
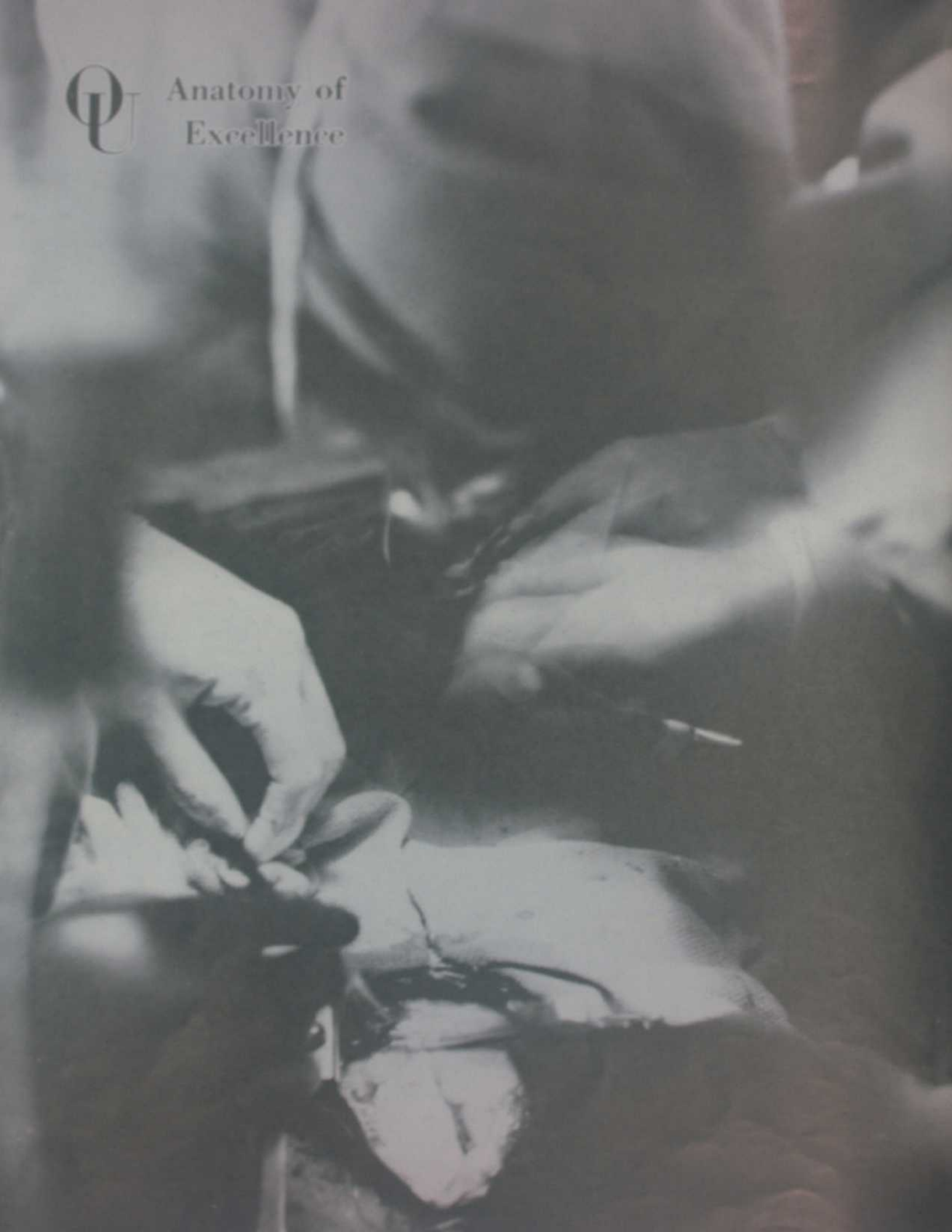


**T**HE ELEMENTS of academic excellence may be found throughout the University of Oklahoma. They exist where years of hard work and devotion have prepared the ground — where men have had enough vision to plan for the future of a great university. In area after area of academic life, the University is establishing records of accomplishment which are gaining national recognition. These areas are the basis for the University's high standing among the nation's educational institutions; upon such a foundation the University's greatness will be built. Yet many of those closest to the University—those most vitally affected by its progress—are unaware of excellence where it exists. In the coming months the *Sooner Magazine* will be presenting an "Anatomy of Excellence" designed to bring these areas clearly into focus. The first in this new series of articles, "Hands to Mend the Heart," which appears on the following pages, is an account of the great progress being made in open heart surgery at the University of Oklahoma Medical Center. In subsequent issues the *Sooner* will be dealing with those academic programs which have been designed for the future, with the personnel who have become the backbone of an outstanding faculty, with the specialized facilities developed by the University for advancement in teaching and research and with the ideas and plans which are the cornerstone of greatness. This series will present an

