

Fare Thee Well, Dr. Cooley

When the righteous die, even the Heavens cry.
— Yiddish expression

The death of Dr. Denton A. Cooley generated a wealth of gratitude from his patients and an outpouring of admiration from his colleagues around the world. One tribute, in particular, caught the attention of our staff—from a man in Mexico, born in 1958 with total anomalous venous return. When he was 14 months old, his defect was surgically corrected by Dr. Cooley at Texas Children’s Hospital in Houston.¹ A review of Dr. Cooley’s personal handwritten log of operations yielded the patient’s name and the date of the procedure—“3-3-60” (Fig. 1). Amazingly, it was already the 13th such repair so early in Dr. Cooley’s career.

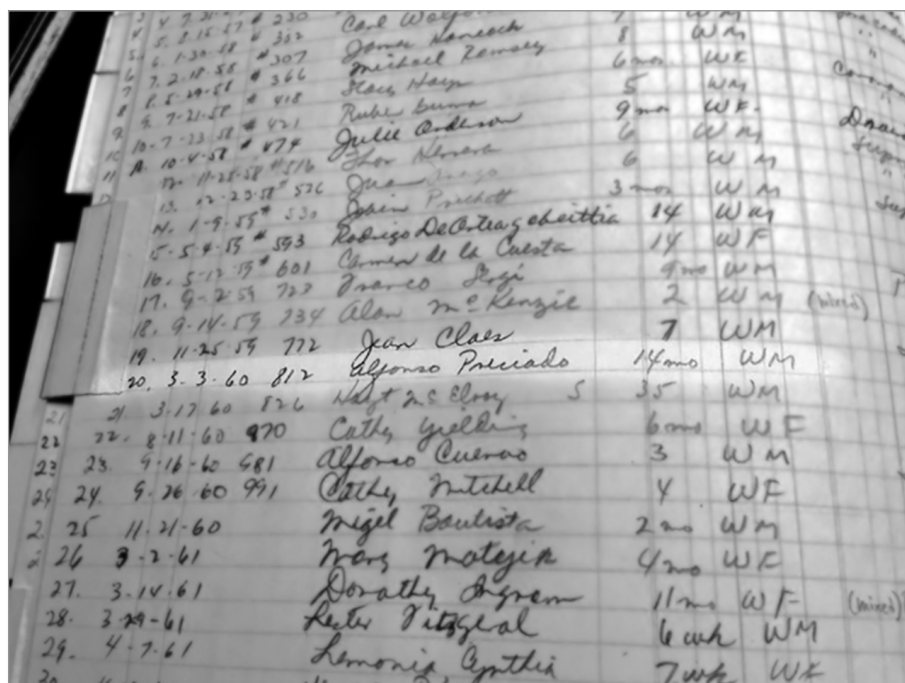


Fig. 1 Dr. Denton Cooley’s handwritten logbook shows the date of a surgical procedure performed on a 14-month-old boy.

Even considering Dr. Cooley’s worldwide tributes, his informative autobiography,² and his detailed obituary,³ no words can convey the scope of his contributions to humankind. Accordingly, we present here a list of his personal contributions to cardiovascular surgery (Table I)⁴ and a comprehensive summary of his surgical inventions and product innovations (Table II).⁴ Both compilations speak for themselves. All we need add is, “Thank you, Dr. Cooley. May you create your wonders in heaven.”

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TABLE I. Denton A. Cooley's Personal Contributions to Cardiovascular Surgery⁴

