

Frank Nicholls, M.B., F.R.S. and the Autopsy of King George II



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Disclosures

Financial Disclosures:

NIH 1R01HL117063-01A1 NHLBI “Mathematical modeling and computer simulation of aortic dissection”

Conflict of Interest:

None

Unlabeled Uses:

None



“These, Gentlemen, are the opinions upon which I base my facts.”

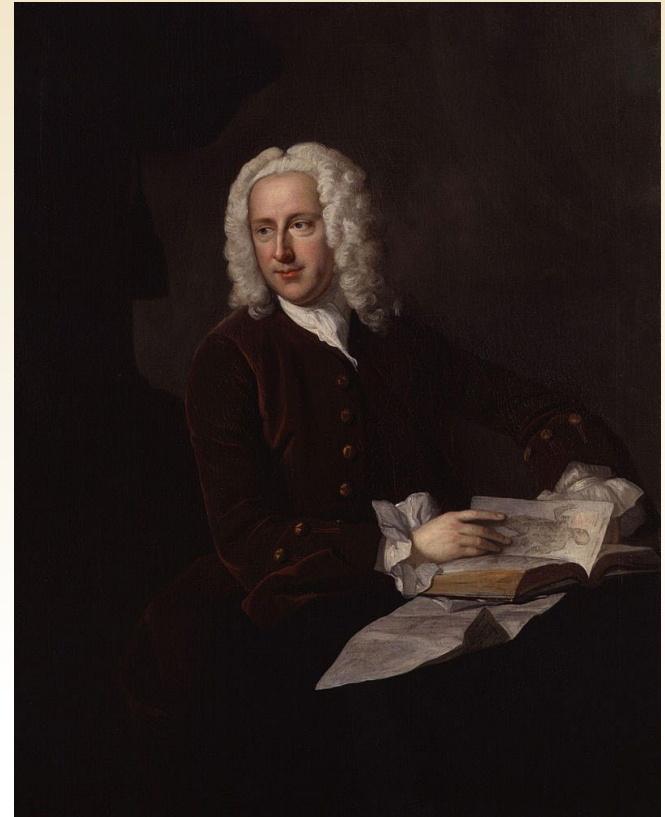
Winston Churchill 1874-1965

Frank Nicholls

- 1728 - Elected Fellow of the Royal Society
- 1753 – Appointed Physician to King George II
- Had previously published his observations of aneurysms (and probably dissections) in 1727

V. *Some Observations on Aneurysms in general, and in particular, on the fore-going.* By F. Nicholls, M. B. Præl. of Anatomy, Oxon. & F. R. S.

