Surgical Approach to Aortic Diseases

Myth or miss ?

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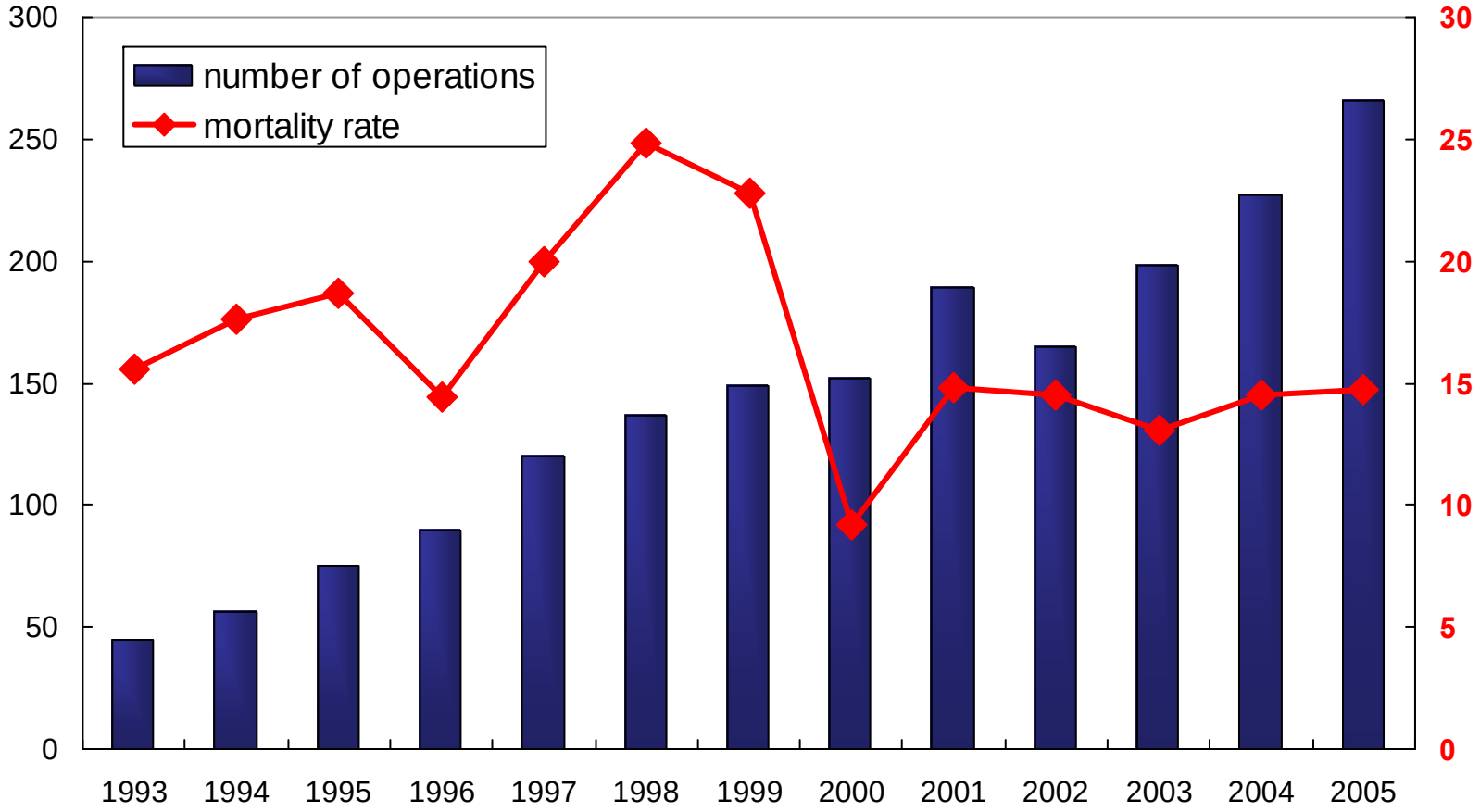
Aortic dissection : *nightmare?*

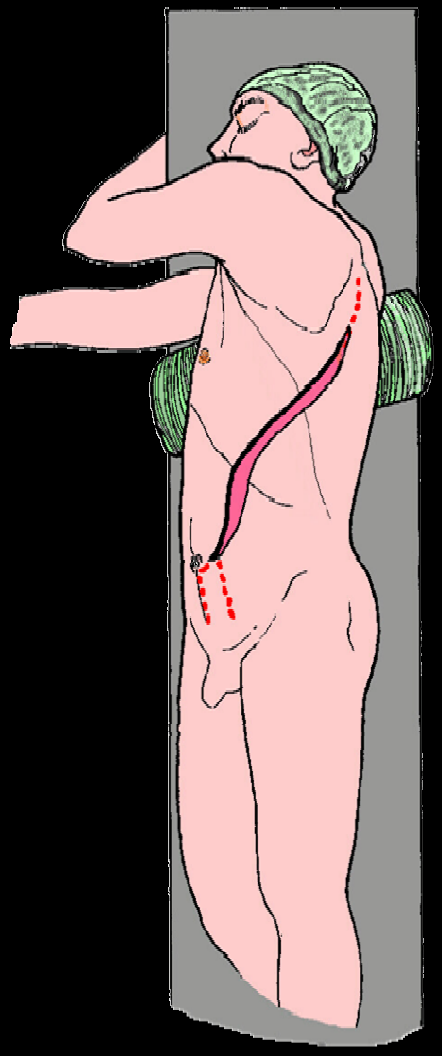
Nationwide outcome of acute type A dissection

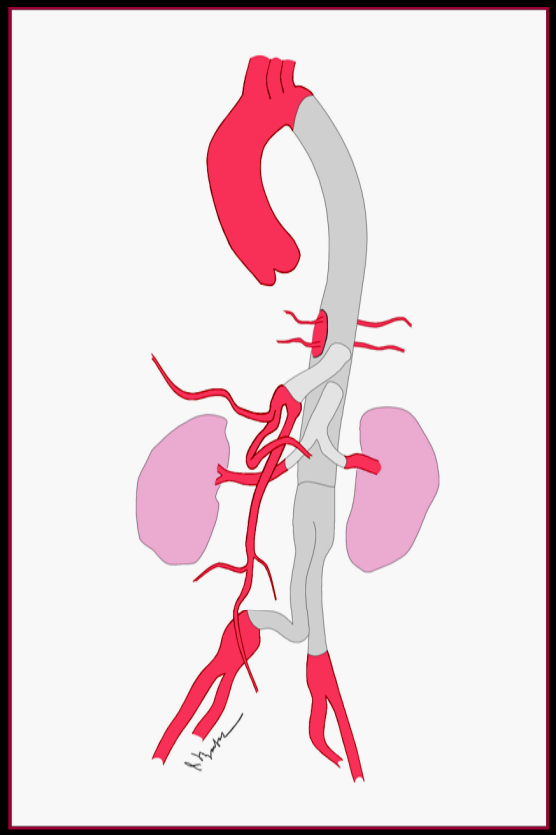
- **Sweden (1992~2004)**
  - 813 dissection
  - Mortality 22.4% (vs. 9.6% for aneurysm)
  - No difference between former half and later half
- **Taiwan (1996~2001)**
  - 5654 dissection → 1089 surgery under CPB → mortality 19.3%
  - Incidence of later aortic event 2.48%/year
    → increased since 4th year after initial episode
- **STS database & European database**
  - 20~25% mortality

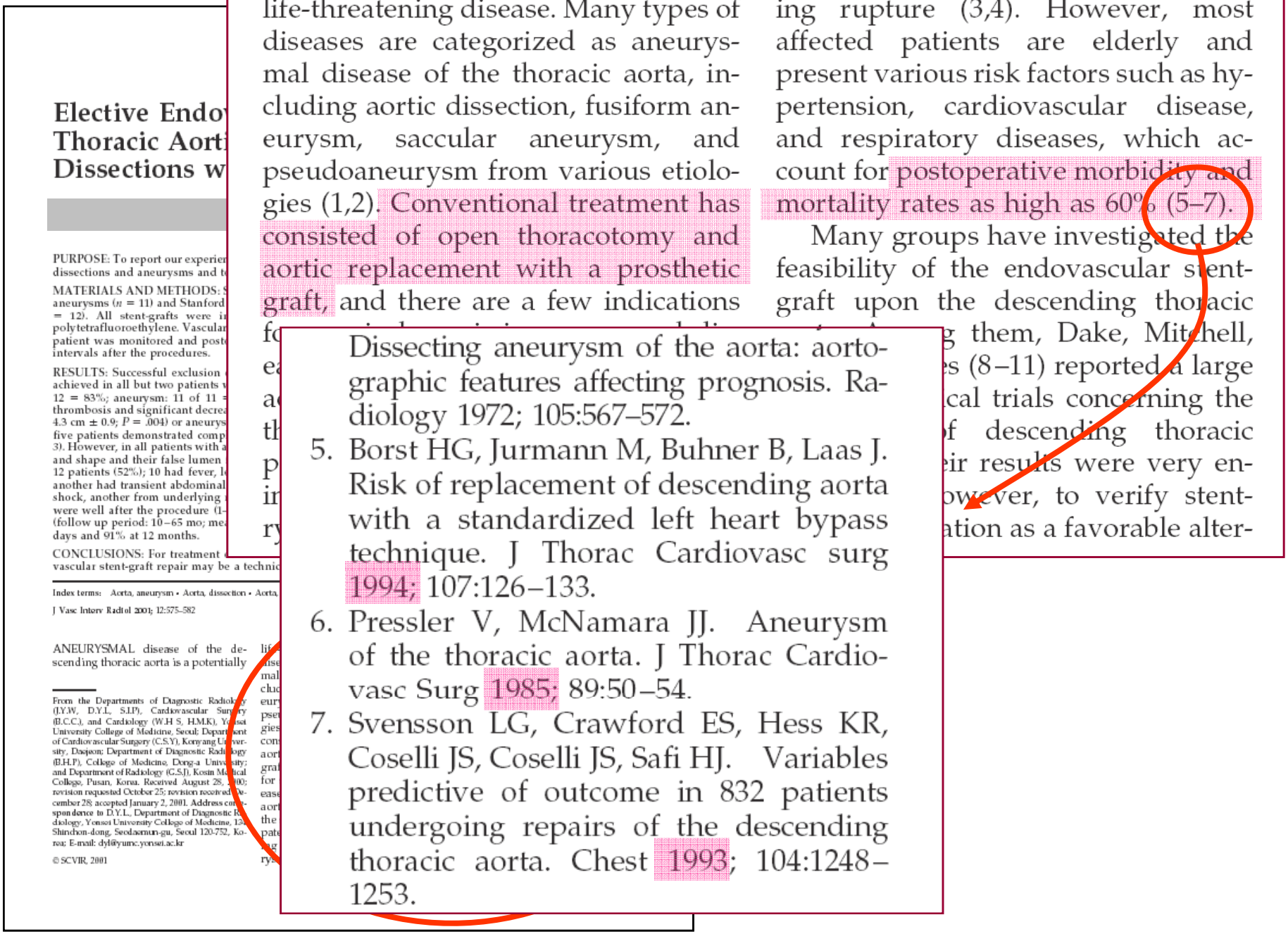
Surgery for Acute Type A dissection in Korea



TAAA - the extreme







Elective Endo
Thoracic Aort
Dissections w

PURPOSE: To report our experien
dissections and aneurysms and t

MATERIALS AND METHODS:
aneurysms (n = 11) and Stanford
= 12). All stent-grafts were i
polytetrafluoroethylene. Vascular
patient was monitored and post
intervals after the procedures.

RESULTS: Successful exclusion
achieved in all but two patients
12 = 83%; aneurysm: 11 of 11 =
thrombosis and significant decre
4.3 cm ± 0.9; P = .004) or aneurys
five patients demonstrated comp
3). However, in all patients with a
and shape and their false lumen
12 patients (52%); 10 had fever, l
another had transient abdominal
shock, another from underlying
were well after the procedure (1-
(follow up period: 10–65 mo; me
days and 91% at 12 months.

