

CHAPTER 9

RICHARD AND RONALD HERRICK

First Identical-Twin Kidney Transplant

Procedure: Identical-twin kidney transplant

Date of Operation: December 23, 1954

Institution: Peter Bent Brigham Hospital, Boston,
Massachusetts

On October 26, 1954, Richard Herrick was admitted to the Peter Bent Brigham Hospital with a diagnosis of chronic nephritis, a life-threatening inflammation of the kidneys. His physician had referred him as a possible candidate for a renal transplant, using as the donor Richard's genetically identical twin brother Ronald. Our optimism at the prospect of transplanting a kidney from one twin to another was tempered initially by Richard's difficult behavior as a result of his illness. He was disoriented, exhibited psychotic behavior and, in general, made life hard for the attending doctors and staff. The physicians' notes tell the story:

10/27/54

Since admission patient has been extremely uncooperative. Has knocked over infusions, has been restrained, has been moved to side room because of loud outbursts. Restless, cursing all members of the House Staff.

The nurses fared no better than the physicians:

10/28/54

Rather a difficult p.m. . . . Is extremely uncooperative. Behavior erratic and unpredictable. Bit nurse on hand while bed linen being changed. . . .

Dr. E. M. Kudarduskas, a psychiatrist called in to evaluate Richard, put such behavior into context:

When seen on October 27 and 28th, prior to dialysis, patient showed a varying disorientation as to time, place, and person. Was periodically disorientated. During his excited stages he would pull out his indwelling urethral catheter and would struggle against doctors and nurses, accusing them of attacking him sexually. Impression: toxic psychosis reaction superimposed on a paranoid personality. Offhand, I feel the patient will recover from his psychosis with the use of medications and removal of toxic agents by dialysis.

In spite of these problems, we continued systematically to work our way through all the procedures necessary to ensure the success of the operations. To test the true genetic identity of these twin brothers, we performed 17 formal genetic tests, only one of which—the reciprocal skin grafts—provided indisputable evidence. After four weeks a skin graft from Ronald to Richard showed no sign of rejection.

I even went so far as to arrange for Ronald and Richard to be fingerprinted at the local police station so we could compare the markings. It hadn't occurred to me that news reporters might be hanging around the station in hopes of getting a scoop. Imagine my surprise when, driving home that evening, I heard on the car radio that Brigham doctors were planning a daring operation. The Herricks' fingerprinting made headlines the next day, and the press began requesting daily bulletins from the hospital. With this news leak, the pressure on all of us increased.

Richard's condition was deteriorating, and although we were able to control the symptoms with judicious fluid balance, medications, and dialysis, we knew we were running out of time. His failing kidneys were beginning to cause his heart to fail as well.

Twin's Life May Hang on Fingerprint Today

A fingerprinting at 4 p.m., today at Roxbury Crossing police station may save the life of a 23-year-old Marlboro man seriously ill in Peter Bent Brigham Hospital.

The fingerprinting is to determine whether Ronald Herrick of East Main street, Marlboro, is the identical twin or merely the fraternal twin of Richard Herrick, critically sick with a kidney ailment.

If the fingerprints of Ronald when they are taken this afternoon match his brothers, Ronald can, if he desires, donate a kidney that may save Richard's life.

If the fingerprints do not match, it still is not definite that the two boys are only fraternal twins. Doctors then will

be forced to rely on a skin graft the size of a thumbnail they made from Ronald to Richard five weeks ago.

So far the graft has stuck, which would indicate the twins are identical. Only the skin from an identical twin will stick after a transplant for any length of time. By the same token, only the kidney from an identical twin will serve to help permanently a patient with nephritis, the disease which Richard is suffering.

At the suggestion of a Peter Bent Brigham physician, The Herald attempted last night to find the doctor who delivered the Herrick twins June 15, 1931.

Both of the Herrick parents are dead.

Dr. John P. Merrill, chief of the Kidney Research Laboratory at Peter Bent Brigham, said last night that a kidney transplant never before has been attempted between identical twins.

He emphasized also that even if Ronald and Richard turn out to be identical twins the operation may not take place. Richard already may be too sick to survive the shock of serious surgery.

Richard, the twin in the hospital, was recently discharged from the Coast Guard. Ronald is a freshman at Worcester State Teachers College. Both live with an uncle and aunt, Mr. and Mrs. Leander Herrick, at the Marlboro address.

Headline appearing in The Boston Herald several days before the kidney transplant operation.