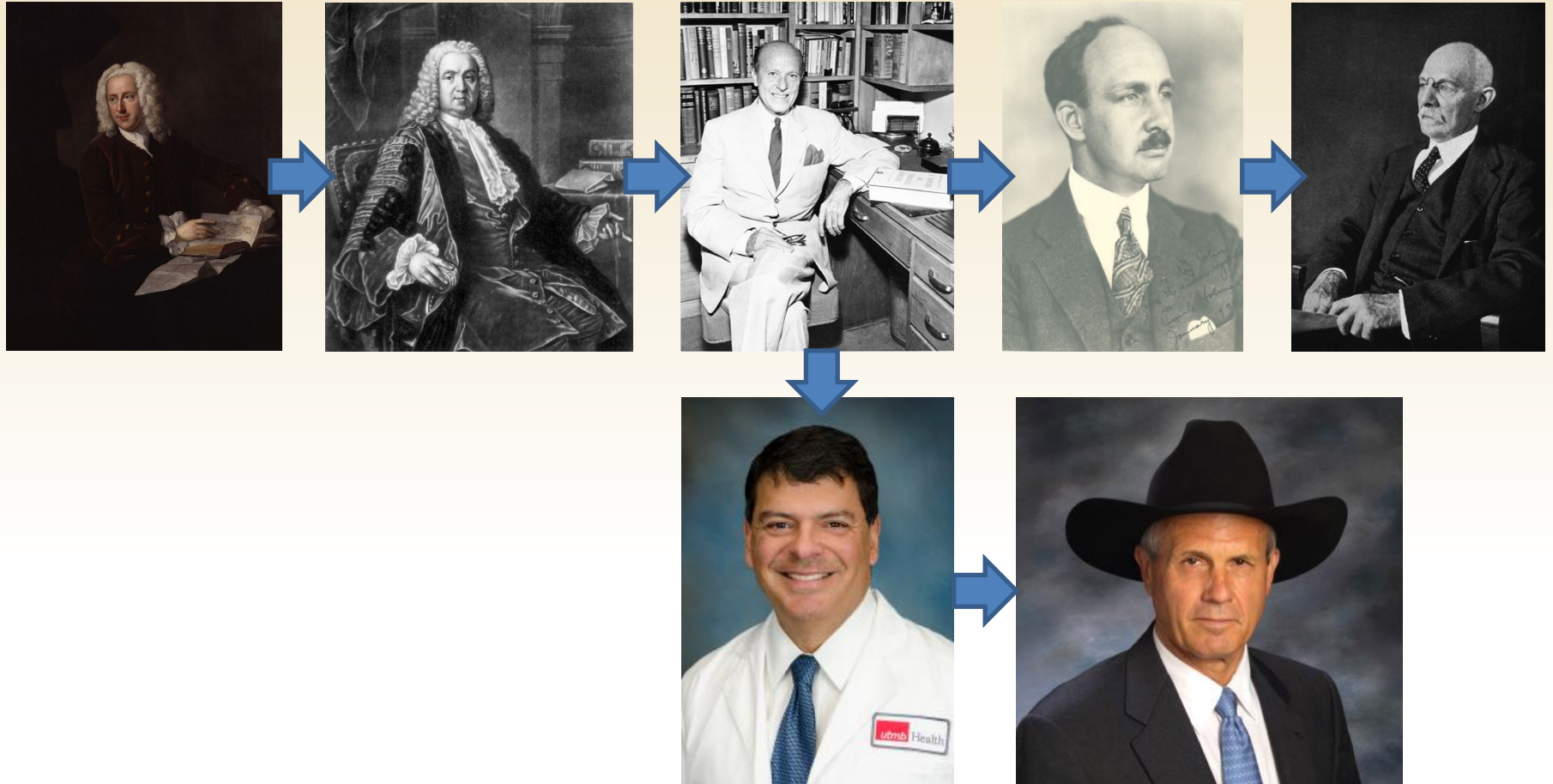
AN Aneurysm is by all Authors defin'd to be a soft circumscrib'd Tumor, in which there is a sensible Pulsation, cotemporary with the Pulsation of the Artery, to which it adheres. As it is certain, that any



Frank Nicholls, 1699-1778

A Digression – 6 Degrees of Separation

Frank Nicholls Connection to Halsted and Stanford



King George II

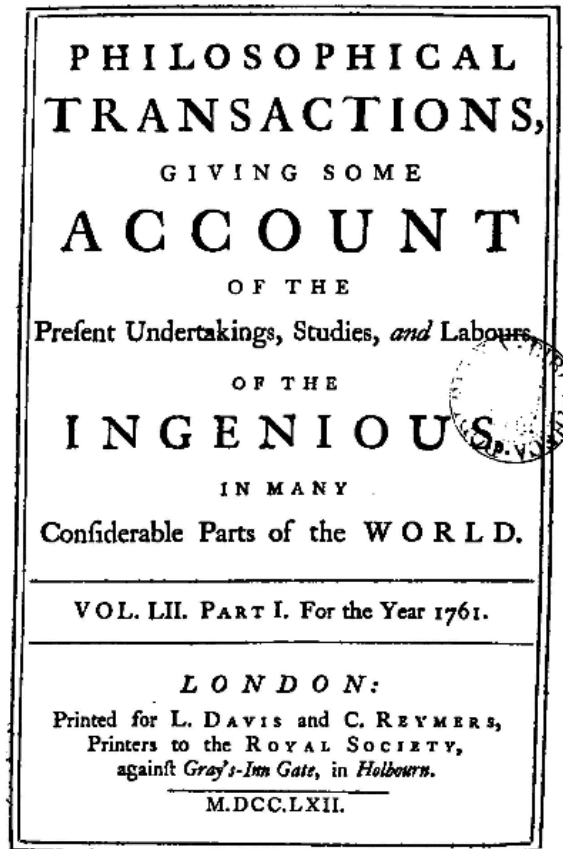
October 25, 1760

76 year old King, found collapsed after a bowel movement.

