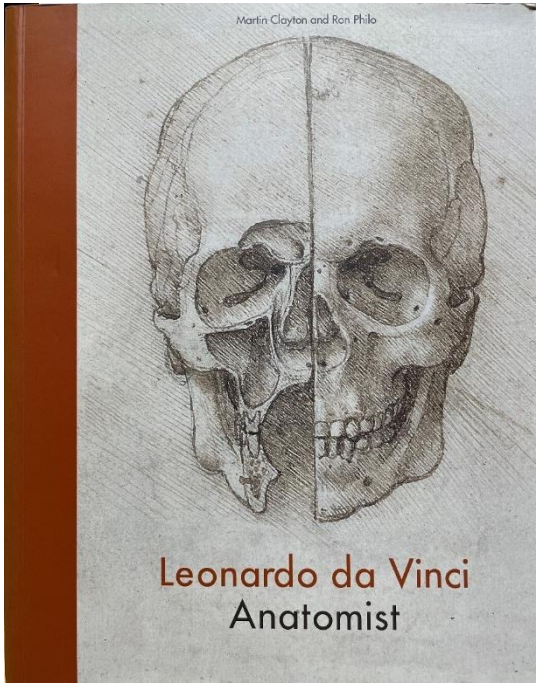

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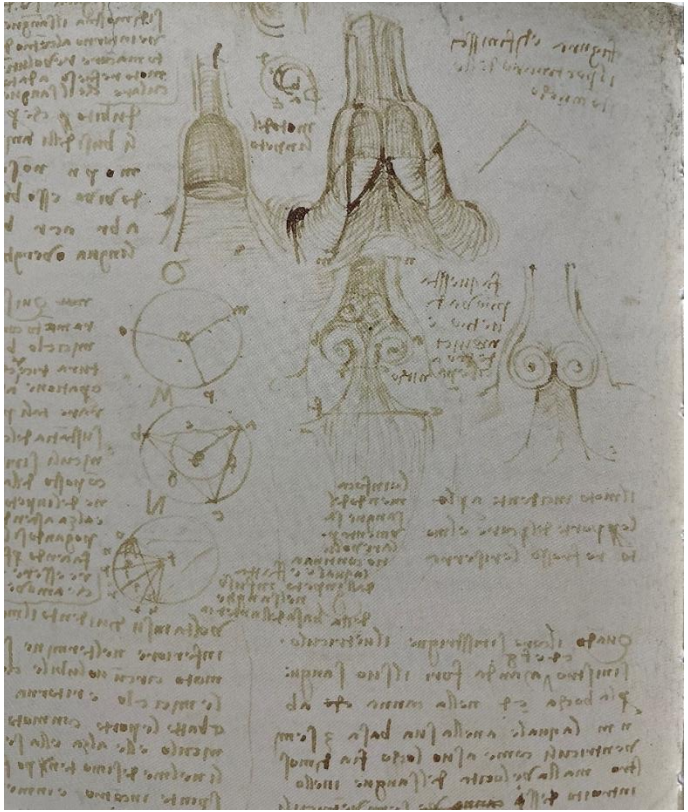

1512 - 1513

Martin Clayton, Ron Philo – Leonardo da Vinci – Anatomist; Royal Collection Trust, p.84

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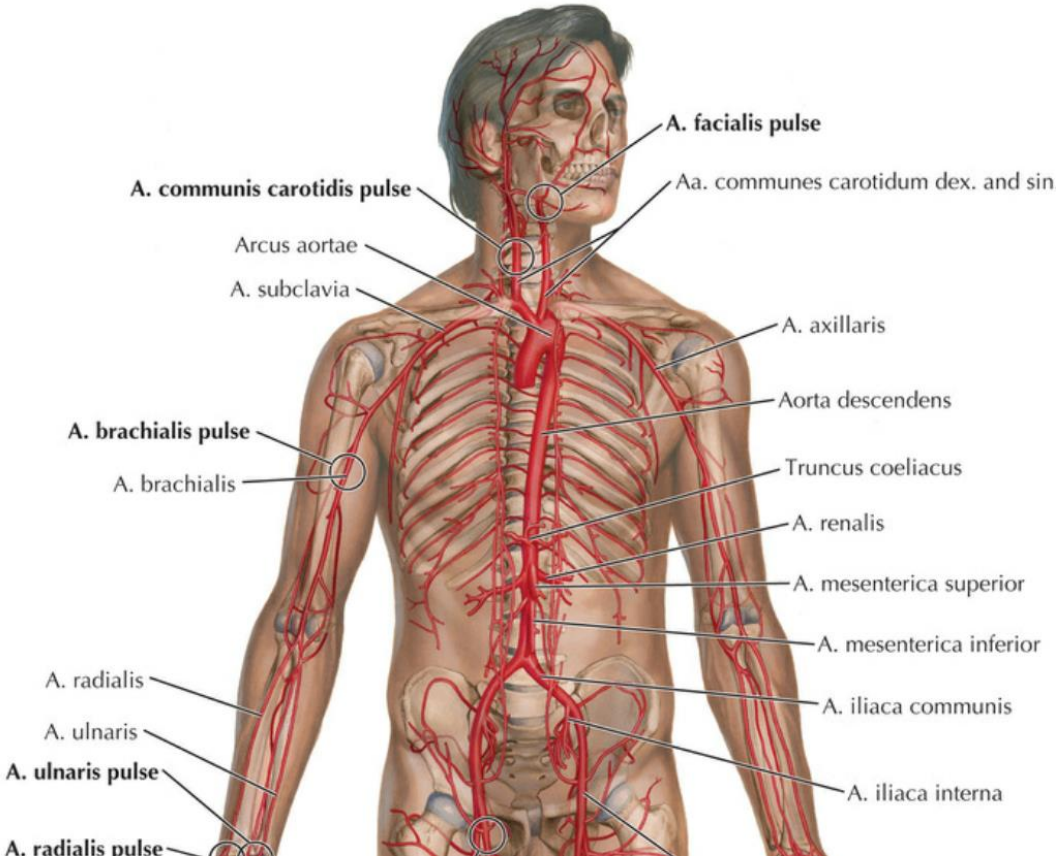

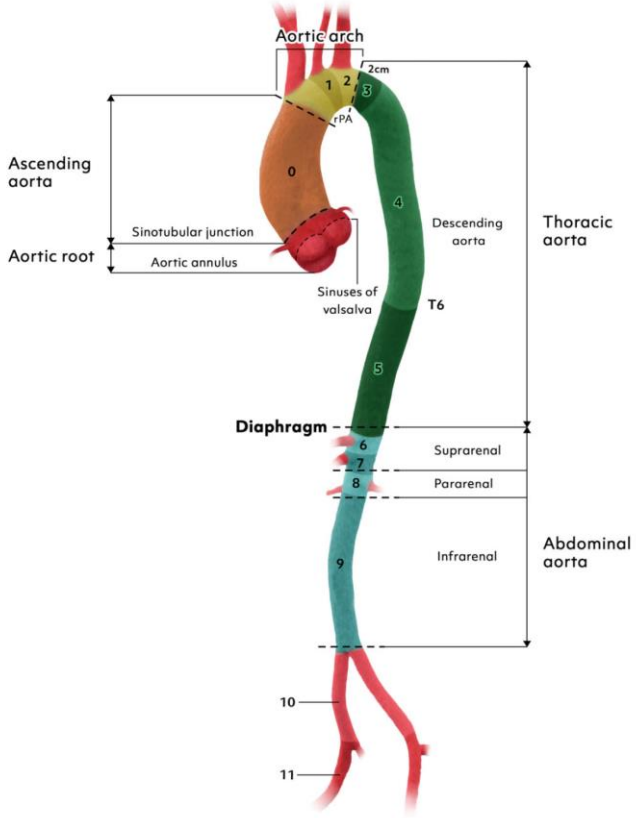

Czerny M, et al. EACTS/STS Guidelines for diagnosing and treating acute and chronic syndromes of the aortic organ. *Eur J Cardiothorac Surg*. 2024;65.