 **Anatomy of  
Excellence**



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# Hands to Mend the Heart

University Medical Center is playing an important role in a modern miracle of surgery

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**W**E asked freckled-faced Donnie Gentry whether he had a favorite baseball player. He sat up in bed and, before you could spell Mickey Mantle, responded: "Sure . . . It's my brother!"

Donnie is 9.

His brother, he explained, is 10 and plays the elementary school circuit for the Tulsa Hawthorne Braves.

Donnie has not been able to play ball or to do much running or, more recently to stay in school full-time. His skin has been blue. Whenever he sat, he squatted in a knee-to-chest position, a posture often assumed by children with a particular type of heart disease. He had been born with a series of four heart defects known medically as Tetralogy of Fallot.

This spring surgeons at the University

of Oklahoma Medical Center opened Donnie's heart and made repairs that will give him his first chance at a normal life. His skin now has a healthy hue, indicating the heart is capable of delivering to his body an adequate supply of properly oxygenated blood.

With Donnie's remodeled heart, even baseball is a possibility.

The boy is one of some 140 persons who have had congenital heart problems remedied at Children's Memorial Hospital in Oklahoma City since the University of Oklahoma Medical Center heart group completed the state's first successful cardiac bypass operation in January, 1959.

The cardiac bypass—temporary use of a mechanical substitute for the patient's heart and lungs—enables surgeons to mend malformations that were not previously amenable to surgery. With the patient's circulatory system connected to a heart-

lung pump, surgeons can cut open the heart and make their repairs under direct vision, instead of working "blind" (by touch). They can operate within a relatively bloodless organ and stop and restart the heart if necessary. They have time to finish the job without the danger of interrupting the oxygen supply and causing irreparable damage to the brain.

At Children's Memorial Hospital, open heart surgery has become somewhat routine—at least hospital personnel know that Wednesday is "open heart" day. The schedule averages one such case a week.

Each case depends on exquisite teamwork by highly-trained personnel, beginning with exhaustive diagnostic studies to plot the problem before surgery and ending with painstaking post-operative recovery care. It depends on superbly functioning equipment and is accompanied by continu-

continued

O.U. surgeons can spot defects in the exposed heart and make repairs under direct vision.



## *the skill to correct nature's oversights . . .*

ing research in the laboratories of University and Veterans Administration hospitals in an assault on malformations and heart damage that have not yet yielded to surgery.

Each operation requires approximately 12 doctors, nurses and technicians and takes from two to four hours.

Today even abnormalities in the tiniest hearts—once considered high risk cases—are being fixed by the Medical Center with the aid of a precision heart-lung machine. The machine overcomes the difficulty of maintaining the delicate balance of blood that had been an obstacle to heart bypass procedures in the very young.

Encouraging results at Children's in a group of infants and small patients were reported in a recent scientific publication. (The authors, all members of the Medical Center team, were Dr. Nell J. Ryan, a National Institutes of Health trainee in pediatric cardiology; Dr. Glen G. Cayler, pediatric cardiologist and an advanced research fellow of the American Heart Association; Dr. Howard B. Keith, '57med, a third-year resident in surgery; Dr. L. E. Rader, '59 med, first-year surgery resident; Dr. Gilbert S. Campbell, professor of surgery; Dr. G. Rainey Williams, associate professor of surgery; Dr. W. L. Felton, clinical assistant in

surgery, and Dr. William R. Richardson, professor of pediatric surgery.)

Surgery has been performed on 32 youngsters, each weighing less than 40 pounds. They range in age from ten weeks to four years and the smallest weighed but seven pounds.

Each case is a virtual emergency. "We don't by election operate on the tiny ones," one of the surgeons explained. "But these children have such complicated defects that if surgery is postponed, many would die before they reach the age when it would be safer to operate."