Attempts at blood-letting failed to revive him.

Dr. Frank Nicholls, by order of the Lord Chamberlain, directed “...to open and embalm the Royal Body”





LI. *Observations concerning the Body of his late Majesty, October 26, 1760, by Frank Nicholls, M. D. F. R. S. Physician to his late Majesty.*

Abdomen opened first:

“...all the parts therein contained were found in a natural and healthy state, except that some hydatides were found between the substance of each kidney, and its internal coat...in the present case, these hydatides were of no consequence, as none of them exceeded the bulk of a common walnut”

LI. Observations concerning the Body of his late Majesty, October 26, 1760, by Frank Nicholls, M. D. F. R. S. Physician to his late Majesty.

Abdomen opened first:

“...all the parts therein contained were found in a natural and healthy state, except that some hydatides were found between the substance of each kidney, these hydatides were of a common wa... e, these exceeded the bulk vs. 15.3%

Variable	Ascending aneurysm	Descending aneurysm	Type A dissection	Type B dissection	Total
Total number of patients	456 (54.2%)	86 (10.2%)	118 (14.0%)	182 (21.6%)	842 (100%)
Number of females	146 (32%)	39 (45.3%)	42 (35.6%)	76 (41.8%)	303 (36.0%)
Number of males	310 (68%)	47 (54.7%)	76 (64.4%)	106 (58.2%)	539 (64.0%)
Mean age	61.7 ± 13.9	64.4 ± 13.7	65.0 ± 15.5	66.5 ± 14.3	63.5 ± 14.2
Prevalence of SRC	169 (37.1%)	49 (57.0%)	52 (44.1%)	85 (46.7%)	355 (42.2%)
Prevalence of SRC in females	55 (37.7%)	22 (56.4%)	17 (40.5%)	39 (51.3%)	133 (43.9%)
Prevalence of SRC in males	116 (37.4%)	27 (57.4%)	35 (46.1%)	46 (43.4%)	224 (41.6%)

Ziganshin BA, Theodoropoulos P, Salloum MN, Zaza KJ, Tranquilli M, Elefteriades JA. Simple Renal Cysts as Predictors of Thoracic Aortic Disease. *Circulation* 2013;128:A17434

LI. *Observations concerning the Body of his late Majesty, October 26, 1760, by Frank Nicholls, M. D. F. R. S. Physician to his late Majesty.*

Chest then opened:

“...upon examining the heart, its pericardium was found distended, with a quantity of coagulated blood, nearly sufficient to fill a pint cup...upon removing this blood, a round orifice appeared in the middle of the upper side of the right ventricle of the heart, large enough to admit the extremity of the little finger. Through this orifice, all the blood brought to the right ventricle had been discharged into the cavity of the pericardium...”