Like many twins, Richard and Ronald were best friends. They spent their childhood together on the family dairy farm in Rutland, Massachusetts. At the outbreak of the Korean War in 1950, each signed up for a different branch of the military service. Ronald was sent to Germany as a soldier in the Army, while Richard joined the Coast Guard and was stationed in the U.S. Their mother had died while the boys were in high school, and their father died while they were in the service. Both were discharged late in 1953, and the two brothers had planned to move to Marlboro, Massachusetts, to live with an aunt and uncle. But while waiting for Richard to join him, Ronald received a letter saying that Richard was being detained at the Marine Hospital in Chicago for care of chronic kidney disease. Their grandfather, a general physician, told Ronald what the disease was and added that there was no known cure. One of their aunt's relatives had also died from nephritis, so the situation seemed hopeless. As Richard's condition grew worse, he was transferred to the Public Health Service Hospital in Brighton, Massachusetts, to be nearer the family.

Richard's death seemed imminent. "We knew he wasn't going to make it," remembers Ronald. Along with their older brother Van and

younger sister Virginia, Ronald visited Richard in the hospital almost every day. At one point, Van was particularly distressed by Richard's condition and asked Richard's doctor, Dr. David C. Miller, whether he could donate one of his own kidneys to try to save his brother's life. At first, Dr. Miller told him it was impossible, but then remembered that Ronald and Richard were identical twins. He had heard about the pioneering work going on at the Brigham and immediately called us. With the family's consent, Richard was quickly transferred to our Kidney Research Laboratory. As Ronald remembers,

I had heard of such things, but it seemed in the realm of science fiction. For the first time, we began to feel the faintest glimmers of hope. My Aunt Virginia, Uncle Lee, Van, Virginia, and I were caught up in the enthusiasm, but I felt a knot in the pit of my stomach. What was it I was about to do?

When it became clear that Richard would die without one of my kidneys, I did some serious soul-searching. I mean, here I was, 23 years old, young and healthy, and they were going to cut me open and take out one of my organs. It was shocking even to consider the idea. I felt a real conflict of emotions. Of course I wanted to help my brother, but the only operation I'd ever had before was an appendectomy, and I hadn't much liked that.

MEDICAL AND ETHICAL ISSUES

Any form of medical treatment is a balance between intended good and potentially adverse effects. For the healthy donor, however, there is no physical benefit. For us surgeons who had been taught to make sick persons well, subjecting Ronald, a healthy human being, to an extensive surgical procedure required a basic qualitative shift in our thinking. To this extent, we were compromising the physician's injunction to "do no harm." Therefore, we had to assume that the low risk to Ronald was justified by the expected benefits for Richard. Only after a series of consultations involving experienced physicians within and outside the Brigham, clergy of all denominations, and legal counsel did we feel comfortable offering the option of transplantation to Richard, Ronald, and, by extension, their family.

The Brigham kidney transplant team, which comprised Drs. John P. Merrill (Head of Nephrology), J. Hartwell Harrison (Chief of Urol-

ogy), Gustave Dammin (Pathologist-in-Chief), and me, met several times with the Herrick family members to discuss calmly and in detail the preparations, anesthesia, operations, possible complications, and anticipated result of the transplant. We advised neither for nor against the operation; we merely presented the facts as thoroughly as possible and left it for the family to decide, encouraging them to ask any and all questions, no matter how irrelevant they might seem.

“What is the life expectancy of a person with one kidney?” they asked. We approached insurance companies for their actuarial tables and discovered that there was no increased risk from living with one kidney. One person in a thousand is born with a solitary kidney, which is usually detected incidentally on medical examination for other purposes or after accidental loss of their only kidney.

“What are the chances of subsequent disease affecting the remaining kidney?” they asked. We explained that the most common types of renal disease affect both kidneys simultaneously. The most critical conditions affecting a solitary kidney are cancer and trauma, both fortunately rare.

Once the Herricks and the surgical team made the decision to proceed with the transplant, an additional professional burden was imposed on Dr. Harrison,¹⁹ who would be removing Ronald’s healthy kidney (a procedure known as a nephrectomy), because his patient was expected to survive normally. In contrast, I was performing the transplant on a patient otherwise doomed to die. The moral and ethical ramifications of this decision weighed heavily on all our minds.

