” transplant, Baylor University Medical Center Proceedings, 31:1, 123-125, DOI: [10.1080/08998280.2017.1391037](https://doi.org/10.1080/08998280.2017.1391037)

To link to this article: <https://doi.org/10.1080/08998280.2017.1391037>



Published online: 04 Jan 2018.



[Submit your article to this journal](#)



Article views: 126



[View Crossmark data](#)



Citing articles: 1 [View citing articles](#)

# A Baylor milestone: Combined heart/lung-heart “domino” transplant

Peter A. Alivizatos, MD

Baylor University Medical Center, Dallas, Texas, and Onassis Cardiac Surgery Center, Athens, Greece

**KEYWORDS** Transplantation; history of medicine

Tom Lee lived with his wife in Garland, a suburb of Dallas, and in spite of the dyspnea that forced him to use oxygen around the clock, he worked as a manager in a printing house. He had been diagnosed with the rare absence of an enzyme that was insidiously but steadily destroying his lungs and would lead to his death. Up to the 1980s there was no cure for the pulmonary emphysema he was suffering from, or for many other lung diseases. This changed with the first combined heart/lung transplant at Stanford in 1961.<sup>1</sup> The experimental work for this procedure started 10 years earlier (1961) by the same pioneers, Richard Lower and Norman Shumway, who developed the technique for heart transplantation.<sup>2,3</sup> Survival in primates after heart-lung transplantation was reported by Stanford in the early 1980s.<sup>4</sup> In the years that followed, large centers, including Harefield Hospital in the United Kingdom under the leadership of the brilliant British surgeon Magdi Yacoub,<sup>5</sup> offered this difficult operation with good short-term results. At first the operation was destined for patients with simultaneous cardiac and pulmonary disease. It was soon extended, however, to those who only had lung disease but whose heart was healthy. So they received two lungs to replace their own and a heart that they did not need. It was the only operation available at that time. Of course, Joel Cooper at the University of Toronto had already started transplanting just one lung, but this procedure was still in its infancy. Clearly, the correct operation for patients with lung disease was the replacement of the lungs only, without the unnecessary removal of the heart. It was good, then, for the standards of the day, that in December 1988, after assessment by pulmonologists and cardiologists, Tom was placed on the waiting list for the combined transplantation of two lungs and a heart. The difficulty of finding a suitable donor was increased by the fact that he belonged to the less common blood group B.

Cliff Hamilton, 65 years old and a pensioner, had previously had a coronary bypass operation because of a series of infarcts. He lived with his wife and four children who watched his progressive deterioration every day. Although he had been

on the waiting list for a heart transplant since March 1988, his blood group B, like Tom's, did not help in the finding of a donor. Furthermore, it was getting near the time he would be taken off the list because of his age, even with the recent raising of the age limit to 65.

In April 1987, Magdi Yacoub had impressed the scientific world with a new achievement. Instead of discarding the healthy heart he had removed with the diseased lungs, he thought he could use it for someone else who was waiting to have a heart transplant only. And so the term “domino transplant” was born, from the tiles used in the game but also from international politics where the fall of one influences the whole. In March 1989, few such operations had been done, and nothing had been heard about them in the Southern and Southwestern states, such as Texas.

At the beginning of January 1989, at one of our weekly meetings, the idea was mooted that perhaps a combined “domino” operation could be performed on Tom and Cliff. As usual, those who hesitated pointed out the difficulties in finding a suitable donor and also the repercussions of the very possible failure. But the seed had been sown, and I immediately started consultations with a view to finding a suitable donor. Such an operation was not to be undertaken lightheartedly. During the previous 2 years, we had already performed combined heart/lung transplants in dogs, transferring the triple graft from one animal to another. In this I worked with my friend Albert Guerraty, a colleague from my Medical College of Virginia days, who had already carried out such experiments at McGill in Montreal. I made a trip there and Albert came to our laboratory to help us get started. A transplant team for experimental animals was organized in which, apart from myself and John Capehart, the German Peter Thiele, a former associate of our late chief, Ben Mitchel, who was still doing great work, and the talented Syrian and Orthodox Christian Maruf Razzuk, former associate of Harold Urschel, took part. The team was completed by Hasmukh Shah, a reliable Indian and a man of few words, an expert in thoracic surgery. From

time to time we were also helped by two American colleagues, the cardiac surgeons Richard Wood and Tom Meyers. We worked in the laboratory once or twice a week, and by the time we attempted to do the operation on a human, we had carried out more than 80 transplants in animals, changing from dogs to pigs because of the justifiable outcry against the use of dogs as “guinea pigs.”