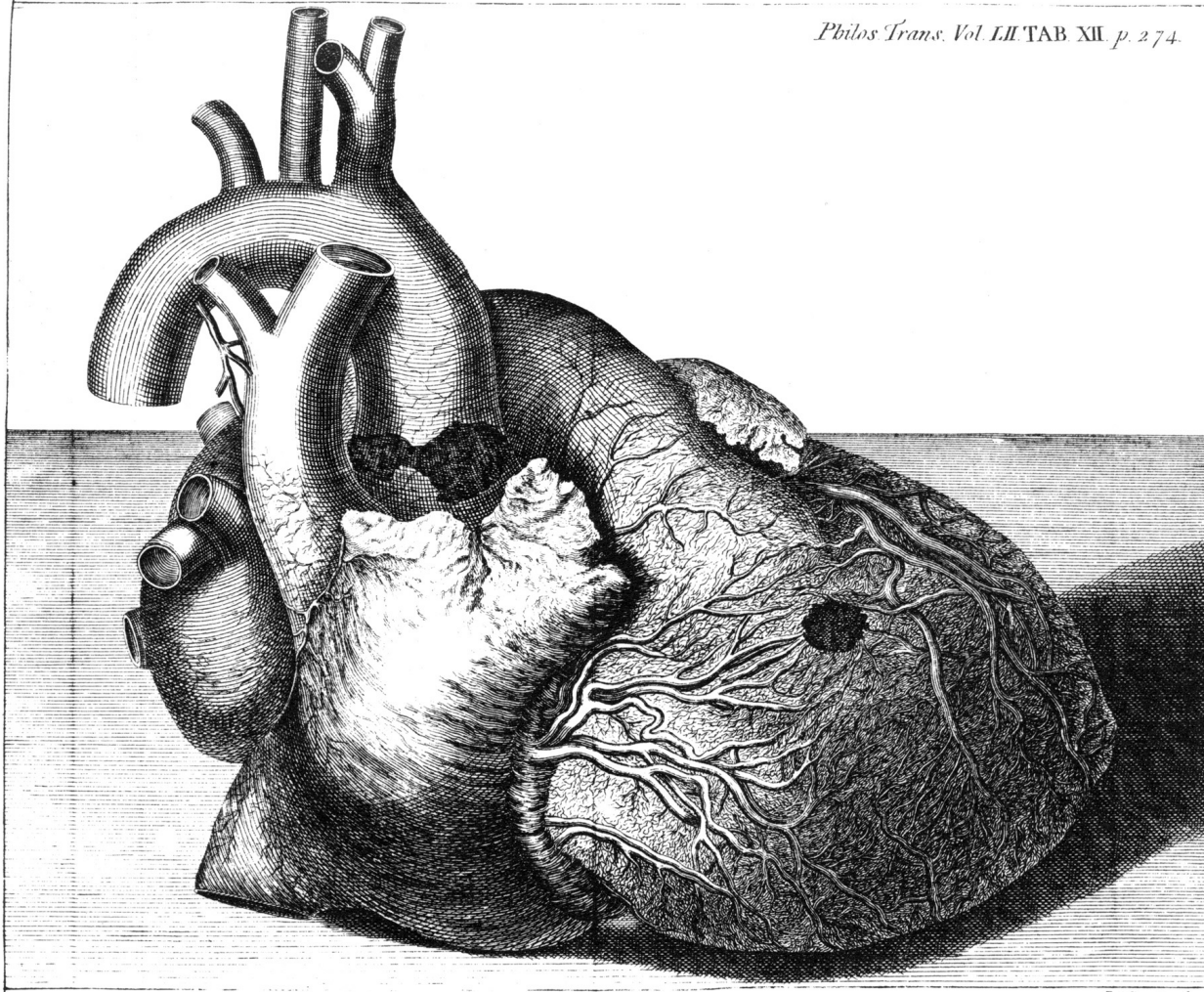
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Chest (continued):

“...we found the two great arteries...and the right ventricle of the heart stretched beyond their natural state...in the trunk of the aorta, we found a transverse fissure on its inner side, about an inch and a half long, through which some blood had recently passed, under its external coat, and formed an elevated echymosis . This appearance showed the true state of an incipient aneurism of the aorta; and confirmed the doctrine...that the external coat of the artery may (and does) often control an impetus of the blood, capable of bursting the internal (or ligamentous coat) although this last is by much the thickest, and seemingly the strongest”

LI. *Observations concerning the Body of his late Majesty, October 26, 1760, by Frank Nicholls, M. D. F. R. S. Physician to his late Majesty.*

Philos Trans. Vol. LII. TAB XII. p. 274.



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The first distension (and this a great and violent one) must have arisen in the aorta; and the consequent pressure on the pulmonary artery (by the aorta so distended) must have been sufficient (either by degrees or at once) to stop the blood's discharge out of the right ventricle and pulmonary artery, and to distend both those cavities greatly beyond their natural state of repletion. So that, under these circumstances, the two great arteries, and the right ventricle, must have been under an extraordinary and continued distension (and, consequently, an increase of bulk) at the same time; whereas, in the natural state of the body, these three cavities are alternately dilated and contracted, and the right ventricle is always propor-

- Ascending aorta abruptly distends and compresses the pulmonary artery
- Compression of PA sufficient to stop ejection of blood from RV thereby distending the RV
- RV ruptures from the distention

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- Basis of theory derived from theories regarding formation of aneurysms and dissections.
- Three possible consequences to downstream obstruction:

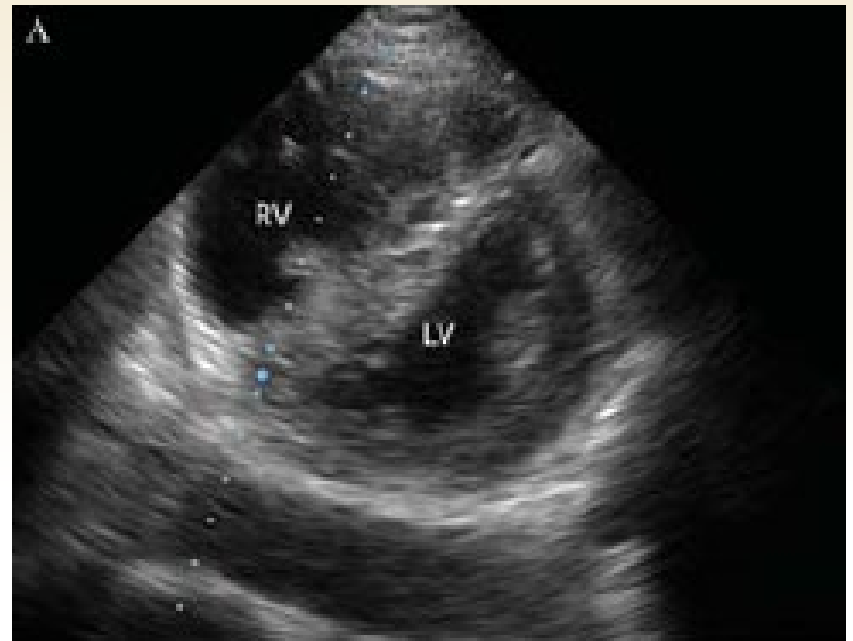
It is obvious that, as the Section of the Artery above the Compressure must in its natural State be sometimes very incapable of containing at once the whole Quantity of Blood, which ought only to have pass'd thro' it successively; and as the Force of the Heart may frequently exceed the Resistance it may meet with from the Coats of the Artery; so the Consequence of such a Stop to the progressive Motion of the Blood, may occasion either a *Rupture* of the Artery, or a *Distension* of the Artery without a Rupture, or a *Rupture* of the *internal* Coats of the Artery, and a *Distension* of its *external* Coat.



- No clear, recorded episodes of RV rupture associated with Type A dissection.
- Apocryphal:
 - Burns A. *Observations on some of the most frequent and important diseases of the heart, etc.* p 231. Edinburgh, Boyce, 1809.
 - Hodgson J. *A Treatise on the Diseases of Arteries and Veins.* P 63. London, Underwood, 1815.
- No recorded episodes of RV rupture associated with saddle pulmonary embolus.

Acute right heart overload due to pulmonary artery obstruction caused by ruptured aortic dissection

Matej Podbregar^{1*} and Tone Gabrijelčič²



Live/Real Time Three-Dimensional Transthoracic Echocardiographic Assessment of Aortic Dissection Rupture into Right Ventricular Outflow Tract: A Case Report and Review of the Literature

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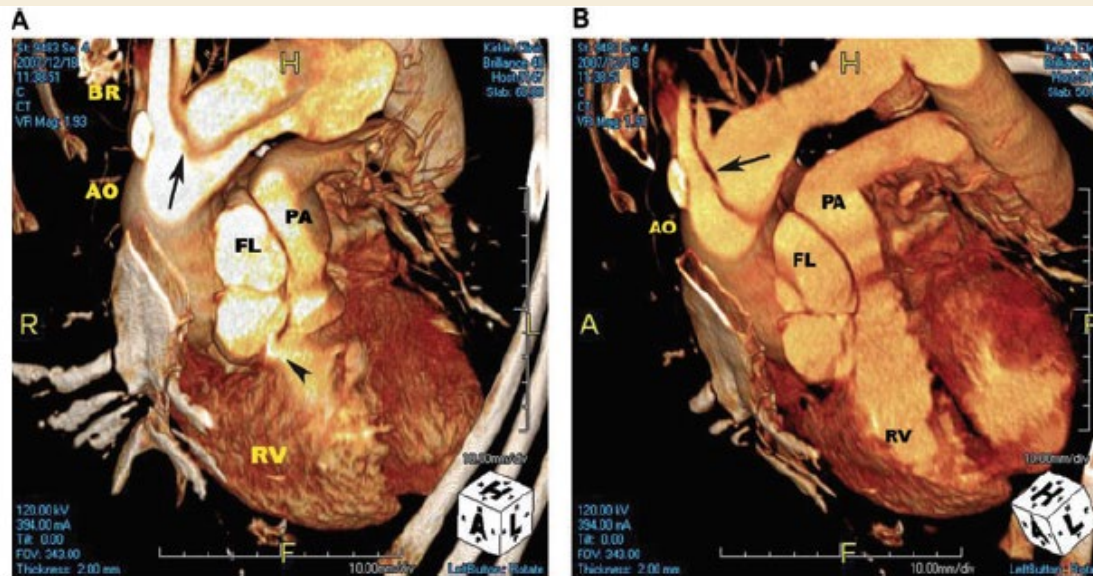