Frank E. Netter, Atlas of Human Anatomy, Elsevier, Phil. USA, 2019

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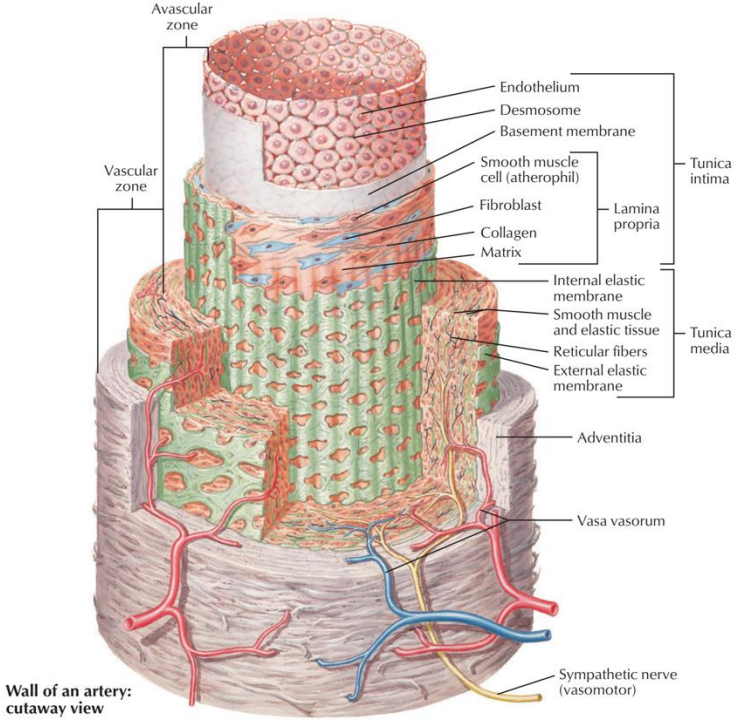
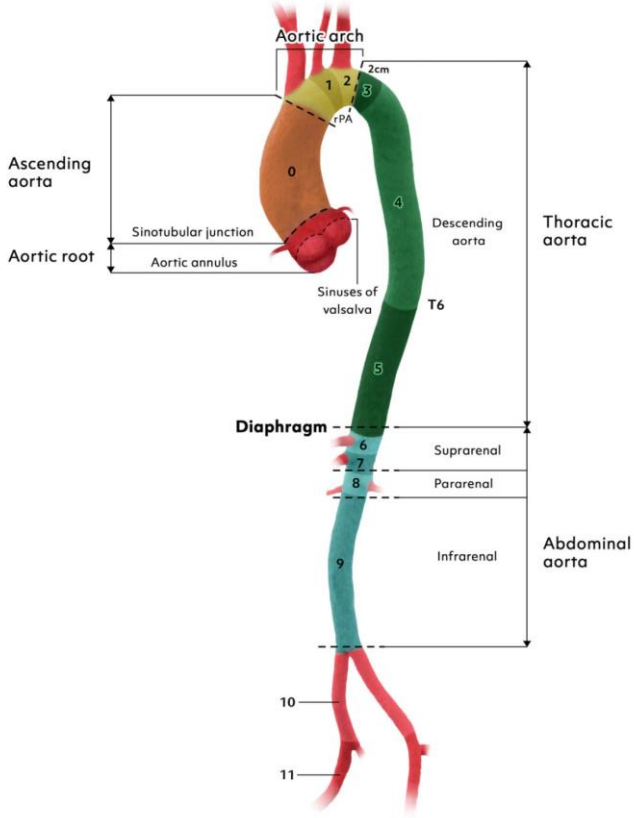
Arterial Wall



Wall of an artery: cutaway view



Czerny M, et al. EACTS/STS Guidelines for diagnosing and treating acute and chronic syndromes of the aortic organ. *Eur J Cardiothorac Surg*. 2024;65.

Frank E. Netter, Atlas of Human Anatomy, Elsevier, Phil. USA, 2019

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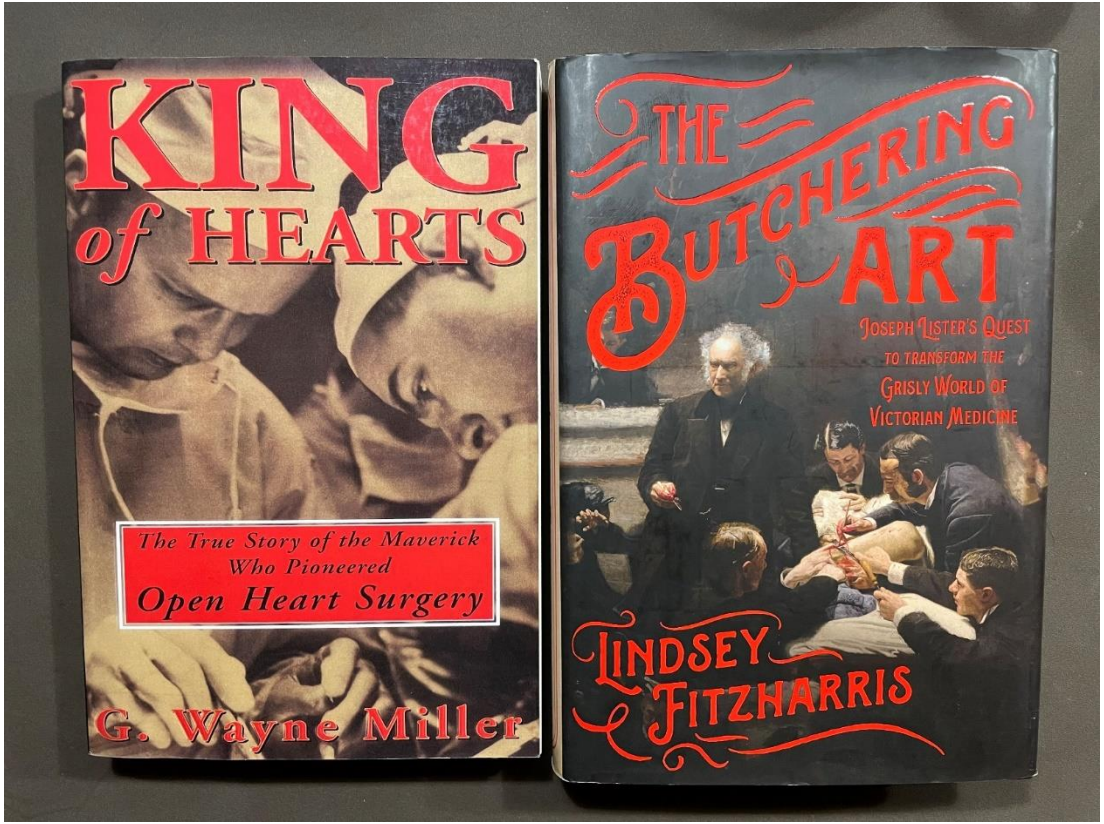
Walton C. Lillehei

ca. 75 J.



Joseph Lister

ca. 150 J.

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Coselli JS, LeMaire SA. Aortic Arch Surgery: Principles, Strategies and Outcomes. Wiley; 2009.

Thomas Mann

(1939, Princeton University)

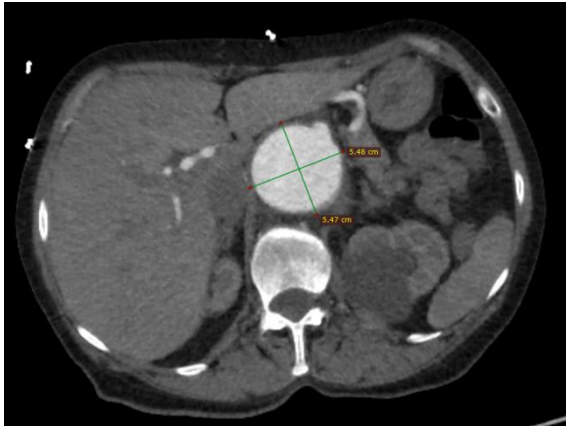
1875-1955

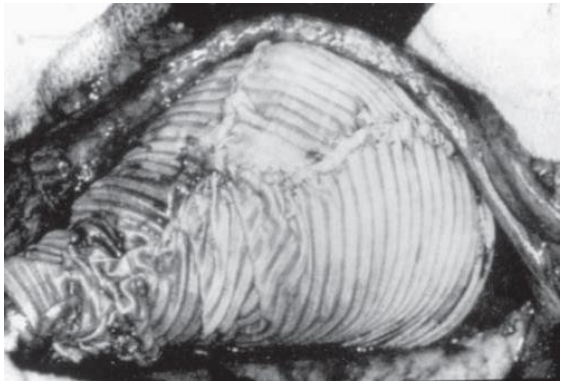
Rupturiertes
Iliakalarterien-Aneurysma

Albert Einstein

1879-1955

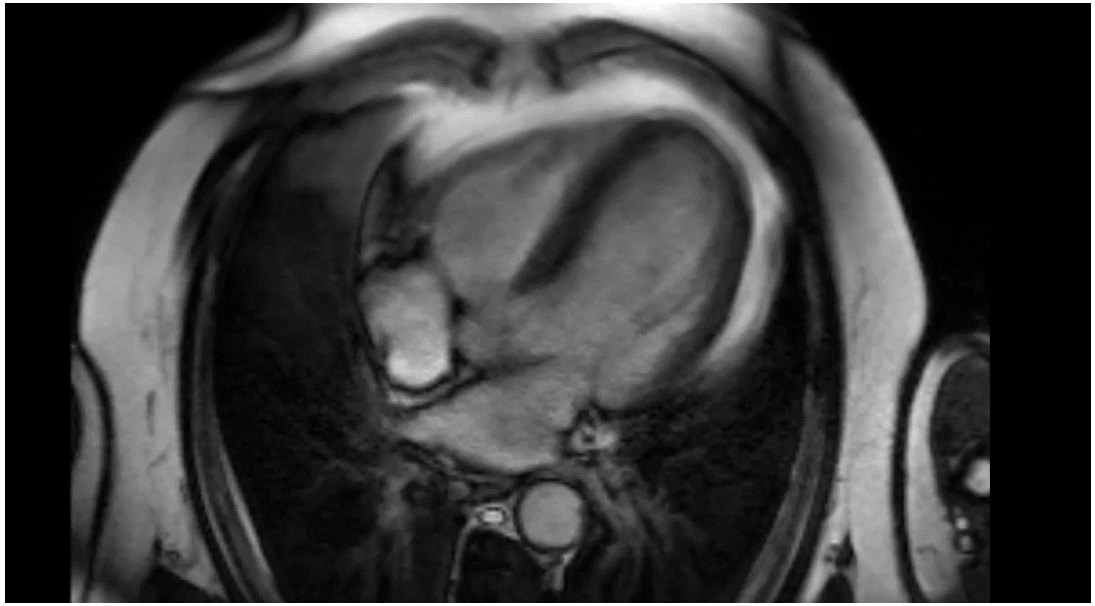
Rupturiertes
Bauchaortananeurysma





Bollinger A, Rüttimann B. Das Aneurysma aus medizinhistorischer Sicht [Aneurysms from the viewpoint of medical history]. Vasa. 2002 Nov;31(4):281-6.

Coselli JS, LeMaire SA. Aortic Arch Surgery: Principles, Strategies and Outcomes. Wiley; 2009.

