

HISTORICAL REVIEW

The 50th anniversary of abdominal aortic reconstruction

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Extraordinary strides in aortic reconstruction have been made during the past few years, leading up to the 50th anniversary of the original reconstructive procedures. Operations that originally possessed the magnitude of an "Everestian" ascent have been reduced to routine procedures via groin punctures or cutdowns, in many cases. As we approach the time when transperitoneal (or retroperitoneal) aortic reconstruction goes the way of open cholecystectomy, it is valuable to review the contributions of the two men that set us on this path.

Although both men were French, their lives and temperaments were vastly different. Charles Dubost (Fig 1) performed the first abdominal aortic aneurysm resection with homograft replacement; however, his contributions to cardiac surgery were greater. Dubost also performed transplants and neurosurgery.

Jacques Oudot (Figs 2 and 3) had a more singular purpose in mind, which culminated in the first homograft replacement of an obstructed aorta. Both of these procedures took place in France, within 4 months of each other. Charles Dubost would live another four decades and become a pioneer in many new techniques in vascular and cardiac surgery. Jacques Oudot would be dead less than 2 years after his historic feat as a result of a car crash.

CHARLES DUBOST

Dubost was born in Saint-Gaultier, India, in October 1914. Soon after, his parents emigrated to France where his father owned a pharmacy, in the Latin Quarter of Paris. Dubost's decision to be a surgeon was made at the age of 10, when he had a severe case of appendicitis. He felt as if his surgeon had snatched him from the jaws of death, and he vowed to devote his life to comfort and heal others.¹

Dubost completed his humanities at Henri IV and Louis-le-Grand. He began his medical studies as an extern

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Competition of interest: nil.

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J Vasc Surg 2001;33:895-8.

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0741-5214/2001/\$35.00 + 0 24/1/114924

doi:10.1067/mva.2001.114924

of the Paris hospitals in 1934. Four years later he began his internship. His surgical training was concentrated primarily in general and gastrointestinal surgery, with some urologic and pediatric surgery. All of Dubost's teachers noted his exceptional intelligence and dexterity.²

Dubost's training was interrupted by World War II. He served as a Lieutenant-Doctor of a fortress artillery unit. After the liberation of France, Dubost was assigned to a mobile surgical group. At Clermont de l'Oise, he performed major operations under difficult conditions and was awarded the War Cross for his bravery.

After the war, Dubost's career was determined by two of Paris' most renowned surgeons: François de Gaudart d'Allaines and Henri Mondor. de Gaudart d'Allaines knew Dubost as an extern. He offered him an internship on his own service, and Dubost soon became first assistant to de Gaudart d'Allaines.³

In 1946, Dubost was named assistant-surgeon of hospitals in Paris. The general surgery service at Broussais Hospital, where Henri Mondor was the chief of surgery, became renowned because of Dubost's work in esophageal, gastric, and colorectal surgery.

In 1947, de Gaudart d'Allaines invited Alfred Blalock and Henry Bahnson to Paris, where they demonstrated their treatment of "blue" children. Dubost was impressed by the thoughtfulness and skill of these surgeons from Baltimore, and he resolved to devote himself to the nascent field of cardiac surgery. de Gaudart d'Allaines supported Dubost and reserved several beds on his service for the treatment of blue children. He also placed an animal laboratory at Dubost's disposal.

In 1949, Dubost became surgeon of hospitals in Paris. In 1950, he resected a saccular aneurysm of the descending aorta.

On March 29, 1951, Dubost became the first surgeon to resect an abdominal aortic aneurysm and replace it with a homograft.^{4,5} His patient was a 50-year-old man, and the operation was performed via a left thoracoabdominal incision. A 15-cm homograft, taken from the thoracic aorta of a 20-year-old woman who died 3 weeks earlier, was anastomosed to the aorta and right common iliac artery. An endarterectomy of the occluded left common iliac artery was performed before its anastomosis to the homograft (Fig 4). The patient survived for 8 years, succumbing to a



Fig 1. Charles Dubost.

myocardial infarction at his home in Brittany. The report of this operation rocked the surgical world and inspired surgeons throughout Europe and the United States. Several years later Michael DeBakey performed a similar operation with a prosthesis and coined it "Dubost's operation."

In 1951, Dubost also attempted the first renal transplant in Europe. The donor most likely did not sign a surgical consent form, because he was a recently guillotined criminal from la Santé. Without the means to prevent rejection, however, the graft failed. Dubost was devastated and never attempted the procedure again.