CONCLUSIONS: For treatment
vascular stent-graft repair may be a technic

Index terms: Aorta, aneurysm • Aorta, dissection • Aorta,

J Vasc Interv Radiol 2001; 12:575–582

ANEURYSMAL disease of the de-
scending thoracic aorta is a potentially

From the Departments of Diagnostic Radiology (J.Y.W., D.Y.L., S.I.P.), Cardiovascular Surgery (B.C.C.), and Cardiology (W.H.S., H.M.K.), Yonsei University College of Medicine, Seoul; Department of Cardiovascular Surgery (C.S.Y.), Konyang University, Daejeon; Department of Diagnostic Radiology (B.H.P.), College of Medicine, Dong-a University, and Department of Radiology (G.S.J.), Kosin Medical College, Pusan, Korea. Received August 28, 2000; revision requested October 25; revision received November 28; accepted January 2, 2001. Address correspondence to D.Y.L., Department of Diagnostic Radiology, Yonsei University College of Medicine, 134 Shinchon-dong, Seodaemun-gu, Seoul 120-752, Korea; E-mail: dyl@yumc.yonsei.ac.kr

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life-threatening disease. Many types of diseases are categorized as aneurysmal disease of the thoracic aorta, including aortic dissection, fusiform aneurysm, saccular aneurysm, and pseudoaneurysm from various etiologies (1,2). Conventional treatment has consisted of open thoracotomy and aortic replacement with a prosthetic graft, and there are a few indications

ing rupture (3,4). However, most affected patients are elderly and present various risk factors such as hypertension, cardiovascular disease, and respiratory diseases, which account for postoperative morbidity and mortality rates as high as 60% (5–7).

Many groups have investigated the feasibility of the endovascular stent-graft upon the descending thoracic

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cal trials concerning the
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Dissecting aneurysm of the aorta: aortographic features affecting prognosis. Radiology 1972; 105:567–572.

5. Borst HG, Jurmann M, Buhner B, Laas J. Risk of replacement of descending aorta with a standardized left heart bypass technique. J Thorac Cardiovasc surg 1994; 107:126–133.
6. Pressler V, McNamara JJ. Aneurysm of the thoracic aorta. J Thorac Cardiovasc Surg 1985; 89:50–54.
7. Svensson LG, Crawford ES, Hess KR, Coselli JS, Coselli JS, Safi HJ. Variables predictive of outcome in 832 patients undergoing repairs of the descending thoracic aorta. Chest 1993; 104:1248–1253.

aortic surgery ; *should it be a myth ?*

Acute Type A Dissection: Conservative Methods Provide Consistently Low Mortality

Stephen Westaby, PhD, FRCS, Satoshi Saito, MD, PhD, and Takahiro Katsumata, MD, PhD

Oxford Heart Centre, John Radcliffe Hospital, Oxford, England

Background. A wide spectrum of operative techniques are applied in acute type A dissection. Most convey hospital morta
risk setting, w
the aortic root
tear are import
from our aorti

Methods. Be
type A dissec
surgeon. They
81 years (mea
Aortic root re
during cooling
rest, and hemostasis while rewarming. Eighty-seven patients had ascending aortic replacement with glue resuspension of the valve. Two others had had aortic valve replacement previously. Aortic root and partial arch replacement was performed in 6 Marfan patients. Eighteen patients had hemiarch replacement, and 6 had total arch replacement to excise the tear.

Results. **Five patients died in hospital (5.3% 30-day mortality) and another after early readmission for mediastinal infection (6.3% total mortality). There were no deaths from bleeding.**

hospital survival is of paramount importance. A conservative "pathology-oriented" approach helps to achieve this aim.

(Ann Thorac Surg 2002;73:707–13)

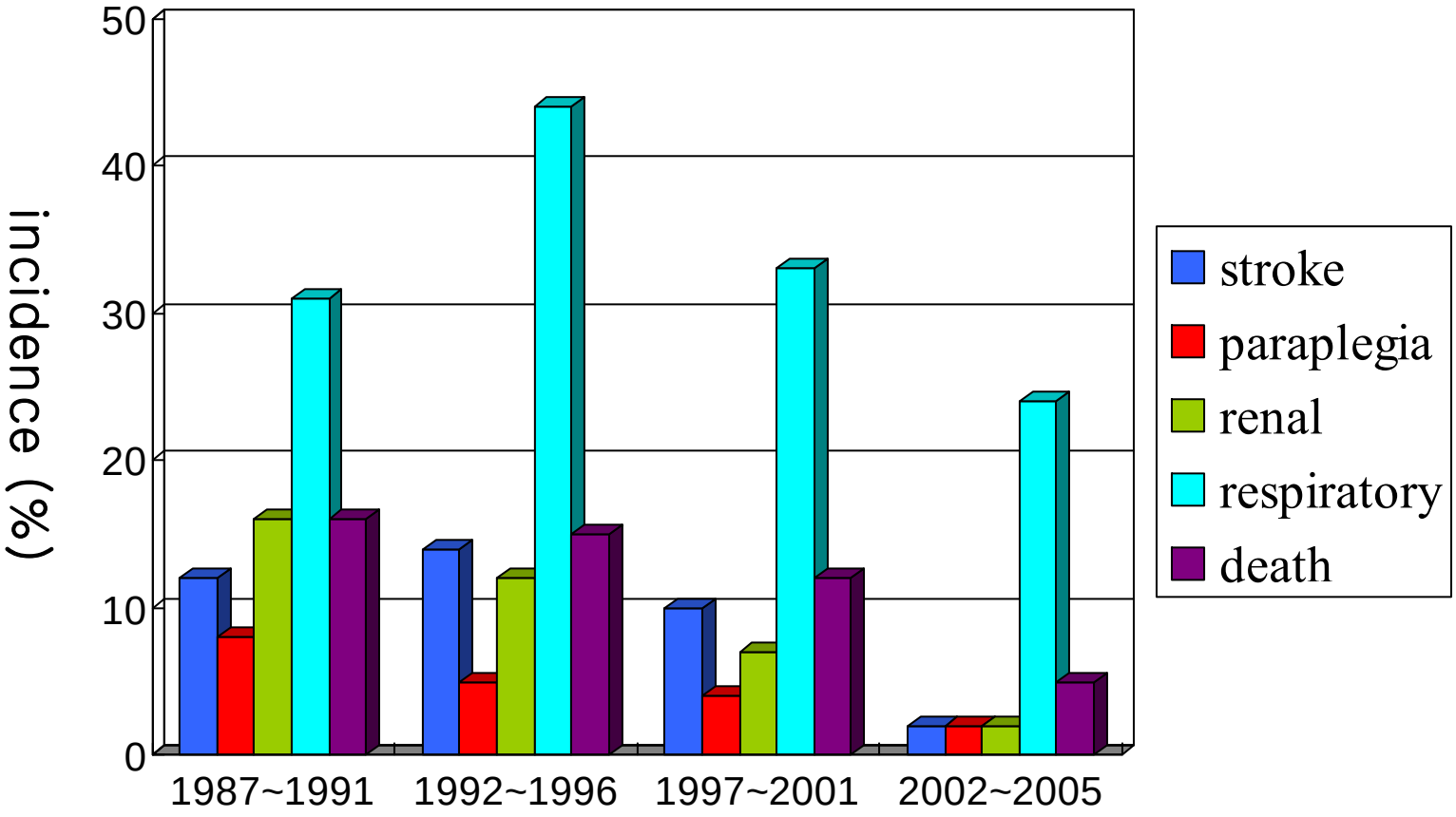
Current standards in aortic surgery

Procedure	Hospital mortality	Neurological injury
elective root surgery	< 2 %	< 2 %
acute type A dissection	< 10 %	< 5 %
elective arch replacement	< 5 %	< 5 %
thoracoabdominal aneurysm	< 8 %	< 8 %

Stephen Westaby, Aortic Surgery Symposium 2006

Incidence of complication after descending thoracic / TAAA surgery

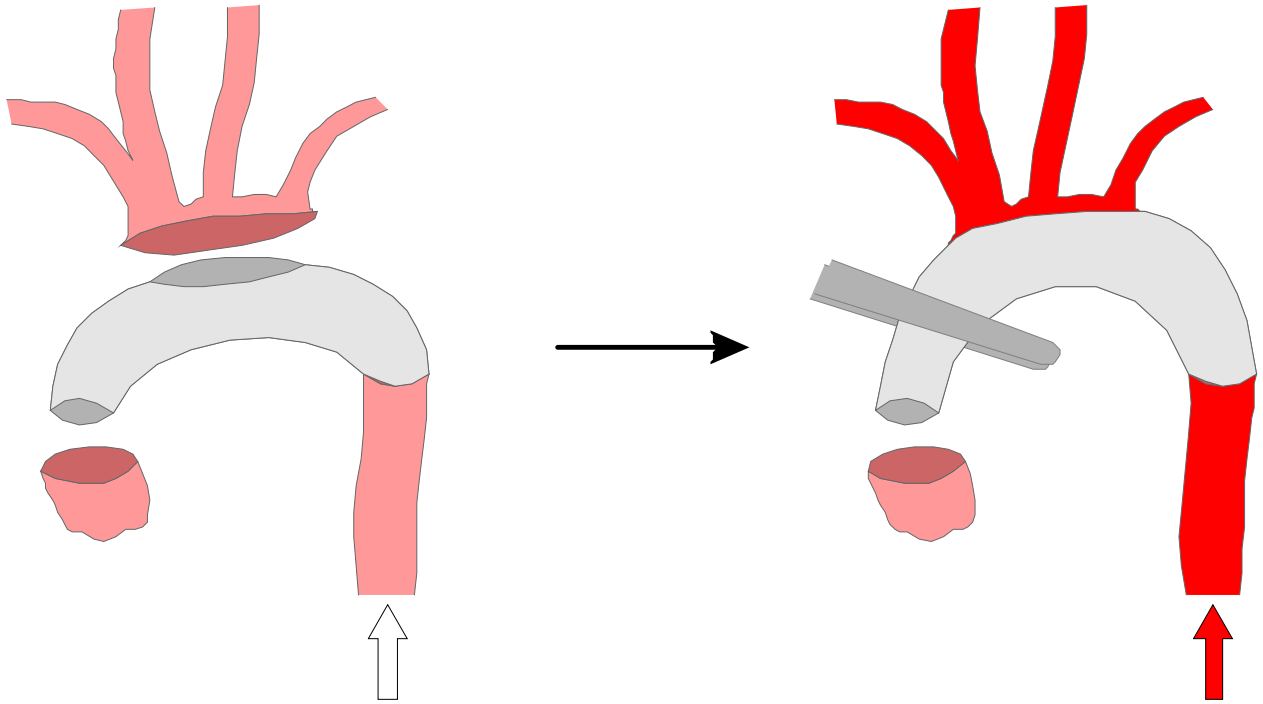
Svensson LG. Aorta Surgery Symposium 2006