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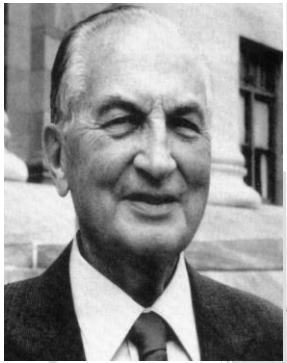
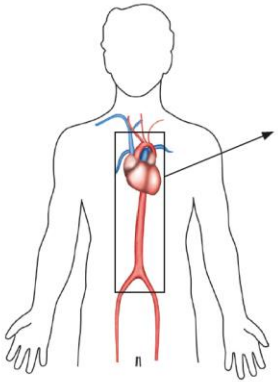
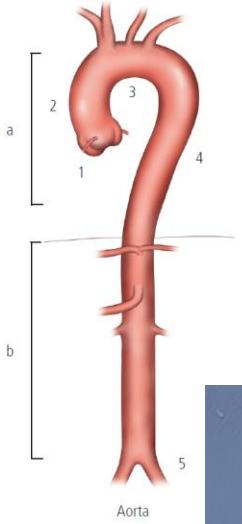


Robert E. Gross





Persistierender Ductus arteriosus 1938
Homograft 1948

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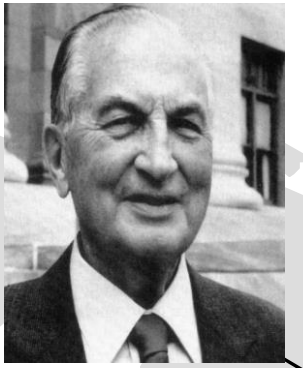
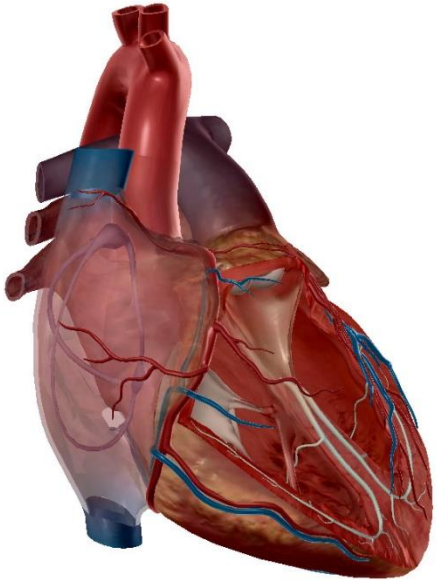
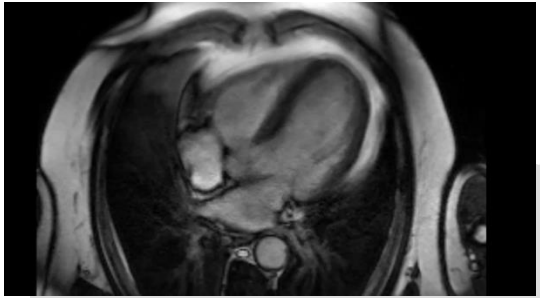
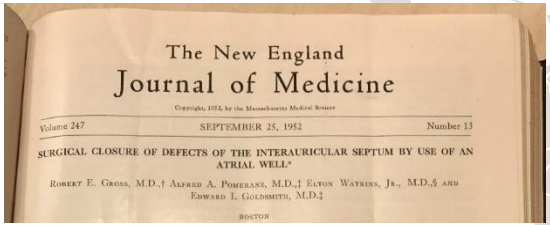


Robert E. Gross





Atrial well 1952



The New England
Journal of Medicine

Volume 247 SEPTEMBER 25, 1952 Number 13

SURGICAL CLOSURE OF DEFECTS OF THE INTERAURICULAR SEPTUM BY USE OF AN ATRIAL WELL*

ROBERT E. GROSS, M.D.,† ALFRED A. POMERANZ, M.D.,† ELTON WATKINS, JR., M.D.,§ AND EDWARD I. GOLDSMITH, M.D.‖

BOSTON

Gross RE, Pomeranz AA, Watkins E, Jr., Goldsmith EI. N Engl J Med 1952;247:455-460.

Human Anatomy Atlas, Visible Body

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SURGICAL CONSIDERATIONS OF INTRATHORACIC ANEURYSMS OF THE AORTA AND GREAT VESSELS*

DENTON A. COOLEY, M.D., AND MICHAEL E. DE BAKEY, M.D.

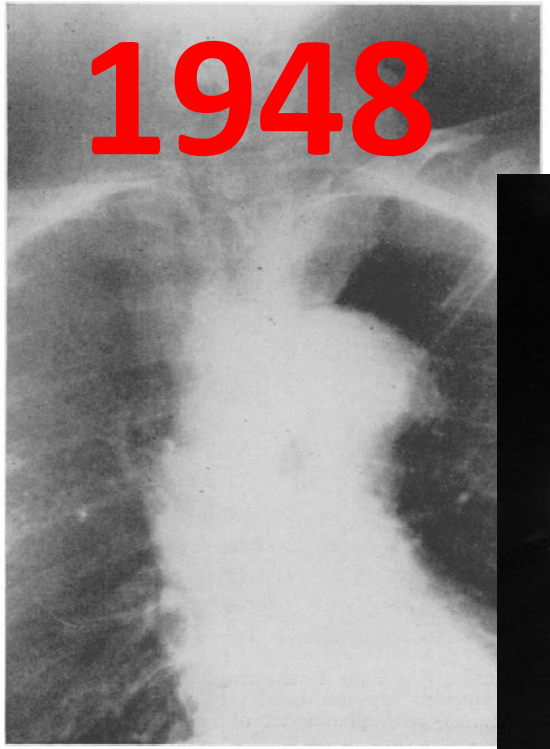
HOUSTON, TEXAS

FROM THE DEPARTMENT OF SURGERY, BAYLOR UNIVERSITY COLLEGE OF MEDICINE, AND THE SURGICAL SERVICES OF THE JEFFERSON DAVIS HOSPITAL AND THE VETERANS ADMINISTRATION HOSPITAL, HOUSTON

TABLE I.

Case No.	Color, Sex, and Age	Date Operated	Aneurysm Nature	Aneurysm Situation	Surgical Procedure	Result and Remarks
1. R.M.	C.M. 46	12/22/48	Syphilitic	Transverse arch	Proximal ligation with cellophane reinforced ligature (rubber catheter)	Apparently well for 2 months and then developed fatal hemorrhage
2. R.R.	W.M. 32	4/28/50	Spontaneous	Rt. subclav.	Proximal and distal ligation with total excision	Cured
3. J.M.	C.M. 45	7/12/51	Syphilitic	Innominate and adjacent aorta	Ligation of subclavian and carotid, aneurysmectomy, and aortorrhaphy	Cured
4. F.D.	W.M 57	10/ 4/51	Syphilitic	Ascending and transverse arch	Aneurysmectomy and aortorrhaphy	Died 14 hours after operation, diffuse cerebral damage, anesthetic complication
5. L.H.	C.M. 41	9/ 6/51	Syphilitic	Terminal thoracic aorta	Aneurysmorrhaphy and cellophane wrapping, subsequent wiring	Died 18 days after operation, secondary hemorrhage
6. W.F.	W.M. 56	9/ 7/51	Syphilitic and arteriosclerotic	Transverse arch	Cellophane wrapping	Improved

FIG. 1.—Roentgenogram of chest in Case 1 showing widening of superior mediastinal shadow, slight tracheal displacement to the right and dilatation and calcification of the aortic arch.



Cooley DA, De Bakey ME. Surgical considerations of intrathoracic aneurysms of the aorta and great vessels. *Ann Surg*. 1952;135:660-680.