Figure 3. Computed tomography angiogram assessment of aortic dissection rupture into the right ventricular outflow tract. **A.** Left anterior oblique (LAO) view demonstrating the communication (arrowhead) between the FL and RVOT. **B.** Cut slab volume rendered image in oblique LAO view demonstrating PA compression by the dilated FL. The arrow in figures A and B points to the dissection flap extending into the aortic arch and the brachiocephalic artery (BR). H = head; F = foot; L = left; R = right; A = anterior; P = posterior. Other abbreviations same as in Figures 1 and 2.

TABLE I

Aortic Dissection with Rupture into the Right Ventricle

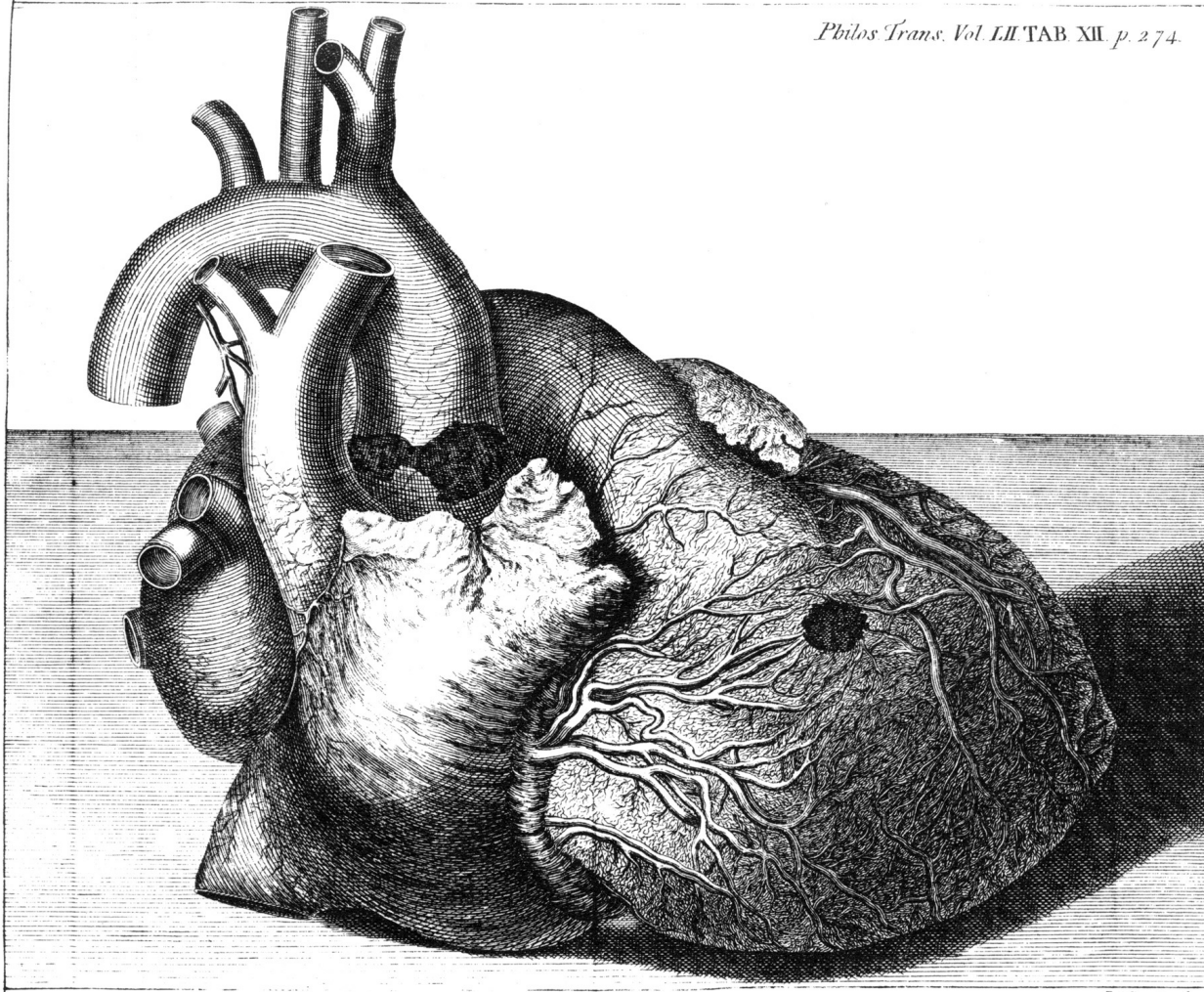
Author and Year	History of Cardiac Surgery	Acute or Chronic Dissection	Continuous Murmur	Coronary Artery Involvement	Imaging Modality
Perryman et al., 1972. ¹⁶	None	Chronic	Yes	No mention.	Aortography 0.5 × 1 cm fistula
Holmes et al., 1973. ¹⁷	None	Chronic	Yes	RCA involvement by dissection, occlusion, RCA infarct.	Aortography
Davies et al., 1990 ¹⁸	Aortic valve replacement & coronary artery bypass graft surgery 2 yrs prior.	Acute	Systolic murmur. Continuous flow with spectral Doppler.	RCA thrombosis.	2D, color, and spectral Doppler TTE
McGoldrick et al., 1990. ¹⁹	None	Acute	Yes	RCA Infarction.	CT angiogram. 2D TTE.
Nanda and Domanski, 2007. ²⁰	Coronary artery bypass graft surgery 3 yrs prior	Chronic	Continuous murmur	Inferior wall non ST-elevation myocardial infarction.	Aortography. 2D,color, and spectral TEE Aortography—false negative for dissection. MRI—false negative for fistula to right ventricle.
