What Are Necessary for Clinical Application of New Treatment Options?

Discussion for “CARVAR”

안전성 및 유효성 규명(2) – 임상의사 입장

울산대학교 의과대학, 서울아산병원 흉부외과

정 철 현

서울아산병원
Asan Medical Center

publications regarding “CARVAR”

“CARVAR” complication cases

AMC results(2007.4 - 2007. 07)

Conclusion

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1. Notice about article: Lee SJ, Shin JK, Kim DC, Kim JS, Kim JS, Chee HK, Song MG. Recent early operative outcomes of comprehensive aortic root & valve reconstruction (**CARVAR**) procedure. Korean J Thorac Cardiovasc Surg 2009;42:696-703.
   Editorial committee of the Korean Journal of Thoracic and Cardiovascular Surgery.
   Korean J Thorac Cardiovasc Surg. 2011 Dec;44(6):461. Epub 2011 Dec 7. No abstract available.
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2. Coronary ostial stenosis after aortic valvuloplasty (comprehensive aortic root and valve repair).
   Han SW, Kim HJ, Kim S, Ryu KH.
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종합적 대동맥 근부 및 판막 재건술의 최근 초기 수술성적

이성준* · 신제균* · 김동찬* · 김진식* · 김준석* · 지현근* · 송명근*

Recent Early Operative Outcomes of Comprehensive Aortic Root & Valve Reconstruction (CARVAR) Procedure

Sung Jun Lee, M.D.*, Je Kyoun Shin, M.D.*, Dong Chan Kim, M.D.*, Jin Sik Kim, M.D.*, Jun Seok Kim, M.D.*, Hyun Keun Chee, M.D.*, Meong-Gun Song, M.D.*

Background: A Comprehensive Aortic Root and Valve Reconstruction (CARVAR) procedure is comprised of aortic root wall reconstruction and corrections of the leaflets for treating various aortic valve diseases. We evaluated our recent early clinical experience with the CARVAR procedure. ***Material and Method:*** From October 2007 to September 2008, 114 cases (66 males) of CARVAR procedures were performed. The mean patient age was 53 years (range: 14～84). The patients were divided into 4 groups: 1) the AAR group: aortic regurgitation with aortic root wall deformity such as annulo-aortic ectasia or ascending aortic aneurysm (n=18), 2) the IAR group: isolated AR with leaflet abnormality (n=42), 3) the IAS group: isolated aortic stenosis (n=51) and 4) the PAVR group: previous aortic valve replacement (n=3). Sinotubular junction (STJ) reduction was done in all the patients, leaflet correction was done in 10 of the AAR group patients and in all the patients of the other groups, annulus reduction was done in 14 of the AAR group patients and in 6 of the IAR group patients. Aortic dissection was excluded from this analysis. ***Result:*** There was no mortality or follow-up death. The diameter of the aortic sinus decreased from 54.6±8.4 mm to 38.3±3.8 mm in the AAR group, the mean AR grade decreased from 3.2 to 0.2 in the IAR group, the mean aortic valve pressure gradient decreased from 47.1±24.4 mmHg to 15.1±11.7 mmHg in the IAS group and the mean AR grade decreased to 0 in the PAVR group. Balloon type coronary perfusion cannula-related coronary ostial stenosis developed in 4 patients and this was treated with OPCAB in three patients and with PTCA in one patient. Two patients developed postoperative infectious endocarditis. All the patients were discharged and followed up in a stable condition. ***Conclusion:*** The CARVAR procedure showed excellent short term results, but a good further follow up result is required to apply this procedure to most kinds of aortic valve diseases.

(Korean J Thorac Cardiovasc Surg 2009;42:696-703)

Notice about article: Lee SJ, Shin JK, Kim DC, Kim JS, Kim JS, Chee HK, Song MG. Recent early operative outcomes of comprehensive aortic root & valve reconstruction (CARVAR) procedure. Korean J Thorac Cardiovasc Surg 2009;42:696-703

Editorial committee of the Korean Journal of Thoracic and Cardiovascular Surgery

This article was reviewed by the editorial committee of the Korean Journal of Thoracic and Cardiovascular Surgery.

Any author who is going to cite this article for writing, must consider the facts listed below which were found during review of this article.

Study group enrolment

- 3 cases of "converting to AVR during CARVAR operation" were omitted.

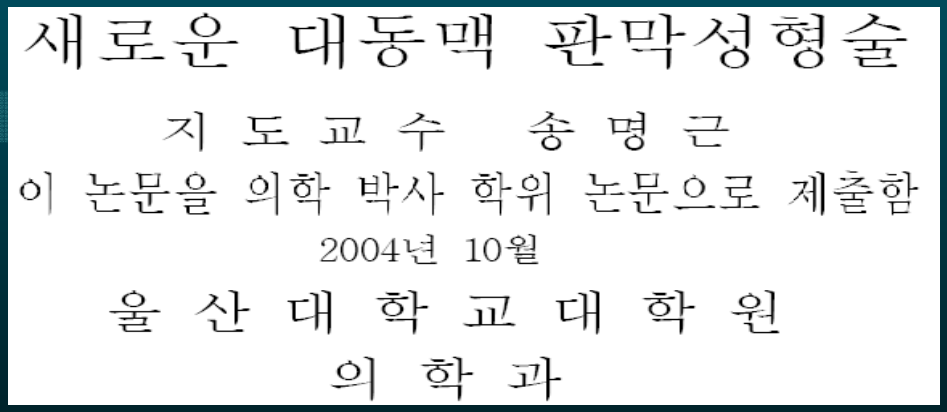
- Re-do CARVAR case was not included.

Complication

- Important complications such as postoperative endocarditis, bleeding, arrhythmia, heart failure were not completely evaluated in this study.

Follow up

- Postoperative AR grading scale criteria was not clear. This may affect the conclusion of this article in terms of "favorable outcome of CARVAR operation".



새로운 대동맥 판막성형술

지 도 교 수 송 명 근

이 논문을 의학 박사 학위 논문으로 제출함

2004년 10월

울 산 대 학 교 대 학 원

의 학 과

2004 박사 논문

ELSEVIER

European Journal of Cardio-thoracic Surgery 29 (2006) 530–536

EUROPEAN JOURNAL OF CARDIO-THORACIC SURGERY

www.elsevier.com/locate/ejcts

Novel technique of aortic valvuloplasty☆,☆☆

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2006 유럽흉부외과 학회지 논문

Korean Circulation J 2006;36:140-149

새로운 대동맥판 성형술

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울산대학교 서울아산병원 심장내과학교실,[3] 방사선과학교실[4]

Novel Technique of Aortic Valve Repair

2006 순환기학회 논문

서울아산병원
Asan Medical Center

	2004 박사 논문	2006 유럽논문	2006 순환기학회
대상 기간	1997.12~2004.10	1997.12~2004.12	1997.12~2005.4
대상 환자 수	65+49	69	75
대상 질환			
AD	49	0	0
IAR	**35**	**30**	35
AAR	**13**	**22**	22
AAE	17	17	18
IRB 통과 유무 기재	-	**+ (허위기재)**	-
식약청 승인 기재	-	**+ (허위기재)**	**+ (허위기재)**

서울아산병원
Asan Medical Center

수술 후 판막기능

수술 직후 심초음파 결과

104명(91%)에서 수술 후 대동맥판막 폐쇄부전의 등급(grade)이 2도를 넘지 않았다. 3도를 넘은 환자들은 5명이었는데 평균 8개월의 추적관찰기간 동안 시행한 심초음파 검사에서는 36명의 환자 중 32명(89%)에서 대동맥판막 폐쇄부전이 없어졌다.

2004 박사 논문

No patient, except for the reoperated patient had AR greater than grade 2.

2006 유럽 논문

수술 직후 심초음파 결과 ;
수술 직후 75명 중 69명(92%)의 환자에서 대동맥판 폐쇄 부전증의 등급이 2도를 넘지 않았다. 3도 환자는 6명이었는데, 이 중 3명은 수술 전 4도에서 호전되었으며 나머지 3명은 수술 전과 변화가 없었다

2006 순환기 학회 논문

서울아산병원
Asan Medical Center

판막 재수술 소견 (1명)

경우는 수술 후 18개월째 재수술을 시행하였는데 우관상동맥기시부가 있는 판막엽에 천공이 있었으며 판막탈출현상(prolapse)을 보이고 있었다.

2004 박사 논문

he had to undergo mechanical AV replacement on the 18th postoperative month due to remnant AR. A fracture in the Prolene used for leaflet correction was causative for the persistent AR.

2006 유럽 논문

이 환자는 수술 후 18개월째 대동맥판막 치환술을 시행하였는데 수술 소견에서 교정술에 이용한 Prolene 실이 끊어져 있었다.

2006 순환기 학회 논문

서울아산병원
Asan Medical Center

	2004 박사 논문	2006 유럽논문	2006 순환기학회
수술 직후 AR ≥ 3+	5	3	6
지속적 AR ≥ 3+	4 (2)*	1	2
대동맥 판막 재수술	2 (1)*	1	1
대동맥 판막 재수술 소견	Leaflet perforation and prolapse	Prolene suture fracture	Prolene suture fracture

*(patents with aortic dissection)

서울아산병원
Asan Medical Center

문제점

- 각각 발표된 논문 상 불일치 하는 data가 많음
- 더욱 중요한 것은 성적이 우수하게 나타나도록 data가 조작 되었다는 점임
- 판막성형술은 수술직후나 단기 결과보다는 장기 성적이 더욱 중요한데, 초기 성적만 발표되고 장기 성적은 알려지지 않고 있다

최종범 교수

"기존 판막 기능 그대로 살리느냐 통째로 바꾸느냐의 차이
보의연 보고서 엉터리 많고 조잡… 감사원 감사 받아야"

김용인 교수

"단순 링 넣는 수준 아닌 획기적인 기술… 의료계 소통 필요
日 의료계선 토론 분위기 진지… 무조건 반대 국가적 손실"

서울아산병원
Asan Medical Center

복지부 앞에서 항의시위 카바수술 환자들

2011.11.02 21:38 입

찾아가 항의했을 것이다. 우리가 복지부 앞에 왜 모였는지 관계당국 공무원들과 의료진든 깊이 생각해봐야 할 것이다."

카바수술 신의료기술 평가를 둘러싸고 정부와 학계, 시술자간 갈등이 끊임없이 이어지고 있는 가운데 이 수술을 받은 환자들이 논란의 조속한 해결을 요구하며 적극적인 목소리를 내고 나섰다.

CARVAR가 아닌Yacoub 수술을 시행.
CAVAR ring도 들어가 있지 않고
Leaflet 에는 아무 procedure도 안함

1cm distal to the aortic commissures. The aortic wall was resected and the coronaries were trimmed as buttons to be

according to the technique as described by Yacoub and associates. The isolated coronaries were then reattached as buttons with #6-0 continuous prolene sutures to the respective coronary sinuses. The distal end of the graft was then anastomosed to the distal ascending aorta. After release

수 술 기 록 지

Chart No. 14714120 ID No. 640607-1479015 Name 한기범 Sex/Age 남 / 38 Yr

Date of Op 2000-03-16 Bwt / Ht / BSA 87.3 kg 205.0 cm 2.22 ㎡
Anesthesia GEA OpType Elective
Operator 송명근 Assistants 주석중 / 제형곤 / 윤석원
진단코드 A3410 AAE with Marfan
진단(기술) Marfan's SD
Ascending aortic aneurysm

수술코드 A341 Root remodelling or replacement
수술(기술) Aortic root remodelling

Findings

Normal cardiomegaly. No AR.
Extremely dilated and thinned sinuses of valsalva of all three leaflets.

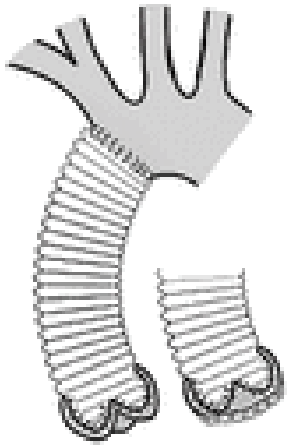
Op Name : Aortic root remelling with coronary transfer and AVP

Procedure

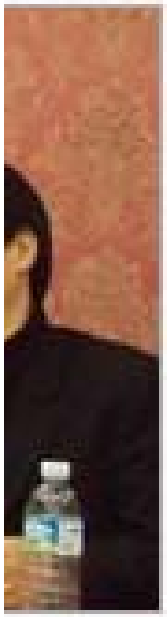
In supine position, the patient was prepped and draped in the usual manner. Anesthesia was conducted under continuous ENG and arterial pressure wave monitoring. The chest was approached via midsternotomy. The pericardium was retracted. The ascending aorta was cannulated and venous drainage was achieved with a single venous drainage cannula. The aorta was cross clamped after temperature was brought down to 31degrees C. The aorta was cross clamped after full venous drainage. The aorta was quickly opened and selective antegrade cold blood high potassium cardioplegic arrest was achieved. The Aortic root was dissected to the level of the aortic annulus. The aortic root was opened transversely about 1cm distal to the aortic commissures. The aortic wall was resected and the coronaries were trimmed as buttons to be reanastomosed later. A strip of teflon felt was used to reinforce the subaortic curtain to prevent possible dilation of the noncoronary and left coronary interleaflet triangle area. The aortic valve leaflets were normal in apearance and morphology. Furthermore, there was no pathologic regurgitation of the aortic valve in the first place. The aortic wall was replaced with a tri scalloped 30mm dacron graft according to the technique as described by Yacoub and associates. The isolated coronaries were then reattached as buttons with #6-0 continuous prolene sutures to the respective coronary sinuses. The distal end of the graft was then anastomosed to the distal ascending aorta. After release of cross clamp, root cannula was inserted. Bleeders were controlled with teflon felt reinforcement sutures. The proximal scalloped sutures were all reinforces contiguously with interrupted felt pledget reinforced prolene sutures. The patient was then rewarmed and bypass weaning was commenced at 36.3 degrees C. Bypass weaning was uneventful. The sternum was approximated with 8 interrupted sternal wires. Two mediastinal tubes were inserted for grainage purposes. The chest wall was then closed in the usual layer by layer fashion.

Described by _____ M.D. Staff : 송명근 M.D.