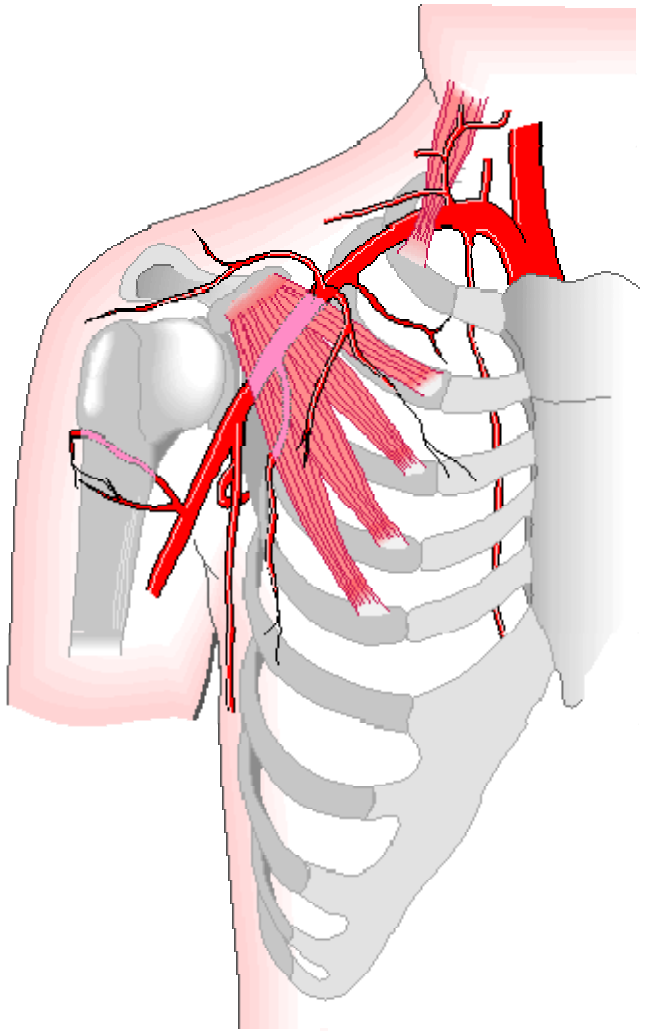
Modern adjuncts to aortic surgery

- Arch surgery
  - hypothermic circulatory arrest
  - selective cerebral perfusion
  - axillary artery cannulation
- Descending aorta surgery
  - distal aortic perfusion
  - hypothermia
  - cerebrospinal fluid drainage
- Hemostasis & blood conservation
  - surgical glues
  - cell saver
  - aprotinin, transamine, epsilon-amino caproic acid

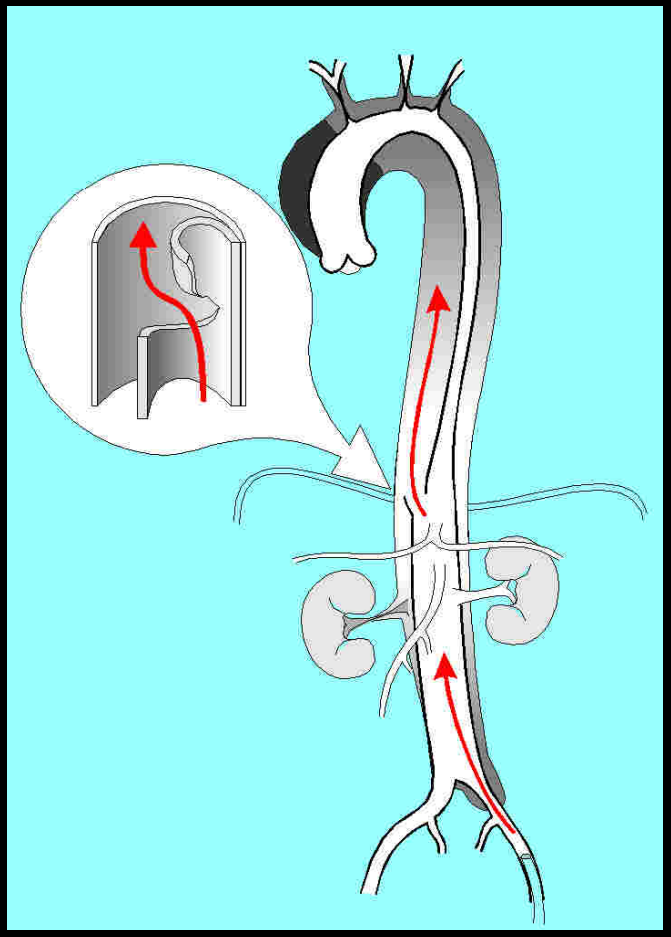
Old technique for arch replacement



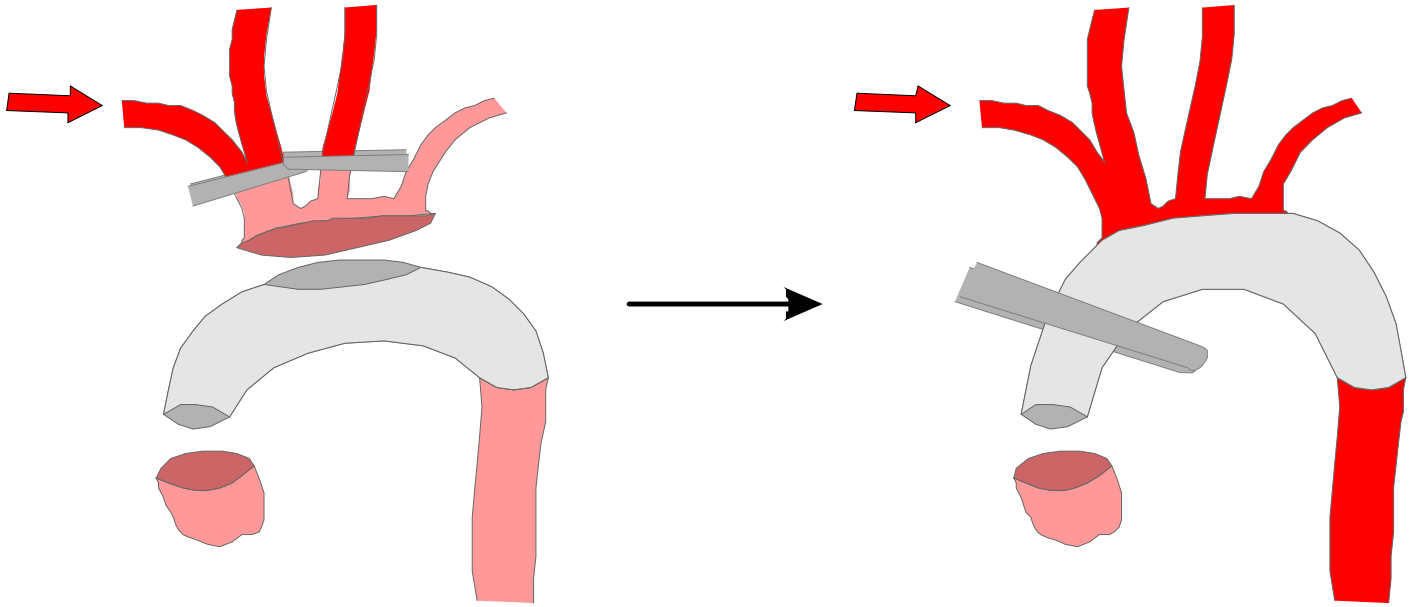
Right axillary artery cannulation



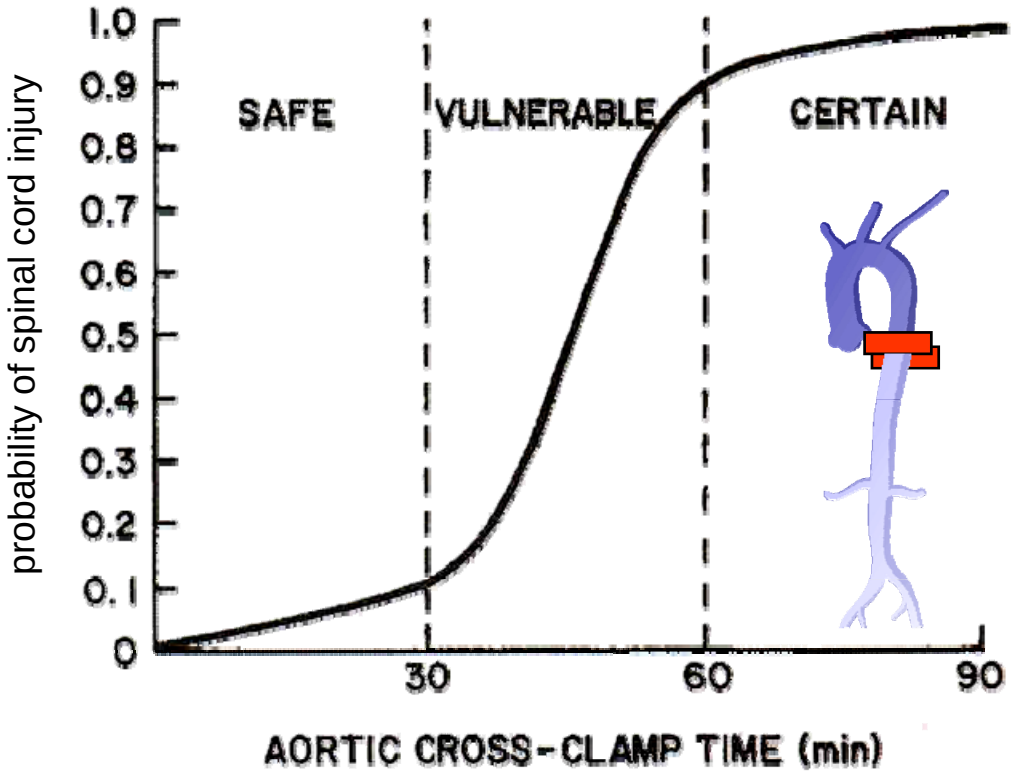
Why is right axillary artery cannulation safer?

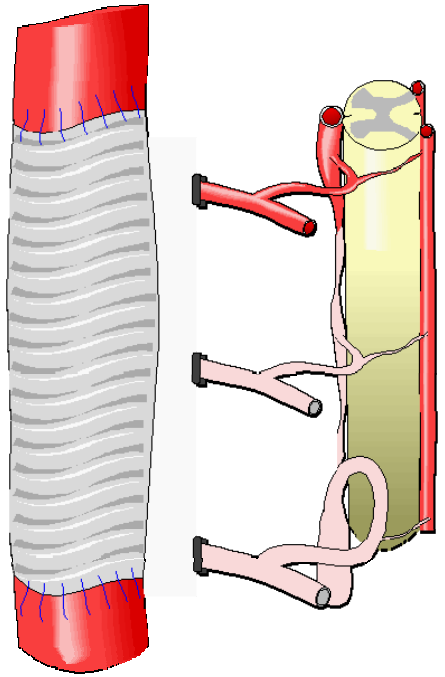


Selective cerebral perfusion via axillary artery



Spinal cord injury during aortic clamping





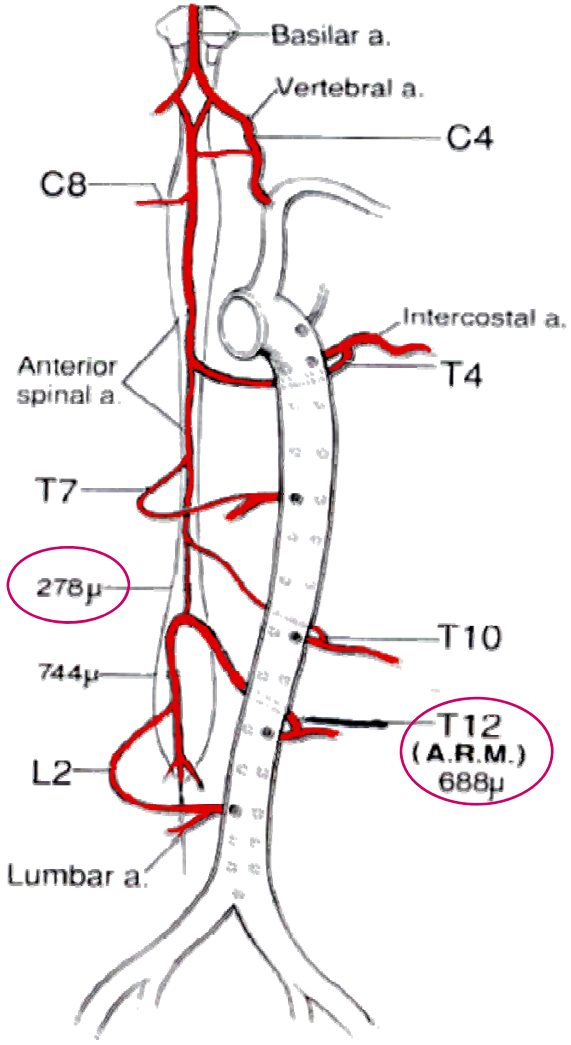
Blood Supply of Spinal Cord

- **anterior spinal artery**

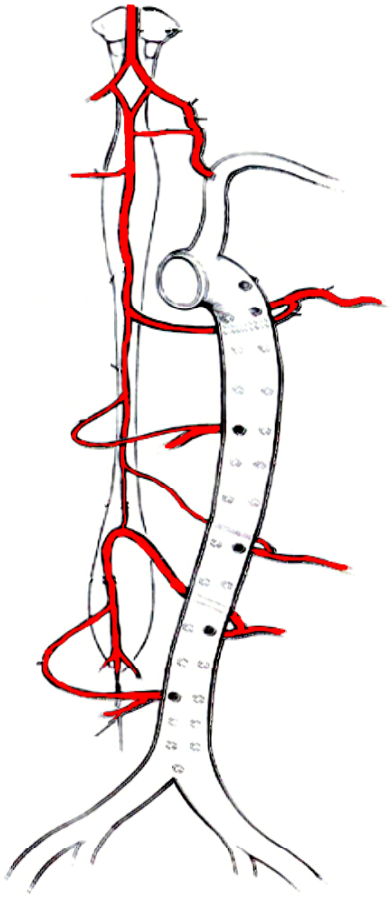
- **segmental radicular arteries**
  - Costocervical 1 ~ 2
  - Intercostal 2 ~ 3
  - Lumbar 1 ~ 2