Gradually the plan took shape and form and started to be discussed at our meetings, which included our chief anesthesiologist, Michael Ramsay, and Göran Klintmalm, chief of transplantation services, to offer some good advice. And so, with our two patients on the waiting list for the same blood group B donor and Albert ready to take the first flight to Dallas, we waited.

The long-awaited phone message came at 5:30 AM on March 9th. On the line was Harold Smith, an enthusiastic coordinator at the Southwest Organ Bank, who with undisguised excitement asked me if I was “awake” and “ready for work”! He had a suitable donor, a 32-year-old who had shot himself and, fortunately for us, had been brought to Baylor. His death was soon certified and, very unusually, his family immediately gave their permission for the donation of his organs. Our luck was more than outrageous: the donor was blood group B!

I got up, dressed, and was coming out before the sun rose above our garage, when a large bird flew in the “right” direction in front of the car. As a descendant of the ancient Greeks, I believe in omens and from that very moment I knew that our enterprise would be crowned with success! Things moved quickly. I spoke to Albert in Montreal, and the cardiac surgery department was put on alert. All operations were postponed and additional specialized staff was enlisted for early afternoon. It was my responsibility to ask each one for particular help according to his experience and his “ego,” taking into account the “chemistry” between the surgeons. And so, shortly before we began, I sketched the three operating rooms in the back of my notebook and allocated the surgeons who were to take part in this unique procedure. I told each one what his role would be and to my great satisfaction they all accepted enthusiastically.

In the first room with the donor, Albert was in charge and, assisted by Drs. Razzuk and Shah, was to remove the block of three organs. We had chosen to follow Yacoub’s method, placing the patient on bypass and cooling him down to 15°C to preserve the organs. In the next operating room I was to remove Tom’s heart and lungs, helped by Drs. Capehart and our chief, Maurice Adam (Figure 1). In the third operating room, where it would be necessary to dissect the heart from the previous coronary bypass operation, Carl Henry was to open the chest assisted by Rick Hebel, with Richard Wood coming in for the main part. The instrument nurse in the most important operation, the heart and lungs, was Anne Broughton, a rough and ready adherent to the old school, who had assisted me over the years with difficult operations. Although she had something the matter with her leg, she had more stamina than her younger colleagues.

The plan unfolded exactly according to our detailed road map. When the donor’s temperature reached 15°C, Albert stopped the pump, speedily removed the block of three organs, and literally threw them into the bowl with the cold solution. Albert was known for his energy, enthusiasm, and somewhat abrupt movements, but he was a wonderful surgeon and completely reliable. Meanwhile, next door, I had prepared the three organs for removal—the lungs really were full of air bubbles—and as soon as the organs arrived for transplantation, we put the patient on bypass with Mike Joubran, our Palestinian technician, operating the pump. The lungs were removed one after the other without damaging the vital nerve supply to the abdomen and diaphragm, and then the heart. Although I had often seen an empty thorax in animals, that morning the sight produced a feeling of awe: an empty cage with only the cannulae of the heart-lung machine keeping Tom alive. Before removing the heart and placing it in the three plastic bags, we came to the most crucial maneuver: where should it be cut? Enough tissue had to be left on it for Cliff but without compromising the necessary length of the caval veins that had to remain behind for Tom’s triple graft. Taking out the heart, I held it in my hands and Albert and I examined it. We gave each other a nod of agreement and, without saying a word, I



**Figure 1.** The first “domino” transplant at Baylor University Medical Center. (a) The heart/lung implantation in progress. (b) Drs. Razzuk, Guerraty, Alivizatos, and Capehart at work. (c) Tom and Cliff on the day of their discharge.

passed it to John for storage in the plastic bags, informing the third operating room that they should begin Cliff's operation. We had crossed the Rubicon. The "domino" would proceed according to plan.

The grafting of the three organs into Tom was unexpectedly easy, confirming for the umpteenth time the saying "practice makes perfect." When we started to warm him up, I left Albert in charge of getting him off bypass and went to the third operating room. We brought Tom's heart from next door and started the last part of the operation, its transplantation into Cliff. Tom's operation finished around 11:00, while I was still suturing Cliff's new heart.

