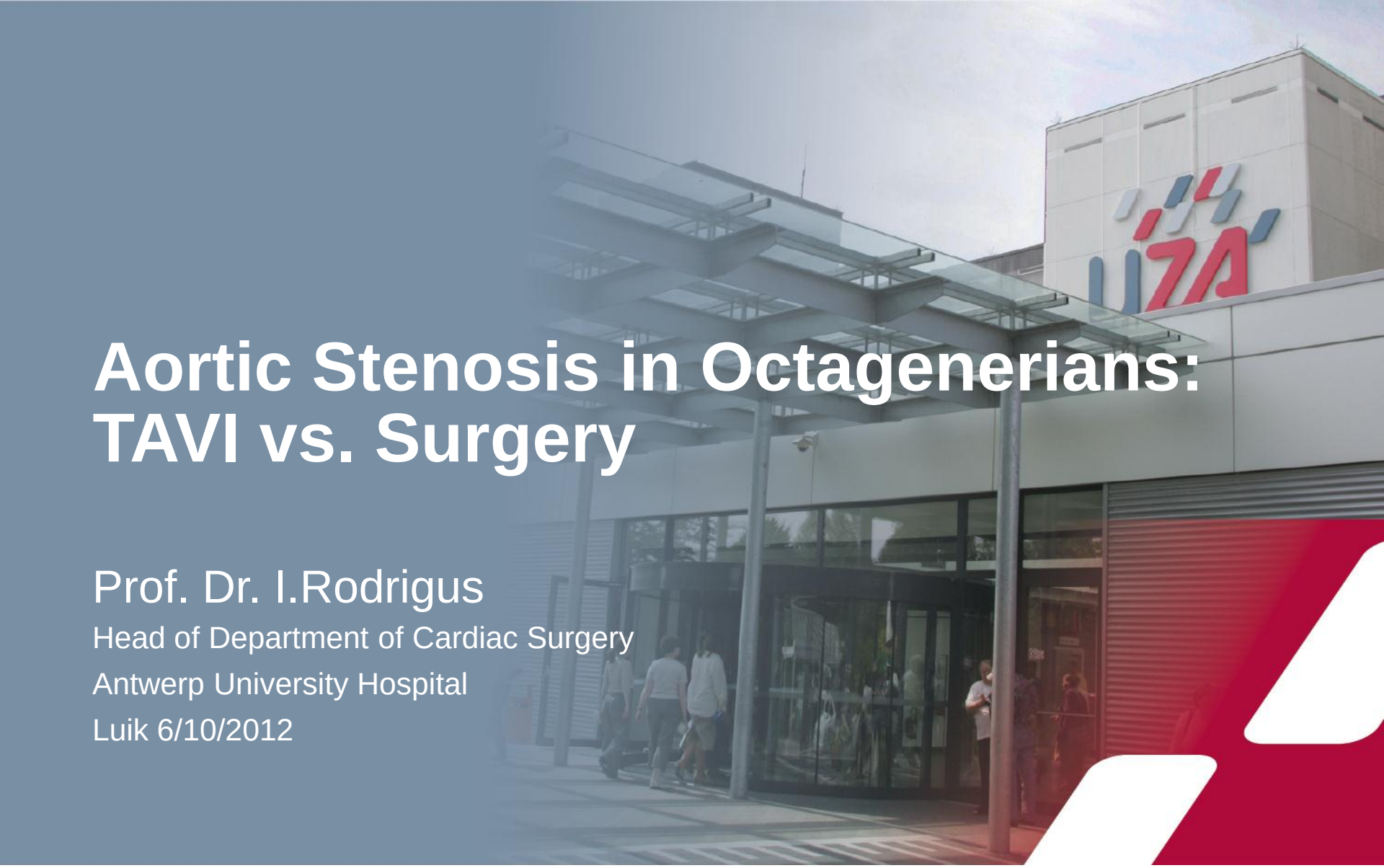

Aortic Stenosis in Octagenerians: TAVI vs. Surgery

Prof. Dr. I.Rodrigus
Head of Department of Cardiac Surgery
Antwerp University Hospital
Luik 6/10/2012

Kennis / Ervaring / Zorg

Aortic valve replacement in the elderly

SAVR in the eighties

Severe Aortic Stenosis in Octogenarians: Is Operation an Acceptable Alternative?

Ph. Deleuze, MD, D. Y. Loisance, MD, F. Besnainou, MD, M. L. Hillion, MD, Ph. Aubry, MD, G. Bloch, MD, and J. P. Cachera, MD

Service de Chirurgie Thoracique et Cardiovasculaire, CHU. Henri Mondor, Créteil, France

From 1981 to 1989, 60 patients more than 80 years of age were referred for operation for severe calcific aortic stenosis. All patients were symptomatic: 13 in New York Heart Association (NYHA) functional class II, 28 in class III, and 19 in class IV. The preoperative mean cardiothoracic ratio was 0.58 ± 0.09; the mean valve area, 0.52 ± 0.14 cm^2; and the mean aortic valve gradient, 62 ± 18 mm Hg. Left ventricular function was impaired in 30 patients (ejection fraction < 0.40). Coronary arteriography was performed in 10 patients. Aortic replacement used bioprosthesis in all 60 patients associated with aortocoronary bypass (in 5) and mitral valve replacement (in 1). One-month mortality rate was 28% (17 patients) due to cardiac failure (in 9), pulmonary complications (in 6), and neurological complications (in 2). Early mortality was not correlated with preoperative angina, cardiothoracic ratio, associated operation, and cross-clamping time. It was not obviously correlated with preoperative functional class but correlated positively with urgent operations and with left ventricular function (40% mortality in patients with ejection fraction < 0.40 versus 16% mortality in others). Hospital morbidity was 68%. Mean hospitalization was 15 ± 7 days. There were four late deaths. Thirty-nine patients are long-term survivors (3 months to 7 years): 27 in class I, 10 in class II, and 2 in class III due to primary valve failure. The actuarial survival probability is 65% at 1 year and 61% at 5 years. In summary, the good long-term quality of life justifies the high postoperative risk in octogenarians. Early operation before cardiac function impairment improves the results.

(*Ann Thorac Surg 1990;50:226–9*)

SAVR in the nineties

Cardiol Rev. 2000 Nov-Dec;8(6):333-9.

Aortic valve surgery in the elderly.

Mullany CJ.

Mayo Clinic, 200 First Street SW, Rochester, MN 55905, USA.

Abstract

As the population ages, aortic valve replacement, particularly for aortic stenosis, has become more common. Although many patients have considerable coexisting morbidity, almost all symptomatic patients are candidates for surgery. Once symptoms develop, surgery should not be unduly delayed, because the operative mortality clearly increases in the presence of poor left ventricular function, heart failure, and New York Heart Association Class III or IV symptoms. Operative difficulties often are related to fragile tissues, a small aortic annulus, and extensive calcification of the aortic annulus and root. In the author's experience, approximately 10% of these patients undergo aortic annulus and root enlargement using pericardium. A tissue valve is the preferred prosthesis. Operative mortality for elective surgery in patients older than 80 years of age is 4-10%, depending on whether associated procedures are required (eg, coronary artery bypass grafting) or whether the patient has had previous surgery. Postoperative neurologic events are important complications that are more common in the elderly. Outcome after successful surgery is excellent, with a 5-year survival of approximately 60%. The vast majority of patients have an improved symptomatic status.