1/1 page



Yacoub
Remodelling



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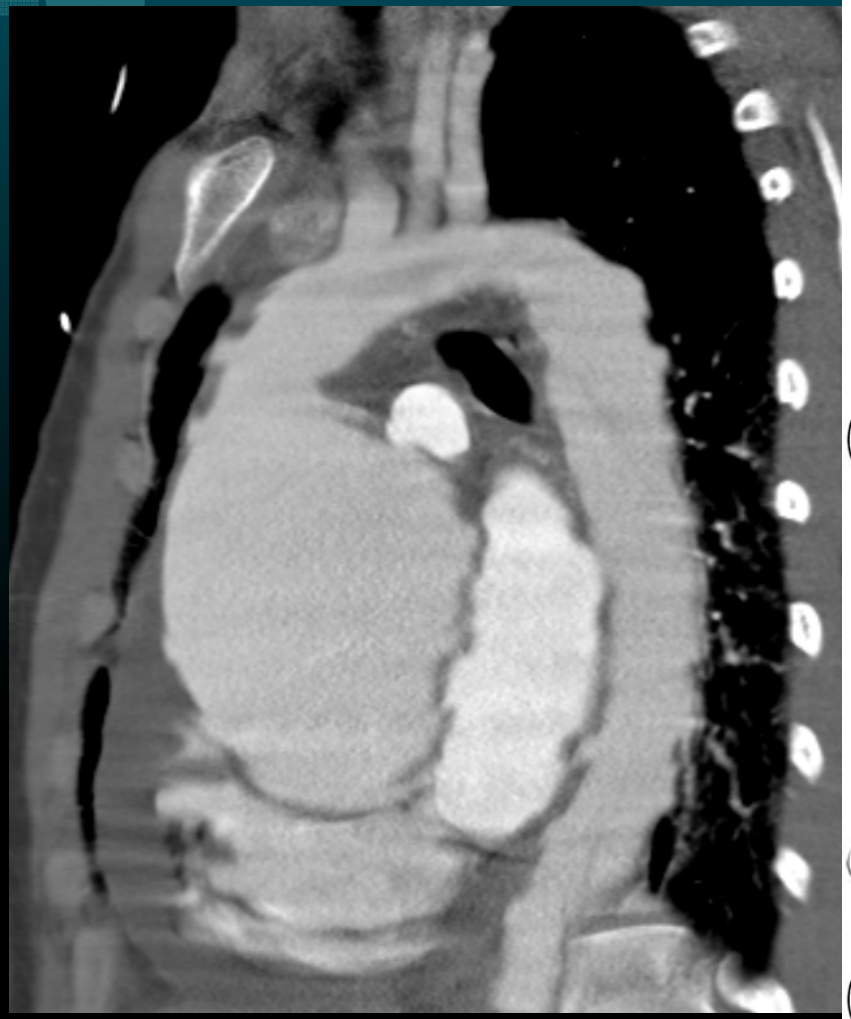
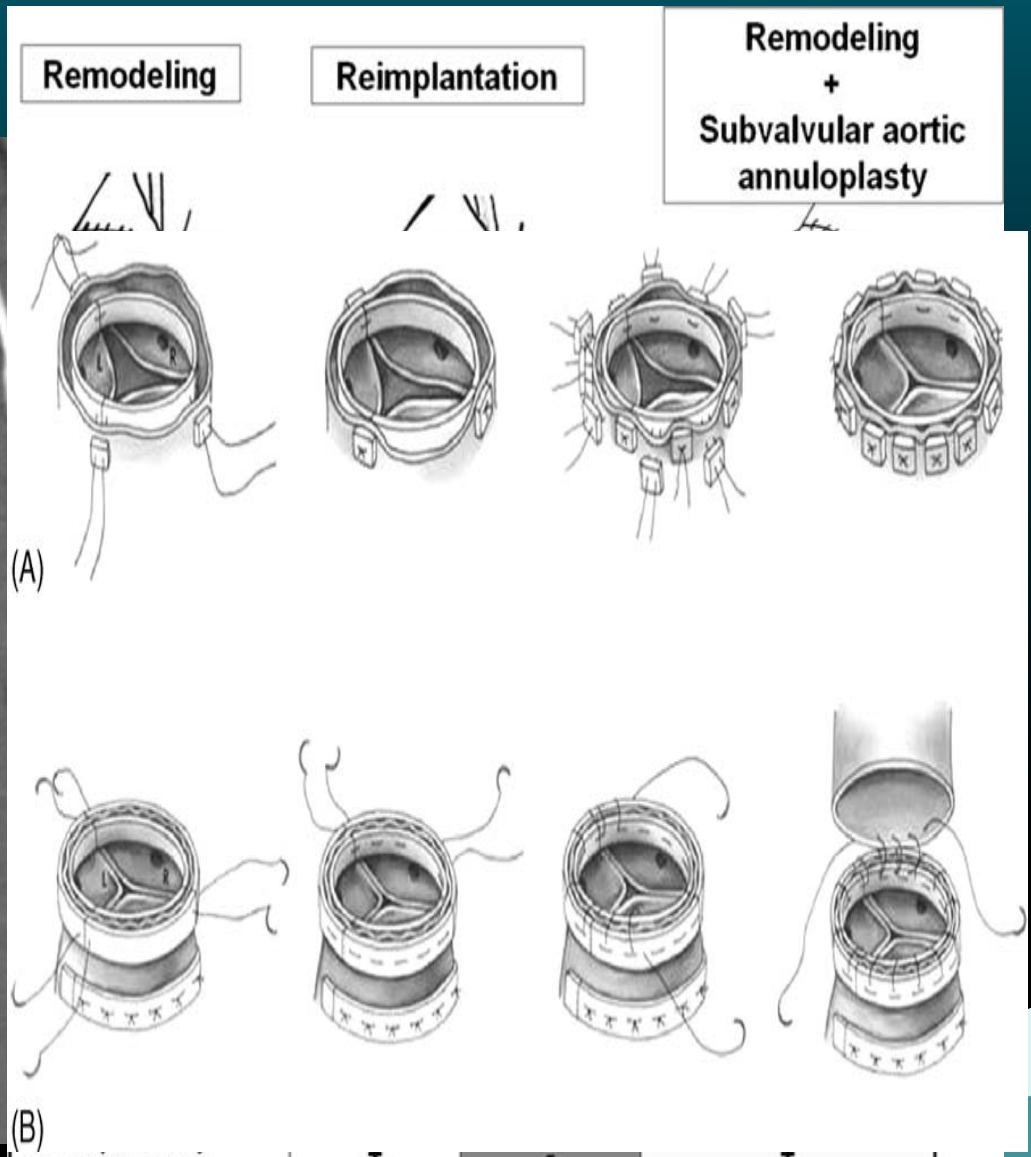
대동맥근부 확장증이 있는 Marfan환자에게 시행된 유사“ CARVAR”수술의 합병증 사례보고 ---

확장부위를 절제하지 않고 “ CARVAR”링으로 고정한 후의 변화

서울아산병원
Asan Medical Center

32230978 서 O, M/22

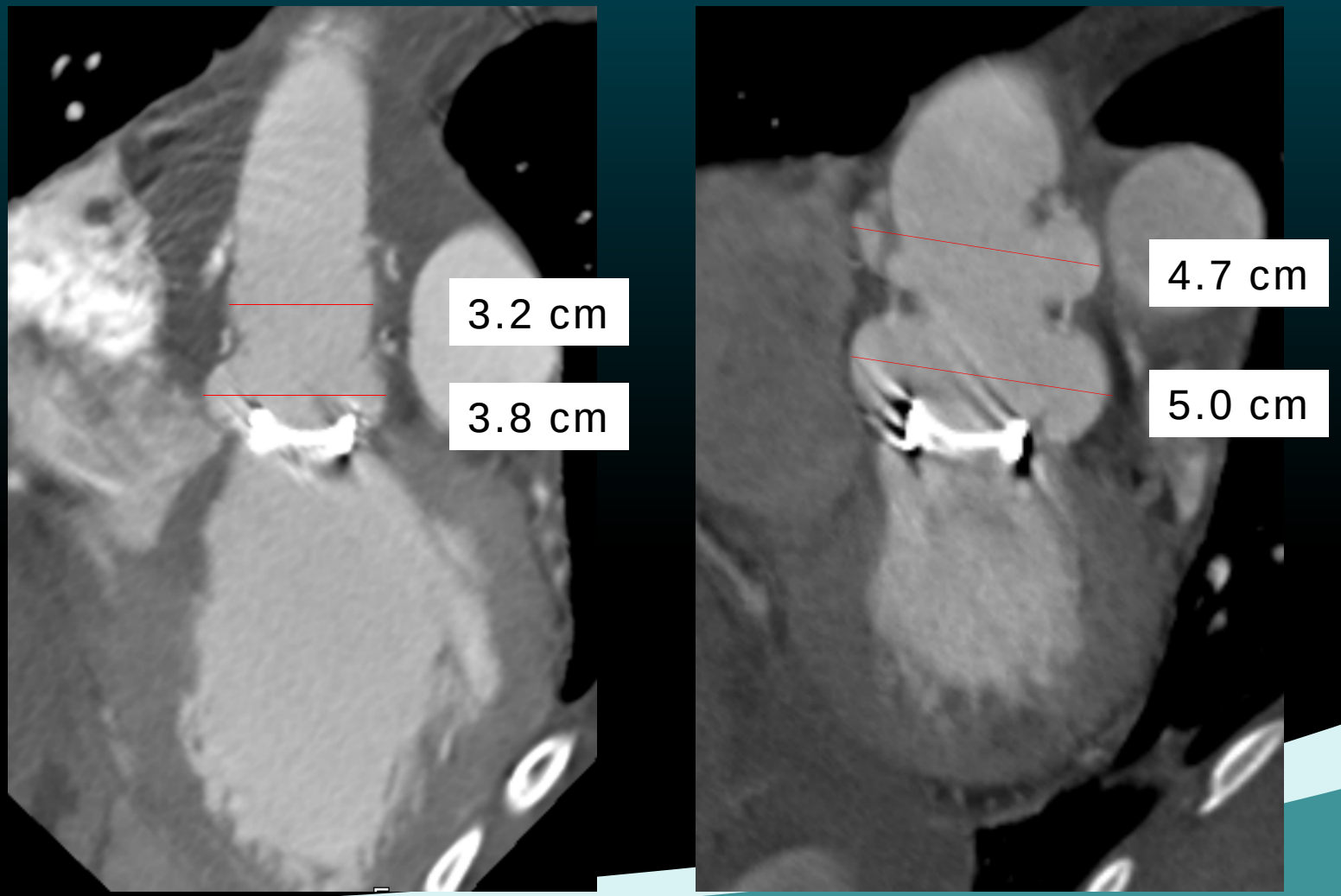




(interleaflet triangles)	+	-	+
Reduction of annular base Ø	-	+	+

32230978 서 O

2005.8.22; (AMC technique; avoiding Bentall op , AVR with Mira 25mm,
inner ring 28mm, outer ring 38mm)



2005-08-29 Immediate postop. CT

2010-6-5 CT

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22 year old male Marfan patient

2005. 8.22, 1st op

F/U dissection CT ; sinus dilation increased gradually

수술 필요성 경고 but neglected

2010.5.8 ; acute type B aortic dissection developed

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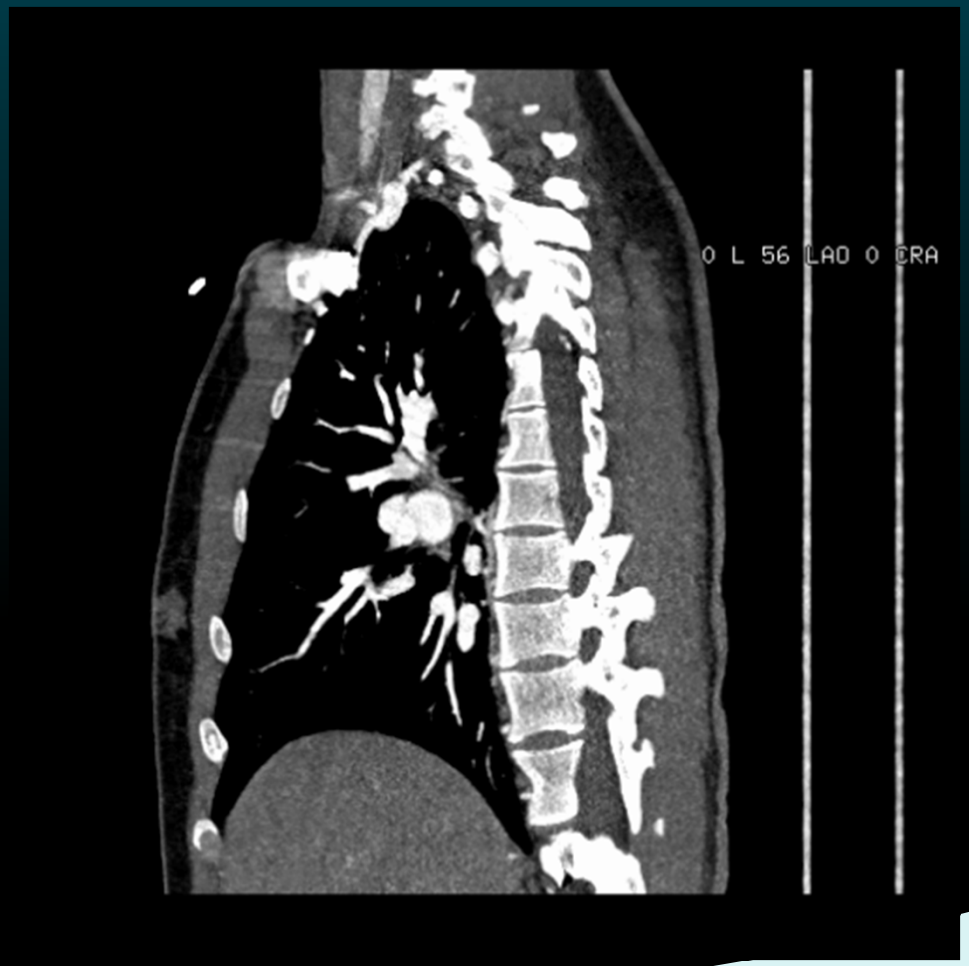
Pre-operative CT image



2010. 05. 20

서울아산병원
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- 건국대 ER visit but op refused
- 2010. 5.31 ; TAAA replacement at AMC
- sinus dilation increased more and more
- 2011. 4.14; redo- Bentall op

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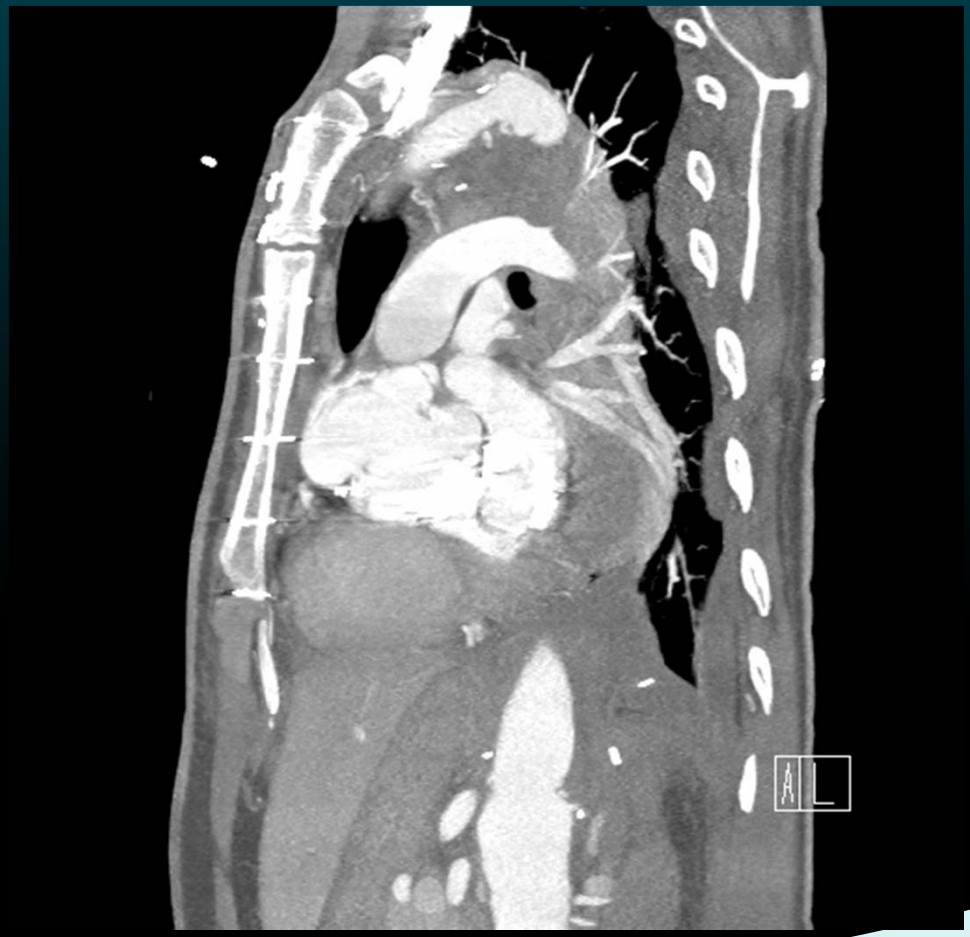
Post-operative CT image