1949	Excision of an aortic aneurysm*	1976	Report of a successful series of cases in which the Meadox-Cooley double-velour graft was used for arterial reconstruction*
1952	Homograft repair of a thoracoabdominal aneurysm*		
1954	Excision of a ruptured abdominal aneurysm*		Surgical treatment of supraventricular tachycardia in infants and children
1956	First successful carotid endarterectomy*	1977	Delayed closure of the sternum, used to prevent tamponade or compression of the heart*
	Repair of a postinfarction ventricular septal defect by using cardiopulmonary bypass (CPB)*	1978	Modified procedure for correction of truncus arteriosus*
	Repair of aorticopulmonary septal defect by using CPB*	1980	Method of preparing woven Dacron aortic grafts to prevent bleeding between graft interstices*
	Correction of total anomalous pulmonary venous drainage by using CPB*	1981	Second total artificial heart (Akutsu-III) implantation in the world as a bridge to transplantation
1958	Excision of a left ventricular aneurysm by using CPB*		Report of "open" distal anastomosis for ascending and transverse arch resection in 18 patients
1959	Correction of congenital heart defects in newborns in 120 patients, a very large series at the time		Comparison of hypothermic techniques in repair of aneurysms of the transverse aortic arch
	Report of 2,700 cases of arterial aneurysms	1984	Cardiac transplantation in an 8-month-old female infant—at the time, the youngest-ever transplant recipient*
1960	Description of the relationship of spinal fluid pressure to the incidence of paraplegia after temporary aortic occlusion*		Founding of Cardiovascular Care Providers, the first bundled-services provider for open-heart operations*
1961	Embolectomy for a massive pulmonary embolism*	1987	Intravalvular implantation of a mitral valve prosthesis*
	Open-heart operations with a disposable oxygenator, 5% dextrose prime, and normothermia*	1989	Ventricular endoaneurysmorrhaphy of a left ventricular aneurysm
1962	Open-heart surgery on patients of the Jehovah's Witness faith*	1992	Comparison of "open" distal anastomosis with the conventional 2-clamp technique for repair of descending thoracic aneurysms
	Founding of the Texas Heart Institute	1993	Transmyocardial laser revascularization for ischemic coronary heart disease
1963	Bypass to reconstruct the coronary system in a patient with a congenital defect of a coronary artery; this was an early type of coronary artery bypass*	1994	Repair of a postinfarction ventricular septal defect by a modified intracavitary method*
1966	Intrapericardial aortic-to-right pulmonary artery anastomosis (called the Waterston-Cooley anastomosis)*	1995	Retrograde replacement of the thoracic aorta for aortic aneurysms*
1968	First successful heart transplant in the United States*	1996	Myocardial revascularization by a less invasive, "limited-access" technique
	First heart-lung transplant in a human*	1999	Selective hypothermia in the repair of aneurysms of the descending aorta*
1969	First total artificial heart (Liotta) implantation in the world (the first bridge to transplantation)*		New, transthoracic incision for implanting apico-aortic conduits*
1970	Surgical treatment with a mitral valve prosthesis for idiopathic hypertrophic subaortic stenosis	2001	100,000 open-heart operations (with Cooley team at the Texas Heart Institute)*
1971	Commercial availability of the Cooley-Cutter artificial heart valve*	2002	Denton A. Cooley Building opens, with state-of-the-art diagnostic and surgical facilities for the Texas Heart Institute at St. Luke's Episcopal Hospital
1972	Description of ischemic contracture of the heart ("stone heart") and patients at risk for the syndrome, with a suggested preventive technique*		
	Use of a contoured, knitted Dacron baffle for repair of transposition of the great vessels*		
	Transaortic repair of a ventricular septal defect*		
1975	Surgical treatment of left ventricular outflow tract obstruction by using a Dacron graft and valve combination (valved conduit)		