Last decade

ELSEVIER

European Journal of Cardio-thoracic Surgery 31 (2007) 600–606

EUROPEAN JOURNAL OF CARDIO-THORACIC SURGERY

www.elsevier.com/locate/ejcts

Aortic valve surgery in octogenarians: predictive factors for operative and long-term results☆

Philippe Kolh [a,*], Arnaud Kerzmann [a], Charles Honore [a], Laetitia Comte [b], Raymond Limet [a]

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Variables associated with operative mortality and prolonged hospital stay, by multivariable analysis

Variables	*p*-value	OR (95% CI)
Predictive of operative mortality		
Urgent procedure	0.003	4.3 (2.3–7.0)
Associated CABG	0.009	3.9 (1.8–5.7)
NYHA functional class	0.01	2.2 (1.2–3.9)
Percutaneous aortic valvuloplasty	0.04	1.7 (0.9–3.6)
Predictive of prolonged hospital stay[a] (>15 days)		
Age	0.006	0.9 (0.9–1.0)
Associated CABG	0.009	0.7 (0.6–0.9)
Urgent procedure	0.01	0.4 (0.2–0.8)

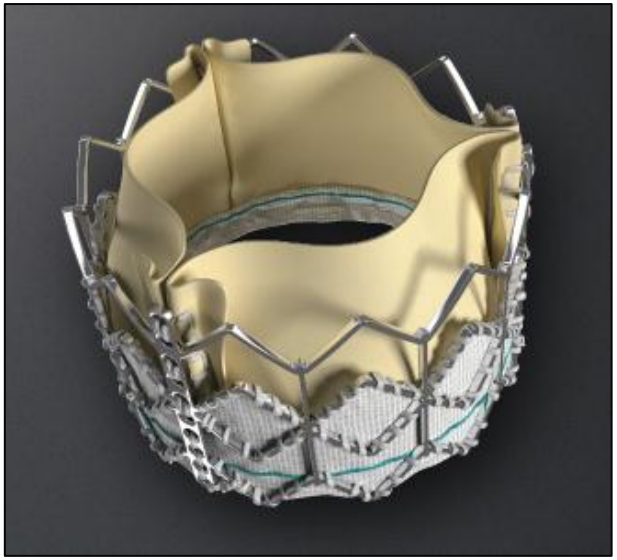
OR, odds ratio; CI, confidence interval; CABG, coronary artery bypass grafting; NYHA, New York Heart Association.

[a] The model assessed the probability of leaving the hospital, and therefore a risk ratio of less than 1% is predictive of prolonged hospital stay.

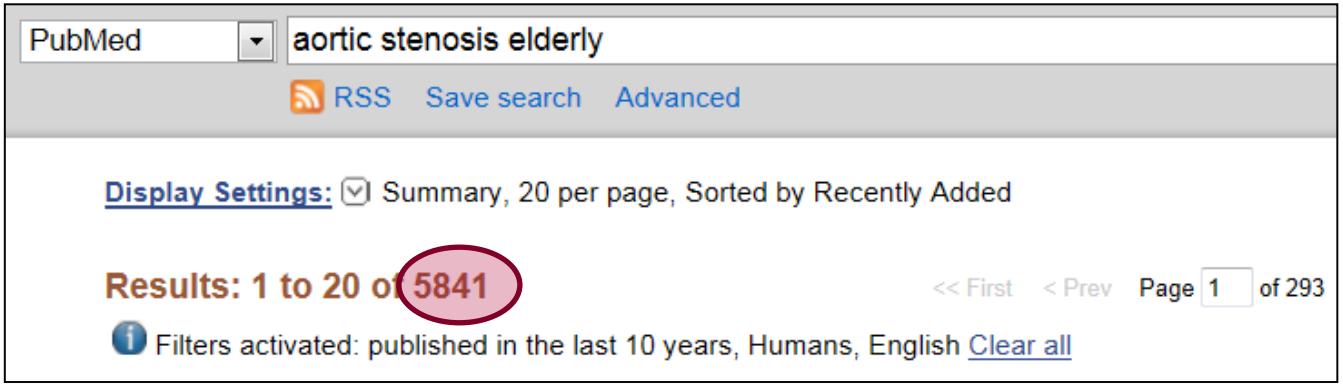
Belgian data on cardiac surgery

	2001	2002	2003	2004	2005	2006	2007	2008
Reporting center	27	28	29	29	29	28	28	28
Cardiac operations	11437	12773	13635	13694	12920	12876	12918	12356
Isolated CABG	7008	7661	7785	7422	6654	6369	6209	5759
Off-pump	1575	2062	2424	2423	2142	1992	1774	1598
On-pump	5433	5599	5361	4999	4512	4377	4435	4161
Valve only	1664	1920	2108	2221	2110	2118	2273	2385
CABG + Valve	859	1074	1292	1338	1315	1325	1417	1267
Number of major cardiac operations - age distribution								
0-1	433	503	464	505	520	558	573	598
2-15	238	279	270	283	253	254	264	276
16-29	106	127	149	149	127	138	122	124
30-39	197	190	211	205	198	188	184	169
40-49	664	735	723	695	653	675	645	666
50-59	1769	2042	2137	2084	1988	2025	1943	1726
60-69	3377	3456	3758	3533	3455	3285	3339	3176
70-79	3954	4613	4898	5156	4577	4523	4515	4323
80-89	679	807	1012	1059	1079	1215	1320	1285
>=90	20	21	13	25	70	15	13	13

And then….there was TAVI !



-Indications
-Frailty
-EuroSCORE
-Alternative access routes
-What is best for the patient ?



INDICATIONS

European Heart Journal (2003) 24, 1231–1243

ELSEVIER

EUROPEAN SOCIETY OF CARDIOLOGY

A prospective survey of patients with valvular heart disease in Europe: The Euro Heart Survey on Valvular Heart Disease

31.8% of patients were not treated surgically, mainly because of high age and/or severe comorbidity

KEYWORDS
Valvular heart disease;
Echocardiography;
Cardiac surgery

Aims To identify the characteristics, treatment and outcomes of contemporary patients with valvular heart disease (VHD), and to examine adherence to guidelines.
Methods and results The Euro Heart Survey on VHD was conducted from April to July 2001 in centers from 25 countries; it included consecutively 5001 adults with moderate to severe native VHD, infective endocarditis, or previous valve intervention. VHD was native in 71.6% of patients and 28.1% had had a previous intervention. Mean age was 64 ± 16 years. Degenerative aetiologies were the most frequent in aortic VHD and mitral regurgitation while most cases of mitral stenosis were of rheumatic origin.
Coronary angiography was used in 85.2% of patients before intervention. Of the 1269 patients who underwent intervention, prosthetic replacement was performed in 99.0% of aortic VHD, percutaneous dilatation in 33.9% of mitral stenosis, and valve repair in 46.5% of mitral regurgitation; 31.7% of patients had ≥1 associated procedure. Of patients with severe, symptomatic, single VHD, 31.8% did not undergo intervention, most frequently because of comorbidities. In asymptomatic patients, accordance with guidelines ranged between 66.0 and 78.5%. Operative mortality was <5% for single VHD.
Conclusions This survey provides unique contemporary data on characteristics and management of patients with VHD. Adherence to guidelines is globally satisfying as regards investigations and interventions.