2010. 06. 05

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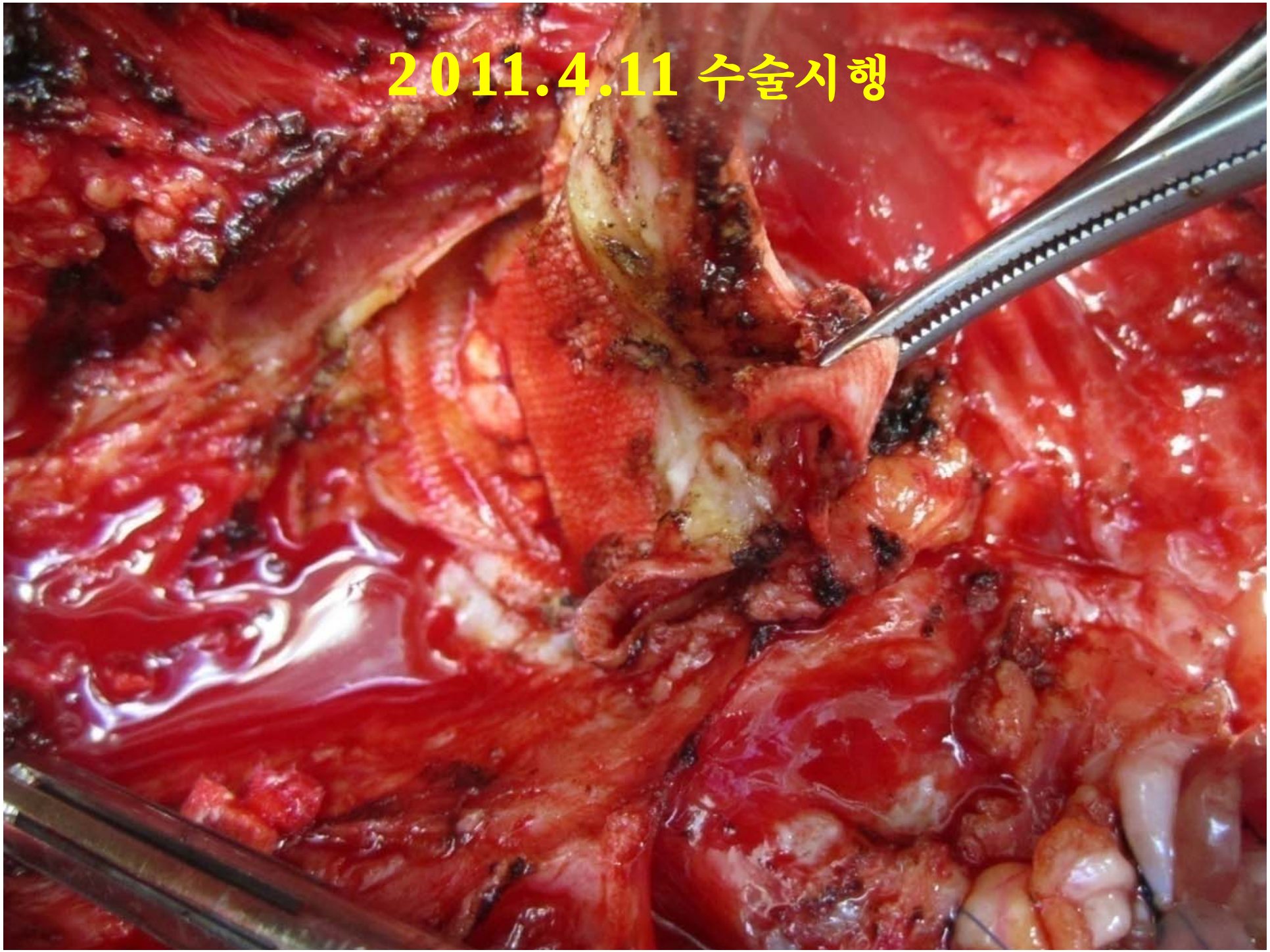
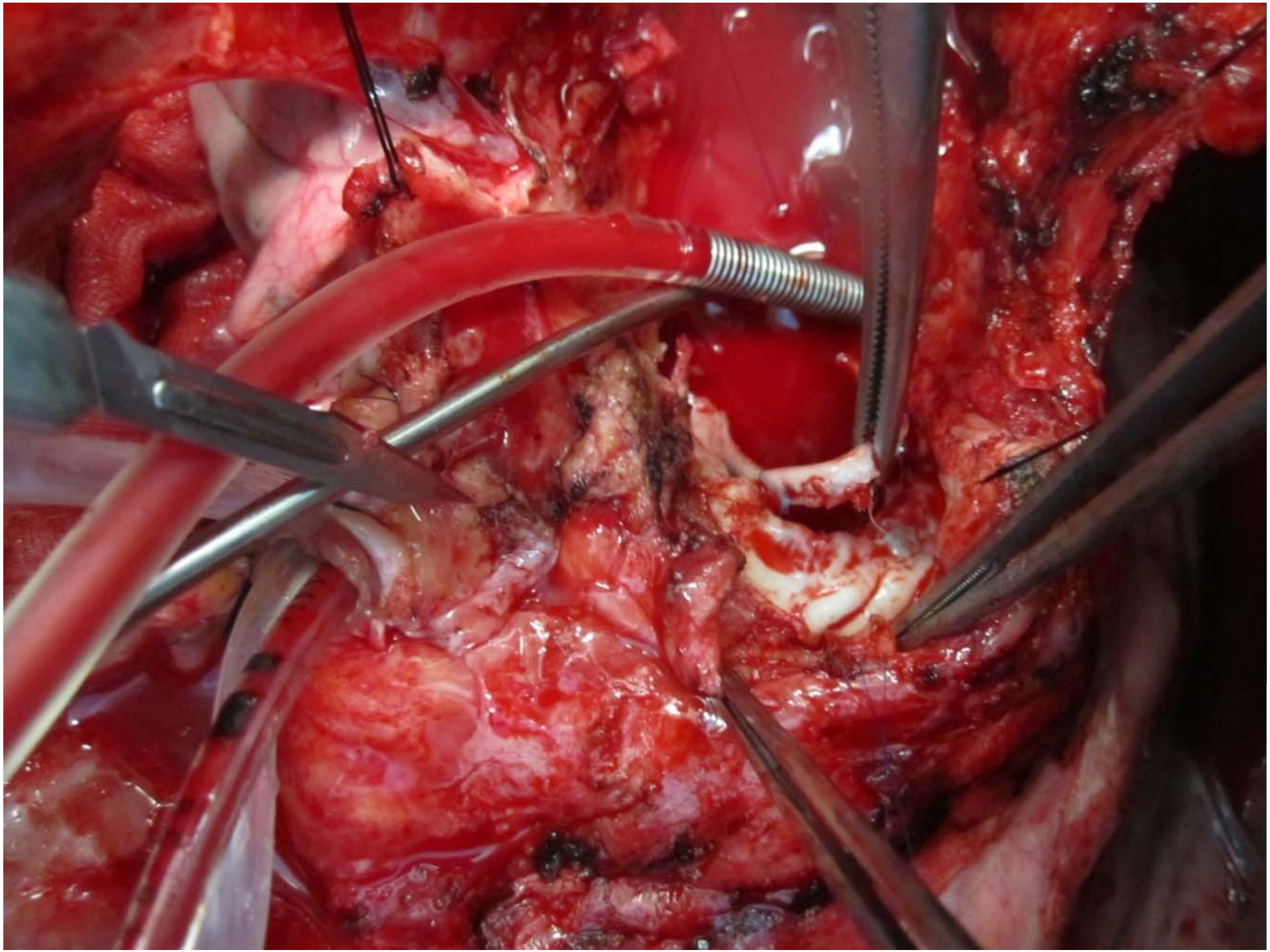
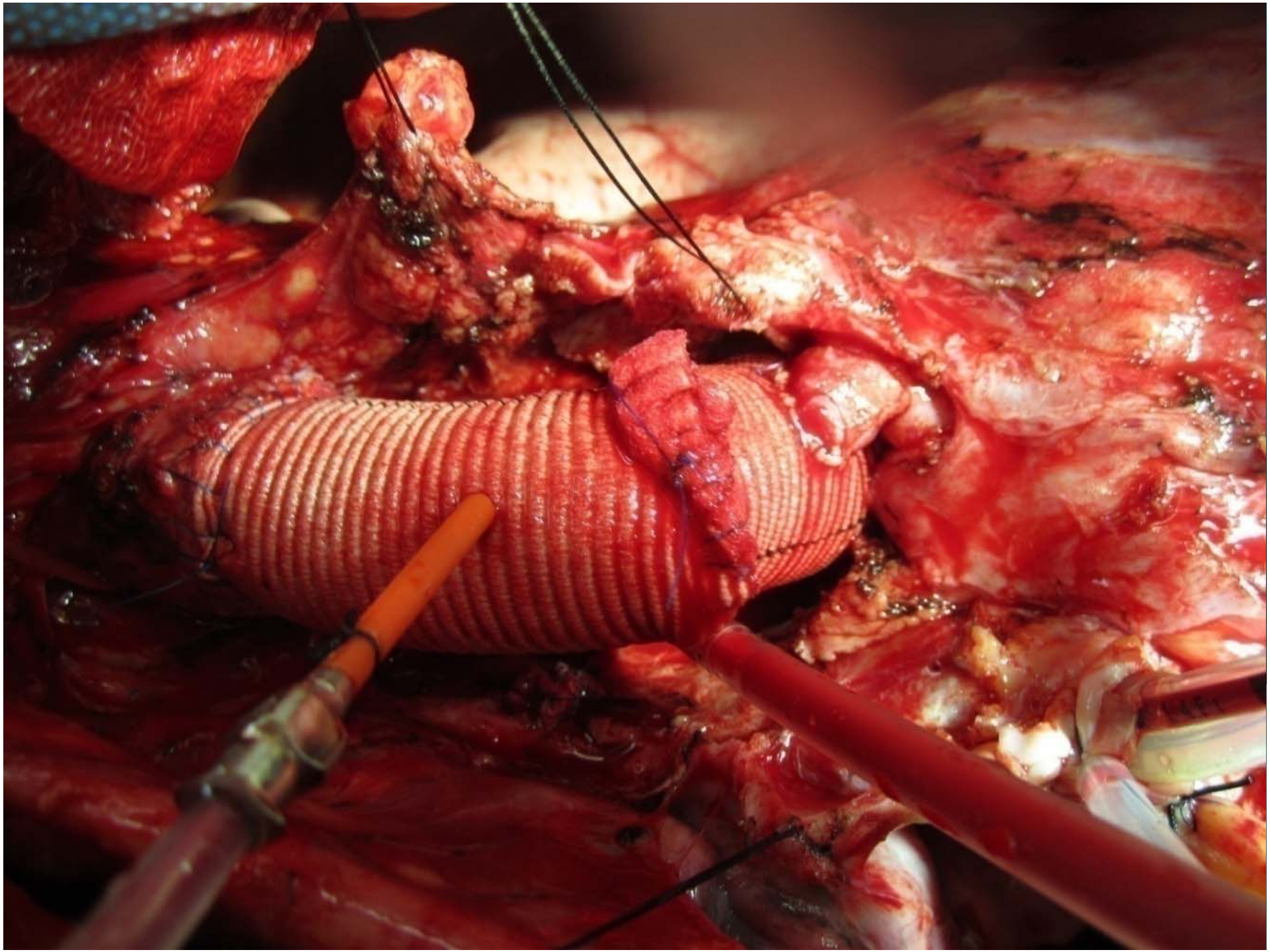
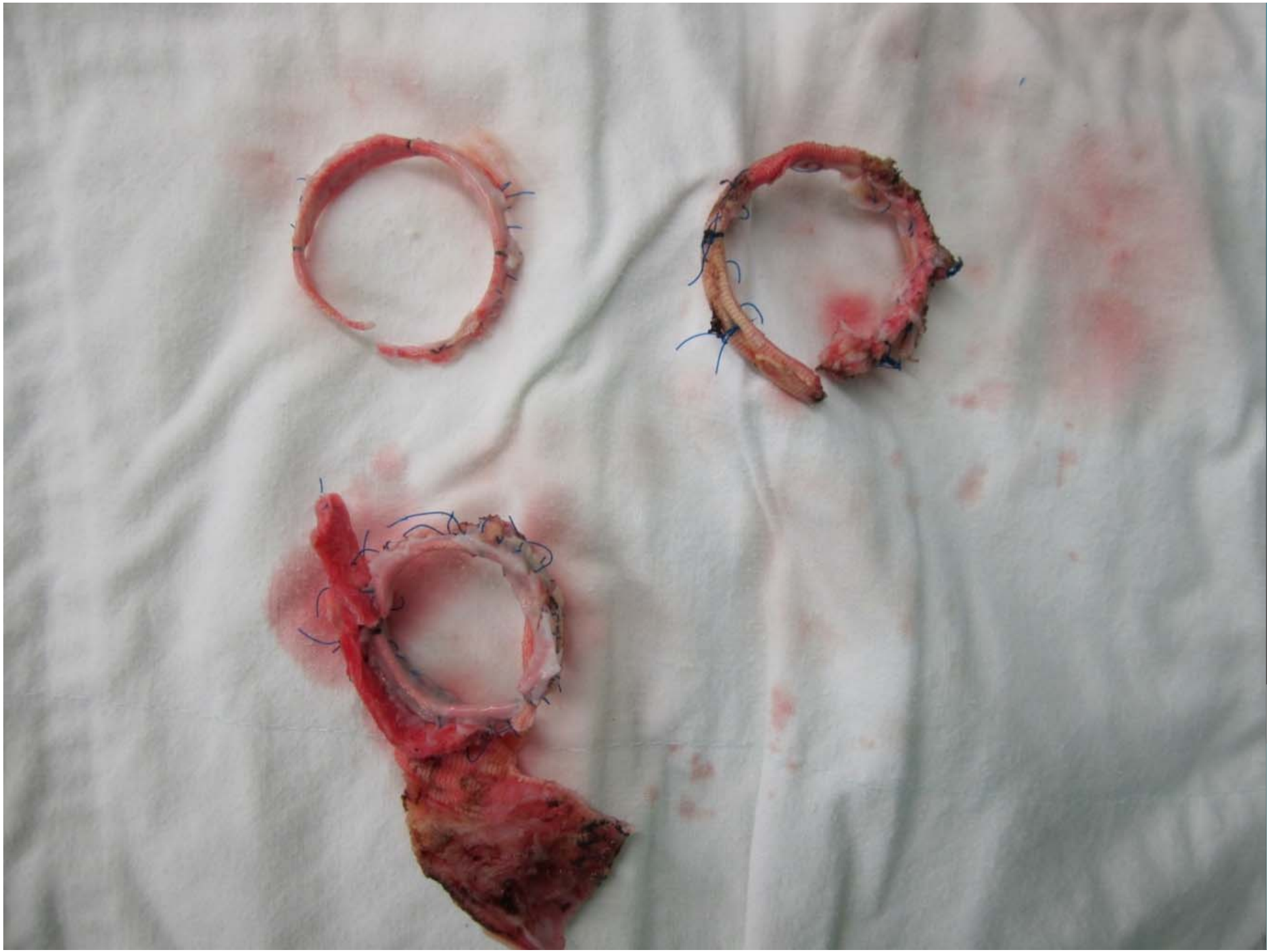
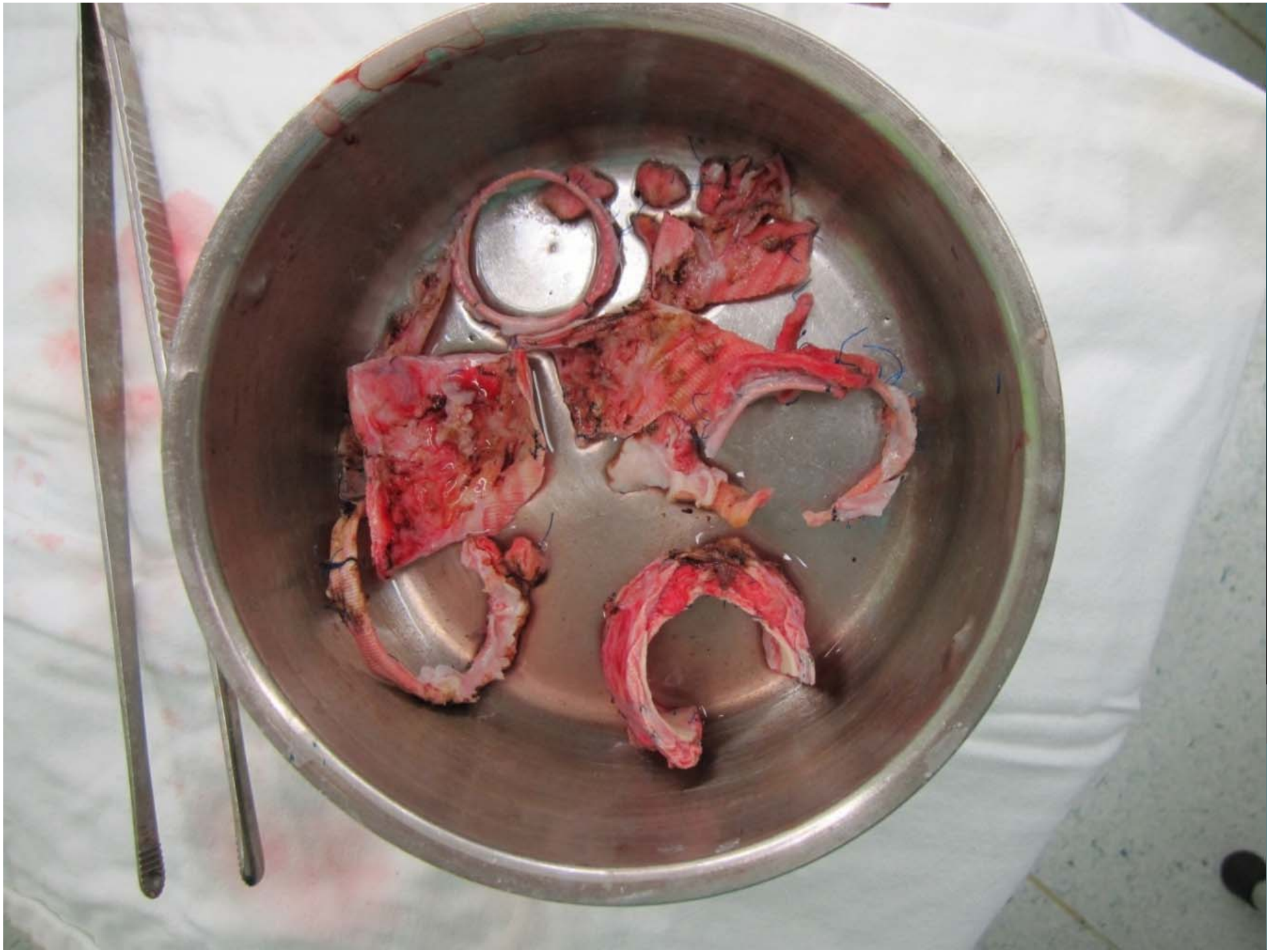

2011.4.11 수술시행









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doi:10.1093/icvts/ivr170

CASE REPORT

VASCULAR THORACIC

Isolated aortic root dilatation following sinotubular junction reduction using prosthetic rings

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Abstract

'Comprehensive Aortic Root and Valve Reconstruction' technique, which was first introduced in 2005 involves aortic root reduction using prosthetic rings in order to preserve the native aortic sinuses in patients having aortic regurgitation associated with aortic root dilatation. We report a case of isolated aortic sinus aneurysm in a Marfan syndrome patient following the aortic root preserving surgery in the presence of ascending aorta aneurysm and annuloaortic ectasia. Re-operation consisted of aortic sinus resection and replacement with an artificial graft, and coronary reimplantation using a button technique. Close follow-up is essential for patients who underwent aortic root preserving surgery to appropriately manage this kind of complication.