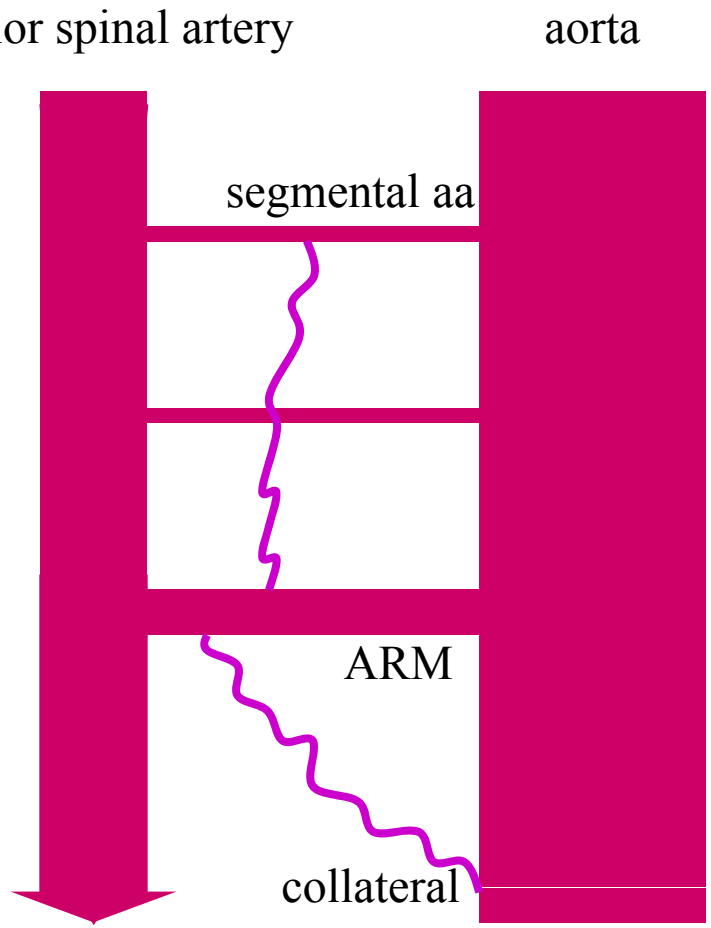
- ***Artery of Adamkiewicz***

  (arteria radicularis magna, ARM)

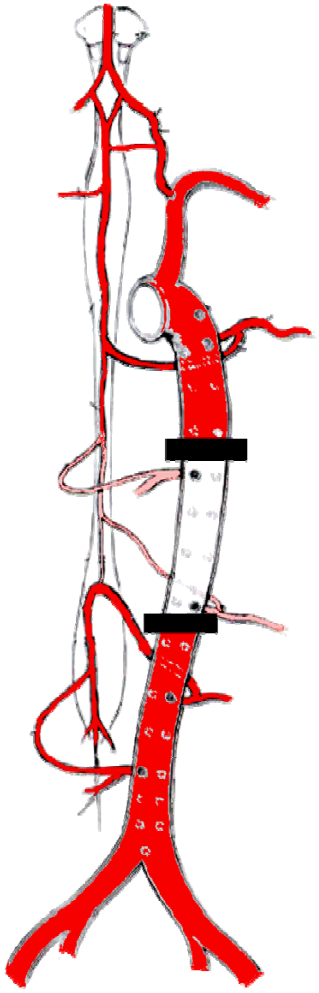


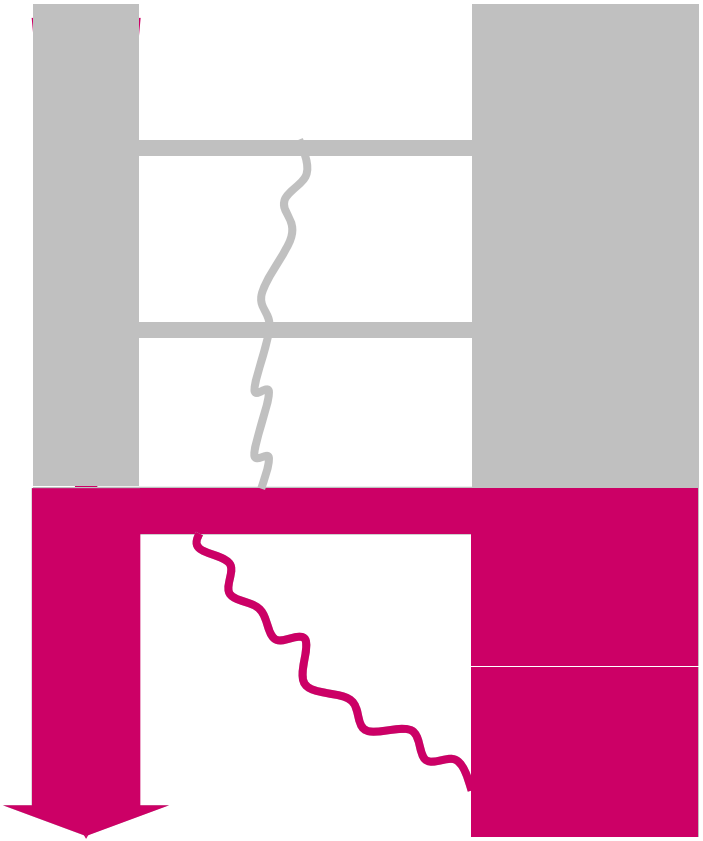
Scheme of spinal cord perfusion





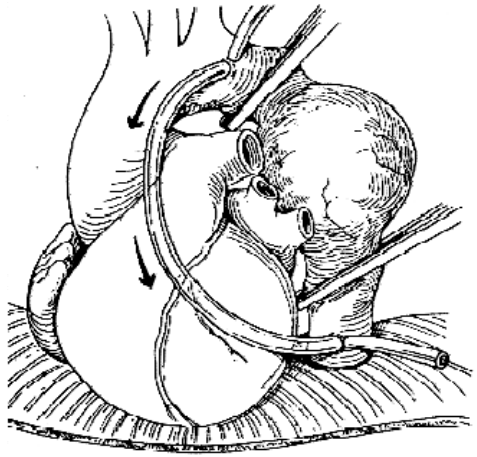
Distal aortic perfusion



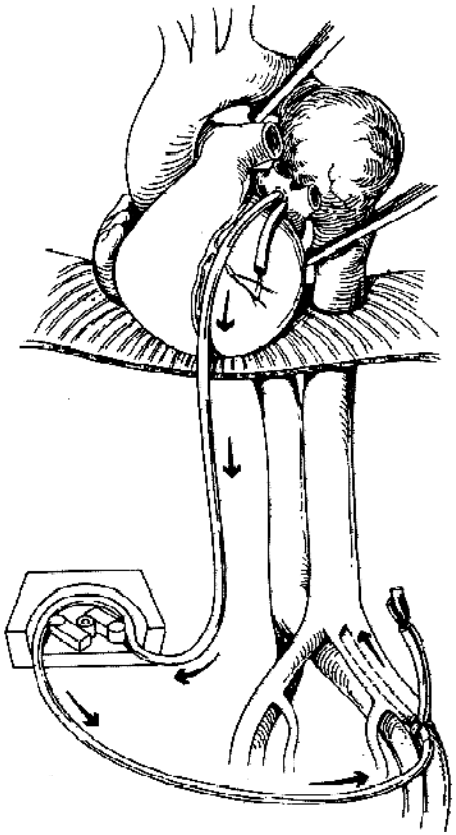


Options for distal aortic perfusion

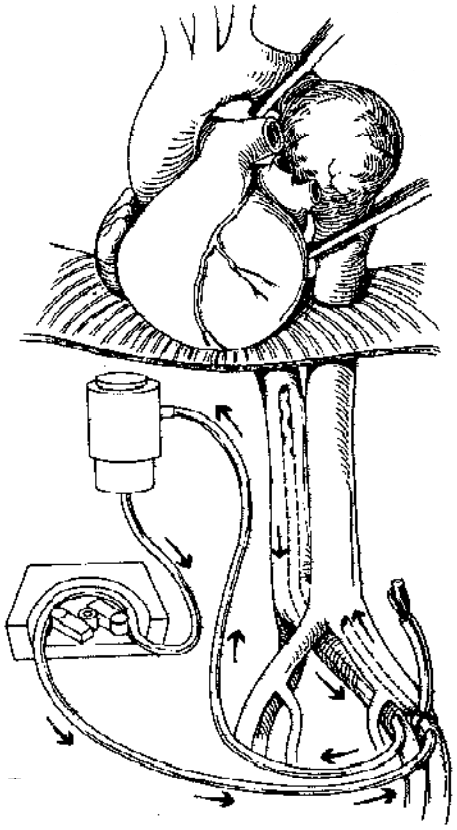
Ao→Ao



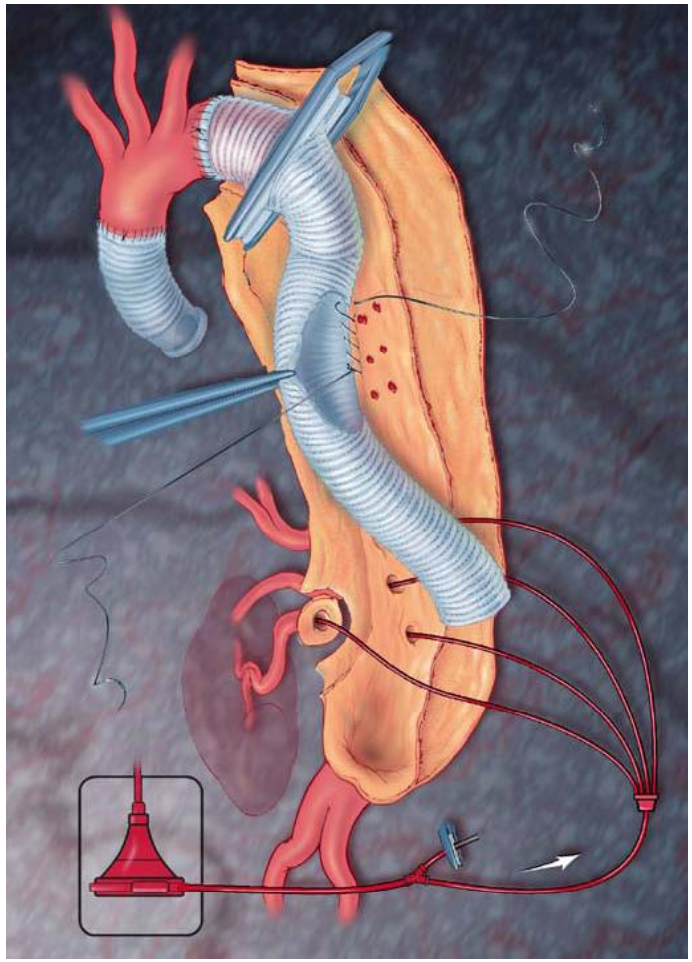
LA→FA(Ao)