UZA

Indications

European Heart Journal
doi:10.1093/eurheartj/ehs109

ESC/EACTS GUIDELINES

Guidelines on the management of valvular heart disease (version 2012)

The Joint Task Force on the Management of Valvular Heart Disease of the European Society of Cardiology (ESC) and the European Association for Cardio-Thoracic Surgery (EACTS)

Indications

- Evaluation:
  - Careful questioning for the presence of symptoms
  - Characteristic systolic murmer
  - Echocardiography is the key diagnostic tool
  - Doppler Echocardiography is the preferred technique for assessing AS severity
  - TOE is rarely helpful for quantification
  - Exercise testing is contraindicated in symptomatic patients
  - MSCT and CMR provide additional information

Table 4 Echocardiographic criteria for the definition of severe valve stenosis: an integrative approach

	Aortic stenosis	Mitral stenosis	Tricuspid stenosis
Valve area (cm^2)	<1.0	<1.0	–
Indexed valve area (cm^2/m^2 BSA)	<0.6	–	–
Mean gradient (mmHg)	>40[a]	>10[b]	≥5
Maximum jet velocity (m/s)	>4.0[a]	–	–
Velocity ratio	<0.25	–	–

BSA – body surface area.
[a]In patients with normal cardiac output/transvalvular flow.
[b]Useful in patients in sinus rhythm, to be interpreted according to heart rate.
Adapted from Baumgartner et al.[15]

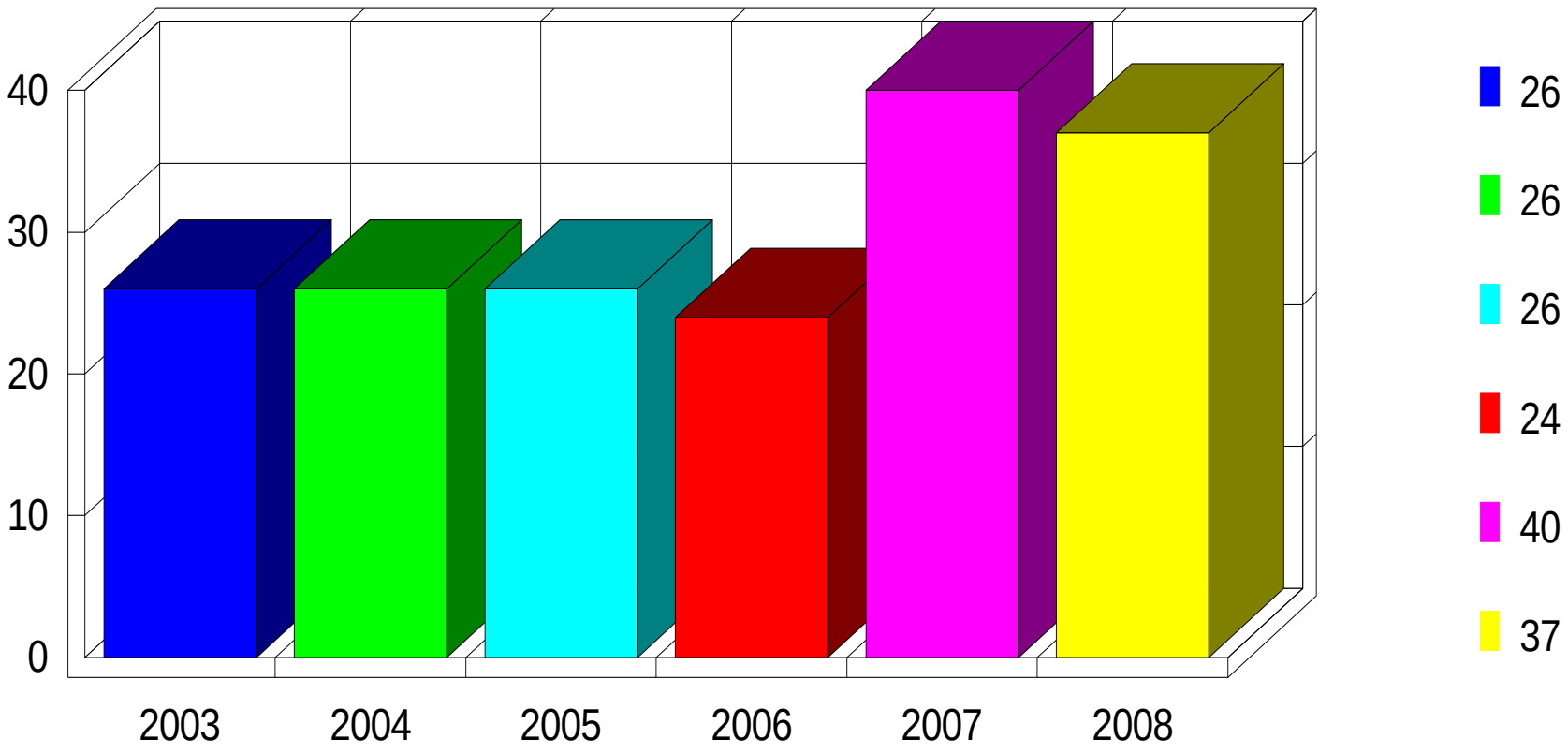
Indications, ECS guidelines

1. “Early valve replacement should be strongly recommended in all symptomatic patients with severe AS who are otherwise candidates for surgery.”
2. “The management of patients with classical low-flow, low-gradient AS is more difficult. …Final decision-making should take into account the patient’s clinical condition, degree of valve calcification, the extent of coronary disease, and the feasibility of revascularization.”
3. “The decision to operate on asymptomatic patients requires careful weighing of the benefits against the risks.”