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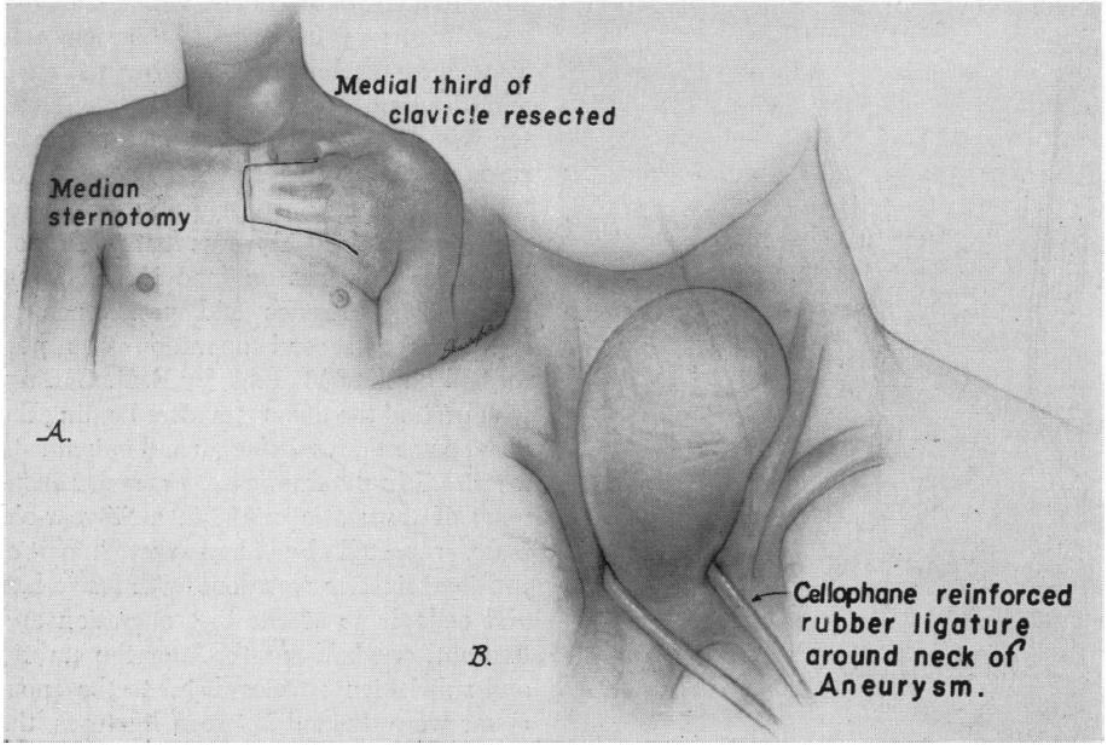
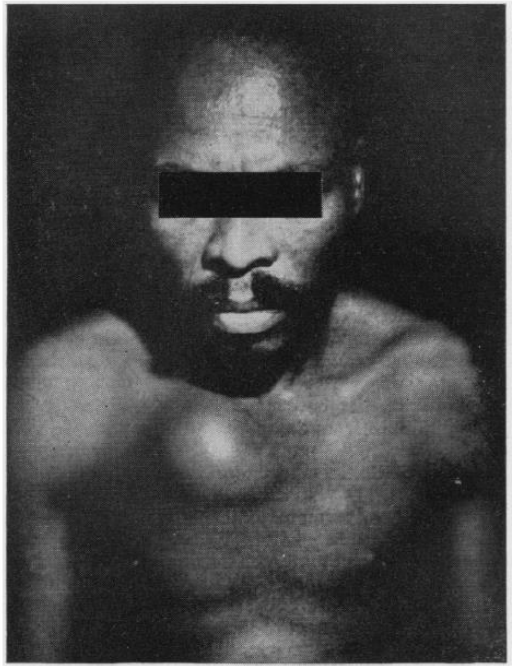
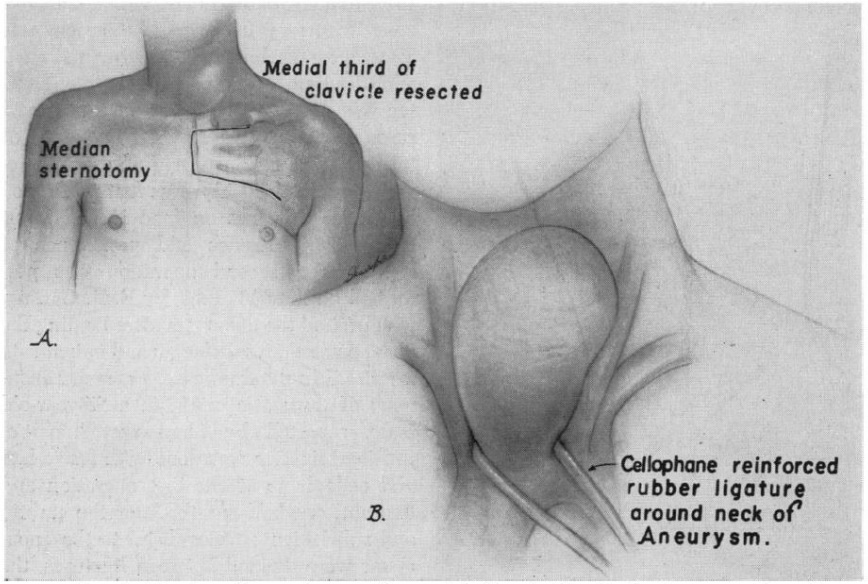


FIG. 2.—Drawing of operative procedure and findings in Case 1, showing approach in A and the sacciform aneurysm in B arising from the anterior superior border of the transverse aortic arch between the innominate and carotid arteries, with placement of cellophane reinforced ligature around its neck.

Cooley DA, De Bakey ME. Surgical considerations of intrathoracic aneurysms of the aorta and great vessels. *Ann Surg*. 1952;135:660-680.





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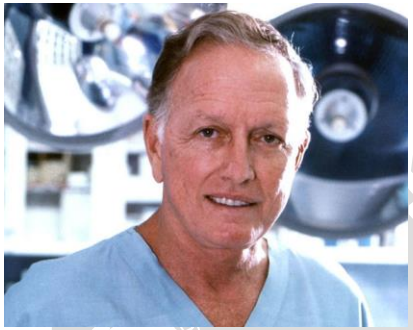
Barnard CN, Schrire V. The surgical treatment of acquired aneurysm of the throracic aorta. Thorax 1963;18:101-115.



Denton A. Cooley

Michael E. DeBakey

TOTAL EXCISION OF THE AORTIC ARCH FOR ANEURYSM

DENTON A. COOLEY, M.D., F.A.C.S., DANIEL E. MAHAFFEY, M.D., and MICHAEL E. DE BAKEY, M.D., F.A.C.S., Houston, Texas

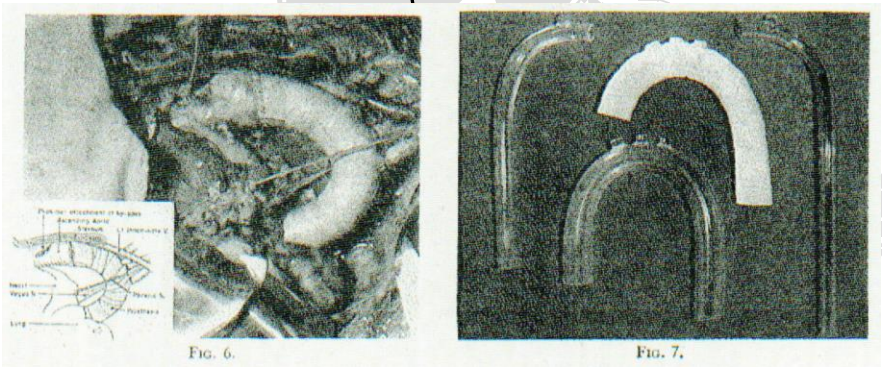


FIG. 6.

FIG. 7.

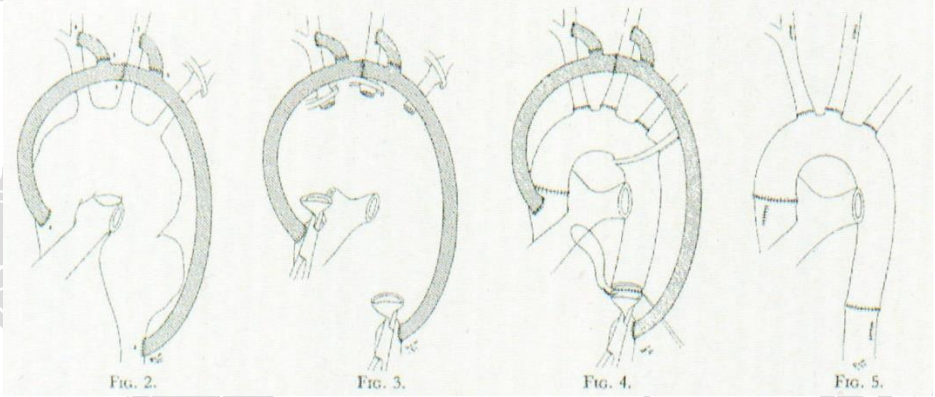


FIG. 2. FIG. 3. FIG. 4. FIG. 5.

Cooley DA, Mahaffey DE, De Bakey ME. Surg Gynecol Obstet 1955;101:667-672.

blog.houstonmethodist.org

www.texasheart.org

G.Wayne Miller. King of Hearts. Crown Publishers. NY. 2000

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Michael E. DeBakey

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www.texasheart.org

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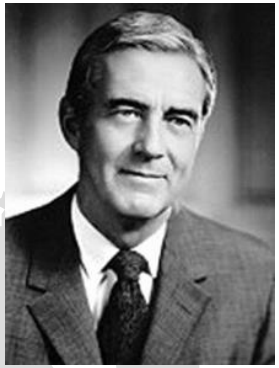
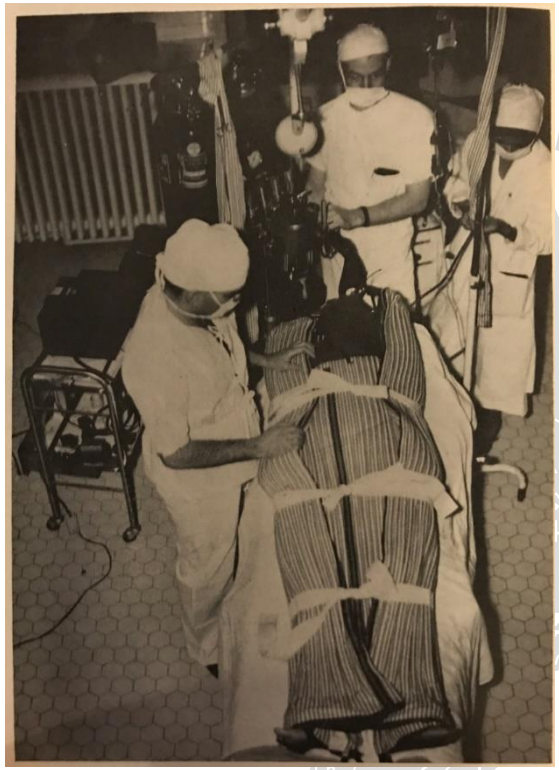


F. John Lewis
Richard Varco

Wilfred Bigelow

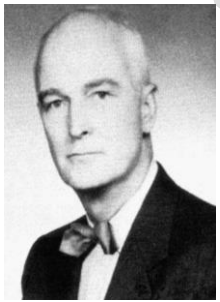
02.September 1952



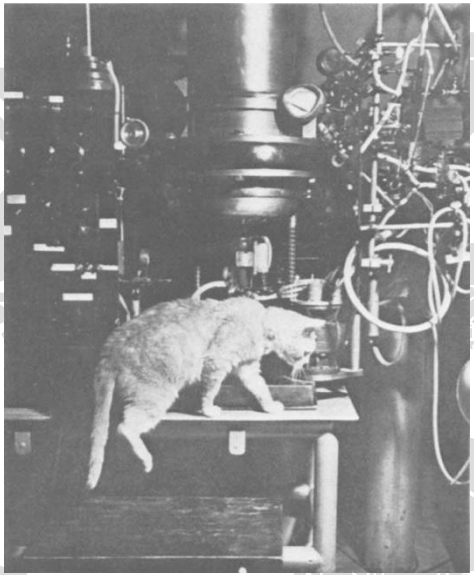
C.Walton Lillhei. Historic Development of cardiopulmonary bypass in Minnesota.