FV(PA)→FA(Ao)

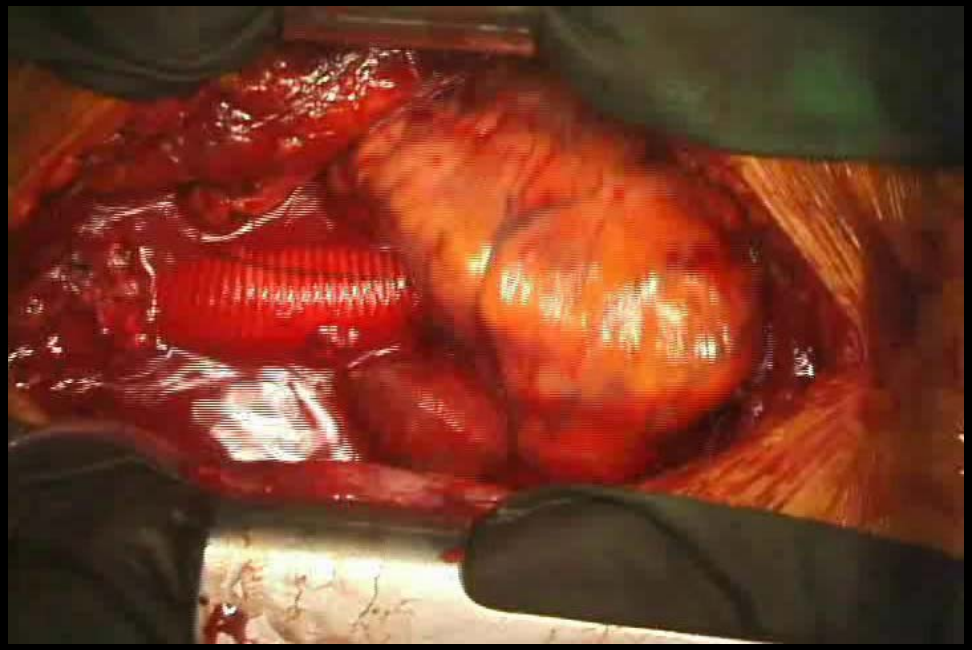


Selective visceral perfusion



Hemostasis in aortic surgery

- **Obstacles**
  - cardiopulmonary bypass
  - hypothermia
  - pre-existing coagulopathy
  - long suture line
  - porosity of prosthetic graft



- **Armamentarium**
  - experienced hands
  - surgical glues
  - aprotinin, transamine, epsilon-amino caproic acid
  - cell saver

Standard vs. personal experience

- in-hospital mortality rate -

Procedure	Standard	Personal
elective root surgery	< 2 %	0 % (0/42)
acute type A dissection	< 10 %	6.1 % (10/175)
	preoperative arrest (-)	*2.4 % (4/165)*
elective arch replacement	< 5 %	6.6 % (4/61)
elective AAA replacement	< 4 %	0 % (0/24)
thoracoabdominal aneurysm	< 8 %	11.1 % (6/54)
	since 2006	*3.6 % (1/28)*

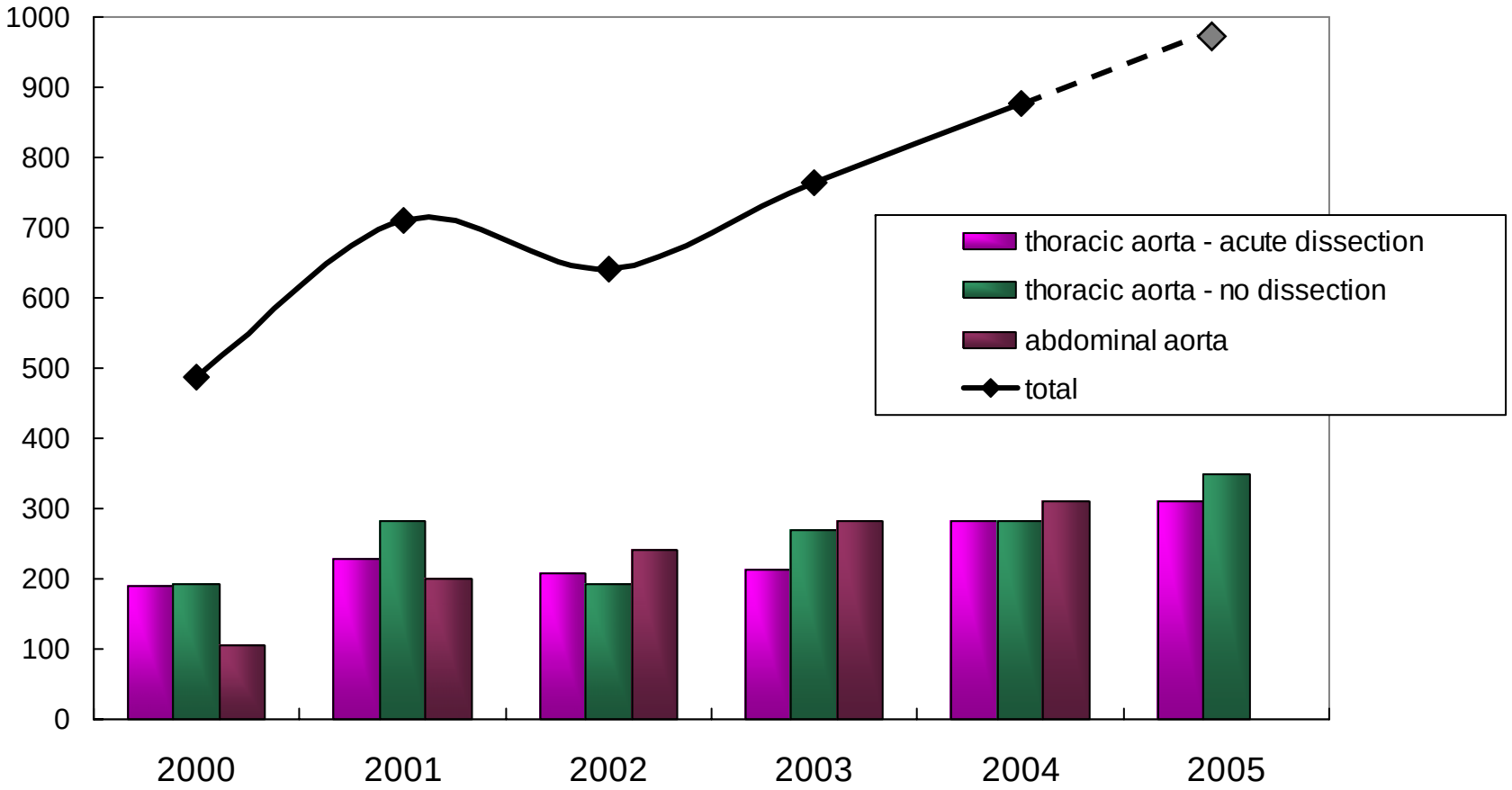
born in 1921 & 1922, hope to see 2021 & 2022

Personal experience (in-hospital mortality rate)

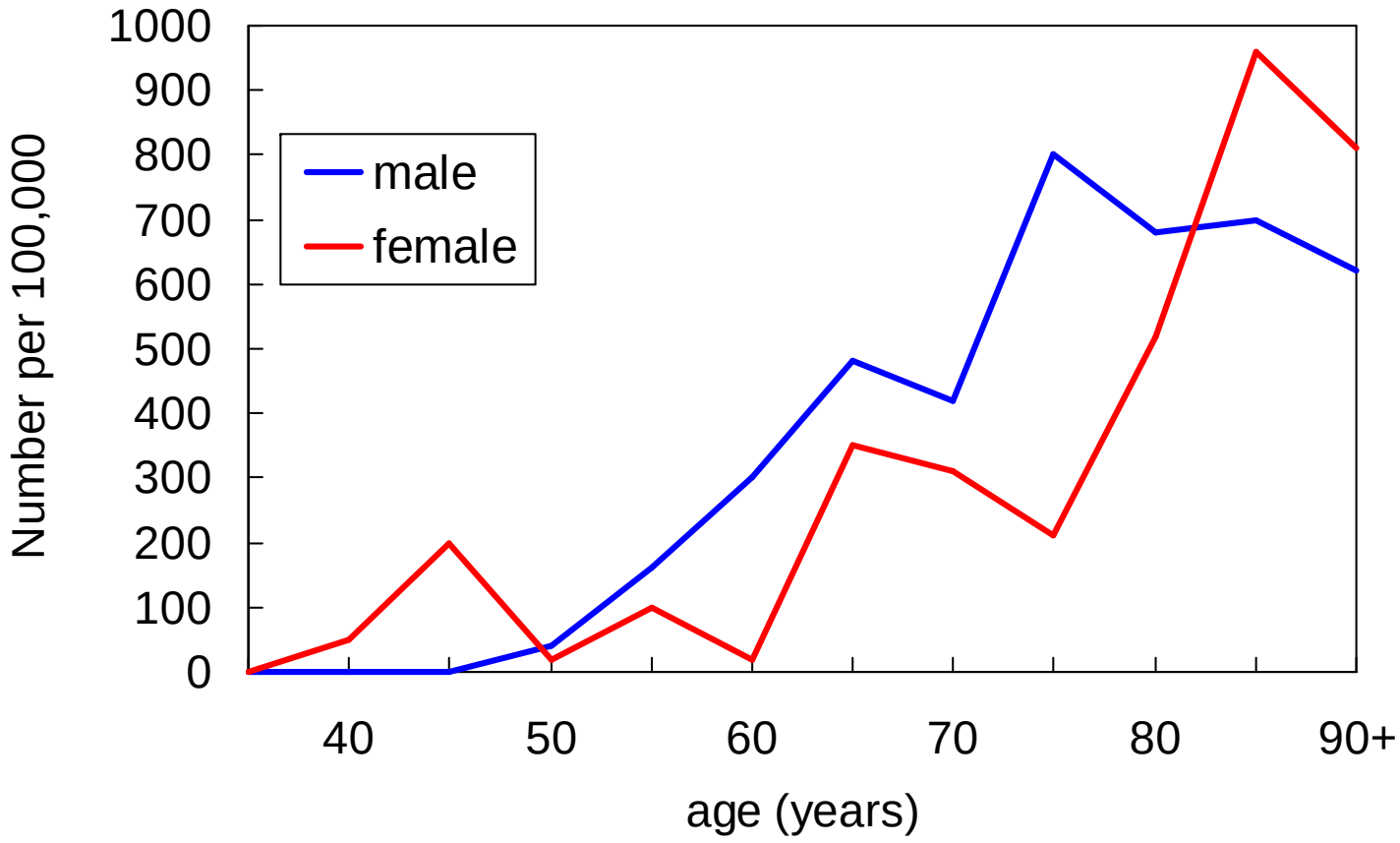
< 70 years : 5.8 % (20/347)

≥ 70 years : 8.6% (8/93)