Keywords: Aortic root • Aortic valve repair • Aortic aneurysm • Re-operation

CASE REPORT

A 27-year old, Marfan syndrome male patient presented with marked aortic sinus dilatation. Six years before he underwent replacement of the ascending aorta and hemiarch (Vascutek graft, 24 mm, Renfrewshire, Scotland, UK), sinotubular junction reduction using prosthetic rings (ScienCity Co., Seoul, Korea) and mechanical aortic valve replacement (Edwards MIRA, 25 mm, Edwards Lifesciences, Irvine, CA, USA) for the treatment of annuloaortic ectasia, ascending aorta aneurysm and severe aortic insufficiency (Fig. 1). During the prior operation, reduction in enlarged aortic root was attempted by inserting two prosthetic rings, inner ring (28 mm) and outer ring (38 mm) (ScienCity Co., Seoul, Korea), which were attached to the inner and outer surface of the aortic root, proximal to the coronary ostium. Another 26-mm sized ring was attached to the intima of the sinotubular junction, distal to the coronary ostium. Five years after initial surgery, he underwent thoracoabdominal aorta replacement (from proximal descending aorta to the supra-celiac level) for the treatment of dissecting aneurysm of thoracoabdominal aorta without postoperative complications.

At the current evaluation, the follow-up computed tomography (CT) images revealed an aortic sinus aneurysmal dilatation up to 60 mm in diameter at the level of the aortic sinus between the mechanical aortic valve (Fig. 2) and the prosthetic rings, and hence an elective operation was planned. Intraoperatively, the proximal part of the aortic sinus was severely dilated, leaving only the prosthetic rings attachment site relatively intact in its mechanical valve with horizontal mattress sutures. Coronary artery was reimplanted with the coronary button technique. Cardiopulmonary weaning was successfully done. The patient's condition was complicated with acute renal failure, which was managed with temporary (21 days) haemodialysis. The follow-up CT findings were unremarkable, showing patent sinus graft and reimplanted coronary arteries without flow disturbances. The urine output progressively increased to finally recover normal renal function. The patient was discharged on 38th postoperative day, without complications.

DISCUSSION

Comprehensive Aortic Root and Valve Reconstruction technique (CARVAR) was first introduced by Song *et al.* in 2005 [1]. This technique involves the reduction of the aortic root size using prosthetic rings that are attached to the inner and outer surface of the sinotubular junction, and thereby correction of associated aortic insufficiency is expected in patients with aortic insufficiency secondary to aortic root enlargement. In selected cases, leaflet extension was combined using bovine pericardial patch according to the presence of leaflet deformity or incomplete coaptation. Reports of consecutive series of the CARVAR technique were followed, with excellent short- and mid-term results [2, 3].

Unlike David- or Yacoup-type aortic valve sparing procedure, in this technique, aortic sinus tissue remained intact in the expectation of sinus function preservation. In their reports, the ra-

Novel technique of aortic valvuloplasty☆,☆☆

Shee Young Hahm[a], Suk Jung Choo[a], Jae Won Lee[a], Joon Beom Seo[b], Tae Hwan Lim[b], Jae Kwan Song[c], Je Kyoun Shin[d], Meong Gun Song[a,*]

European Journal of Cardio-thoracic Surgery 29 (2006) 530–536

Table 1
Preoperative patient profiles

Variables	IAR	AAR
Number of patients	30	39
Age (mean ± SD (range))	43.4 ± 14.0 (17–68)	49.5 ± 17.3 (16–73)
Sex (M:F)	19:11	26:13
Causes of AR		
Ascending aortic aneurysm		22
Annuloaortic ectasia (Marfan's synd)		17 (13)
Isolated AR	30	
Main leaflet pathology	30	17
Leaflet thickening	16	5
Leaflet prolapse	6	5
Degenerative change	1	2
Bicuspid aortic valve	1	2
Quadricuspid aortic valve	1	
Commissural detachment	2	1
Infective endocarditis	2	
Aortic steno-insufficiency	1	2

SD, standard deviation; AR, aortic regurgitation; synd, syndrome.

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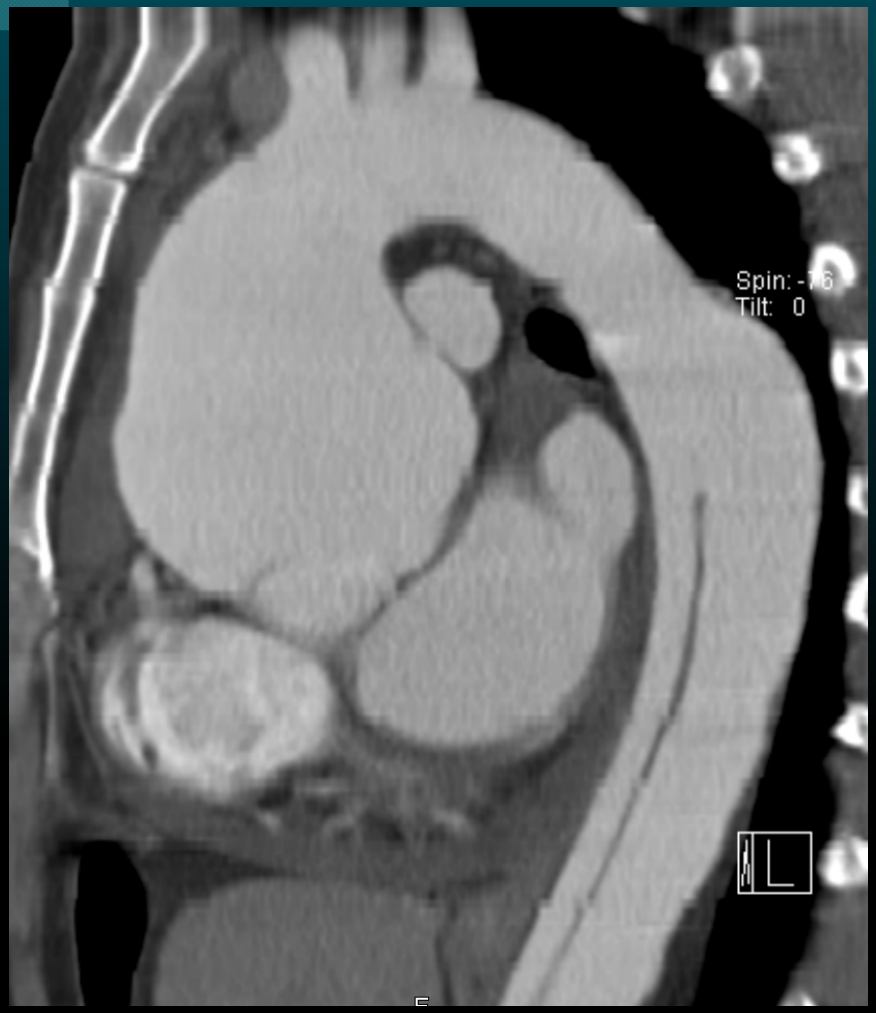

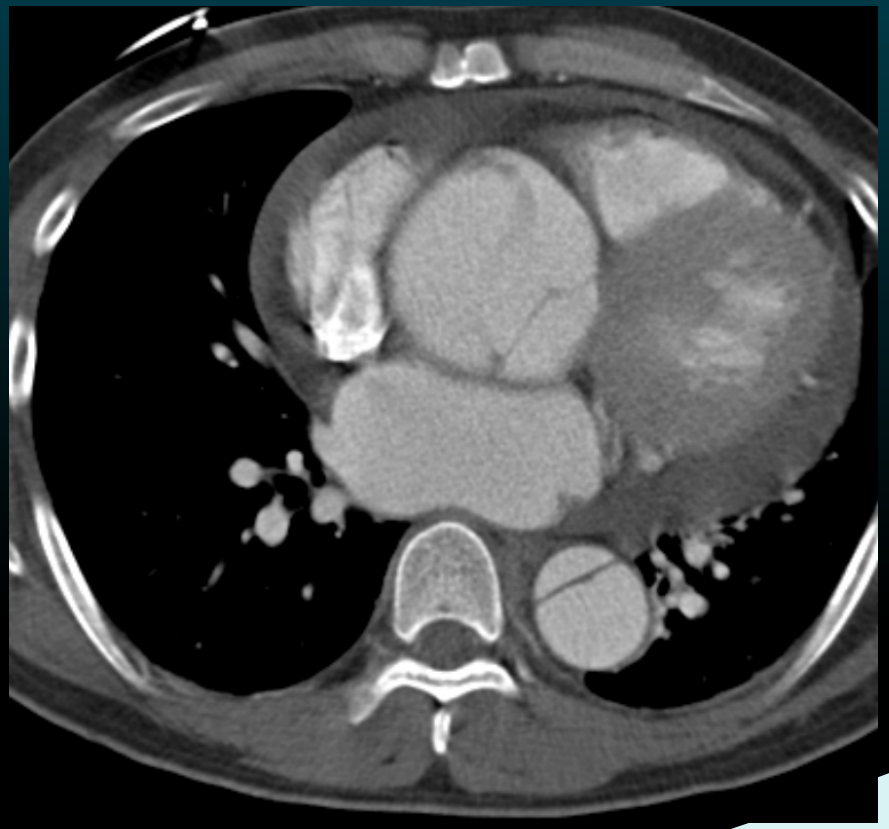

2005-7-27 Preoperative CT

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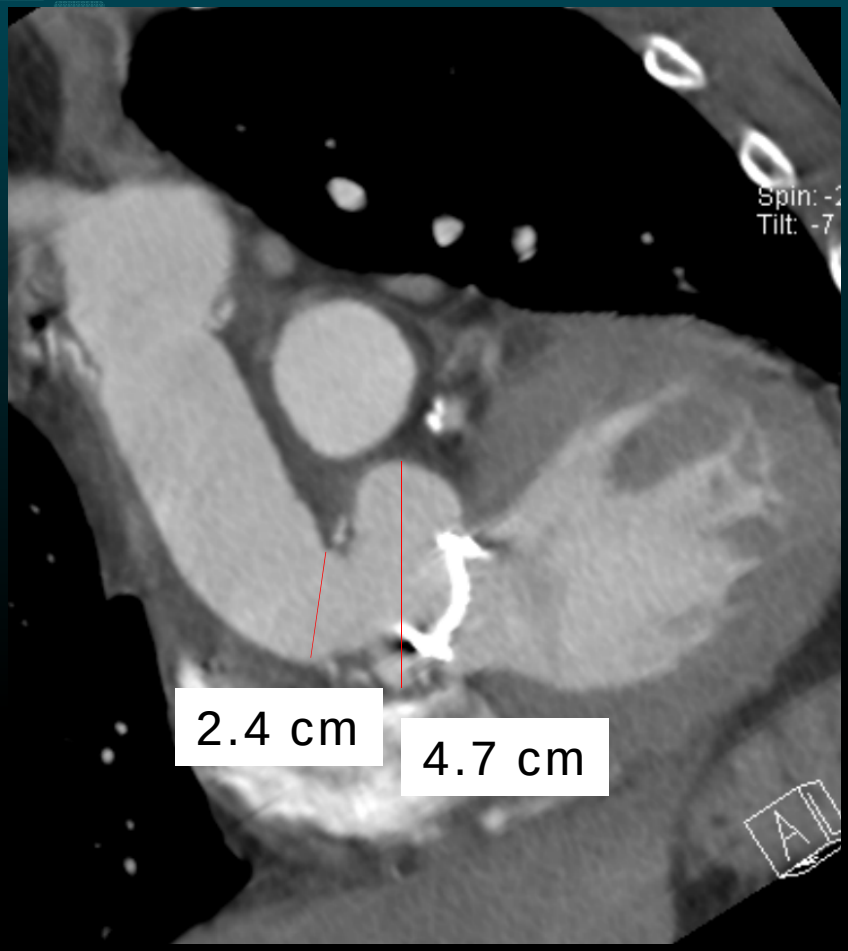
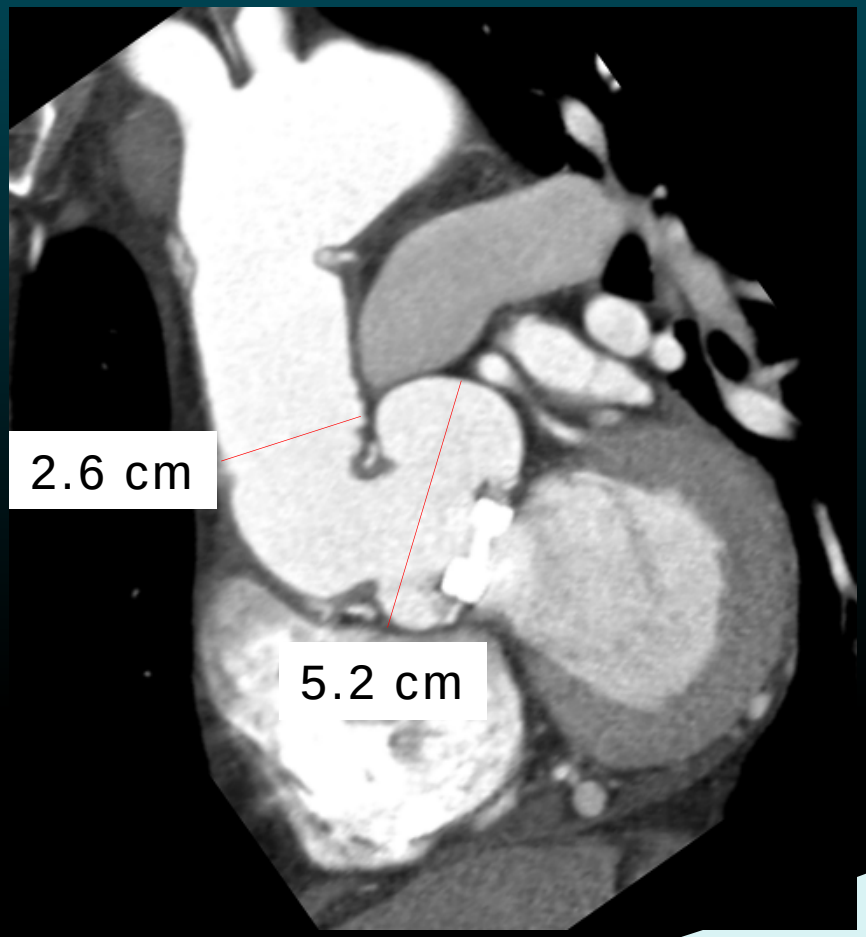
32130100 44/M 이O우





2005-08-8 Immediate postop. CT

2009-9-9 F/U CT

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유OO F/65

Preoperative Diagnosis

; Severe AR, focal narrowing of abdominal aorta, Takayasu arteritis, HTN

Operation : 2007.01.03

- AVP (AMC technique, new leaflet formation, inner 26mm, outer 34mm)
- Axillo-femoral bypass (10mm Gore-Tex graft)

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Postoperative follow-up (op; 2007,1,3)

- 2007. 01.08 postop f/u echo : Trivial AR after AVP

- 2007. 07.18 postop f/u echo : Trivial AR, r/o edematous change of NCC

- 2007. 08 ~ 2010.12 : 건국대학교 병원 CS, CV follow-up

- 2010. 11. 29 건국대 병원 Echo F/U due to moderate to severe dyspnea developed

  Echo ; but no information or suggestion at all to the patient

- 2011. 05 .17 : generalized edema 동반한 dyspnea 점점 악화되는 소견 보여

  본원에서 Echo 시행 ; severe AR with detachment of neoleaflet

Redo operation : 2011.05.27

- Redo AVR (Top-hat 19mm),

- Asc. Ao. Replacement (Hemashield 28mm)