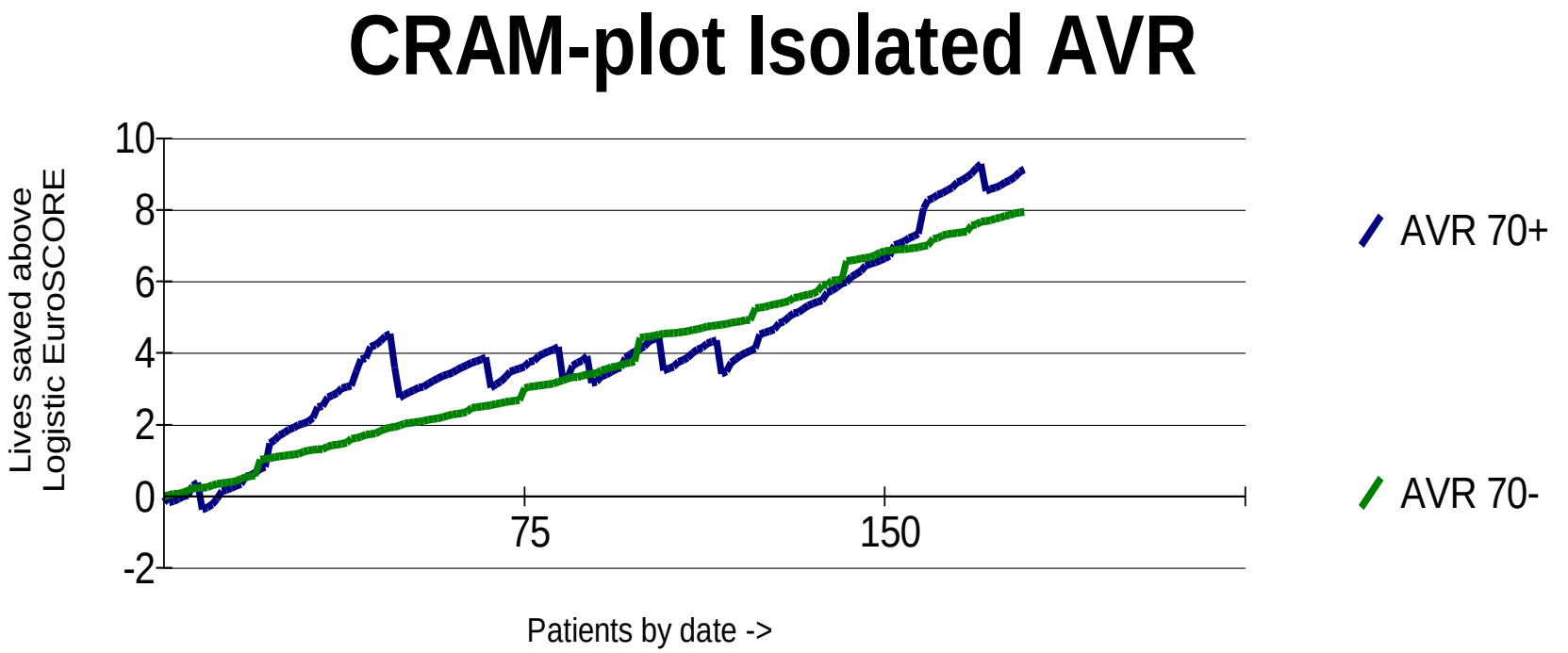
Asymptomatic AS ?

- **“Survival after valve replacement for aortic stenosis: implications for decision making”,** Mihaljevic, *J Thorac Cardiovasc Surg 2008;135:1270*
  - To optimize survival, earlier aortic valve replacement should be considered even in asymptomatic patients before severe left ventricular hypertrophy or dysfunction develops
- **“Malignant natural history of asymptomatic severe aortic stenosis: benefit of aortic valve replacement”,** Pai, *Ann Thorac Surg 2006;82:2116*
  - … the natural history of asymptomatic AS is not benign and survival is dramatically improved by AVR.
- **“Outcome of 622 adults with asymptomatic, hemodynamically significant aortic stenosis during prolonged follow-up”,** Pellikka, *Circulation 2005;111:3290*
  - Most patients with asymptomatic , hemodynamically significant AS will develop symptoms within 5 years. Sudden death occurs in 1%/year.
  - N=622 , mean age 72 years
  - Probability of remaining free of cardiac symptoms while unoperated at 1, 2 and 5 years: 82 %, 67 % and 33 %
  - 352 (57 %) underwent AVR and 265 (43 %) died

Isolated AVR > 70 y (2003-2008), n=179



Logistic ES <70 and >70 y (N=179)



- M: 51.4%, F: 48,6%, Mean log ES: 10.69 % (range 3.2-83.8)

Who is at risk to die after AVR ?

- N=11 (6%)
- M : 3 / F: 8
- Mean age: 81 y (range 75 - 90)
- Mean log ES: 21,45 % (range 7,85 - 83,45)
- Median log ES: 15,34 %
- All patients were extubated within 12 hours of the operation
- The first signal of deterioration was respiratory failure and pneumonia !!!

Why do patients die after AVR ?

- Respiratory failure followed by hemodynamic deterioration
- Renal failure
- Atrial fibrillation in hypertrophic ventricle
- CVA (n=1)
- Nasopharyngeal bleeding (n=1)
- Preoperative factors:
  - Peripheral vessel disease (n=4)
  - Underweight (n=2)
  - Mitral disease (n=3)
  - COPD (n=1)
  - Redo after CABG (n=3)

EuroSCORE is imprecise for prediction of mortality

Aortic Valve replacement in octogenerians: utility of risk stratification	Leontyev	Ann Thorac Surg 2009;87:1440
Is the EuroSCORE model valid for estimating the operative risk of patients considered for percutaneous aortic valve replacement ?	Brown	J Thorac Cardiovasc Surg 2008;136:566
EuroSCORE performance in valve surgery: a Meta-Analysis	Parolari	Ann Thorac Surg 2010;89:787
Overestimation of aortic valve replacement risk by EuroSCORE: implications for percutaneous valve replacement	Osswald	Eur Heart J 2009;30:74
High mortality in late octogenerians undergoing isolated aortic valve replacement for aortic valve stenosis: EuroSCORE underestimates mortality in this cohort	Lichtenberg	Thorac Cardiovasc Surg 2012
Do we need separate risk stratification models for hospital mortality after heart velve surgery ?	Van Gameren	Ann Thorac Surg 2008;85:921
Does EuroSCORE predict length of stay and specific postoperative complications after heart valve surgery ?	Toumpoulis	J Heart Valve Dis 2005;14:243
High-risk aortic valve replacement: are the outcomes as bad as predicted ?	Grossi	Ann Thorac Surg 2008;85:102

Yes, we can operate on octagenerians with an acceptable mortality rate, which is usually overestimated by the common risk scores

Which patient will do better with TAVI ?