Henry M. Fox, Chief of Psychiatry and one of the doctors monitoring the case, expressed his thoughts in the patient record:

11/4/54

Saw this patient today and discussed the entire situation with the house staff. This is a very complex problem and there is much to be said for and against asking him to donate a kidney. In my opinion, this is primarily an ethical problem. I think we have to be careful not to be too much swayed by our eagerness to carry out a kidney transplant successfully for the first time (i.e., to succeed in having it take permanently). It seems to me, furthermore, that the potential recipient’s mental state is a subsidiary issue. The important question would seem to be whether we as physicians have the right to put the healthy twin

under the pressure of being asked whether he is willing to make this sacrifice. I do not feel that we have this right in view of the potential danger to the healthy twin as well as the uncertainty of the outcome for this patient.

Dr. John P. Merrill, who was on the medical service, head of the Kidney Research Laboratory, and my co-leader of the transplant team, was keenly aware of these issues and wrote in the record:

11/29/54

We are now faced with a situation (in the recipient) in which the immediate prognosis is certain. The advent of congestive heart failure (CHF) makes it imperative that we decide whether to attempt a homograft [an inexact term that eventually was more precisely referred to as an 'isograft'] taken from his identical twin. The hypertension and CHF make this more difficult and the prognosis uncertain even if the graft functions well. If it does, and hypertension remains, removal of the diseased kidney is indicated. Dr. Murray feels that if the skin graft remains well healed after four weeks the probability of identity is excellent. He (Richard) will return in one week. In the meantime, we will investigate other legal, technical and moral aspects.

This thoughtful consideration of the potential consequences of the transplant contrasts with medical resident E. Robin's enthusiastic note: "Informed that patient has a twin (identical) and possibility of transplant from brother to patient exists. This is an exciting prospect and all stops should be pulled to promote this project."

At the conclusion of our last preoperative group discussion, Ronald asked whether the hospital would assume responsibility for his health care for the rest of his life. Dr. Harrison replied, "Of course not." But he immediately followed this declaration with a question: "Ronald, do you think anyone in this room would ever refuse you care if you needed help?" Ronald paused, then realized that his future health care depended upon our sense of professional responsibility rather than on legal assurances.

Once Ronald had made up his mind, there was no turning back. Unbeknownst to us, it was Richard who had second thoughts. He wrote an urgent note to Ronald on the eve of the operation: "Get out of here and go home," it said. But Ronald would not be swayed, and in

a return note he told Richard, "I am here and I am going to stay." With that, we entered uncharted territory.

A DRY RUN

Richard had reached the final stage of his disease and was close to death. But before we could attempt any operation, he had to be metabolically stable—that is, there had to be proper levels of minerals and acid in his blood; otherwise, his chances of surviving any surgical procedure would be greatly diminished. Fortunately, thanks to the "Kolff-Brigham Kidney," we were able to achieve this with dialysis. However, in those days the dialytic process caused a large internal fluid flux, upsetting the balance of ions in the blood and possibly causing serious cardiac irregularities. To avoid this risk, we had to coordinate the timing of the dialysis and the operation itself.

To be as cautious and thorough as possible, Dr. Francis Moore and I were anxious to do a "test run" using a cadaver to ensure that a transplanted kidney would fit comfortably in its new site. When experimenting on the dogs in the lab, I had ample time to try out a variety of sites before settling on the best one. In Richard's case, I would have no second chance. The kidney I was transplanting was the only compatible kidney in the entire universe! I did not want it to fail for any reason—especially for a reason I had neglected to anticipate.

I left my name with pathology departments all across the city, with instructions to alert me the minute a patient died so I could use the cadaver for a trial run of the operation. Each day was one of anxious waiting, both at the office and at home. My daughter Ginny, who was eight years old at the time, recalls not being able to use the telephone for days for fear we'd miss the critical phone call. Richard's condition was continuing to deteriorate, and I feared we'd lose him if we didn't operate soon.

December 20th was cold and snowy. Bobby and I were home, preparing for a Christmas party for about 75 friends and neighbors. I was in charge of making the eggnog and was just about to get started when the phone rang. It was the Brigham pathology department, calling to tell me that a cadaver was available. I handed Bobby the eggnog ingredients, kissed her goodbye, and left immediately.

I anxiously drove the icy roads into the city and met Franny Moore in the postmortem room. I'd brought all the necessary instruments,

and together we went through the entire operation, trying to think of every possible surgical mishap. The whole procedure took only a couple of hours, and I arrived home to share the last of the eggnog with the few remaining guests. The Herrick operation was scheduled for three days later.