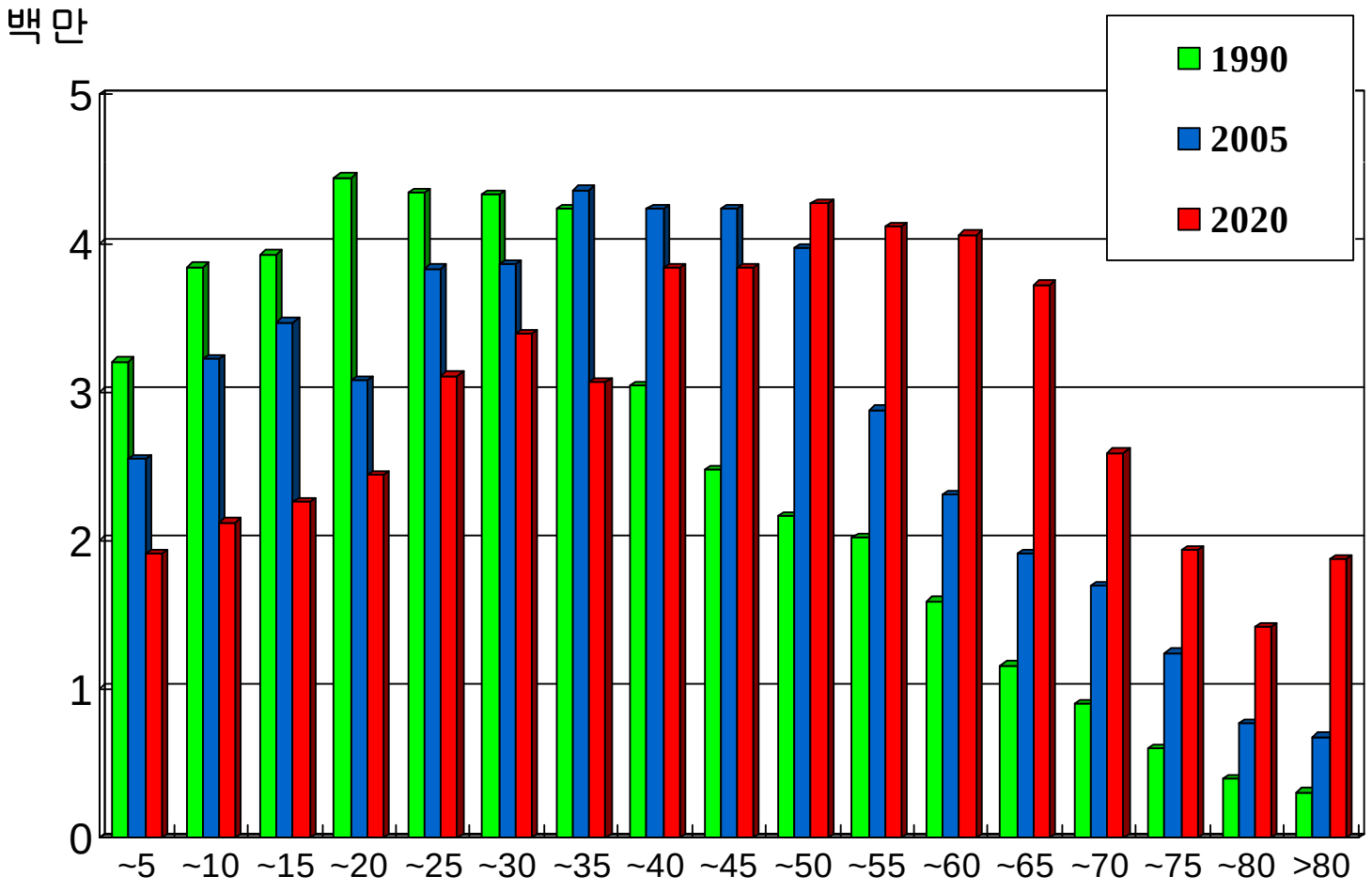
Aortic Surgery in Korea



Incidence of asymptomatic TAA



한국의 연령별 인구 분포 (통계청 자료)

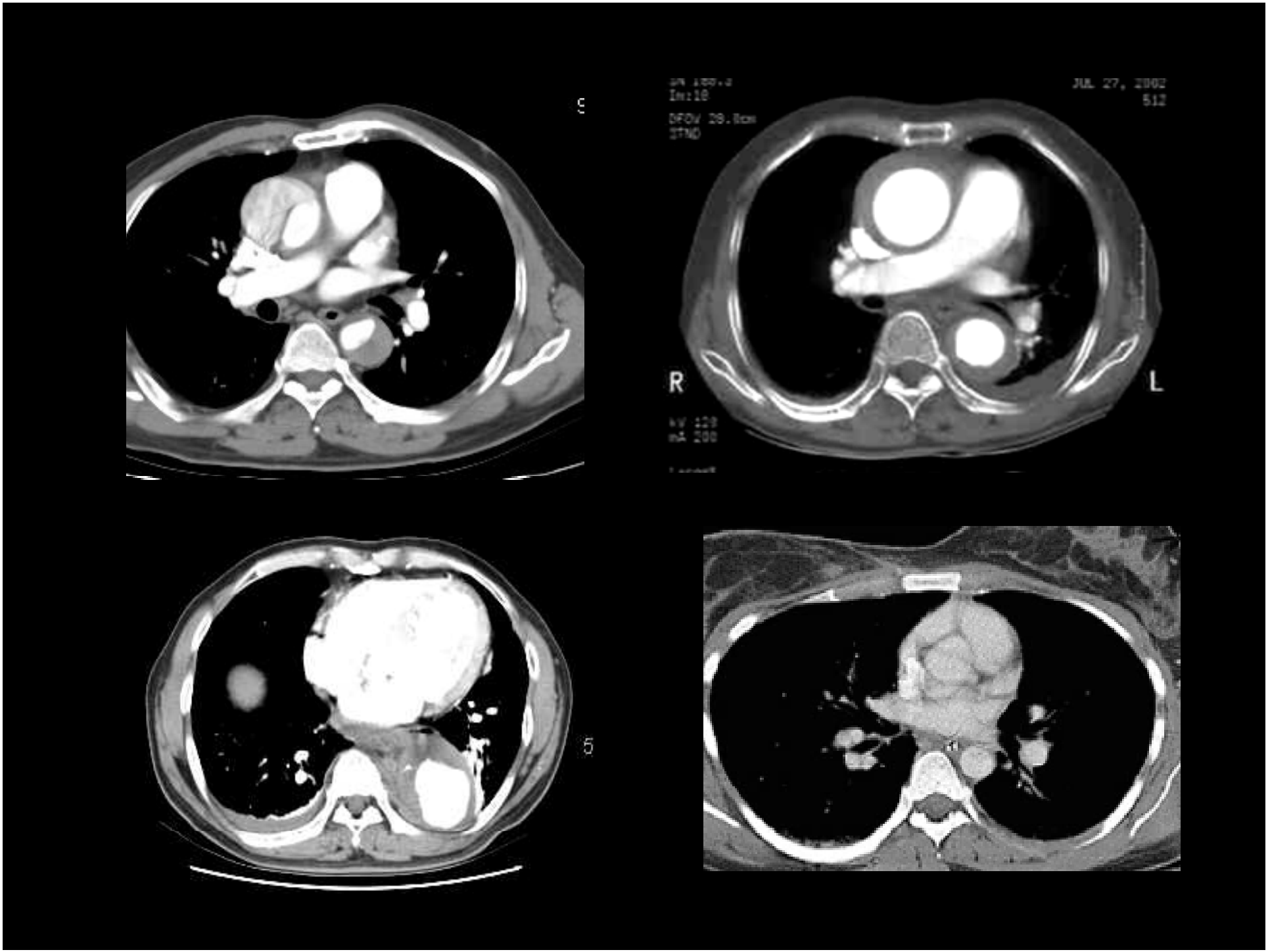


How to improve nationwide outcome?

- **Enhanced knowledge and skill of each team/center**
  - Diagnosis
  - Education
- **Effective transfer & proper referring of patients**
- **Timely intervention**
  - Awareness
- **Adoption of new technology**
  - hybrid repair

Discrepancy between transferring diagnosis and final diagnosis

- Beaver TM, et al. (*Ann Thorac Surg 2005;79:1957-60*)
- 100 patients with aortic diseases transferred
  to University of Florida-Shands Hospital (2002~2003)
- diagnostic discrepancy in 24 patients
  - misclassification of dissection and aneurysm
  - 50%: misinterpretation by radiologists
  - more common misdiagnosis when the referring doctor was not a surgeon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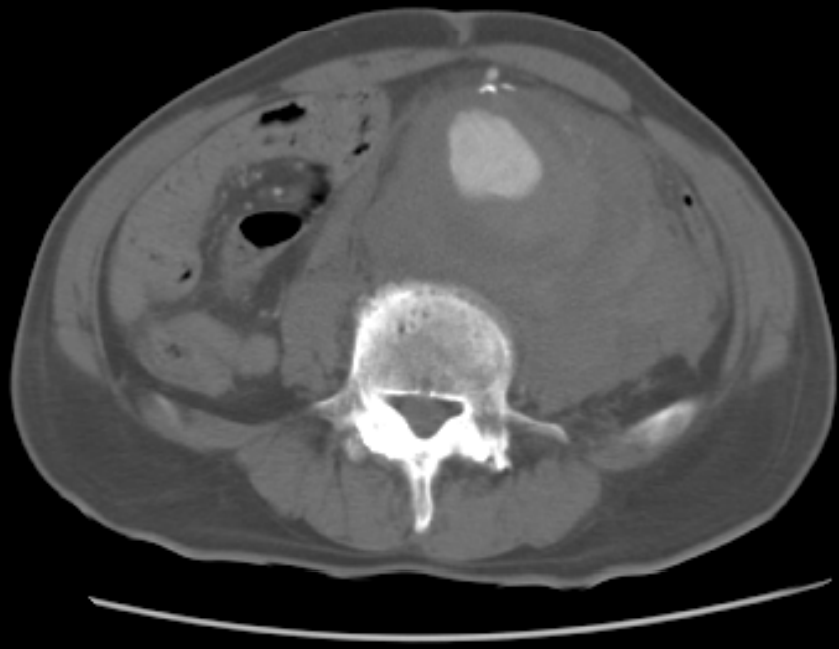
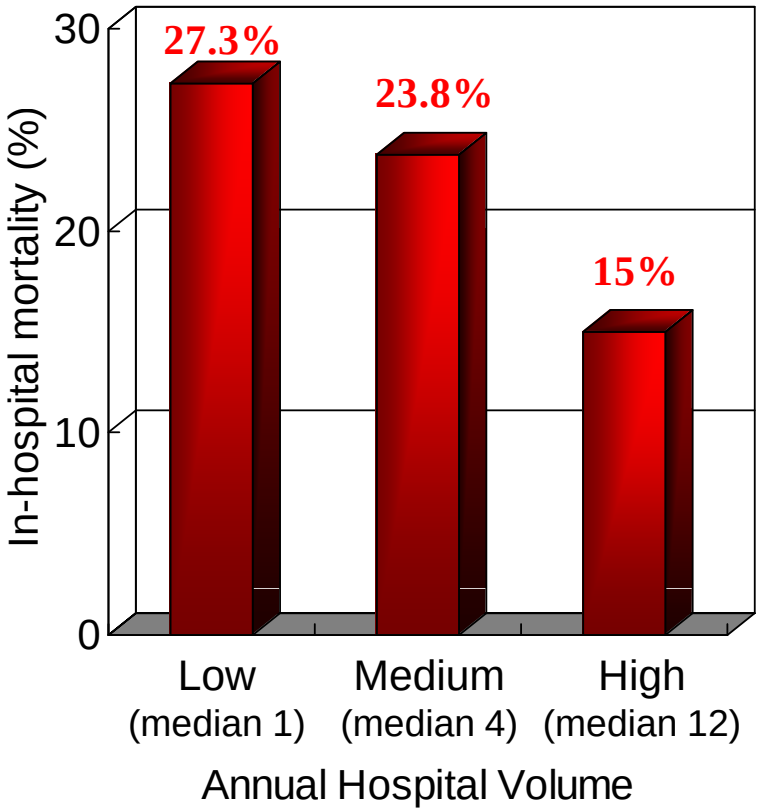
Cause of death after aortic surgery