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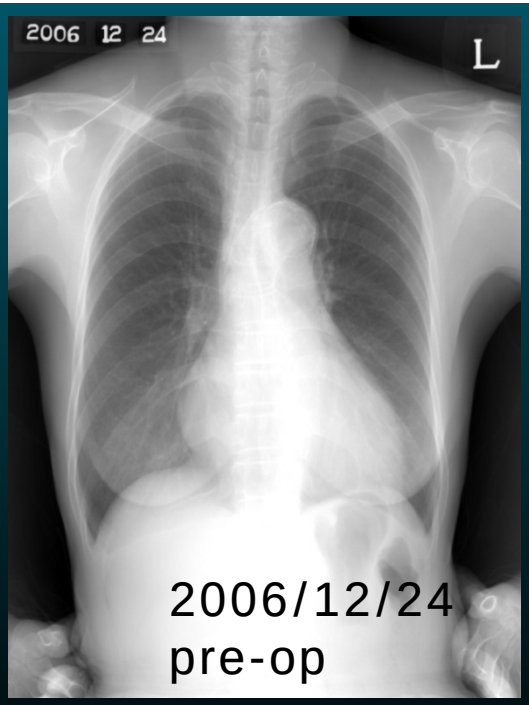
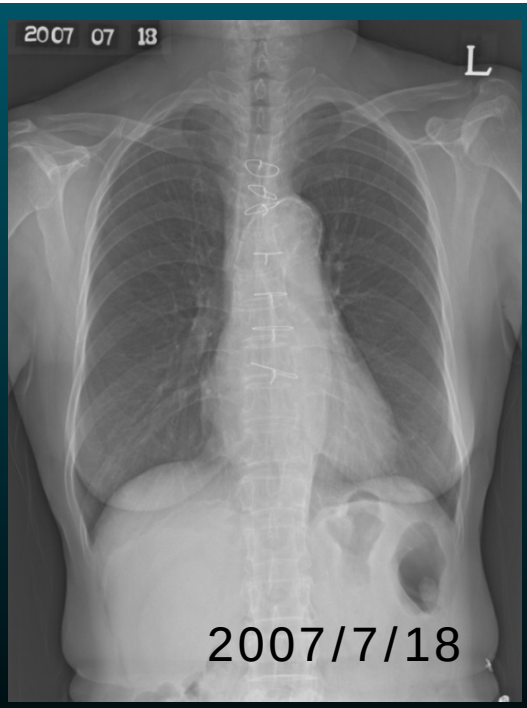
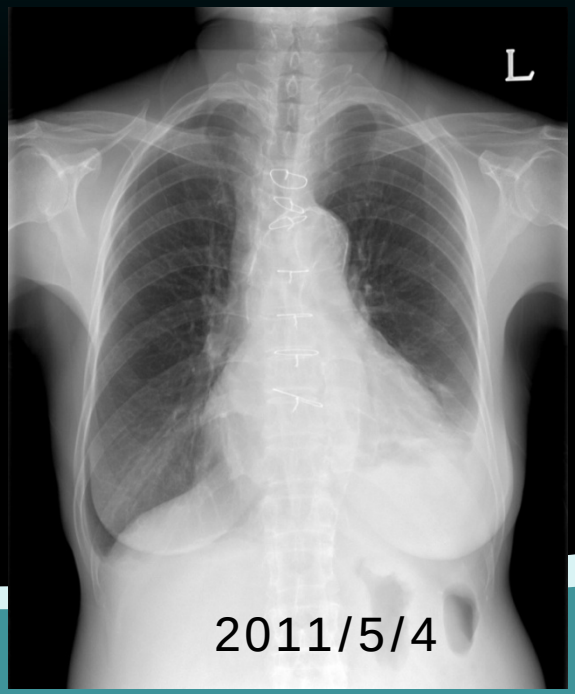


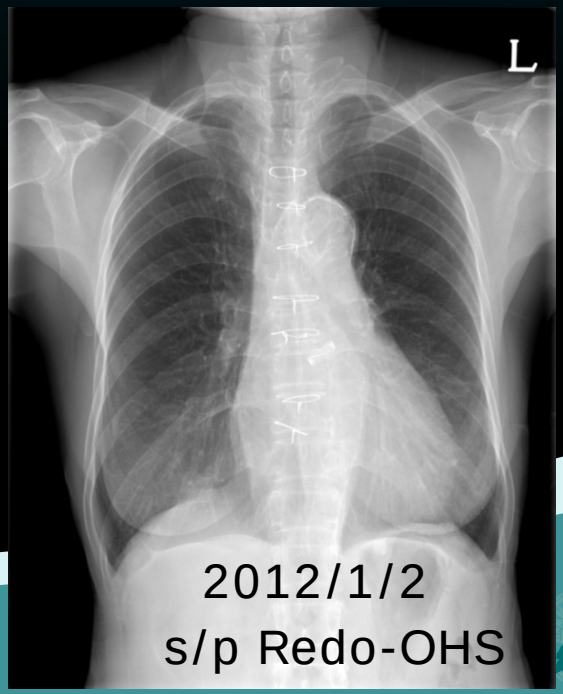
2006/12/24
pre-op



2007/7/18



2011/5/4



2012/1/2
s/p Redo-OHS

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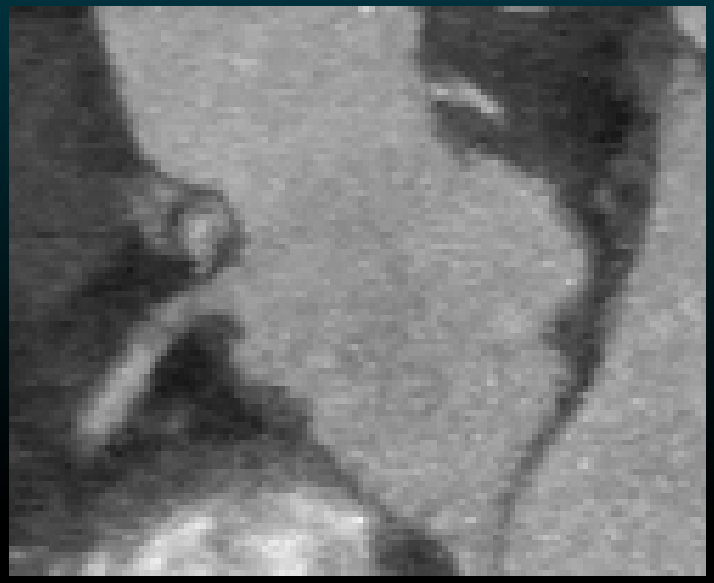
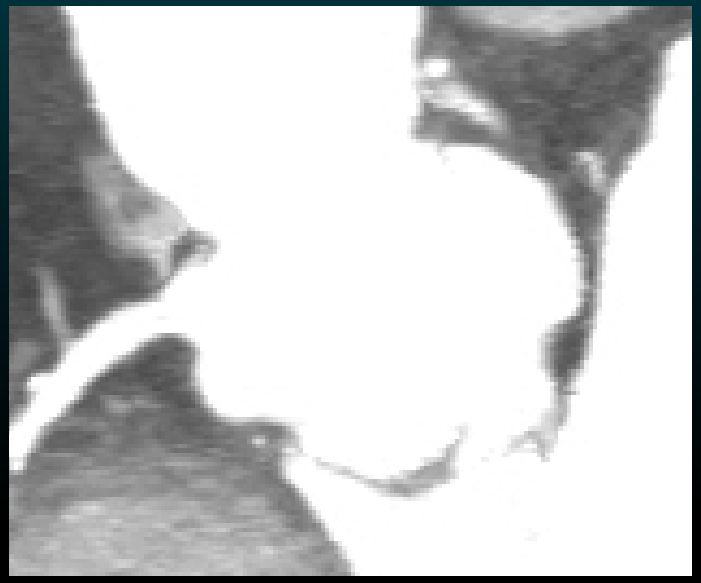


2007/1/9
Immediate post-CARVAR



2011/5/26
Before Redo-OHS

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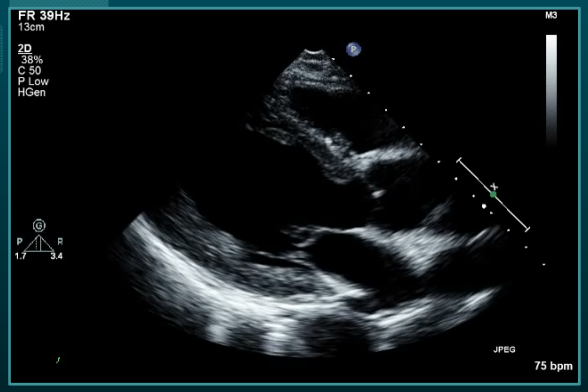
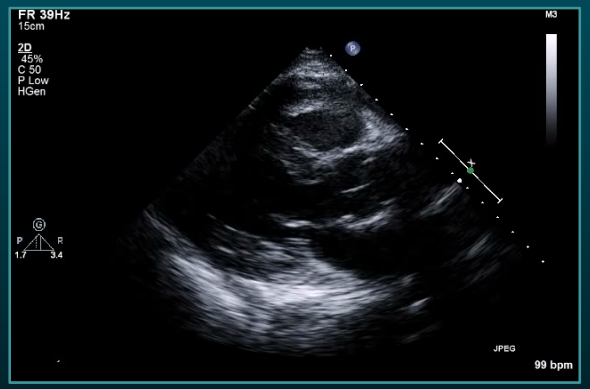
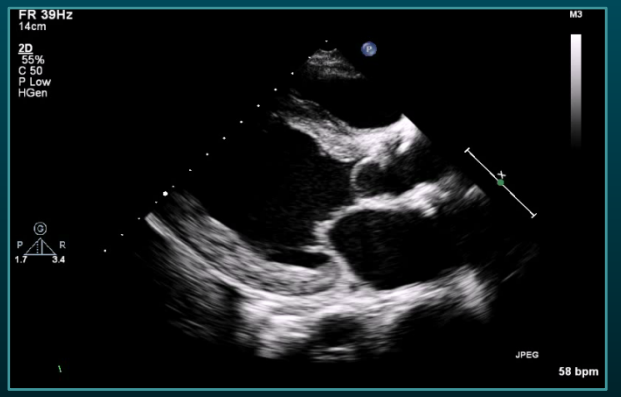
Dec 2006