- Indications for TAVI
  - Should be performed in hospitals with cardiac surgery on-site
  - A “heart team” that assesses individual patient’s risks, as well as technical suitability of TAVI access issues, should be best able to make decisions
  - Eligible patients should have a life expectancy of more than 1 year and should also be likely to gain improvement in their quality of life, taking into account their comorbidities
  - TAVI is recommended in patients with severe symptomatic AS who are considered unsuitable for conventional surgery because of severe comorbidities.
  - Among high-risk patients the decision should be individualized
    - Heart team favors TAVI, Frailty, Porcelain aorta, Patent grafts, chest radiation

High risk SAVR: Porcelain aorta

- Alternative cannulation
- Aortic clamping
- Endarterectomy of the ascending aorta
- L apical to aorta valved bypass
- Composite valve bypass with CABG
- Deep hypothermic circulatory arrest

High risk SAVR: Etiology of chest deformities

- Neoplasms
  - Primary tumors
  - Metastatic tumors
  - Involvement by lung or breast cancer
  - Radiation induced tumors
- Infection
  - Mediastinitis
  - Median sternotomy wound infection
  - Osteomyelitis
  - Costochondritis
- Radiation necrosis
- Trauma

High risk SAVR: COPD

TABLE 1

GOLD CLASSIFICATION OF COPD

Stage	Characteristics
0: At risk	Normal spirometry
	Chronic symptoms (cough, sputum production)
I: Mild COPD	FEV1/FVC ‹ 70%
	FEV1 greater than or equal to 80% predicted
	With or without chronic symptoms (cough, sputum production)
II: Moderate COPD	FEV1/FVC ‹ 70%
	FEV1 greater than or equal to 30% to ‹ 80% predicted IIa: FEV1 greater than or equal to 50% to ‹ 80% predicted IIb: FEV1 greater than or equal to 30% to ‹ 50% predicted
	With or without chronic symptoms (cough, sputum production, dyspnea)
III: Severe COPD	FEV1/FVC ‹ 70%
	FEV1 ‹ 30% predicted or FEV1 ‹ 50% predicted plus respiratory failure or clinical signs of right heart failure

GOLD, Global Initiative for Chronic Obstructive Lung Disease; COPD, chronic obstructive pulmonary disease; FEV1, forced expiratory volume in one second; FVC, forced vital capacity; respiratory failure, arterial partial pressure of oxygen ‹ 60 mm Hg with or without arterial partial pressure of carbon dioxide greater than or equal to 50 mm Hg while breathing air at sea level.

- Reason for dyspnea ?
- Moderate COPD despite bronchodilators:
  - Consider TAVI
- Severe COPD and/or FEV_1 < 1.0 L/min:
  - contraindication for surgery

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High risk SAVR: Redo surgery after CABG

- Reported mortality : 6.4 to 17 %
- IMA injury during sternal reentry
- Aortic clamping
- Myocardial protection
  - Wash out through functioning IMA
  - Retrograde CP in hypertrophic heart ?
  - Effects of DHCA ?
- Management of progression of arteriosclerosis in native coronary arteries and grafts
  - Which grafts need to be replaced ?
- “Prophylactic” AVR at initial CABG ?

Myocardial protection

High risk SAVR: Redo after CABG

- Byrne, *Ann Thorac Surg 2002;73:779*
  - N=94, Age range 55 to 90 y
  - Aortic cannulation: 36, femoral cannulation: 58
  - CPB before sternotomy and DHCA (20º C)
  - Mortality: 6%, predominantly from cardiac causes
  - LIMA injury: 5, LCO: 12, PO IABP: 13, CVA: 10, Afib: 27, PM: 5, DSWI: 4
- Hirose, *Ann Thorac Surg 2004;78:782*
  - N=18, all BIMA, Mean age: 67y ± 6.4
  - Aortic cannulation: 12, Femoral cannulation: 6
  - DHCA: 3
  - Mortality: 0%
  - IABP: 1, CVA: 1

High risk SAVR: Redo after CABG

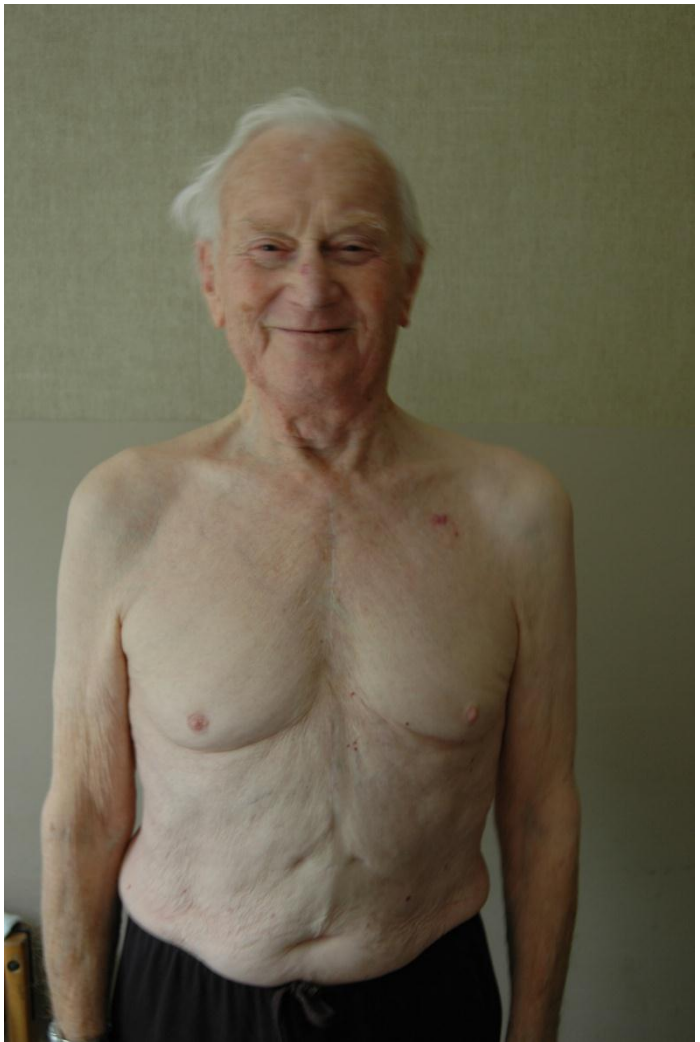
EuroSCORE Risk Profile — cardiothoracic UZA

Patient Name: XXX Date of Birth: 24/mei/1921 Patient number: 13	Date: 10/jul/2008 Surgeon: select surgeon

Operation: Corevalve

Notes:

		Additive EuroSCORE Φ	Logistic EuroSCORE βi Xi
Patient Factors			
Age	87yr	6	1,945023429
Sex	☐ Female		
Chronic pulmonary disease	☑ Yes	1	0,4931341
Extracardiac arteriopathy	☐ Yes		
Neurological dysfunction	☐ Yes		
Previous cardiac surgery	☑ Yes	3	1,002625
Serum creatinine >200 µmol/L (2,27 mg/dl)	☐ Yes		
Active endocarditis	☐ Yes		
Critical preoperative state	☐ Yes		
Cardiac Factors			
Unstable angina	☐ Yes		
LV dysfunction moderate or LVEF 30-50%	☑ Moderate	1	0,4191643
Lv dysfunction poor or LVEF<30	☐ Poor		
Recent myocardial infarct	☐ Yes		
Pulmonary hypertension	☐ Yes		
Operation Factors			
Emergency	☐ Yes		
Other than isolated CABG	☑ Yes	2	0,5420364
Surgery on thoracic aorta	☐ Yes		
Post infarct septal rupture	☐ Yes		
EuroSCORE		ΣΦ	$e^{(-4.789594 + \Sigma(\beta i Xi))} / 1 + e^{(-4.789594 + \Sigma(\beta i Xi))}$
Downloaded from http://euroscore.org		13	40,43%



Frailty

- Fried criteria:
  - Unintentional weight loss, weakness, self reported exhaustion, slowness of gate speed and low physical activity
- Rockwood score, clinical frailty index etc.
- Simple measurement used to quantify frailty
  - 5 m Gate speed test:
    - Understanding the instructions
    - Be able to do it
    - Speed of steps
    - > 6 sec = undependent predictor of mortality

Eyeballing of the surgeon

Who should treat the patient with AS ?