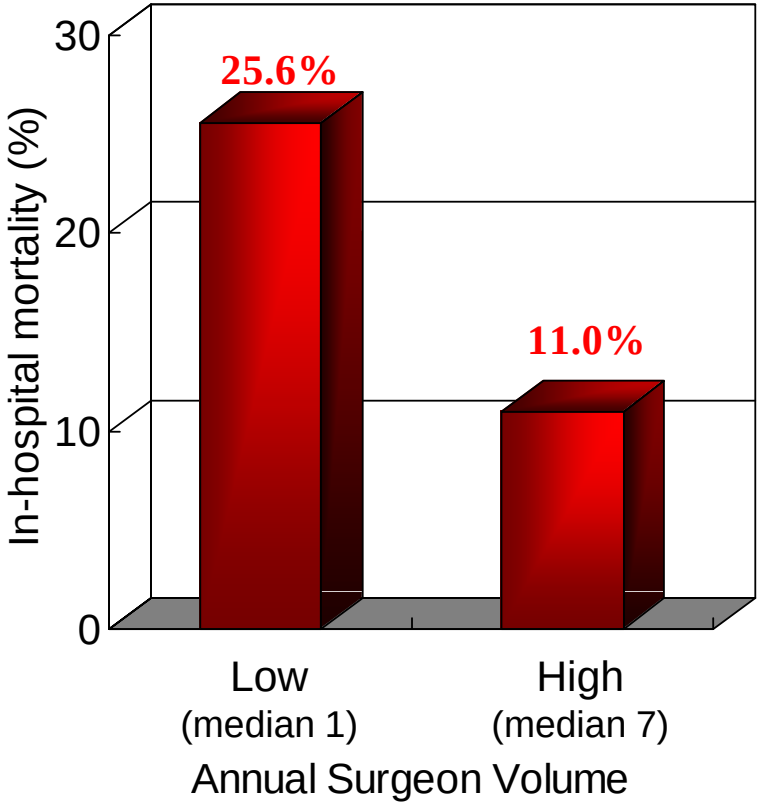
• rupture – arrest before operation	6	(*acute dissection*)
• preop limb/bowel ischemia – MOF	2	(*acute dissection*)
• postop bowel infarction	1	(*acute dissection*)
• sudden death (rupture?)	2	(*acute dissection*)
• sepsis	1	(*prosthetic valve endocarditis*)
• cardiac dysfunction (*air embolism?*)	2	(*acute dissection, TAAA*)
• bleeding	2	(*TAAA type II*)
• stroke	3	(*acute dissection 1, entire thoracic aorta 2*)
• ARDS	1	(*entire thoracic aorta*)
• sepsis	1	(*TAAA*)

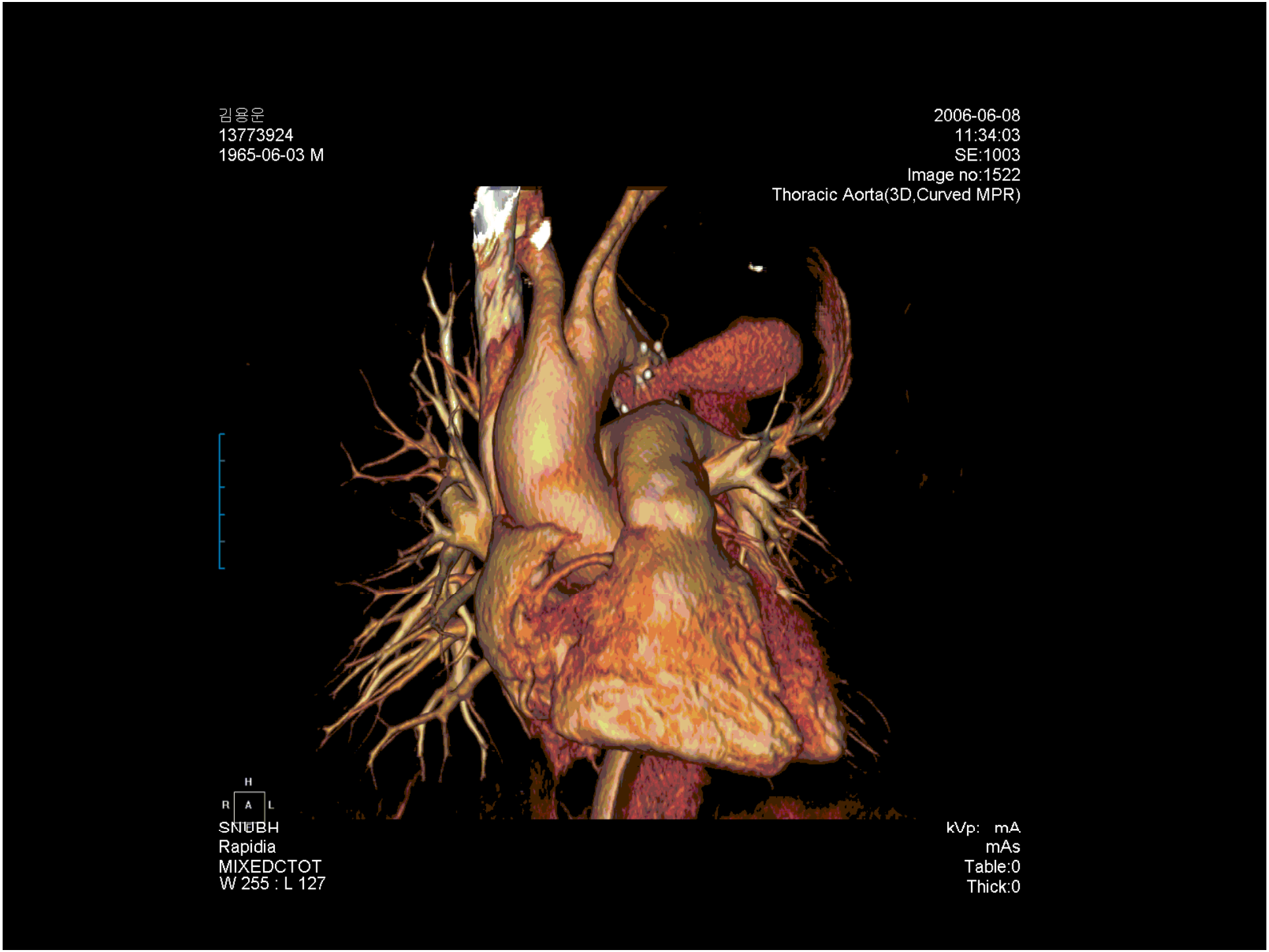


Volume-related outcomes in TAAA surgery

(USA NIS database, 1988~1998) *Cowan JA, et al. J Vasc Surg 2003;37:1169-74*



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Thoracic Aorta(3D,Curved MPR)
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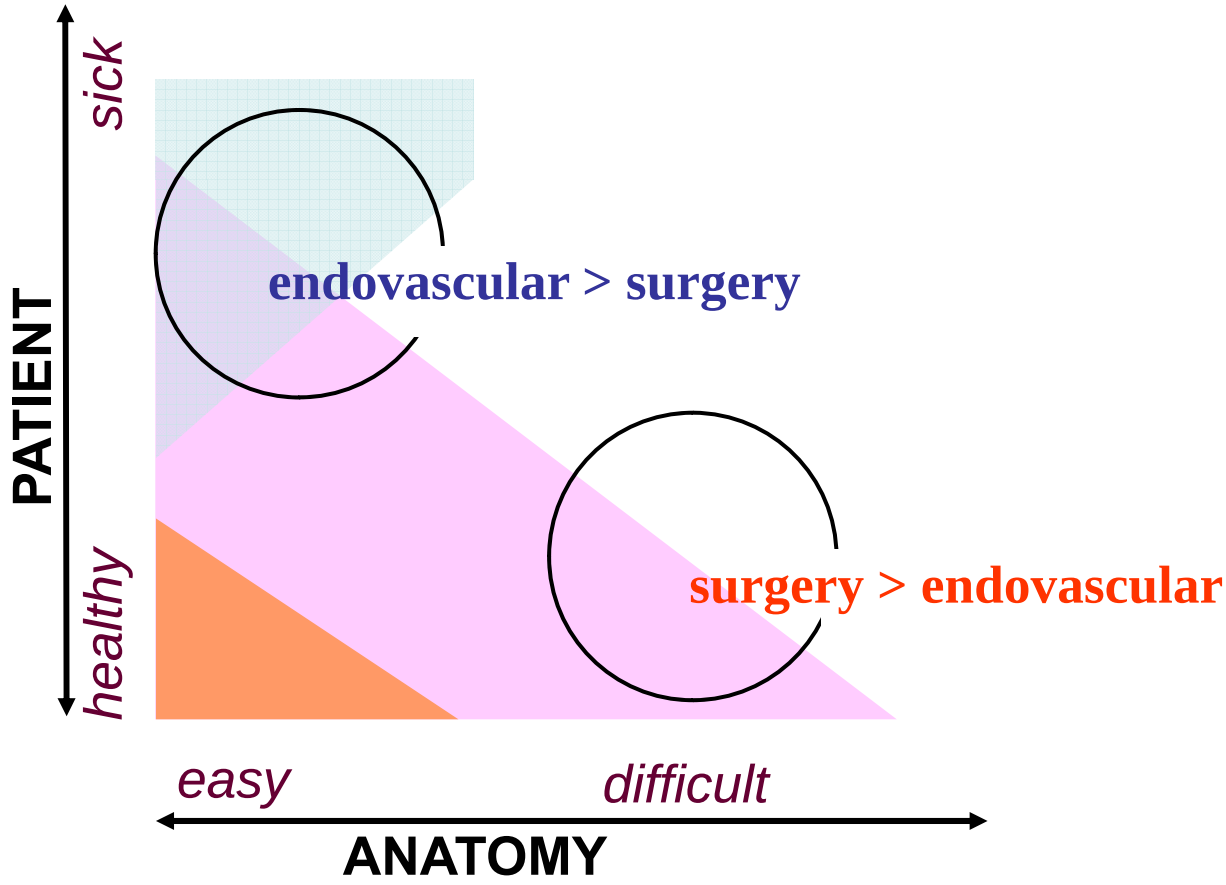
Whom to refer ; *better surgeon or interventionist?*