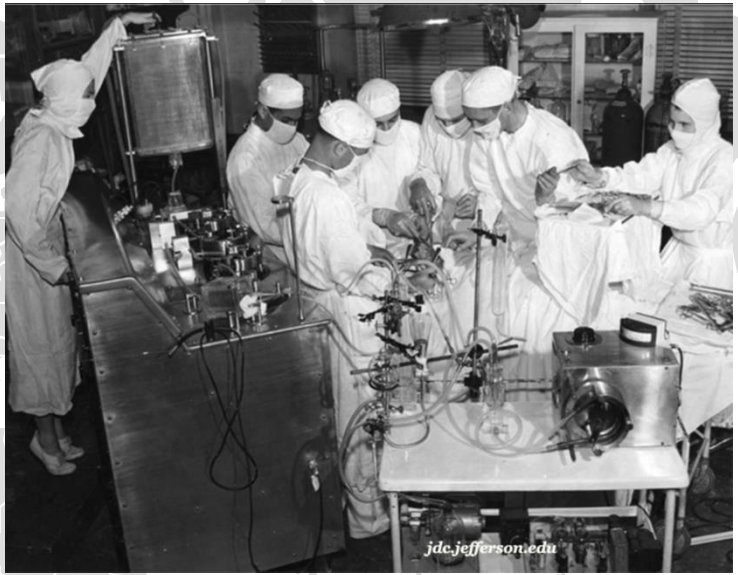
Lewis FJ, Taufic M. Surgery 1953;33:52-59.

Alexi-Meskishvili VV, Konstantinov IE. Ann Thorac Surg 2003;76:322-327.



John Gibbon
06.05.1953





Hill JD. John H. Gibbon, Jr. Part I. The development of the first successful heart-lung machine. *Ann Thorac Surg*. 1982;34:337-341.

jdc.jefferson.edu

TABLE 4 Open-Heart Surgery with Total Cardiopulmonary Bypass

Physician (refs)	No. of Patients	Age	Defects	Method	Date	Result	
						Died	Lived
Dennis et al. (7,8)	2	6–8 yr	ASD, AV canal	Film oxygenator	1951	2	0
Gibbon (11–13)	6	15 mo–18 yr	PDA, ASD (2 patients), ASD and VSD (1 patient), NA (2 patients)	Film oxygenator	1952–1953	5	1 (ASD)
Helmsworth et al. (15)	1	4 yr	ASD	Bubble oxygenator	1952	1	0
Dodrill et al. (16)	1	16 yr	Pulmonary stenosis	Autogenous lung	1953	1	0
Mustard and Thomson (17)	5	10 mo–11 yr	Tetralogy of Fallot	Monkey lungs	1951–1953	5	0
Clowes et al. (18)	3	Neonate–55 yr	Lung disease, AO stenosis, left atrial myxoma	Bubble oxygenator	1953	3	0

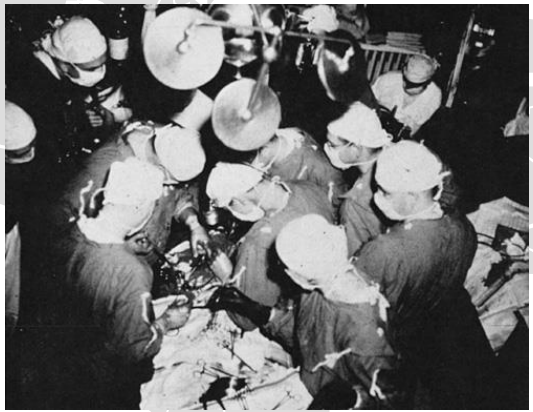
All reported cases from 1951 to 1954, before cross-circulation, March 26, 1954. ASD, atrial (secundum) septal defect; AV, atrioventricularis communis; PDA, patent ductus arteriosus; VSD, ventricular septal defect; NA, not available; AO, aortic.

Sterblichkeit
17 / 18

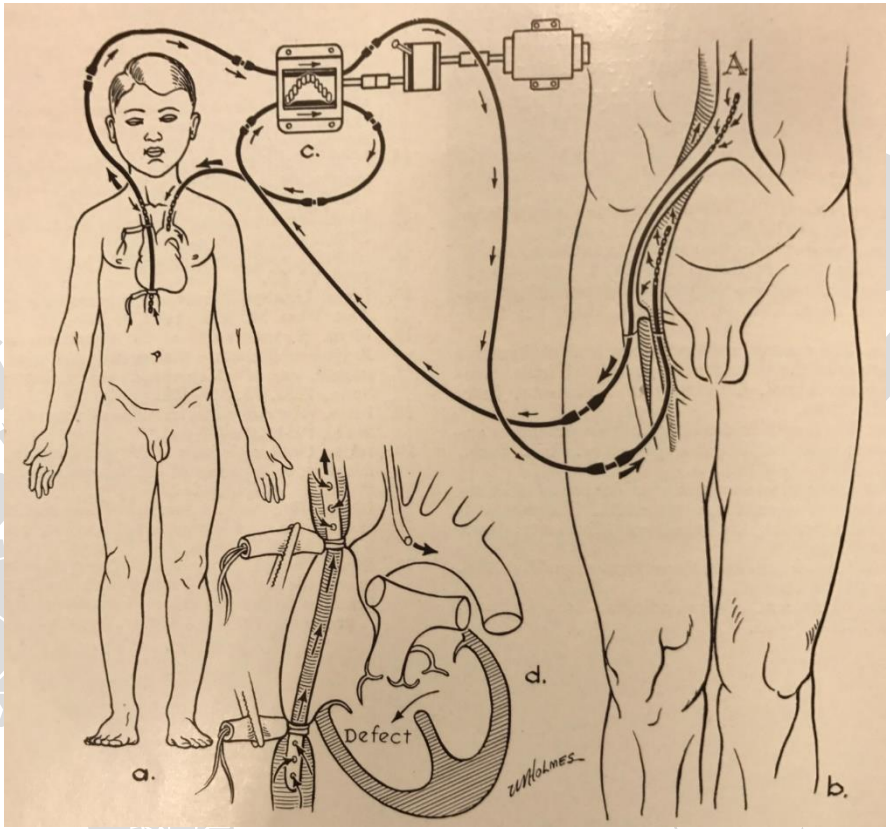
94% !!

C.Walton Lillhei. Historic Development of cardiopulmonary bypass in Minnesota. In Cardioplumonary Bypass: Principles and Practice. 2006

C. Walton Lillehei



26. März 1954



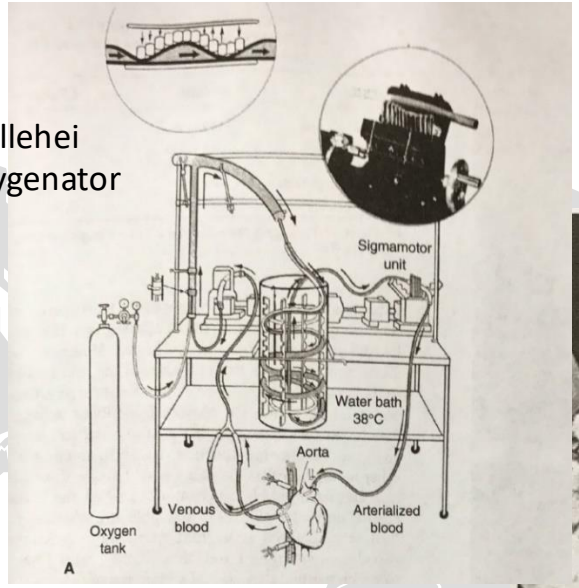
Lillehei CW, Cohen M, Warden HE, Ziegler NR, Varco RL. Surg Gynecol Obstet 1955;101:446-466.

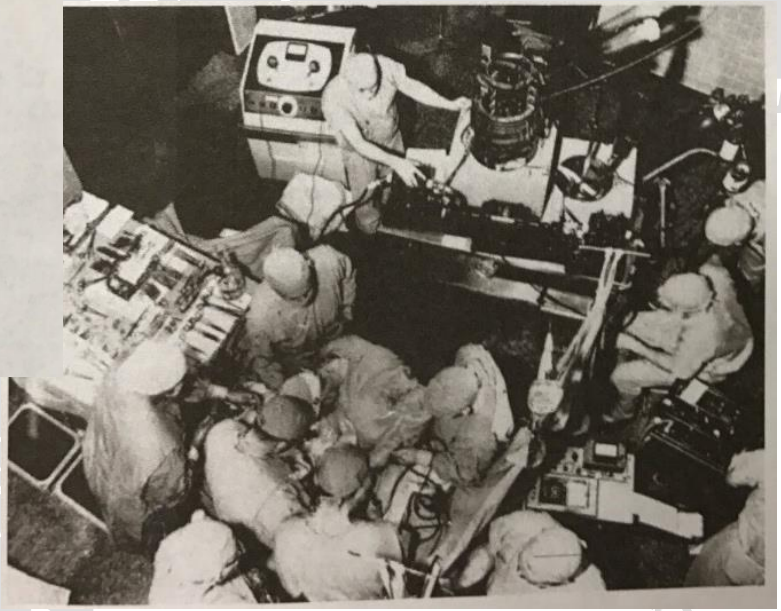
www.msthalloffame.org/walton_lillehei.htm

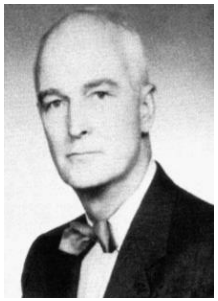
www.heart.umn.edu

C. Walton Lillehei

DeWall Lillehei
pump oxygenator







John Gibbon

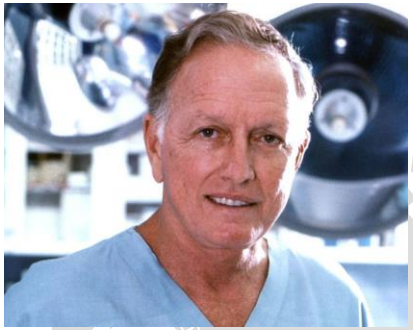
Gibbon JH, Jr. Minn Med 1954;37:171-185;

C.Walton Lillhei. Historic Development of cardiopulmonary bypass in Minnesota.