UZA TAVI Heart Team

Multidisciplinary approach

Interventional cardiologists:

J.Bosmans and M.Claeys

Cardiac surgeon: I.Rodrigus

Echocardiographist: B.Paelinck

Anesthesiologist: D.Van Doninck

Radiologist: R.Salgado

Neurologist: P.Cras

Treatment algorithm

- No reimbursement for TAVI in Belgium
- Degenerative, symptomatic AS: SAVR
- “Inoperable” and “high risk” patients: TAVI
  - Too high risk: COPD, frailty, Log EuroSCORE > 20%, too old….
  - Porcelain aorta
  - Redo after CABG
  - Chest deformation
- If TAVI with Corevalve is considered:
  - Transfemoral access
  - Subclavian access
  - Direct aortic access
  - Transapical access for Edwards Sapian Valve

Contraindications for TAVI

Absolute contraindications
Absence of a 'heart team' and no cardiac surgery on the site
Appropriateness of TAVI, as an alternative to AVR, not confirmed by a 'heart team'
Clinical
Estimated life expectancy < 1 year Improvement of quality of life by TAVI unlikely because of comorbidities Severe primary associated disease of other valves with major contribution to the patient's symptoms, that can be treated only by surgery
Anatomical
Inadequate annulus size (< 18 mm, >29 mm)
Thrombus in the left ventricle
Active endocarditis
Elevated risk of coronary ostium obstruction (asymmetric valve calcification, short distance between annulus and coronary ostium, small aortic sinuses)
Plaques with mobile thrombi in the ascending aorta, or arch
For transfemoral/subclavian approach: inadequate vascular access (vessel size, calcification, tortuosity)
Relative contraindications
Bicuspid or non-calcified valves
Untreated coronary artery disease requiring revascularization
Haemodynamic instability
LVEF <20%
For transapical approach: severe pulmonary disease, LV apex not accessible

TAVI experience UZA

- First experience with 2nd generation 21Fr Corevalve with CPB
- Experience with 3rd generation 18 Fr Corevalve since 2008
  - 132 patients
  - Transfemoral: 115
  - Subclavian access: 8
  - Direct aortic access: 4
  - Brachiocephalic trunc: 5
- No apical access
- All procedures in cathlab
- Cardiologist **and** cardiac surgeon
- No OR standby
  - Iliac repair in cathlab
  - Later operative iliac repair in OR

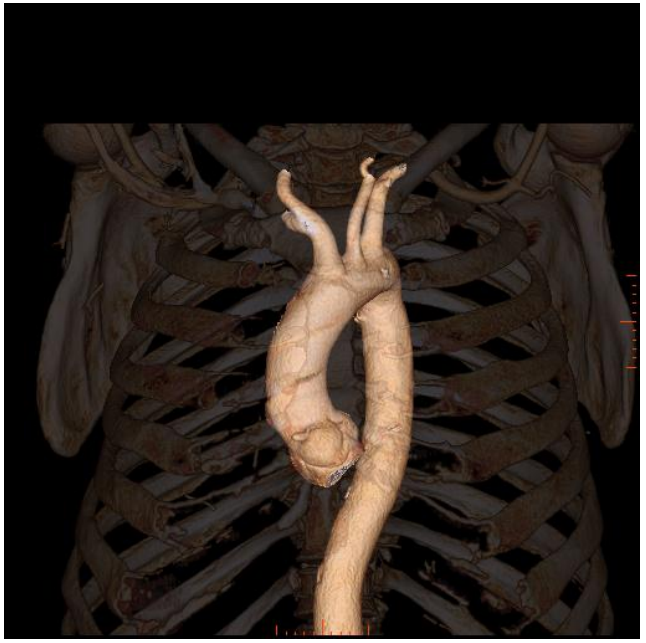
Access routes : TF and subclavian

- Conditions for transfemoral access
  - Diameter iliac vessels: > 6,5 mm
  - Minimal aortic calcifications
  - Minimal turtuosity
  - No previous peripheral bypass or stents
- Conditions for left subclavian access
  - Diameter subclavian artery: > 6,5 mm
  - No ostial stenosis, no turtuosity
  - No LIMA – LAD graft

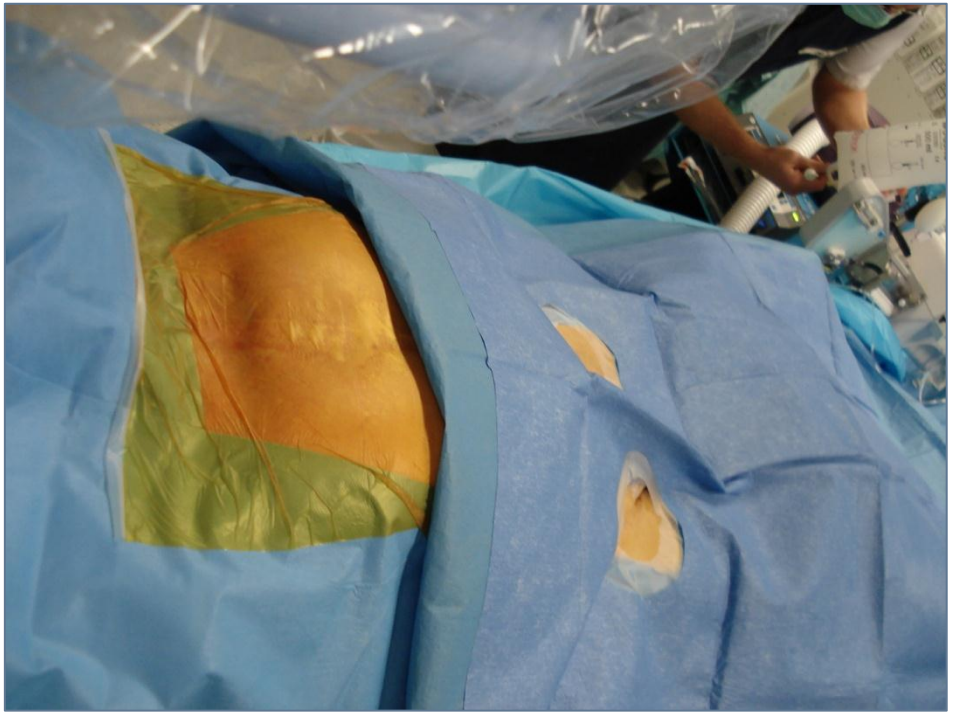
If TF and/or subclavian access is not possible/safe:
Direct aortic or truncal access