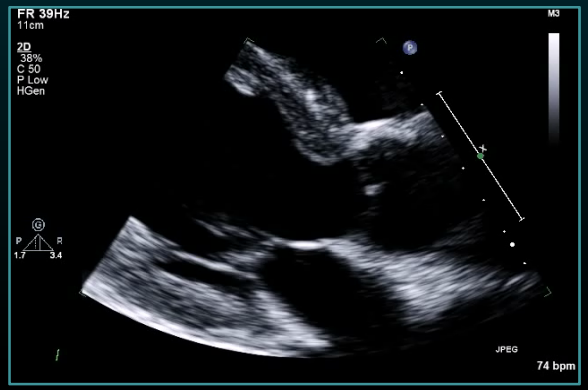
Jan 2007

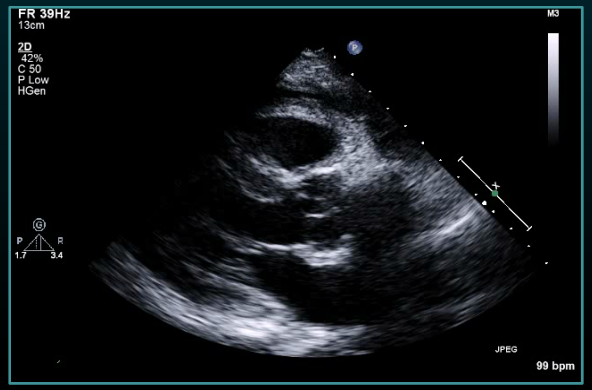
May 2011

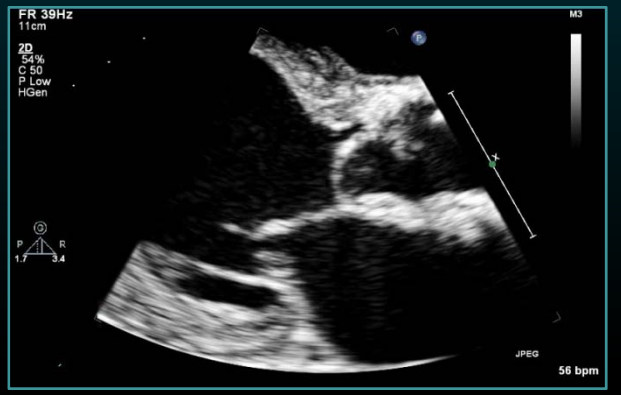


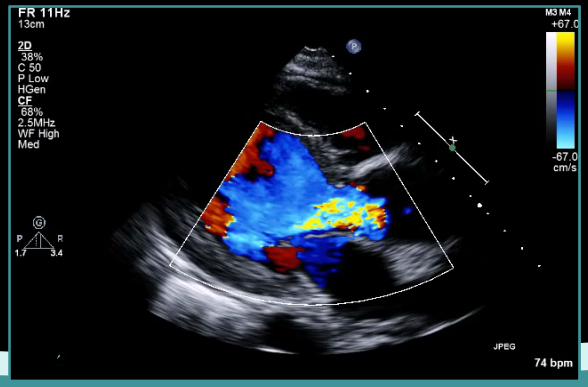


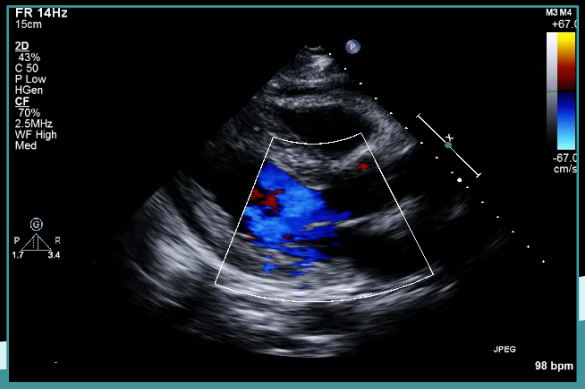


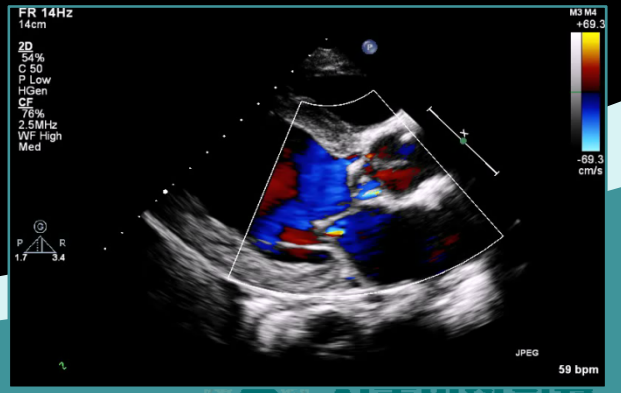




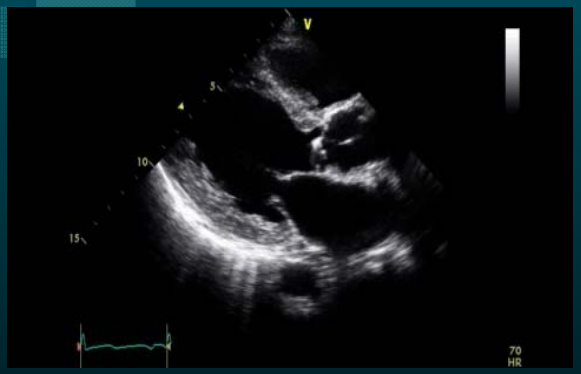


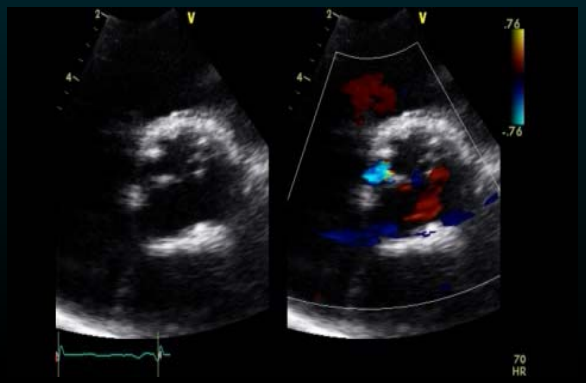


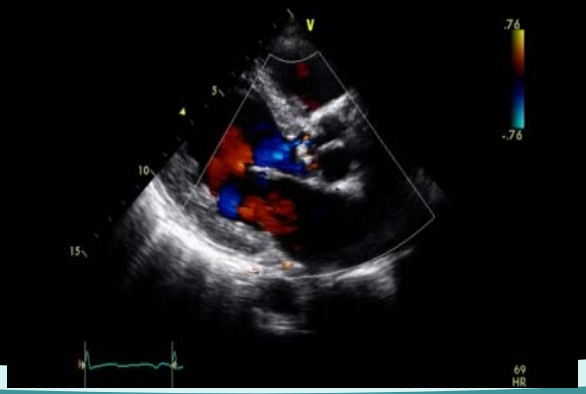




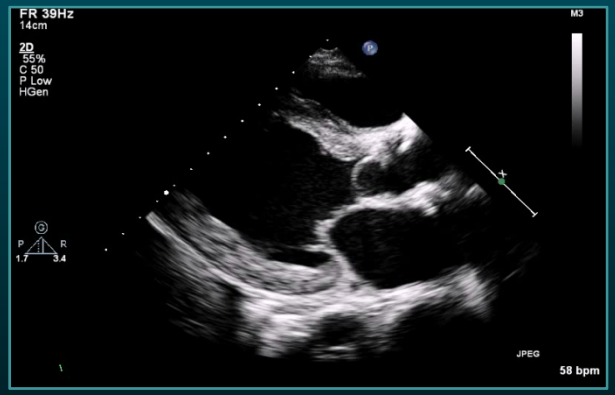
Nov.2010 건국대

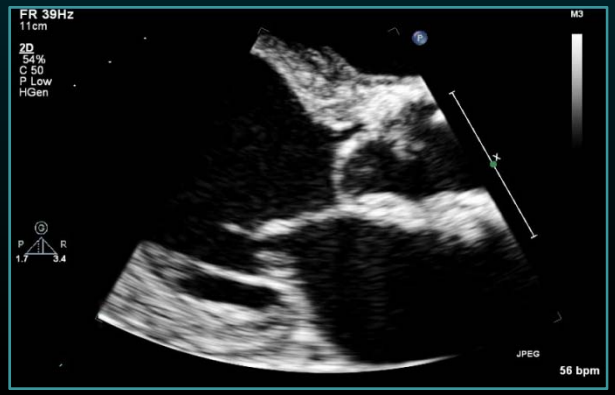


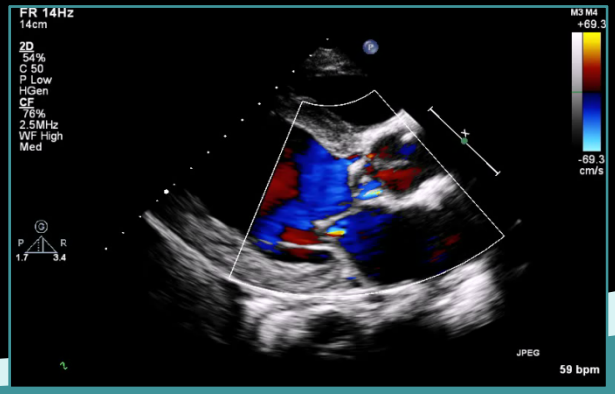




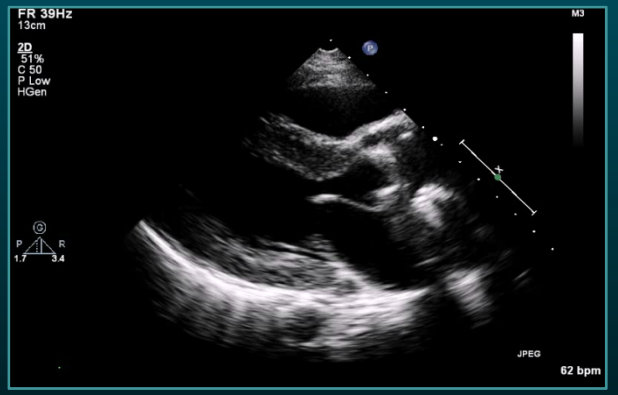
May 2011 AMC

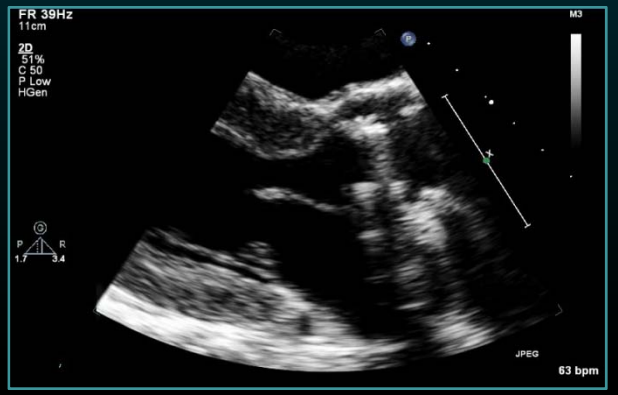


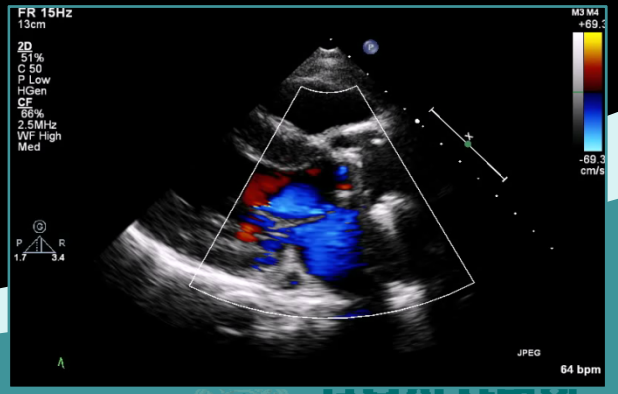




Jan 2012 reop







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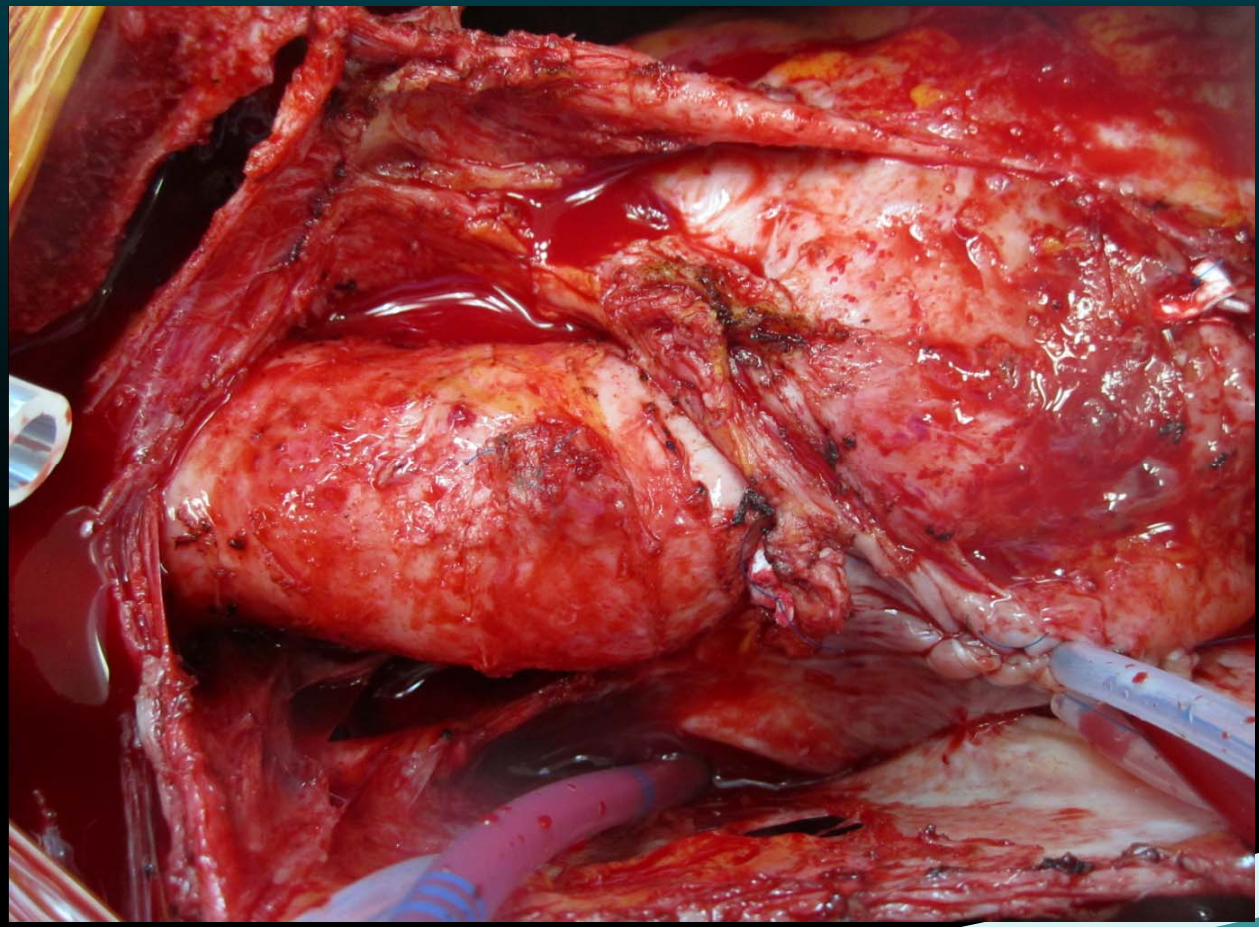
Op finding at redo-operation



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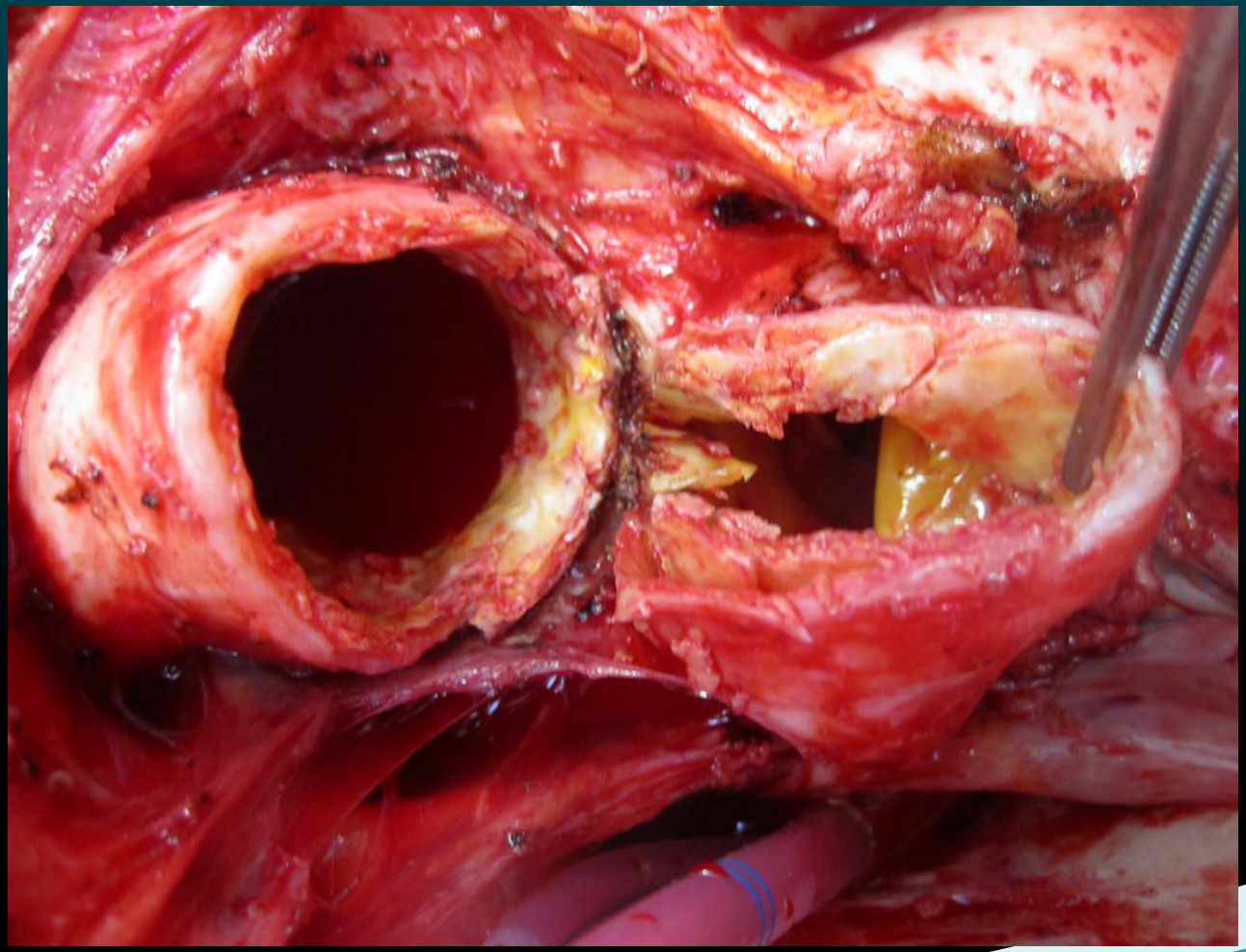

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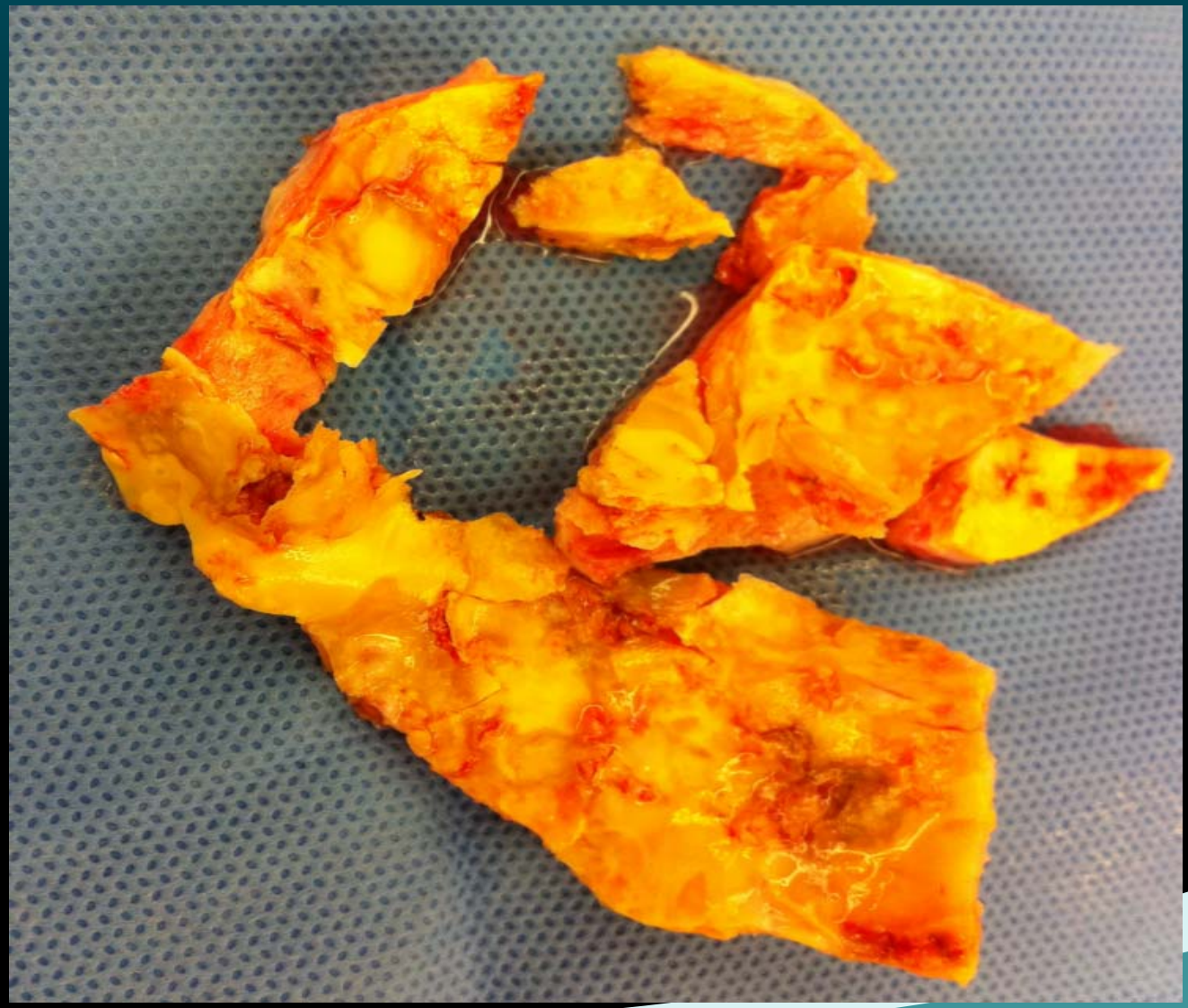

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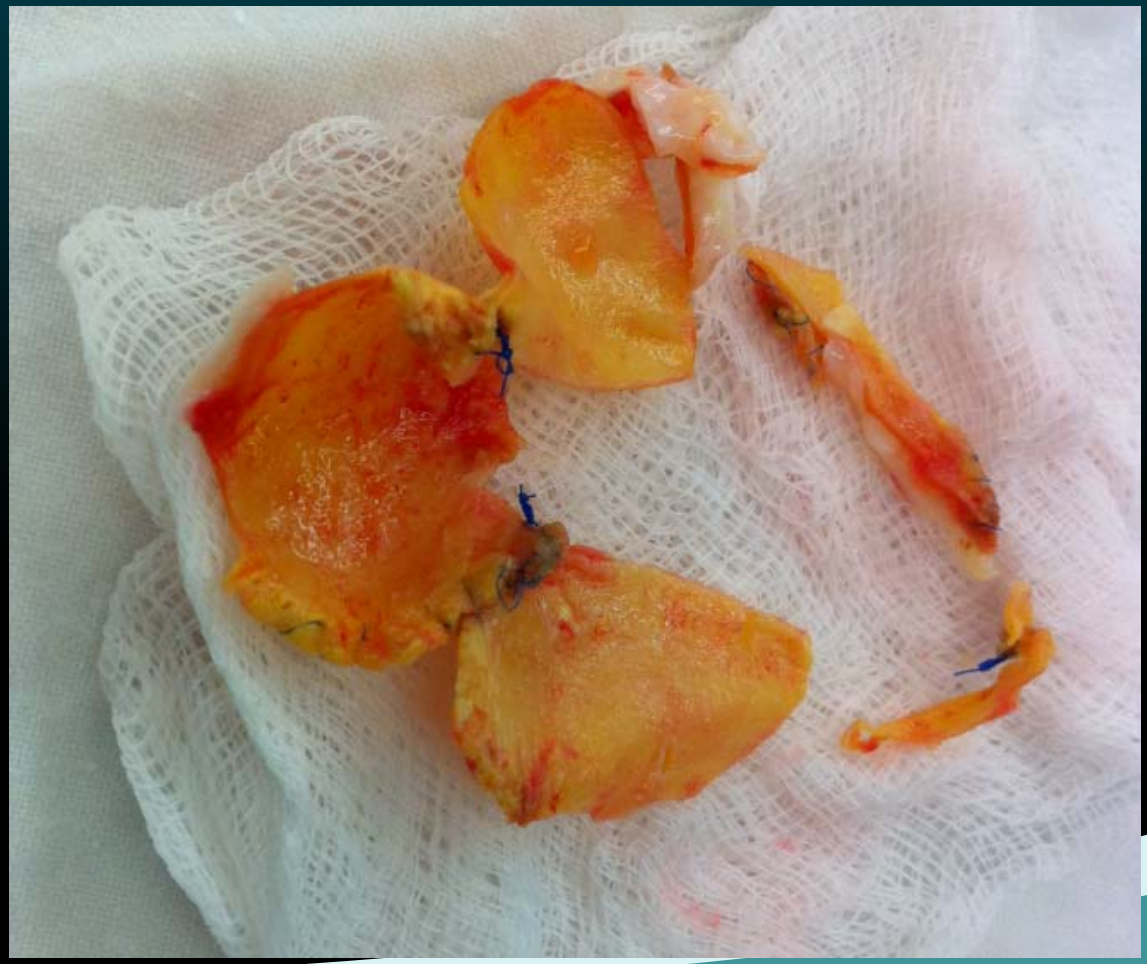

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문제점

◈ 빙산의 일각;

- 대동맥 근부가 확장된 환자는 일반적으로 증세를 호소하지 않기 때문에 수술 후 환자들의 추적 관찰 시 주기적인 초음파나 CT 검사를 적절히 하여 정확한 정보를 주지 않으면 환자 본인은 알 수가 없어 적절한 수술시기를 놓치거나 급사할 수 있다.
- 상기 사례에서와 같이 계속 환자가 발생되고 있으나 대부분의 수술 후 환자관리는 건국대 측에서만 시행되고 있기 때문에 문제가 있을 수 가능성이 있는 환자가 상당수 은폐되고 있는 것으로 추정된다.