All but five of these small children made complete recoveries. Two died after surgery to correct transposition of the great vessels. The artery between the heart and lungs and the aorta, between the heart and the rest of the body, were transposed. This inborn error usually proves fatal soon after birth and only recently, at the Mayo Clinic, has successful corrective surgery been reported in the United States.

A third fatality was a patient with openings in the walls of the heart and valve clefts permitting blood from all four chambers of the heart to mix. Persons with this condition are said to have less than a 50 percent chance for survival with surgery,

but face an early death without it. Such flaws have been successfully repaired in one of the tiny patients at Children's. Another difficult problem, rarely overcome, is when veins from the lungs drain into the wrong side of the heart.

Obviously, from a mechanical standpoint alone, it is harder to operate inside a miniature heart than inside a larger one. The major drawback, however, has been in regulating the blood supply of a diminutive patient while the heart is opened and its functions taken over by a machine. There is little room for error in an infant whose entire blood volume may total no more than a half pint. What would amount to a minute loss of blood in a larger patient is a life-endangering loss to a baby if not replaced. On the other hand, a slight overtransfusion could tax the tiny heart and make the child vulnerable to pneumonia or heart and lung failure.

With the compact heart-lung machine used at Children's, the flow of blood can be quickly varied from a few to several thousand cubic centimeters a minute while the operation proceeds. The machine has a variety of lung unit sizes to accommodate a range of patients. (The largest person to undergo open heart surgery at the Center

## *the equipment to preserve life . . .*



*the team to  
perform miracles . . .*



was a 180-pound man.) Babies are weighed on a very sensitive scale in the operating room immediately before and after surgery so that any blood loss can be corrected at once.

Throughout surgery the physicians know precisely how much blood has been lost and how much is in the pump. "In a small patient, the overall blood use may be a half pint, but for his safety the pump would be primed with three and a half pints," one of the surgeons said. "If the occasion should arise, we would have a potentially life-saving reservoir of blood in the machine."

The child's blood pressure, brain waves, heart waves and temperature are monitored during the procedure.

The Medical Center team has found that the death rate for infants and small children with lesions considered amenable to surgery is as low as that for older children. In addition the younger patients often get along better postoperatively.

Apparatus used at the Medical Center is a Kay-Cross rotating disc oxygenator and a DeBaKey pump, a type currently favored at many of the nation's major heart centers. The equipment was given to the Center by an Oklahoma City business man.

Excess bubbles are removed from the oxygenated blood by filming it on a rapidly rotating disc. When the program first got underway, a "bubble oxygenator", bulkier and noisier than the new equipment, was used. It required as many as 13½ pints of fresh blood for priming, and blood remaining in the machine could not be salvaged.

Blood given by the donor on the morning of surgery is still required at the Center. Recruitment of a steady stream of volunteer donors seemed an insurmountable obstacle in the beginning, but the Oklahoma State Heart Association lent a helping hand, taking over the recruitment in the patient's home town and arranging for blood typing and transportation of volunteers to Oklahoma City. As of June 1, heart association volunteers from dozens of Oklahoma cities have given some 2,500 pints of blood at the Medical Center.

The more refined equipment conserves on this valuable blood in two ways. Less blood is needed to prime it, and the pump is so gentle in its handling of blood that any surplus can be taken to the blood bank and used for postoperative transfusions.

The latter feature has enabled doctors to perform several "double header" procedures, operating on two patients with

identical blood types in succession and making use of the same donated blood for both.

An important aspect of the open heart program is the education and training of medical, nursing and technical personnel to help future Donnie Gentrys. Instruction extends from the medical student through the physician taking specialty training in thoracic surgery, from the orderly to the skilled technologist who assists in operating and taking care of equipment.

The Center has the only approved thoracic surgery residency in the state and physicians completing the training today are well-grounded in cardiovascular as well as pulmonary surgery. Such training takes an average of six years beyond the physician's internship.

Each year one of the surgery residents is selected for the cardiovascular research program, his duties for the 12 months including operation of the heart-lung machine during surgery. Dr. Rader is the resident who has this assignment at present. Dr. Keith preceded him. Both are Oklahomans. Thanks to an expanding University Medical Center, opportunities for advanced training in their chosen field are now available—to them and to others—at home in Oklahoma.



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even baseball is a possibility*