Access route: investigations for DA approach

- Normal TAVI workup
  - Clinical judgement
  - Coronary angiography
  - Echocardiography
  - Computed Tomography thorax, abdomen and pelvis with three dimensional reconstructions of the arterial vasculature and aortic root
- Extra:
  - CT scan: Length and diameter of ascending aorta and Brachiocephalic Trunc , relation to the sternum
  - Duplex carotid vessels

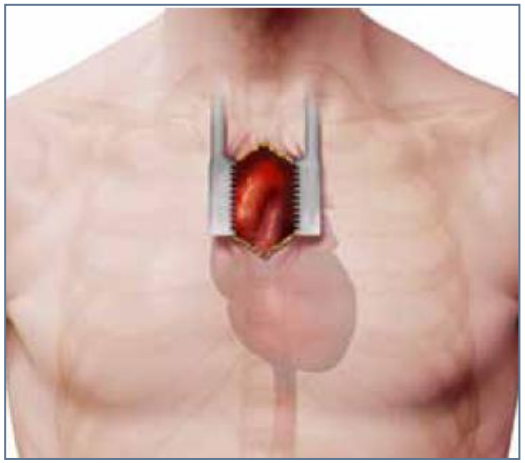


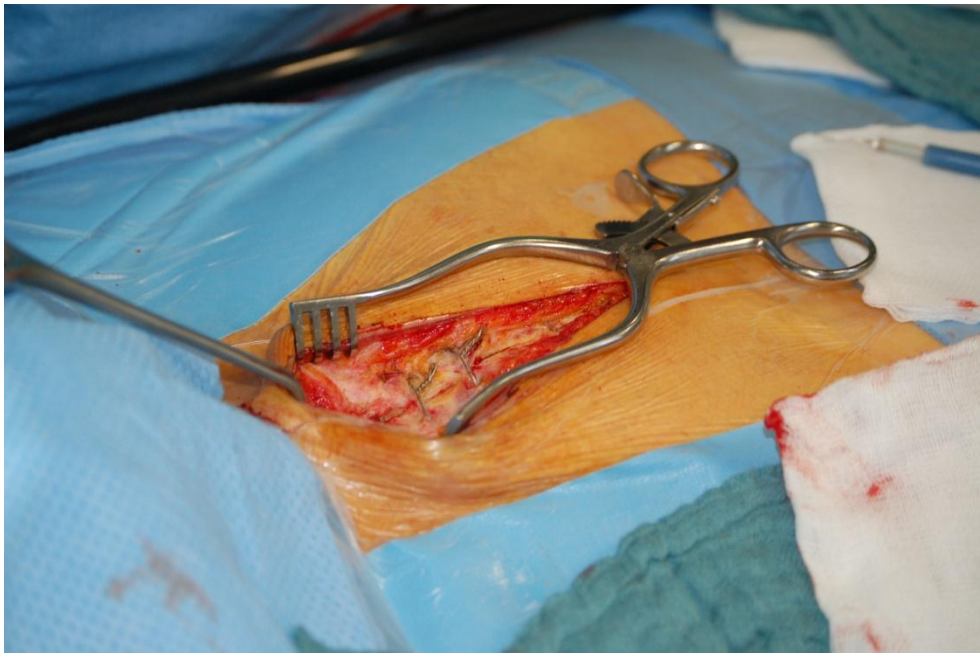
DA: Different desinfection and draping



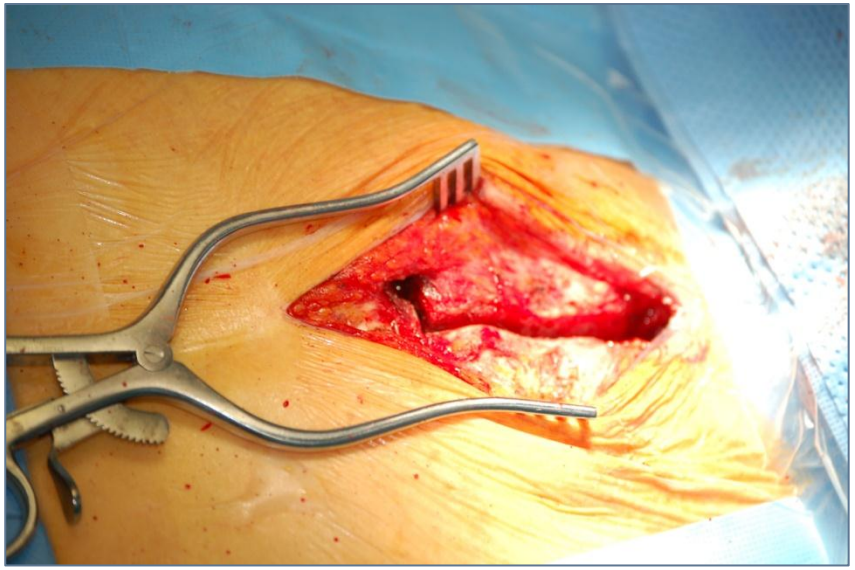
How to perform DA access

- 5Fr sheath in Femoral artery
- graduated pigtail upto the non-coronary cusp for angiography of aortic root
- Skin incision: 5 to 8 cm
- **Partial upper ministernotomy**: J-shape to 2nd intercostal right with an oscillating saw
- Small sternal retractor