CARVAR in Asan Medical Center

from April.07 to July.20 2007

N = 30

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CARVAR in Asan Medical Center

Profiles	Number of patients (%)
Female gender	8 (26.7)
Aortic valve pathology	
AAE with AR	10 (33.3)
Isolated AR	7 (23.3)
Isolated AS	8 (26.7)
ASR	3 (10.0)
SBE	1 (3.3)
Chronic aortic dissection without AR	1 (3.3, Marfan syndrome)
Combined operation	
Ascending aorta replacement	12 (40)
CABG	2 (6.6)
MV repair	5 (16.7)
TV repair	2 (6.6)
AF ablation	2 (6.6)

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CARVAR in Asan Medical Center

◈ Major complications

; 3 in-hospital deaths (10.0%): IE in 2, intractable bleeding in 1

; **Infective endocarditis** in 2: all underwent reoperation and died

; **Aortic valve reoperation** in 4: Bentall operation in 3 (1 patient underwent 4 operations) and AVR in 1

; **Aortic valve dysfunction** (AR≥3 or AV mean PG> 30mmHg): n=13 (AR in 8, AS in 5). Of them 4 underwent reoperation

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Patient		OP.Date	DX	OP. Name
ID	Name			
3485OOOO	정미x	2007.04.21	SBE. Root abscess	CARVAR
			AR. MR. TR.	with asc. A. replacement , MVP. TAP
		2007.08.03	IE. AR	Redo Bentall(prima plus 21mm
3494OOOO	정기x	2007.06.13	AR.	CARVAR
		2007.06.20	Severe AR.	VSD patch closure
			latrogenic VSD	
		2007.07.03	Complete AVBlock	pacemaker Insection
		2007.07.13	failure of prev. AR repair	Redo Bentall with prima plus
				MAP
				Ascending a replacement
3518OOOO	황봉x	2007.07.20	AR.	CARVAR
		2007.08.01	failure of prev. AR repair	MVR with Mira valve
				Bentall op with S-J AUG 25mm
		2007.10.11	pseudoaneurysm of	Redo Bentall with Homograft
			LVOT(rapture to RA)	Ascending a replacement
3476OOOO	이옥x	2007.04.02	Asr	CARVAR
		2007.07.25	failure of prev. repair	AVR Mira 19mm
				Ascending a replacement

◈ 2007년 4월부터 송명근 교수 퇴직 전 시행한

CAVAR 수술의 성적은 짧은 기간의 F/U에서도

기존수술에 비해 사망률, 재수술율, infective

endocarditis 비율 등에서 2배 이상의 유병율을

보이고 있고 판막성형술의 특성상 F/U기간이 길

어질수록 재수술율이 크게 증가할 것으로 보인다

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Long-term results of aortic valve-sparing operations for aortic root aneurysm

Tirone E. David, MD, Christopher M. Feindel, MD, Gary D. Webb, MD, Jack M. Colman, MD, Susan Armstrong, MSc, and Manjula Maganti, MSc

J Thorac Cardiovasc Surg 2006;132:347-54

- 1988-2005:
- 220 consecutive patients who had aortic valve sparing for aortic root aneurysm

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Long-term results of aortic valve-sparing operations for with aortic root aneurysm

David et al. J Thorac Cardiovasc Surg 2006

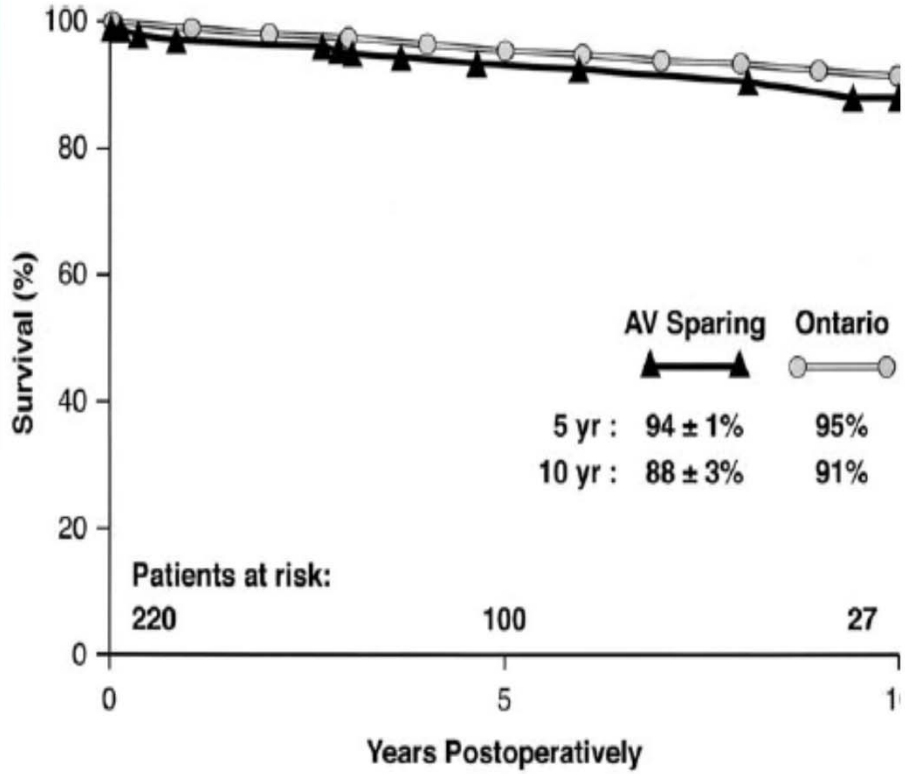

Figure 1. Survival of patients after aortic valve-sparing operations compared with survival of age- and sex-matched general population of Ontario.

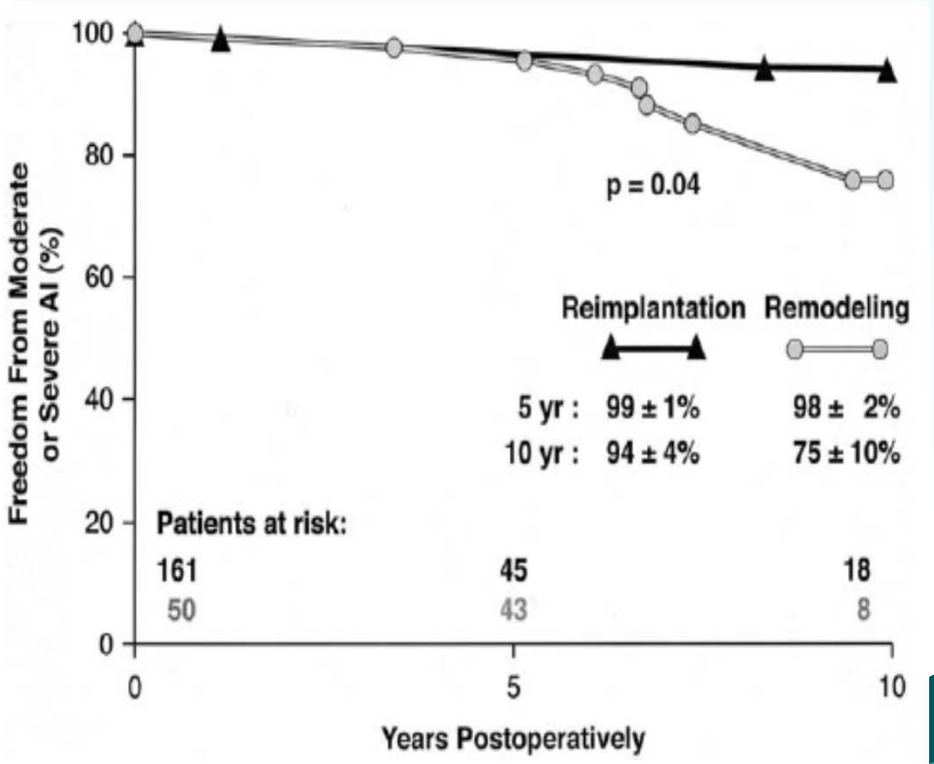

Figure 3. Freedom from moderate or severe AI in patients who had reimplantation of the aortic valve and remodeling of the aortic root.

Aortic Valve Repair Using a Differentiated Surgical Strategy

Frank Langer, MD; Diana Aicher, MD; Anke Kissinger, Olaf Wendler, MD; Henning Lausberg, MD; Roland Fries, MD; Hans-Joachim Schäfers, MD

Circulation. 2004;110[suppl II]:II-67–II-73.

1995 to 2003
AV repair in 282 of 493 patients (57.2%) undergoing surgery for AR

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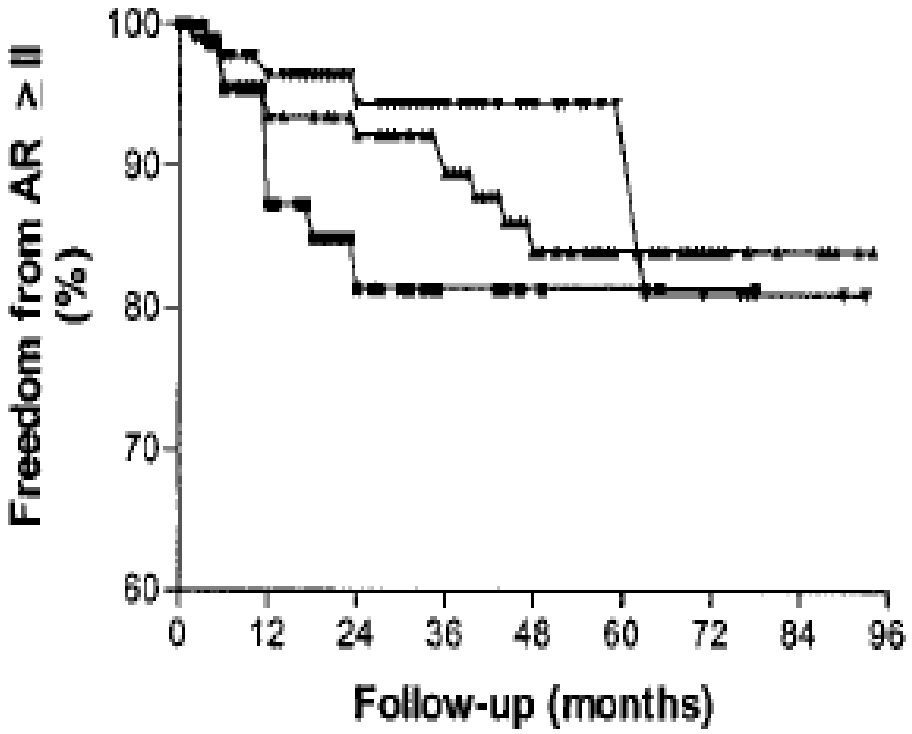
Aortic Valve Repair Using a Differentiated Surgical Strategy

Langer et al. Circulation 2004



At 5-year

81% for isolated valve repair
84% for isolated root replacement
94% for combination of both

Figure 7. Freedom from AR grade ≥II (AVRp indicates aortic valve repair; ARRc, aortic root reconstruction).

J Thorac Cardiovasc Surg 2009;138:859-64

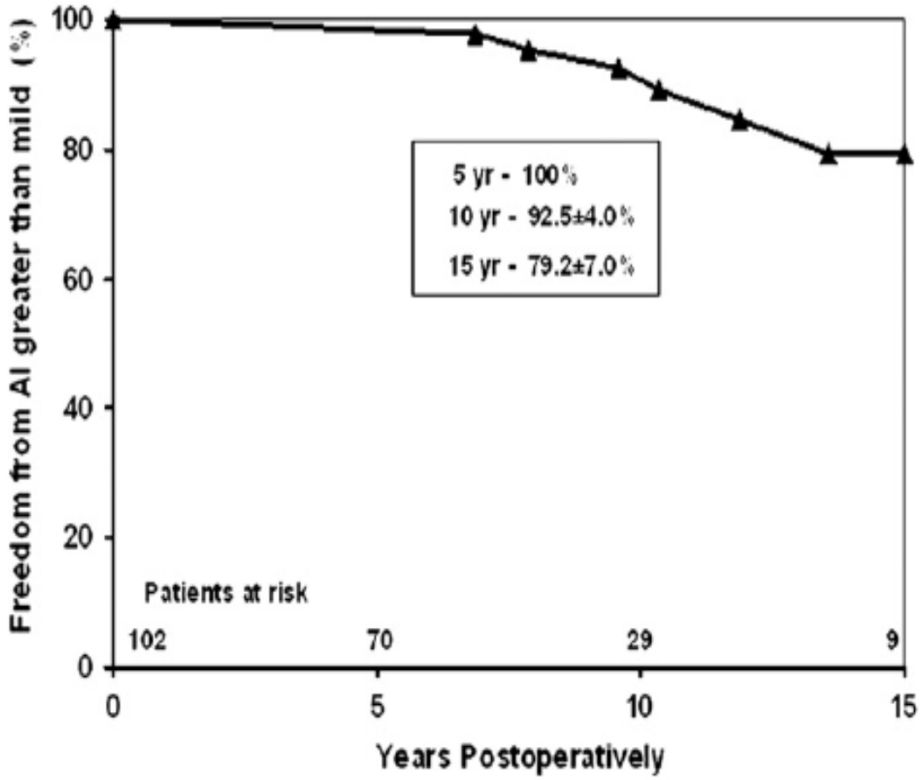


FIGURE 3. Kaplan–Meier estimates on freedom from aortic insufficiency *(AI)* greater than mild after aortic valve–sparing operations.

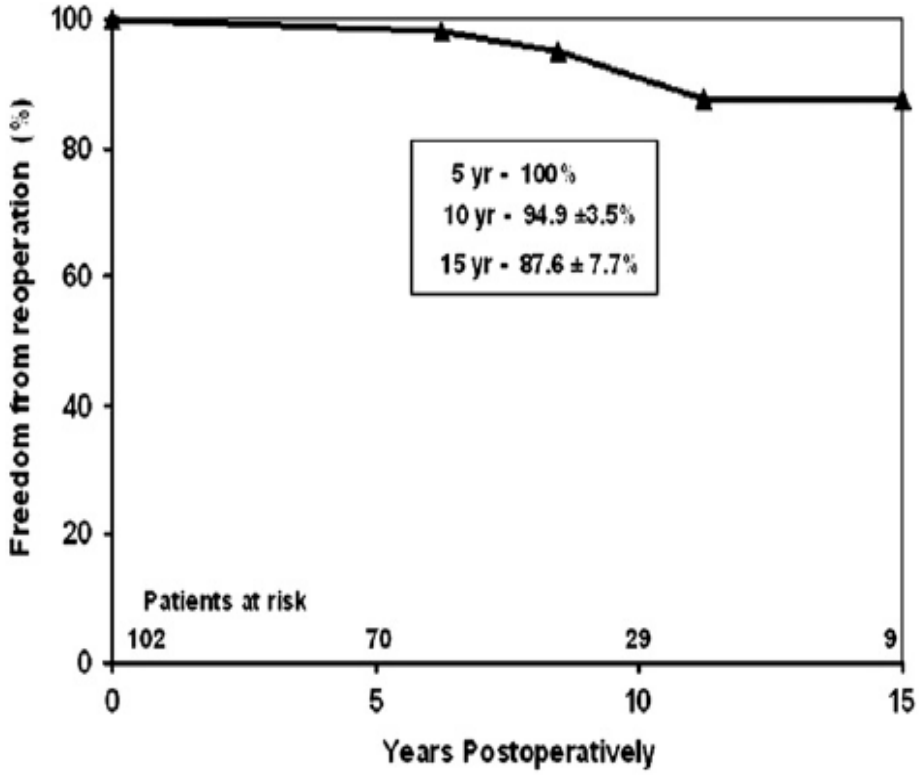


FIGURE 2. Kaplan–Meier estimates on freedom from reoperation on the aortic root after aortic valve–sparing operations.