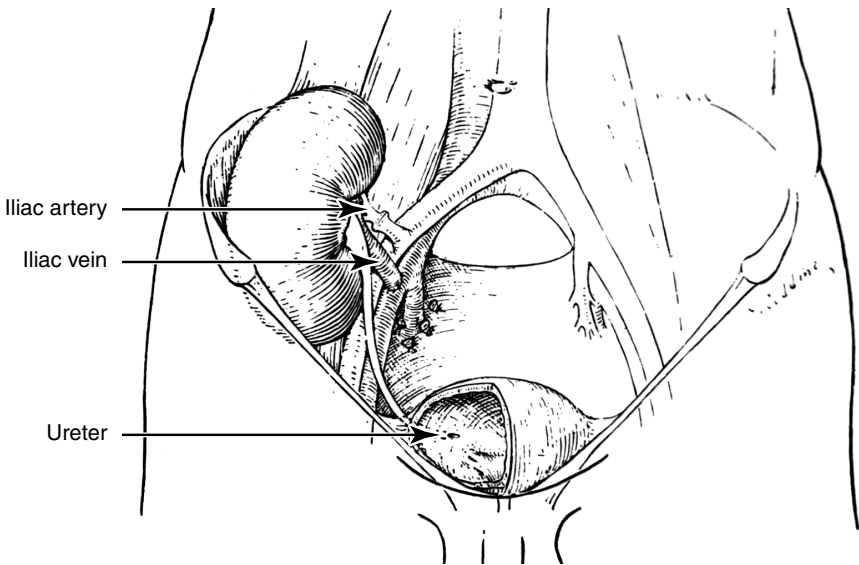
DECEMBER 23, 1954: THE OPERATION

As I drove in to the hospital early on the morning of December 23rd, I listened to the news report about the impending operation on the car radio. If not the eyes of the world, certainly the ears of those in Greater Metropolitan Boston would be tuned in to what we were about to do. I felt as prepared as I could be.

The operation began at 8:15 A.M. Throughout I was in constant communication with the donor team in the adjacent room. By 9:50 A.M., the blood vessels supplying Richard's donor kidney had been isolated and exposed but were still attached. When I was completely prepared, I took a deep breath and gave Dr. Harrison the go-ahead to sever the blood supply to one of Ronald's damaged kidneys. From that moment on, timing was critical. At all costs, the time between cutting off the blood supply to the donor organ and reestablishing it in the recipient (the "ischemic time") had to be as short as possible.

Dr. Francis Moore carried the severed donor kidney into the room at 9:53 A.M. Wrapped as it was in a cold, wet towel and set in a sterile stainless-steel basin, it seemed a humble transport for such precious cargo. Now we had to reestablish blood flow as rapidly as possible, which meant pumping fresh arterial blood into the donor kidney and removing the "used" venous blood.

We could not let Richard's blood flow into his new kidney until we had attached his native vessels to the donor kidney vessels (artery to artery and vein to vein). For this reason, clamps had been placed on two of Richard's arteries supplying his kidney and his leg. We began by attaching (anastomosing) the renal artery of the donor kidney to Richard's external iliac artery at 10:10 A.M. and completed the connection 30 minutes later. Joining the donor renal vein to Richard's external iliac vein took a bit longer and was completed at 11:15 A.M. Although I was well aware of the time ticking away throughout the procedure—everyone was—I could only continue to work carefully and systemati-



The donor kidney has been placed within the abdominal cavity of the recipient. The intestines and appendix (not shown) remain within their peritoneal sac but have been pulled back with retractors to allow better visibility of the operative site. The recipient's iliac artery brings fresh blood into the new kidney via its renal artery, while the recipient's iliac vein returns used blood to the patient via the kidney. The ureter carries urine from the kidney to the urinary bladder.

cally and, at all costs, efficiently. We would know soon enough whether I had succeeded.

There was a collective hush in the operating room as we gently removed the clamps from the vessels newly attached to the donor kidney. As blood flow was restored, Richard's new kidney began to become engorged and turn pink. The donor kidney had been without blood flow for total of 1 hour and 22 minutes. There were grins all around. We removed the remaining clamp from the common iliac artery approximately 10 minutes later and immediately noted pulsation in Richard's right foot.

The kidney lay comfortably in its new site, pulsing with blood and showing pinpoint areas of bleeding on the surface. Urine flowed so briskly from the ureteral catheter that it had to be mopped up from the floor. Judging by that measure, the kidney was working perfectly. We next implanted the free end of the ureter, which was spurting urine, into the urinary bladder. Thus, the normal flow of urine was restored.