In a little while, things started to go wrong, however: his strangely low blood pressure on bypass, in spite of all the efforts of the anesthesiologists. The other strange thing was the widespread bruising, a bluish hue to the heart in spite of the relatively short ischemic time. We finally managed to get the patient off bypass with an intraaortic balloon pump, after Albert, who was also wondering what was to blame, and I had spent the whole night in surgery. In the end we managed to have the two patients side by side in the intensive care unit, with all the staff on hand. We were exhausted but knew we had made history, and the whole hospital was buzzing with the news from the ground floor up to the 17th.

Of course, the administration and the public relations office did not lose a moment, and around 11 AM newspapers and television journalists gathered in the press room. We barely had time to spruce ourselves up and change into a suit before presenting the event, along with the diagrams we had prepared to explain the procedure, that at first sight must have looked complicated. That night all the channels carried the news and showed video clips of the operation.

At one stage I had counted around 40 people in the three operating rooms, each one with his own task. Only a huge hospital like Baylor could rise to such a challenge. The next morning it was front-page news in all the newspapers, with a photograph of Tom who, meanwhile, had had all his tubes removed, making the thumbs up sign behind the window of the unit. It was reported in newspapers all over America, and I later even saw a cutting from the Japanese press.

John and I spent the next few weeks in the hospital as we had in the good old days when we were Lower's residents in Richmond. Cliff, with his heart transplant, took several days to recover before he could be extubated, and Tom, in spite of his initial spectacular progress, developed rejection on the seventh day postoperatively, something unprecedented in our experience. Then began complications that required all-night vigils, while the whole hospital held its breath, because the "domino" had caused an uproar. I remember one evening John and I were together in the intensive care unit at 11:00 PM, when suddenly President Boone Powell and Vice President Bob Hille made their appearance like two shadows. With intense anxiety

clearly visible on their faces, they murmured: "This is the real deal!"

Tom and Cliff, having made life hell for us with their complications for 6 weeks after the operation, were now ready to go home. The event was preceded by a big press conference with President Boone Powell Jr. at the head of the table and the two patients on each side of him. Cliff stole the show when he made the moving comment: "It is lovely to see the sun rise each morning!" This phrase was engraved on the trophy for the annual golf tournament organized by "NewHearts," the association of transplanted patients. And then he caused general hilarity when he was asked: "How do you feel with Tom's new heart?" "Marvelous," he answered, and then added the clarification: "As long as my wife doesn't have too many expectations." Eleanor Belanger, the "NewHearts" president, brought in an enormous cake on a trolley, and Boone and I cut it together. The photograph of the two "Dioskouroi" transplant patients in the parking lot before they got into the car was published everywhere and from that time has decorated my office wall.

Two weeks later, Boone, after my introduction, presented the patients to the hospital's board of trustees, which expressed its complete gratification and congratulations on the risk he had taken in approving such a complex operation. God only knows what the outcry would have been if we had failed. We celebrated our success in a dinner I gave in honor of all those who had worked with me. A meal gives an opportunity to really get to know one another, removes prejudices, and forges bonds. This recipe I would use later in Greece with an annual reception for the transplant team at the "Yacht Club."

It was the peak of the program's success because soon the combined transplantation of heart and lungs would be overtaken by the rapid development in the transplanting of lungs without the heart. Even so, we successfully carried out three such operations, but never another "domino." It was a landmark in the history of the hospital, and older members still speak nostalgically about 1989, calling it the "golden age" of the program, as I discovered a few years ago during my last visit to Baylor.

1. Reitz BA, Wallwork JL, Hunt SA, et al. Heart-lung transplantation: successful therapy for patients with pulmonary vascular disease. *N Engl J Med.* 1982;306(10):557-564. PMID:6799824.
2. Lower RR, Stofer RC, Hurley EJ, Shumway NE. Complete homograft replacement of the heart and both lungs. *Surgery.* 1961;50:842-845. PMID:14466958.
3. Lower RR, Shumway NE. Studies on orthotopic homotransplantation of the canine heart. *Surg Forum.* 1960;11:18-19. PMID:13763847.
4. Reitz BA, Burton NA, Jamieson SW, et al. Heart and lung transplantation: autotransplantation and allotransplantation in primates with extended survival. *J Thorac Cardiovasc Surg.* 1980;80(3):360-372. PMID:6774178.
5. Radley-Smith R, Yacoub M. Heart and heart-lung transplantation in children. In Galucci V, Bartolotti U, eds. *Heart and Heart-Lung Transplantation Update.* Florence: Uses Edizioni Scientifiche, 1988: 85.