Midterm Results of Aortic Valve Replacement Using Tissue Valve

Dukhwan Moon, M.D.*, Jae-Won Lee, M.D.*, Yun Seok Kim, M.D.**, Won-Chul Cho, M.D.*, Sung-Ho Jung, M.D.*, Suk-Jung Choo, M.D.*, Cheol-Hyun Chung, M.D.*

Korean J Thorac Cardiovasc Surg 2010;43:627-634

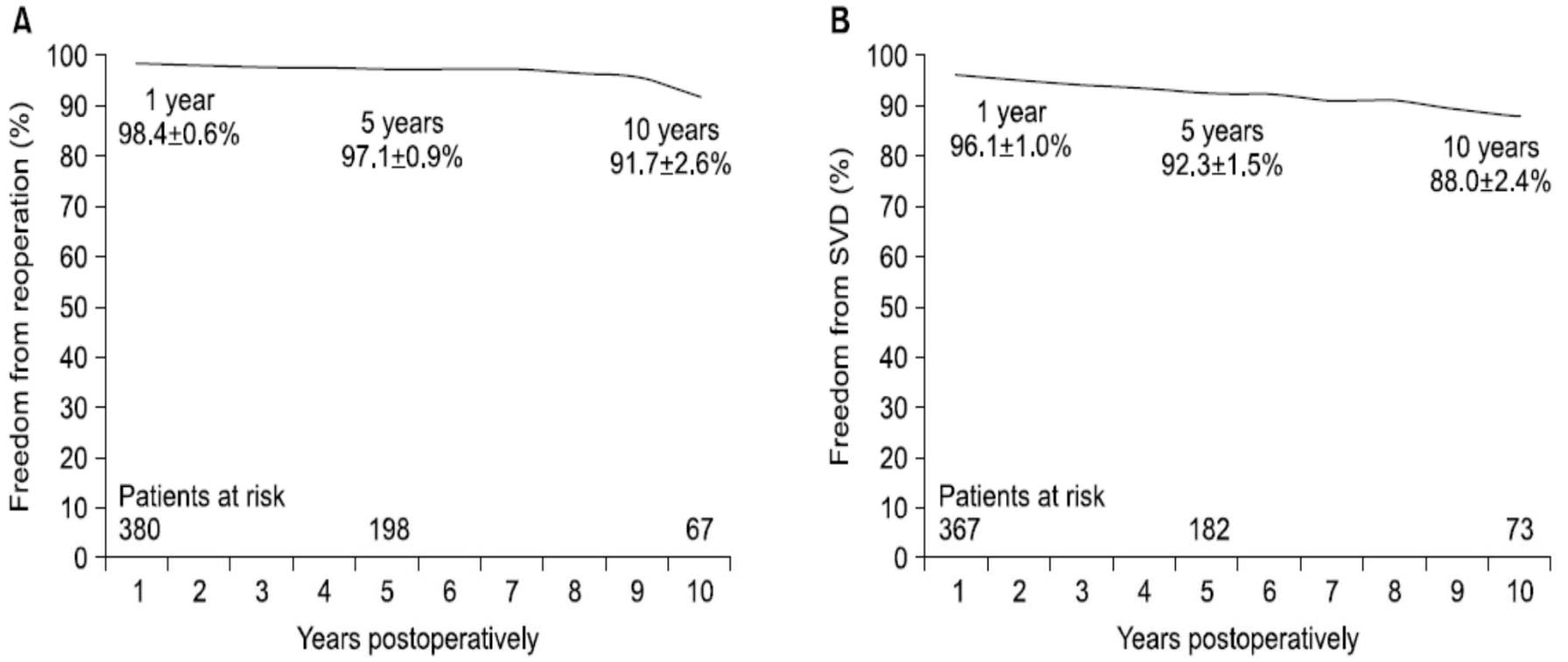


Fig. 4. (A) Acturial freedom from reoperation in the aortic bioprosthetic valve replacement patients. (B) Acturial freedom from structural valve deterioration (SVD) in the aortic bioprosthetic valve replacement patients.

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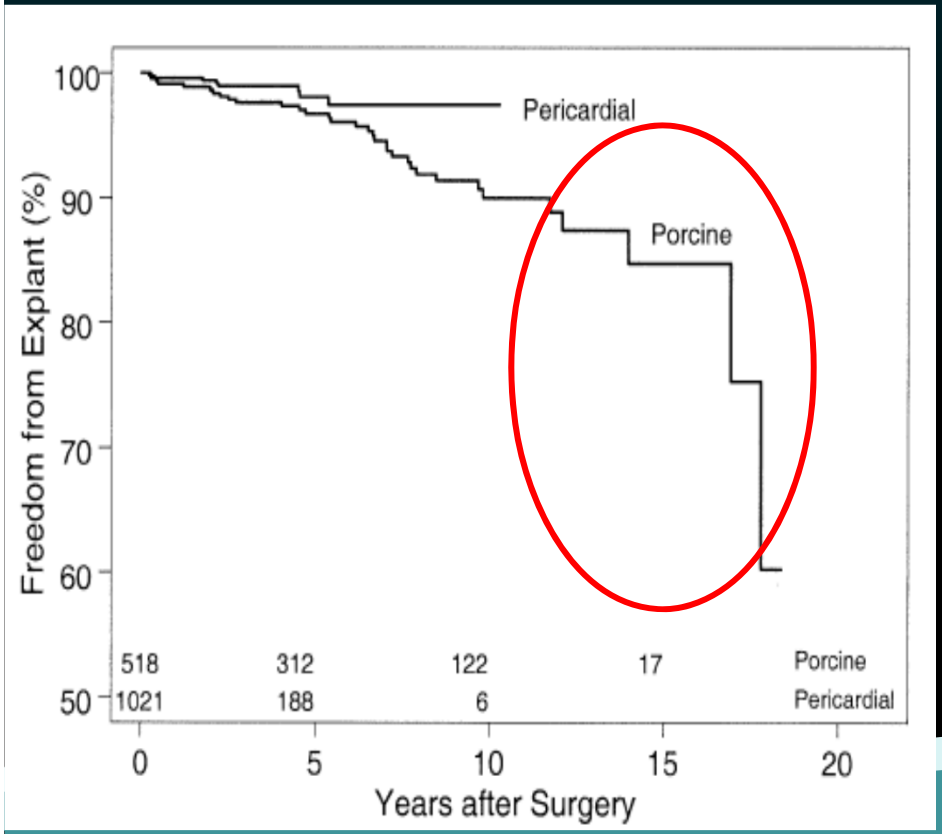
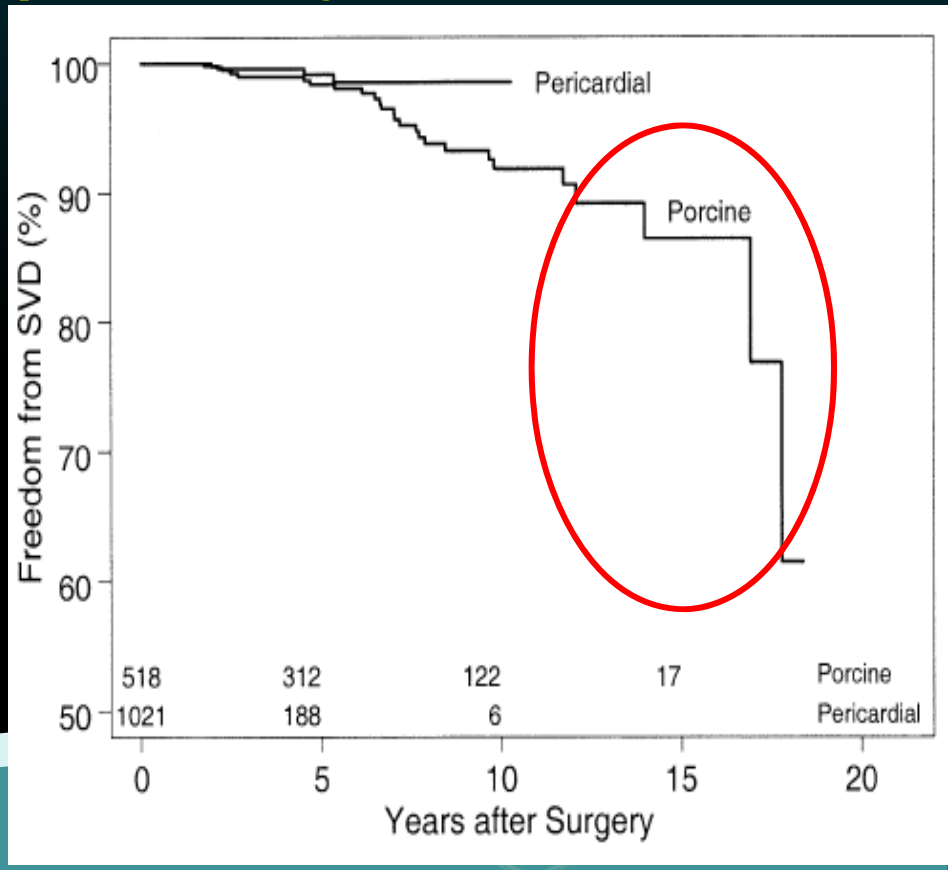
Durability of Pericardial Versus Porcine Aortic Valves

Guangqiang Gao, MD, YingXing Wu, MD, Gary L. Grunkemeier, PHD, Anthony P. Furnary, MD, Albert Starr, MD

Portland, Oregon

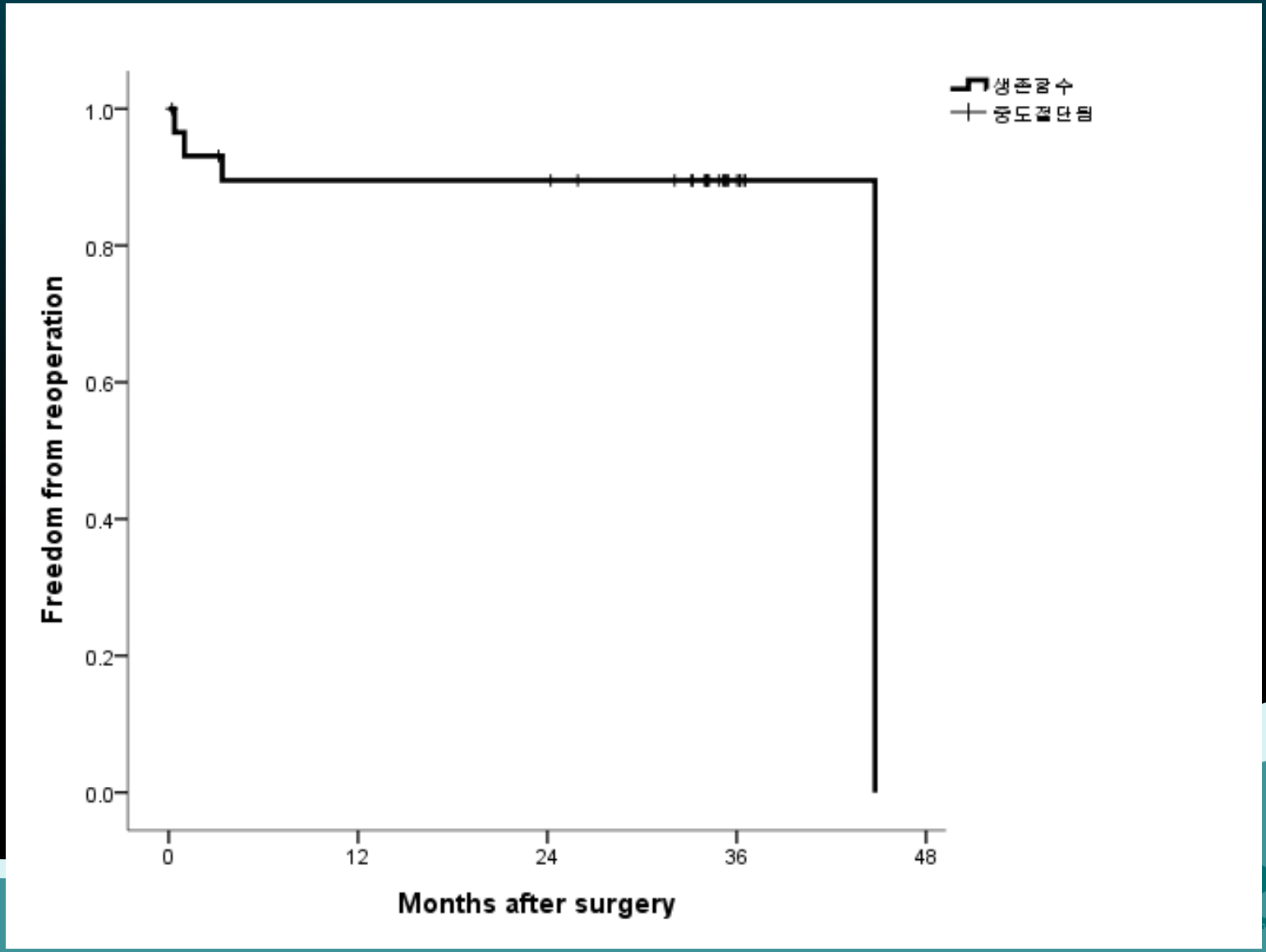
Marked drop after 15 years





Freedom from reop. at 2 years : 89.5 ± 5.7%

CARVAR in Asan Medical Center



Conclusions

CARVAR 수술...

혁명적 '의술'인가 위험한 '사술'인가

서울아산병원
Asan Medical Center

Decision Letter

- From: ats@uphs.upenn.edu
  Subject: The Annals of Thoracic Surgery MS
  ID# ATS/2004/070433
  Cc:

The Annals of Thoracic Surgery MS ID#: ATS/2004/070433

MS TITLE: Novel technique of aortic valvuolplasty

서울아산병원
Asan Medical Center

Reviewer 1 Comments for Author

- ... Doctor Song and colleagues describes that "**A new durable technique for aortic valve repair** was developed" **but not a single component of their "novel technique" is really novel.**

Actually, if they had reviewed the literature more carefullly they would have found that **every part of their complex aortic valve repair has been described before.**

Reduction of the diameter of the aortic annulus was described by **Tirone David** during the 1990's. Aortic cusp augmentation or creation with glutaraldehyde fixed autologous pericardium was first described by the late **Ake Senning** and extensively used by **Carlos Duran** during his experience in Saudi Arabia. Aortic cusp reduction was described by **George Trusler** in patients with sub-aortic VSD and by **Alain Carpentier, Delos Cosgrove, Tirone David, and Hans Schaeffer** for myxomatous bicuspid and tricuspid aortic valve disease with prolapse. Reduction of the diameter of the sinotubular junction to increase aortic cusps coaptation was first described by **Frater** and extensive published by **David.** "Sandwiching" the aortic root with two strips of synthetic fabric is as old as operations for aortic dissections and extensively published by **Craig Miller.** What the authors have done is combining a number of these techniques in a variety of pathologic process involving the aortic root.

◈ Reviewer 1 Comments for Author

- The paper is not well written. The introduction has several erroneous interpretations of the work by other authors. **The description of the operative procedure is unclear.** The authors failed to determine the mechanism of AI in each sub-group of patients who had their "novel" technique, and **did not quantitate the reductions, additions, etc. on the various components of the aortic valve.**

◈ Reviewer 2 Comments for Author

◆...However we feel that the technique described **does not represent a major innovation**. It represents **merely a combination of commonly used surgical strategies** in various heterogenic aortic pathologies and in fact the patients described in **this paper encompass a heterogenic population** with aortic dissection, non dissecting aneurysm, annulo-aortic ectasia and various types of leaflet pathologies including rheumatic disease. Therefore **one can hardly consider this as one technique.**

Reviewer 3 Comments for Author

- … **Currently the series includes multiple patient types and is difficult to sort out.** Analyze the dissections separately. Analyze the leaflet extensions and leaflet repairs separately. **Try to learn what is working well and then share it with the Thoracic community.**
- I have several difficulties with the paper.

First the title is erroneous - this is not a novel technique. At best, it is a novel combination of previously published techniques. The annular correction is virtually identical to the David II procedure annular correction. The leaflet repairs, extensions, etc. have all been described by **Duran, Angel, Cosgrove,** etc. The STJ fixation/reduction has been discussed by many authors and their technique is the same as the standard four layer dissection repair.

As such I do not find this a novel? technique.

서울아산병원
Asan Medical Center

◈ Reviewer 4 Comments for the Author...

My biggest concern with your technique is that the native tissue at the level of the sinuses is left intact which in previous studies has been shown to lead to subsequent dilation and recurrent root aneurysm +/- AI.

As stated above there does appear to be a trend towards increasing AI by the presented Echo data in this paper.

One or two year data would be more helpful.

Thank You for your attention

서울아산병원
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