Dubost continued to devote much of his time to cardiac surgery in the animal laboratory, and in 1953, his efforts were rewarded when René Savage offered him a position in the new thoracic surgery center of Marie-Lannelongue. Dubost organized a 12-bed cardiac surgery unit and continued his laboratory research.

In 1955, Dubost passed the aggregation examination and became professor of surgery. That year, he also became the first European to use a heart-lung machine when he repaired a ventricular septal defect in a 6-year-old patient. Four years later, Dubost and Gérard Guiot used hypothermic circulatory arrest to successfully excise a large cerebral angioma. This was another "first in the world" for Dubost. Dubost eventually used this technique in more than 200 operations to correct tetralogy of Fallot, pulmonary stenosis, atrial-ventricular malformations, and cardiac septal defects.

In 1963, Dubost succeeded de Gaudart d'Allaines at Broussais. He was appointed chairman of cardiovascular surgery and chief of the new Leriche service. In this position, he encouraged Alain Carpentier to develop a prosthetic heart valve. In 1968, Carpentier implanted the first valve prostheses in humans, at Broussais. That same year, Dubost

also became the first European surgeon to perform cardiac transplantation. His patient, Father Damien Boulogne, survived for 16 months, during which he and Dubost became close friends. In fact, the only photograph in Dubost's office was of Boulogne. When asked why only that photo, Dubost replied, "He showed me what courage is."

In 1971, Dubost performed the first decortication procedure for endocarditis. During his career of four decades, Dubost oversaw more than 15,000 open-heart procedures. He performed more than 800 repairs of coarctations and continued Jean Kunlin's work with lower extremity revascularization. Patients throughout Europe flocked to Broussais and Marie-Lannelongue because of his reputation.

Between 1969 and 1975, Dubost was elected Honorary Fellow of the Society of Thoracic Surgeons, of the American College of Surgeons and of the American Surgical Association. In 1975 he was elected to the Academy of Sciences, and 3 years later he was elected to the Academy of Medicine.

Dubost retired in 1982. During his last decade, he read, enjoyed classical music, and entertained many of the friends and students he had known throughout his career. Dubost died at Saint-Michel Hospital in 1991.

In his eulogy to Dubost, Maurice Mercadier best described the respect and affection that shone on him: "He incised, he cleaved, dissected, resected and reconstituted the tissues or the organs without a hitch, without haste, and without a wasted gesture. The intervention he realized took place like a harmonious ballet of elegant movements . . . To help him was a joy, and all help had the exalted feeling of participating in a magic ritual with happy results. Thus is explained the admiring affection of his students and his staff, of his technicians and his nurses, whom I thank for having come en masse to pay him homage."

JACQUES OUDOT

Oudot was born in Dammarie-les-Lys in 1913. Little has been written about his childhood, and unlike Dubost, he did not consider a career in medicine until he was in his third decade of life. Oudot began his career in chemistry and pharmacy, and actually began a pharmacy residency before evincing an interest in surgery.⁶

In 1946, Oudot wrote his thesis on vasodilatation. He remained interested in blood vessels and began research in vascular surgery during the next few years.

By 1950, Oudot was assistant surgeon at the Paris hospitals. Most of his time was spent at the Animal Experimental Center of the Anatomy Laboratory, rue du Fer à Moulin. Oudot's experimental work there was divided into three parts. The initial stage involved creation of a dog model for chronic aortic occlusion. Early attempts with an active thrombin called Topostasine were unsuccessful because of the rapidity with which thrombosis occurred. Next, Oudot wrapped the aortic trifurcation (the canine hypogastric arteries originate in a common trunk from the aorta) with cellophane and achieved success in three animals. These dogs had hind limb claudication without paraplegia.



Fig 2. Jacques Oudot.



Fig 3. Oudot at Annapurna.

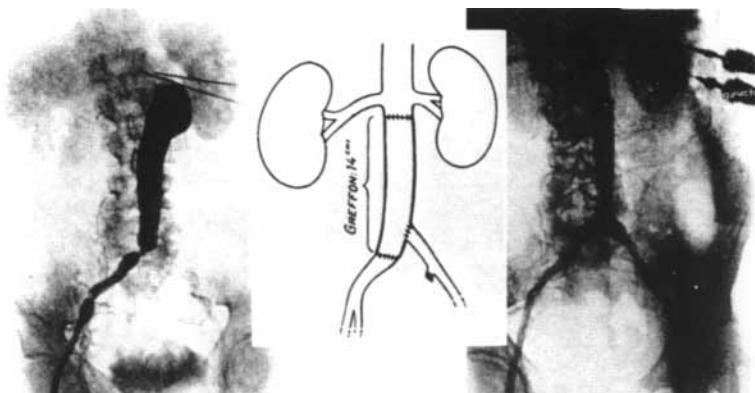


Fig 4. Diagram of Dubost's first aortic aneurysm replacement with homograft.