Lillehei CW, Cohen M, Warden HE, Ziegler NR, Varco RL. Surg Gynecol Obstet 1955;101:446-466.

www.msthalloffame.org/walton_lillehei.htm

www.heart.umn.edu



Denton A. Cooley

Michael E. DeBakey

DeWall Lillehei pump oxygenator, 2800 cc/min

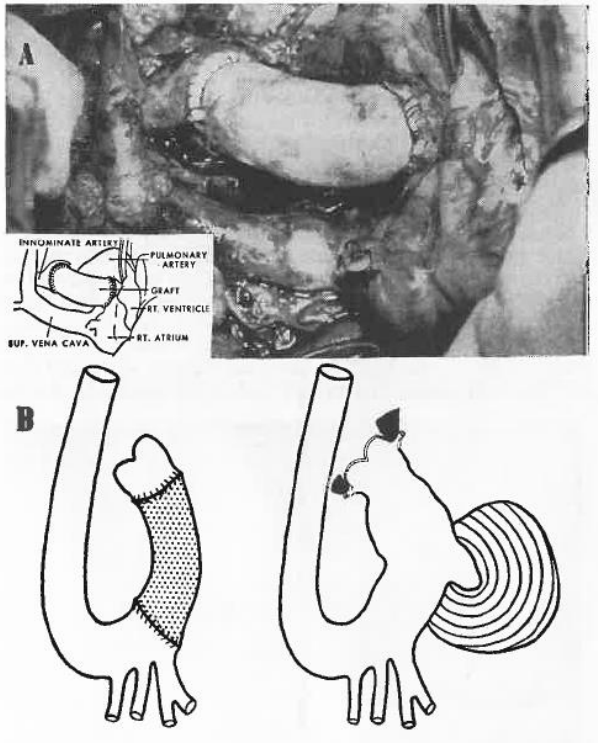
Cerebral perfusion 200cc/min

Aorta proximal geklemmt, nach 10min Herzstillstand, 31min

24. August 1955

RESECTION OF ENTIRE ASCENDING AORTA IN FUSIFORM ANEURYSM USING CARDIAC BYPASS

Denton A. Cooley, M.D.
and
Michael E. De Bakey, M.D., Houston, Texas



Cooley DA, DE Bakey ME. J Am Med Assoc 1956;162:1158-1159.
blog.houstonmethodist.org
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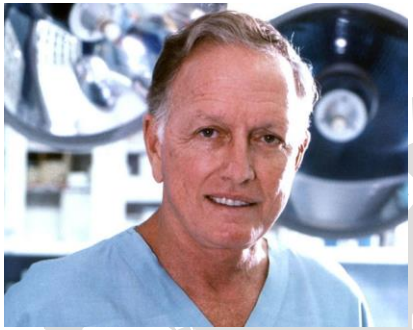
G.Wayne Miller. King of Hearts. Crown Publishers. NY. 2000

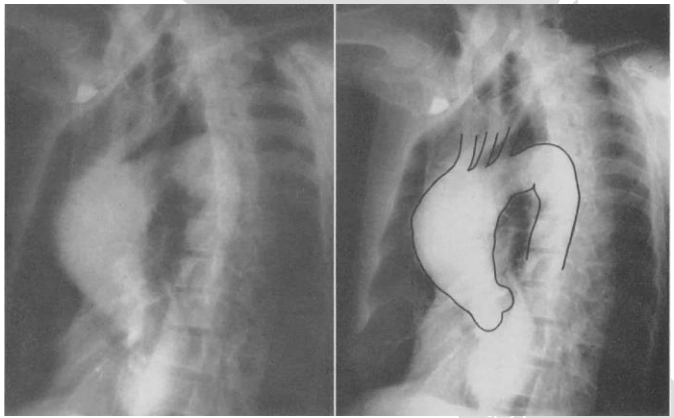


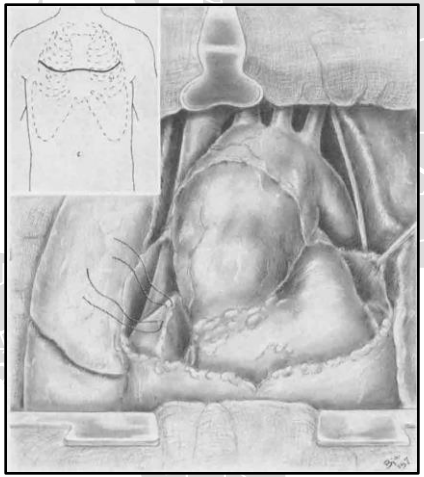
Denton A. Cooley

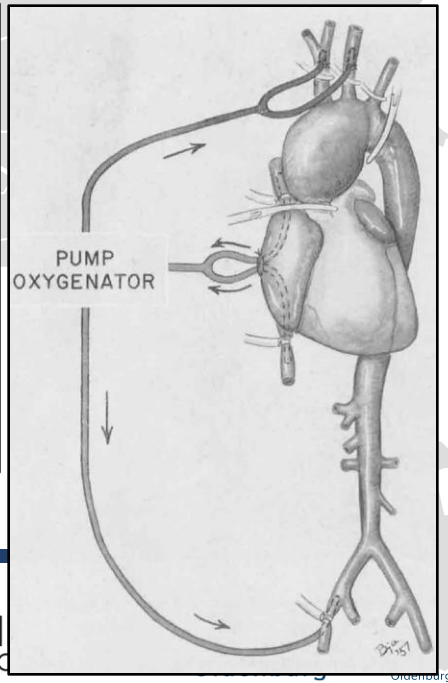
Michael E. DeBakey

SUCCESSFUL RESECTION OF FUSIFORM ANEURYSM OF AORTIC ARCH WITH REPLACEMENT BY HOMOGRAFT

MICHAEL E. DE BAKEY, M.D., F.A.C.S., E. STANLEY CRAWFORD, M.D.,
DENTON A. COOLEY, M.D., F.A.C.S., and GEORGE C. MORRIS, JR., M.D.,
Houston, Texas







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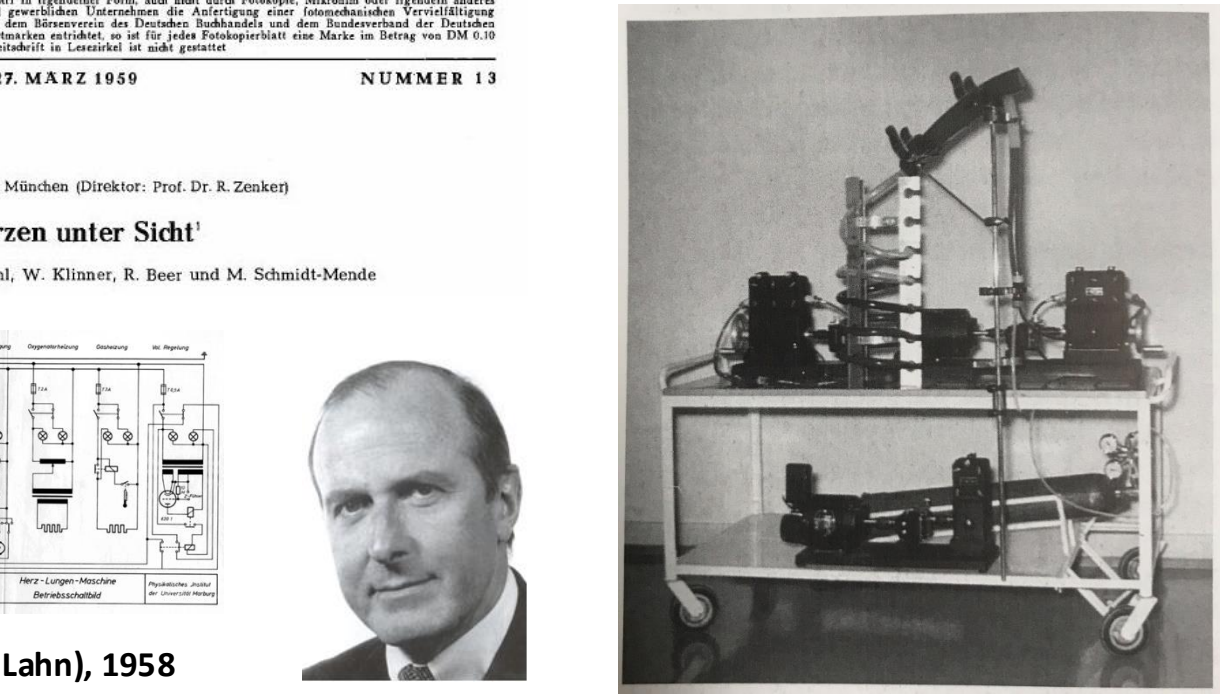
DeWall Lillehei Pumpenoxygenator 1956



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84. JAHRGANG STUTTGART, 27. MÄRZ 1959 NUMMER 13

Aus der Chirurgischen Universitätsklinik München (Direktor: Prof. Dr. R. Zenker)

Eingriffe am Herzen unter Sicht[1]

Von R. Zenker, G. Heberer, H. G. Borst, H. Gehl, W. Klinner, R. Beer und M. Schmidt-Mende

Rudolf Zenker

Marburg (a.d. Lahn), 1958

Hans-Georg Borst

Zenker R, Heberer G, Borst HG, Gehl H, Klinner W, Beer R *et al. [Direct vision open heart surgery]*. Deutsche medizinische Wochenschrift (1946) 1959;84:577-80 contd.