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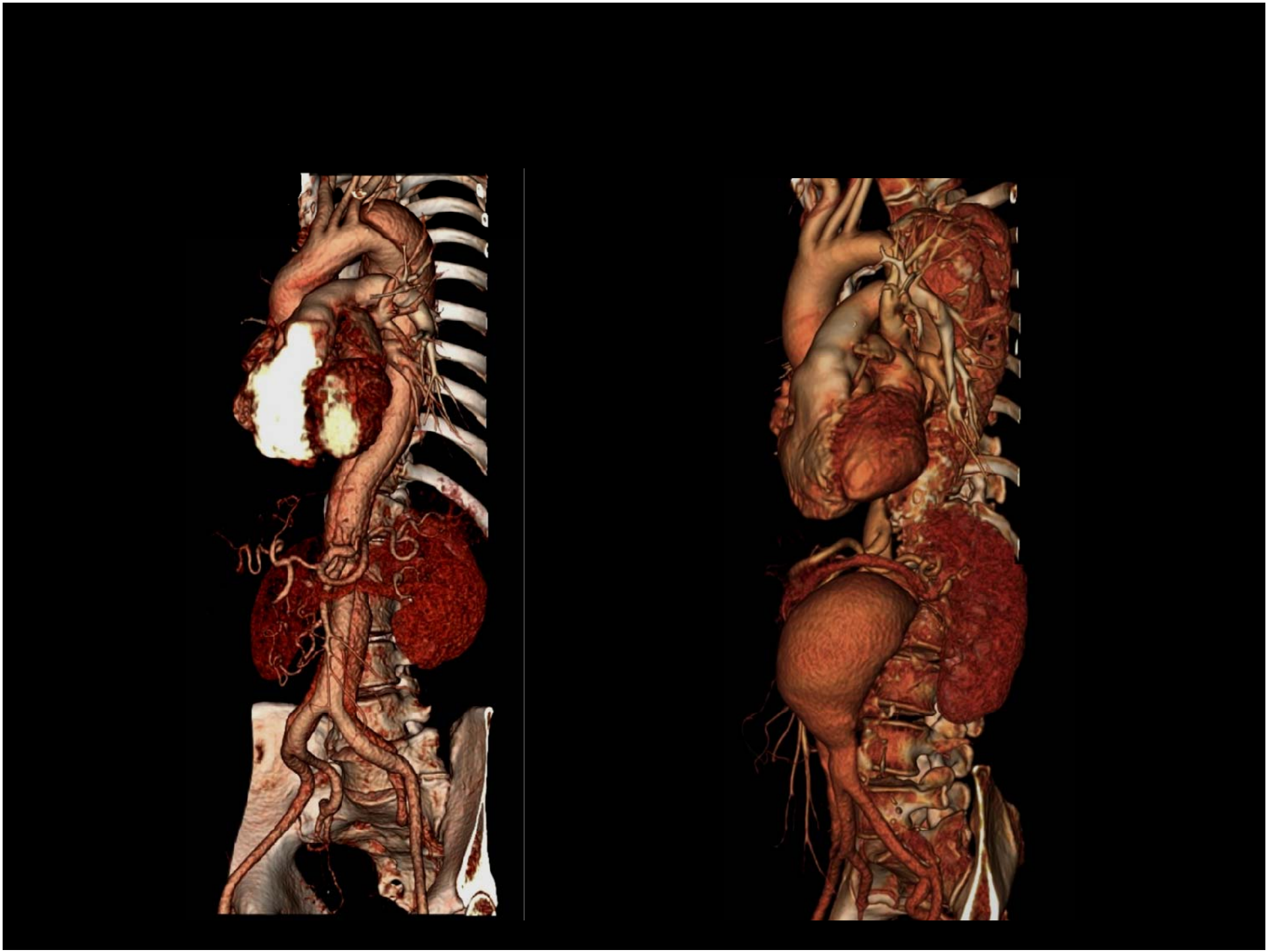
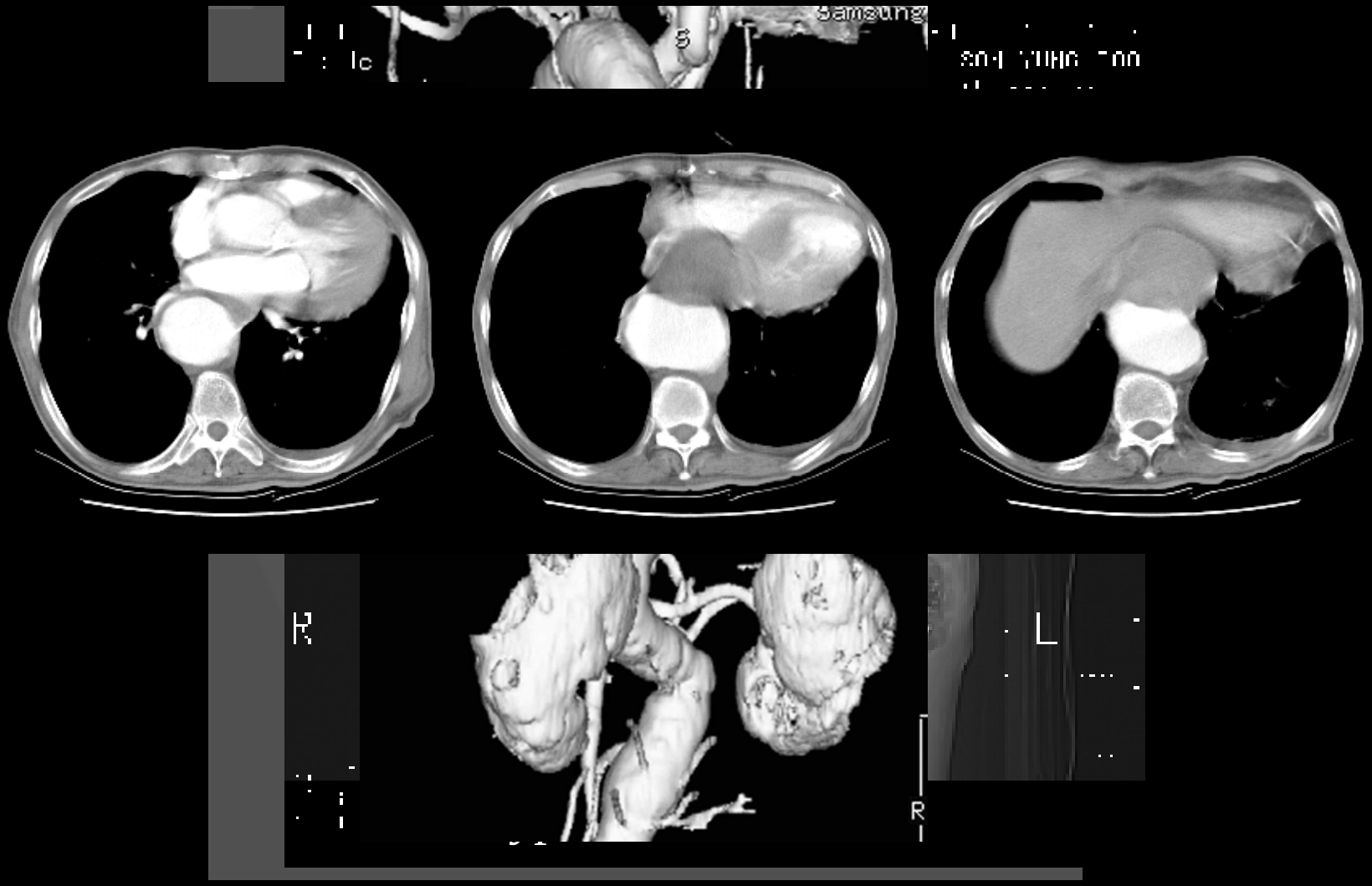


- M / 67y
- s/p left nephrectomy for renal cell ca (6 years ago)
- CRF → recent start of HD
- recent episode of hemoptysis, pleural effusion, voice change

- radiologist's reading
  - CXR (> 10 times during F/U) : "*no active lesion*'
  - Chest CT (done d/t pleural effusion): "*pseudoaneurysm of aortic arch*'

- M / 75y
- dysphagia, weight loss 15kg over 6 months



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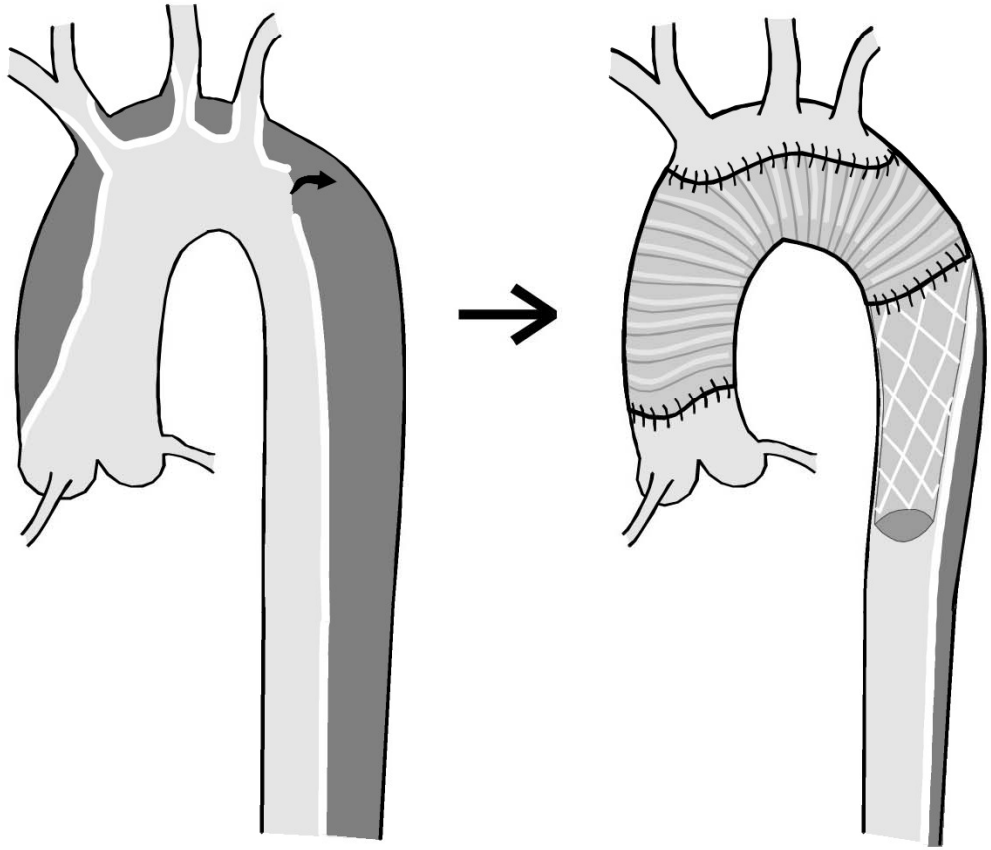


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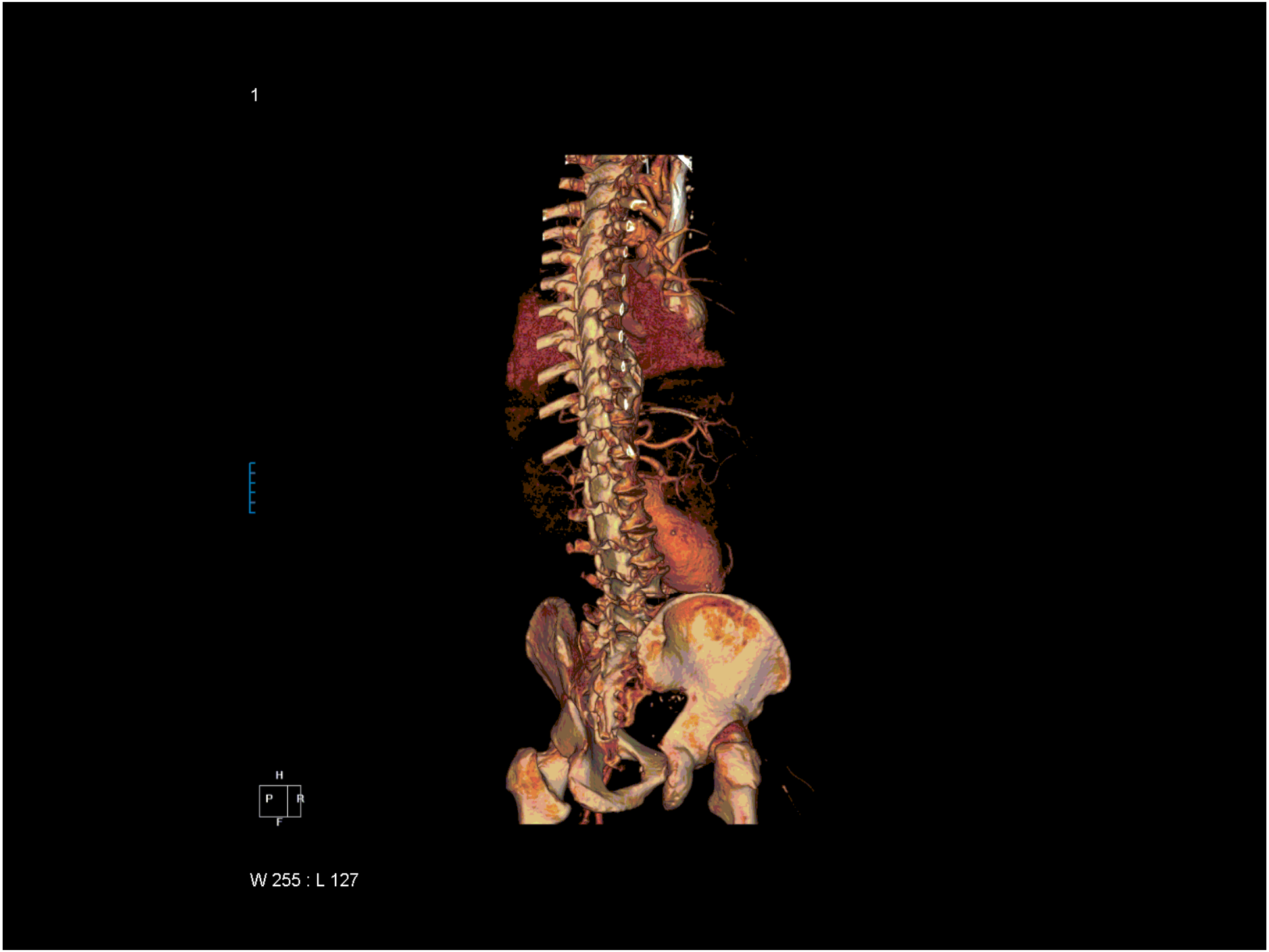
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Thank you !