The second phase of Oudot's work concentrated on the effects of transient aortic clamping on the kidneys, lungs, and carotid and femoral artery pressures. He ultimately learned that animals could tolerate transient acute aortic occlusion.

Finally, Oudot tested many solutions with which to preserve homografts. He harvested grafts from animals humanely sacrificed at a local pound and placed them in a modified Tyrode's solution. The grafts were then refrigerated for several days to 4 weeks. Oudot found that the grafts remained grossly normal and were strong enough to hold sutures.⁷

In 1950, Oudot and Jean Natali operated on 20 dogs. Their initial mortality rate was 100%; however, by October, they had achieved survival in eight of 10 animals. They attributed their improved results to greater experi-

ence, less traumatic clamps, and the procurement of finer needles. Their experiments were continued through 1951, and one dog eventually lived for 10 years.

On November 14, 1950, Oudot operated on a 51-year-old woman with aortic occlusion and nonhealing ulcers of the left leg.⁸ A retroperitoneal approach was used, and as might have been predicted, Oudot had considerable difficulty with the right iliac anastomosis. The left iliac anastomosis was uncomplicated. Oudot's patient did well postoperatively, but the right femoral pulse was absent. On May 8, 1951, Oudot performed the first crossover bypass by inserting a graft between her two external iliac arteries. These two procedures were also remarkable because they defied the predication of René Leriche, who favored lumbar sympathectomy over direct vascular reconstruction. The patient survived

until 1954. Her autopsy revealed thrombosis of the homograft.

The second aortic bifurcation graft was performed on May 16, 1951. The patient made an uneventful recovery. During the next 2 years, Oudot operated on 11 additional patients. Four died and seven survived with satisfactory results.

Whereas Dubost was utterly devoted to surgery, Oudot had a second consuming passion: mountain climbing. In 1950, just several months before the first aortic bifurcation replacement, Oudot participated in a far more trying "first." He was part of the team that ascended Annapurna, the massif of the Himalaya Mountains in Nepal. During the 26,502-ft climb, Oudot treated Maurice Herzog and Henri Lachenal, two of the expedition leaders, for frostbite. He gave intra-arterial injections of Novocain, and the two alpinists eventually required partial amputations of several fingers and toes.⁹

Oudot's passion for climbing claimed him in 1953. While driving to Chamonix, a major winter sports resort and mecca for European alpinists, he wrecked his car. By one account, Oudot lived long enough to diagnose his own splenic rupture. He was taken to a small hospital where the local surgeon was so awestruck by his celebrity patient that he dared not operate on him. Oudot died a short time later. His promising work on

kidney transplantation and grafts of the aortic arch was never published.

When we perform femoral cutdowns in preparation for the next aortic endovascular graft, when we move the fluoroscope into proper position, or when we slide the first wires past the renal arteries, it is fitting that we pay silent homage, if only for an instant, to the two men who took the first and greatest steps on this path for us.

REFERENCES

1. Mercadier M. Éloge de Charles Dubost. Bull Acad Natl Med 1991;175:1005-15.
2. Binet JP. Nécrologie Charles Dubost. Chirurgie 1991;117:507-9.
3. Blondeau P. Nécrologie Charles Dubost. Arch Mal Coeur 1992;85:483-6.
4. Dubost C. Resection of an aneurysm of the abdominal aorta. Arch Surg 1952;64:405-8.
5. Dubost C. First successful resection of an aneurysm of the abdominal aorta with restoration of the continuity by a human arterial graft. World J Surg 1982;6:256-7.
6. Natali J. Hommage à Jacques Oudot pour le 50 anniversaire de la première greffe de bifurcation aortique. Chirurgie 1999;124:448-54.
7. Oudot J. Observations physiologiques et cliniques en haute montagne. Presse Med 1951;59:297-300.
8. Oudot J. La greffe vasculaire dans les thromboses du carrefour aortique. Presse Med 1951;59:234-6.
9. Ichac M, Herzog M. Regards vers l'Annapurna. Paris: B. Arthaud; 1951.

Submitted Feb 6, 2001; accepted Feb 9, 2001.