*Contributions considered "firsts" in the field of cardiovascular surgery

TABLE II. Denton A. Cooley's Surgical Inventions and Products⁴

1949	Defibrillator (Johns Hopkins University School of Medicine)	1976	Veri-Soft Cooley Woven Vascular Graft[s] (Licensing Agreement with Meadox Medicals, Inc.)
1955	Reusable Stainless-Steel Oxygenator	ca. 1976	Cooley Annuloplasty "C" Ring (Licensing Agreement with Meadox Medicals, Inc.)
1956	Mark-Cooley Heart-Lung Apparatus (Mark Company)	1976–	Suction Systems: 23 Patented Products, Including:
1959	Mechanical Ventilator for Infants (With Dr. Arthur Keats)	1978	1976, Suction Wand (U.S. Patent 3,963,028)
	Cooley Mitral Valve Dilator (Pilling & Son)		1977, Method of Making a Suction Wand (U.S. Patent 4,045,859)
1960s	Cooley Anastomosis Clamp (Pilling & Son)		1977, Surgical Suction Wand Assemblies (U.K. Patent 1,569,945)
	Cooley Coarctation Clamp (Pilling & Son)		1978, Surgical Suction Wand Assembly and Method (U.S. Patent 4,068,664) (Surgimedics, Texas Medical Products, Inc.)
	Cooley Jaw Serrations (Pilling & Son)	1977	Air Aspirator Needles: 3 Patented Products, Including Air Embolus Aspirator (U.S. Patent 4,002,174) (Surgimedics, Texas Medical Products, Inc.)
	Cooley Ring Handle Forceps, Offset Angle Forceps, Straight String-type Tissue Forceps (These, among others comprise a "matched set" of Cooley surgical instruments.) (Pilling & Son)		Disposable Surgical Instrument Tray (U.S. Patent 4,011,944) (Surgimedics, Texas Medical Products, Inc.)
	Cooley Pediatric Surgical Instruments (Pilling & Son)	1979	Blood Oxygenator (U.S. Patent 4,158,659—Not Produced) (Surgimedics, Texas Medical Products, Inc.)
1960	Cooley Modified Dilator (for Smaller Adult Hearts) (Pilling & Son)		Multipurpose Disposable Needle for Open Heart Surgery (Texas Medical Products, Inc.)
	Cooley Pediatric Modified Dilator (Pilling & Son)		
	Cooley Pulmonary Valvulotome (Pilling & Son)	1980	Blood Oxygenator Assembly Method (U.S. Patent 4,180,896— Not Produced) (Surgimedics, Texas Medical Products, Inc.)
1962	Model 1500 Pump Oxygenator Console (Sarns, Inc.)	ca. 1980	Cooley Knitted Graft with Guideline (Licensing Agreement with Meadox Medicals, Inc.)
ca. 1962	Plastic Disposable Oxygenator (Travenol, Inc.)	1981	Method of Preparing Woven Dacron Grafts to Prevent Interstitial Hemorrhage
ca. 1963	Cooley Patent Ductus Clamp (Pilling & Son)	ca. 1982	Cooley Rigid Collar Prosthesis (Licensing Agreement with Meadox Medicals, Inc.)
	Cooley Renal Artery Clamp (Pilling & Son)	1983	Cooley Sternal Boot (Texas Medical Products, Inc.)
	Cooley Tissue Forceps (Pilling & Son)		Pre-bypass Filters: 3 Patented Products, Including Blood and Perfusate Filter (U.S. Patent 4,422,939) (Surgimedics, Texas Medical Products, Inc.)
1964	Cooley Atrial Retractors (Pilling & Son)	ca. 1983	Cooley Flexible Collar Prosthesis (Licensing Agreement with Meadox Medicals, Inc.)
ca. 1964	Cooley Aortic Occlusion Clamp (Pilling & Son)		Cooley Meadox Annuloplasty Tape (Licensing Agreement with Meadox Medicals, Inc.)
ca. 1966	Cooley Graft Suction Tube, Cooley Intracardiac Suction Tube, and Cooley-Anthony Tip, Cooley-Crawford Tunneler (Pilling & Son)	ca. 1984	Cooley Cold Light Projection System (Texas Medical Products, Inc.)
	Cooley Left Ventricular Sump (Pilling & Son)		Denton A. Cooley Fiber Optic Illumination Systems (Luxtec) (Head Lamp and Gooseneck Floor Lamp)
1969	Total Artificial Heart (with Dr. Domingo Liotta)	1987	Bubble Oxygenator (U.S. Patent 4,637,917—Not Produced) (Surgimedics, Texas Medical Products, Inc.)
1970s	Cooley Sternotomy Retractors (V. Mueller)		Videolux Headset Camera (Luxtec)
1970	Cooley Knitted Graft (Licensing Agreement with Meadox Medicals, Inc.)	1989	Collagen Graft[s] (Licensing Agreement with Meadox Medicals, Inc.)
1971	Cooley-Cutter Heart Valve (Aortic and Mitral) (Cutter Laboratories)	1993	Dacron Annuloplasty Ring (Cost-effective Prosthesis Fashioned from Commercially Available Aortic Tube Grafts)
1975	Cooley Coronary Occluder, U-Shaped (V. Mueller)		
	Cooley Coronary Retractor, Straight (V. Mueller)		
	Cooley Double Velour Guideline Grafts (Licensing Agreement with Meadox Medicals, Inc.)		
	Cooley Low Porosity Woven Grafts (Licensing Agreement with Meadox Medicals, Inc.)		
1976	Parallel "Y" Connectors: 16 Patented Products, Including Bifurcated Tubing Connector (U.S. Patent 3,944,261) (Surgimedics, Texas Medical Products, Inc.)		
	Saphenous Vein Cannula, Including Coronary Artery Bypass Graft Testing Device and Method (U.S. Patent 3,958,557) (Surgimedics, Texas Medical Products, Inc.)		

References

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3. Life tributes: Denton Arthur Cooley, M.D. *Houston Chronicle* 2016 Nov 27;116(45):F5.
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