Spier LN et al., 1995. ²¹	None	Acute- but duration not specified	Not specified.	RCA involvement with aneurysm.	2D TTE. Aortography—false negative for dissection, but positive for fistula into PA and RV.
Ulrike Neumayer et al., 2003. ¹⁰	Prosthetic aortic valve replacement surgery 8 years prior.	Acute	Systolic murmur. Continuous flow with continuous wave spectral Doppler	RCA involvement by dissection. RCA Infarct	MRI—false negative. 2D, color, and spectral Doppler TTE. 2D TEE. Aortography.

2D = two-dimensional; CT = computed tomography; PA = pulmonary artery; RCA = right coronary artery; RV = right ventricle; TEE = transesophageal echocardiogram; TTE = transthoracic echocardiogram.

Hansalia et al. *Echocardiography* 2009;26:100-6.

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In regard to this distention of the aorta; as his Majesty had, for some years, complained of frequent distresses and sinkings about the region of the heart; and as his pulse was, of late years, observed to fall very much upon bleeding; it is not doubted, but that this distension of the aorta had been of long standing, at least to some degree; and, as the pulmonary artery was thereby necessarily compressed

Summary

In regard to this distention of the aorta; as his Majesty had, for some years, complained of frequent distresses and sinkings about the region of the heart; and as his pulse was, of late years, observed to fall very much upon bleeding; it is not doubted, but that this distention of the aorta had been of long standing, at least to some degree; and, as the pulmonary artery was thereby necessarily compressed

Alternative Cause of Events:

- Chronic or subacute Type A Dissection vs. root aneurysm and acute Type A
- Involvement of RCA
- Ischemic infarct of RV free wall

Thank you