Hans-Georg Borst

11.03.1963

Traumatisches Aneurysma
mit einer „papierdünnen Wand“

paper-thin wall which felt like broken eggshells.

Hypothermer Kreislaufstillstand

ARTERIOVENOUS FISTULA OF THE AORTIC ARCH: REPAIR DURING DEEP HYPOTHERMIA AND CIRCULATORY ARREST

H. G. Borst, M.D., A. Schaudig, M.D., and W. Rudolph, M.D.,
Munich, Germany

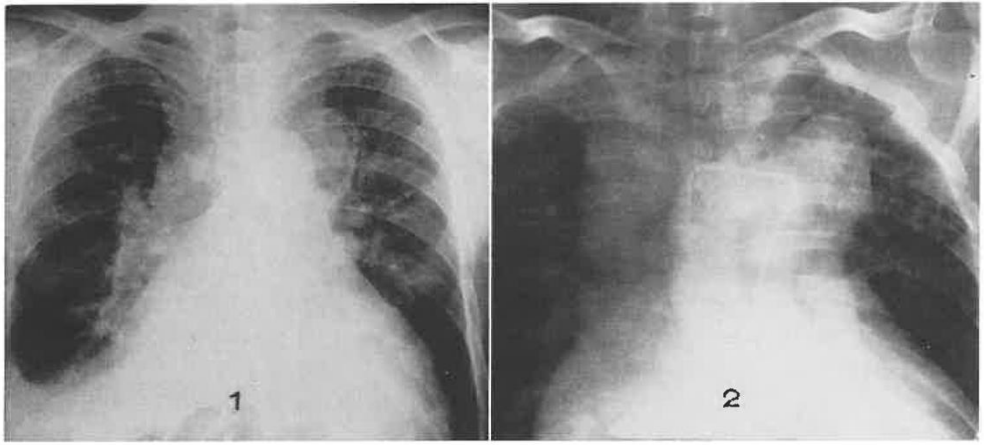
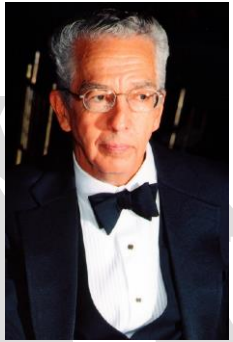


Fig. 1.—Preoperative chest x-ray film shows marked left and right heart enlargement and pulmonary congestion. The aneurysm with its calcified wall can be seen in the left upper lung field.

Fig. 2.—Retrograde aortography shows the aneurysm, as well as the tremendously dilated innominate vein and superior vena cava, filled with dye. On the upper margin of the costovertebral joint of the fourth rib the shell fragment can be seen. Just below it, the arteriovenous fistula is visible.

Borst HG, Schaudig A, Rudolph W. Arteriovenous fistula of the aortic arch: Repair during deep hypothermia and circulatory arrest. *J Thorac Cardiovasc Surg*. 1964;48:443-447.

Borst HG. The birth of the elephant trunk technique. J Thorac Cardiovasc Surg 2013;145:44.

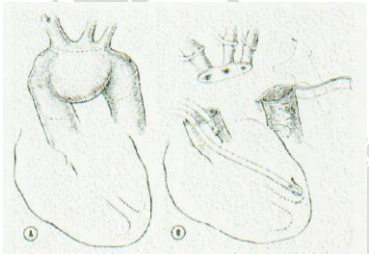


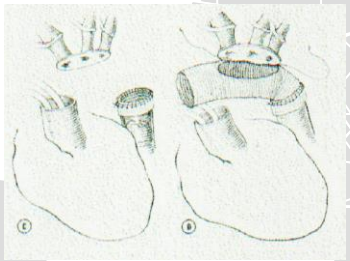
Randall B. Griepp

Prosthetic replacement of the aortic arch

Randall B. Griepp, M.D., Edward B. Stinson, M.D.,
Jefferson F. Hollingsworth, M.D., and Donald Buehler, M.D., *Stanford, Calif.*

1975
Temperature: ~15 °C
Bubble oxygenator, 2500-3500 cc/min
Heart 4°





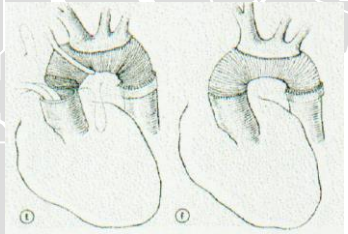


Table I. *Perfusion and temperature data**

	Case No.				
	1	*2*	*3*	*4*	*All*
Cerebral ischemia time	75	42	38	18	43
Myocardial ischemia time	90	92	75	40	74
Lowest temperature	12	15	18	13	14
Surface cooling time	130	70	75	75	88
Terminal temperatures	35→30	35→34	35→30	35→30	35→31
Core cooling time	30	51	40	45	42
Terminal temperatures	28→14	30→15	26→18	28→13	28→15
Core warming time	108	103	110	68	97
Terminal temperatures	12→34	17→36	18→36	15→36	16→36

Griepp RB, Stinson EB, Hollingsworth JF, Buehler D. J Thorac Cardiovasc Surg 1975;70:1051-1063.

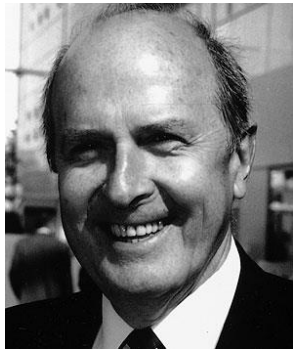
HOW TO DO IT

Thorac. cardiovasc. Surgeon 31 (1983) 37–40

Extensive Aortic Replacement using "Elephant Trunk" Prosthesis*

H.G. Borst, G. Walterbusch, and D. Schaps[1]

Division of Thoracic and Cardiovascular Surgery, Surgical Center, and
[1]Institute of Anesthesiology, Hannover Medical School, Hannover, FRG



1983
Elephant Tunk

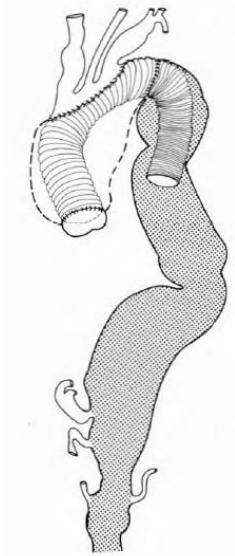


Fig. 1b

Fig. 1 a) Composite angiogram of aneurysm involving the entire suprarenal aorta
b) Diagram depicting the appearance of the reconstruction after ascending aortic and arch replacement. Note "elephant trunk" floating in the descending aortic aneurysm

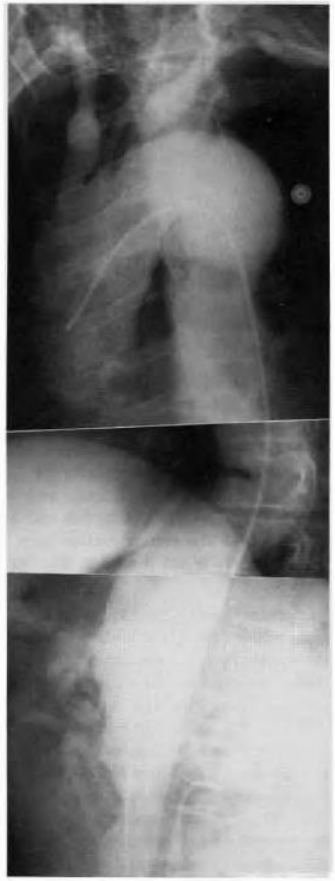


Fig. 1a

Borst HG, Walterbusch G, Schaps D. *Thorac Cardiovasc Surg*. 1983;31:37-40.

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UMO Universitätsmedizin Oldenburg

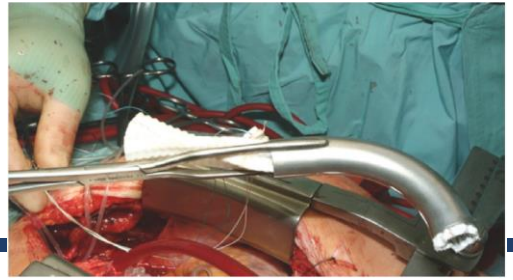
The Journal of
Thoracic and Cardiovascular Surgery

The frozen elephant trunk technique: A new treatment for thoracic aortic aneurysms

Matthias Karck, Ajay Chavan, Christian Hagl, Holger Friedrich, Michael Galanski and Axel Haverich

J Thorac Cardiovasc Surg 2003;125:1550-1553

2001



Frozen Elephant Trunk

Karck M, Chavan A, Hagl C, Friedrich H, Galanski M, Haverich A. J Thorac Cardiovasc Surg 2003;125:1550-1553.

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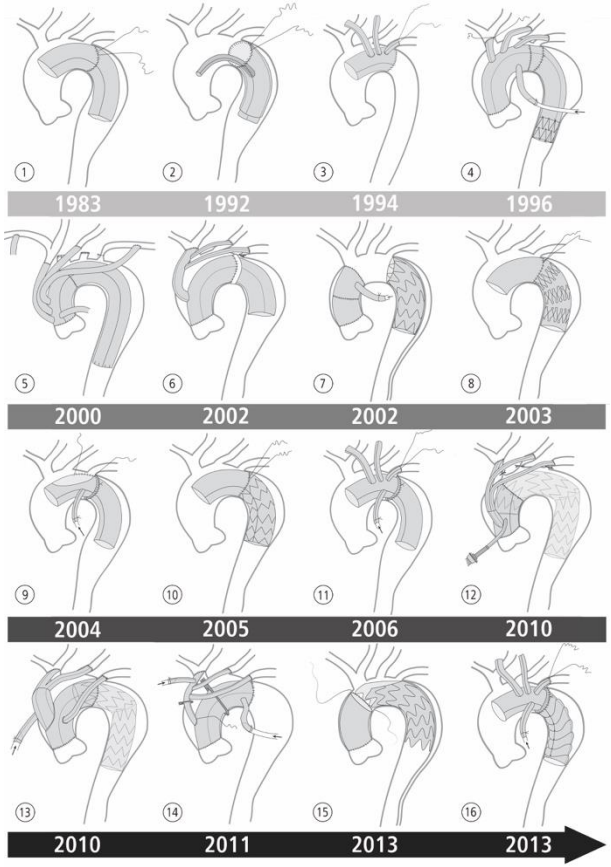
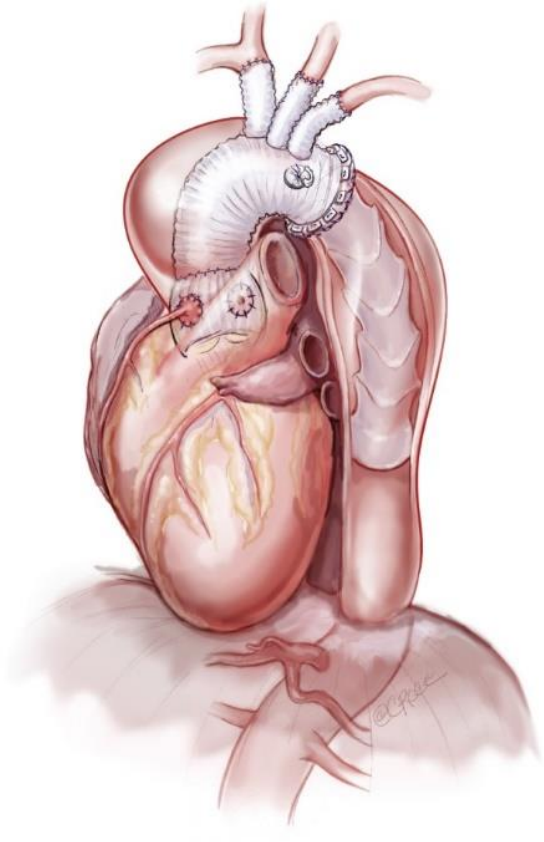
30 Jahre Evolution des Elephant Trunk

EVAR 1990
TEVAR 1992

FET 2001





Martens A. Die Evolution des 'Elephant Trunk': Weiterentwicklungen des kompletten Aortenbogenersatzes seit Hans-Georg Borst. Hannover Medical School; 2017.

Tian DH, et al. Ann Cardiothorac Surg 2013;2:581-591.

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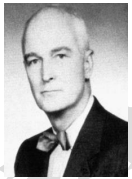
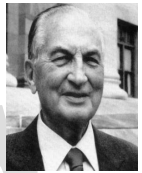
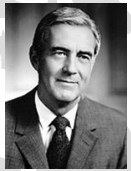
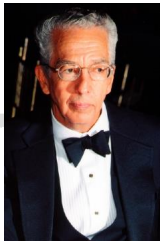
Lillehei



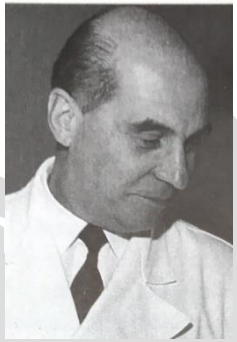


Gibbon
Gross
Bigelow

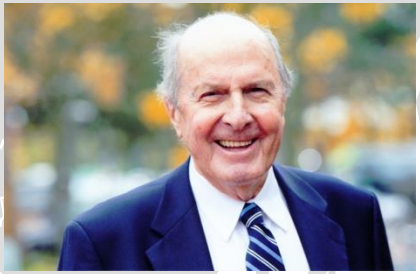




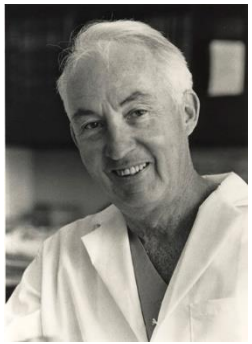
Griepp



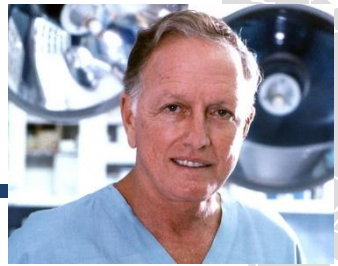
Zenker



Borst



Shumway



Cooley

DeBakey

Barnard

Haverich

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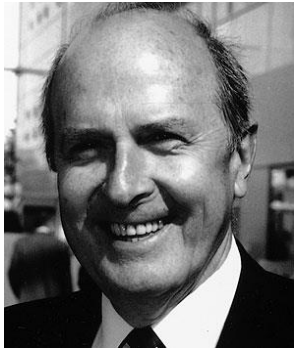


1983
Elephant Tunk

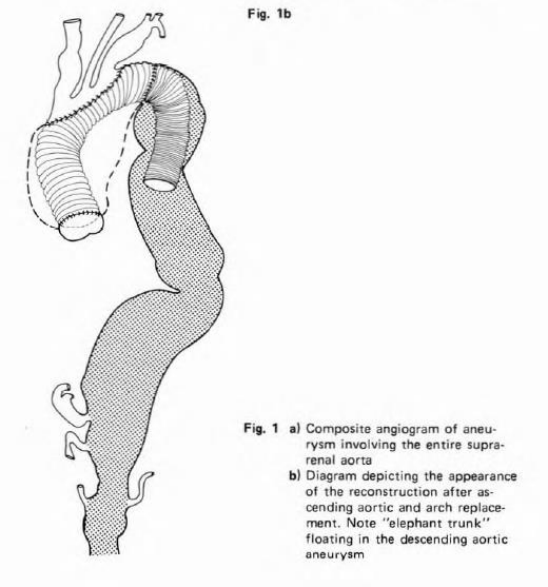
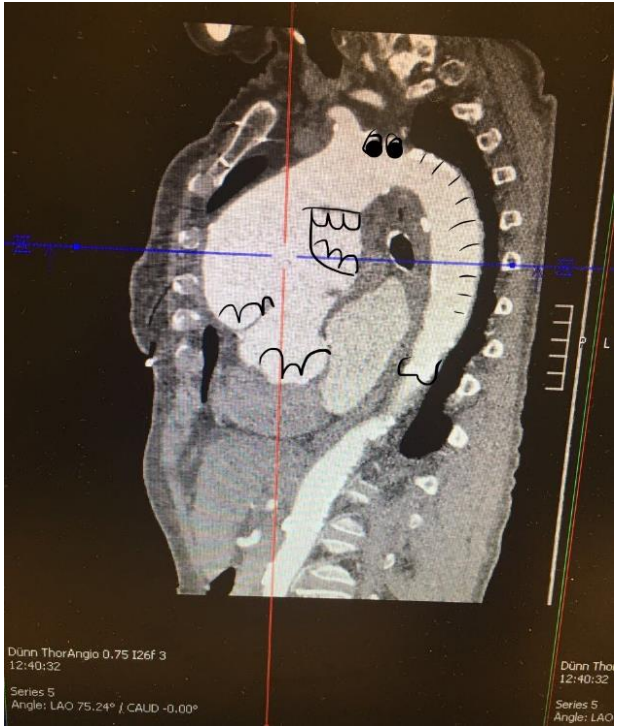


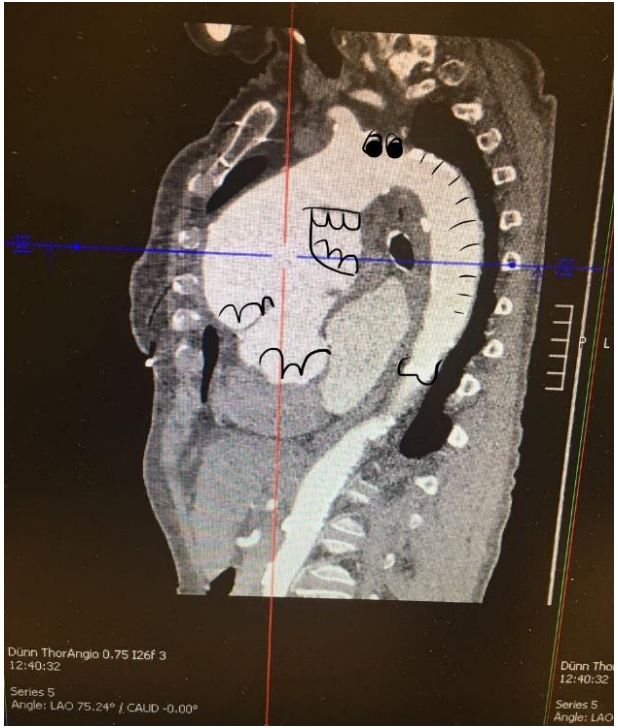
Fig. 1b

Fig. 1 a) Composite angiogram of aneurysm involving the entire suprarenal aorta
b) Diagram depicting the appearance of the reconstruction after ascending aortic and arch replacement. Note "elephant trunk" floating in the descending aortic aneurysm




SPR 0109
HILFE
OTTO
kommt!

1983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