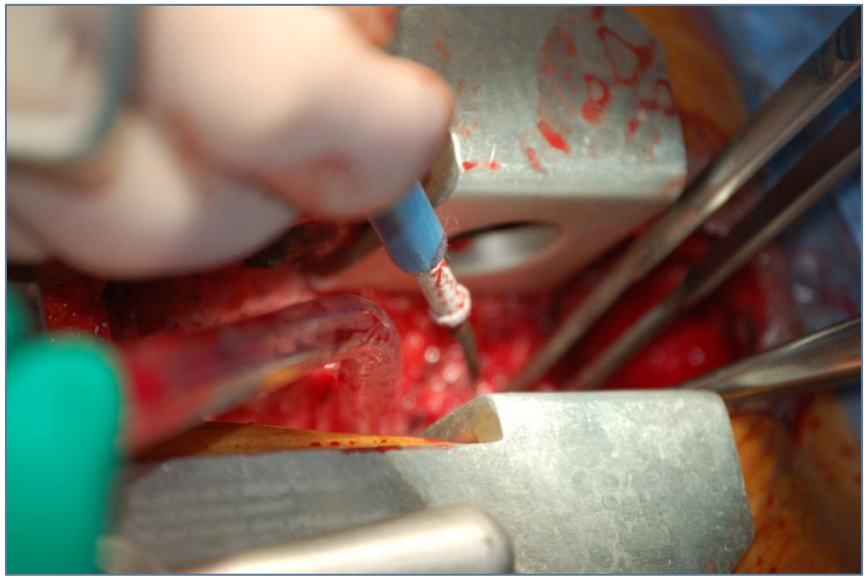


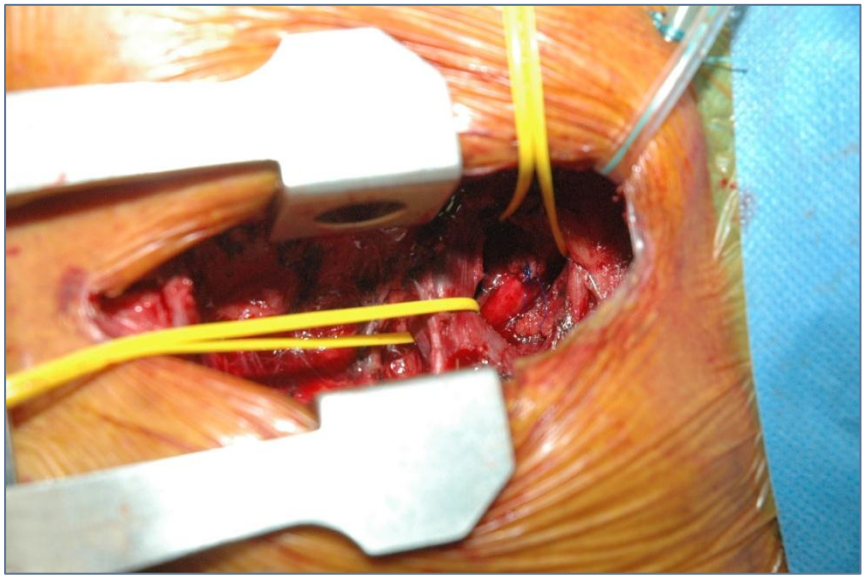
How to perform DA access : ministernotomy



How to perform DA access : dissection

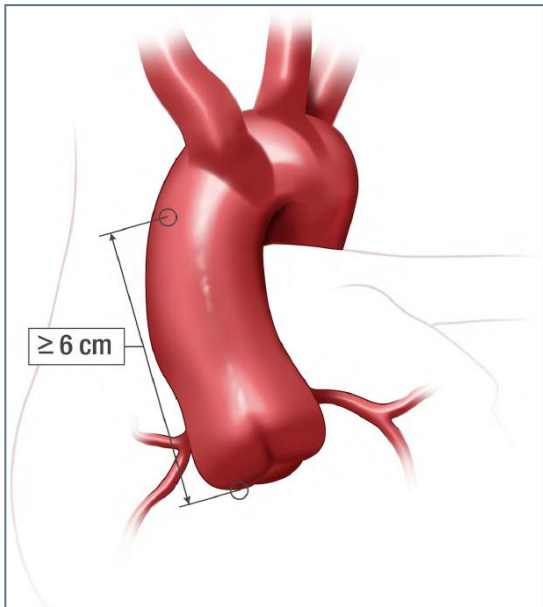
- Dissection of substernal tissues
- Isolation of Innominate vein
- Dissection of brachiocephalic trunc (BT) and aorta upto the normal cannulation site





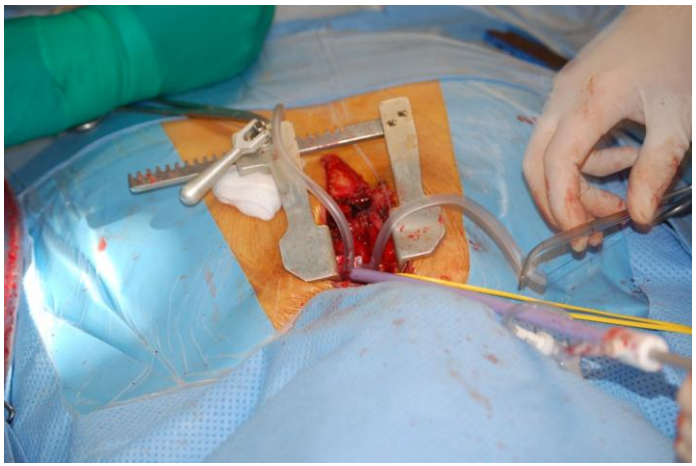
How to perform DA access : where to put the sheath ?

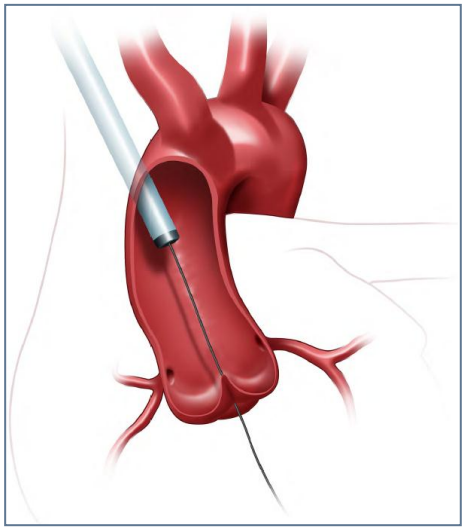
- Access site:
  - With a short aorta and big BT (> 8 mm) : BT
  - With long aorta and small BT: aorta
  - Be sure to have at least 6 cm distance to the aortic valve !!!
- BT clamping for 2 min
  - Foresight signal OK: BT
  - Foresight signal low: aorta
- Double pledgetted pursestring suture with Prolene 4/0 on BT or aorta
- Heparine administration (2cc, ACT > 180 sec)
- Introduction of 9 Fr sheath in aorta or BT

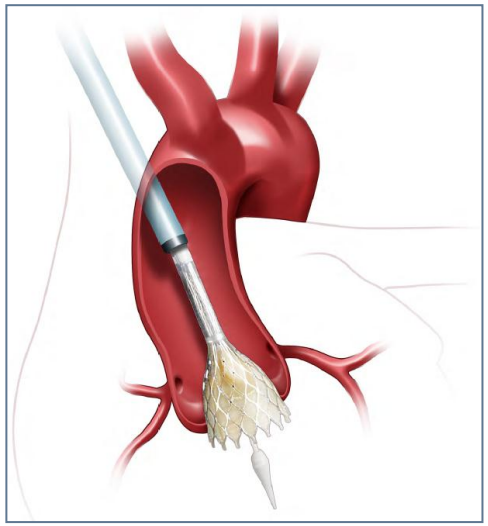


How to perform DA access : 18 Fr introduction

- Crossing AV with floppy wire
- Exchange for pigtail in ventricle
- Exchange for Amplatz super stiff wire in ventricle
- Introduction of 18Fr sheath for a few cm.
- Balloon valvuloplasty
- Corevalve deployment

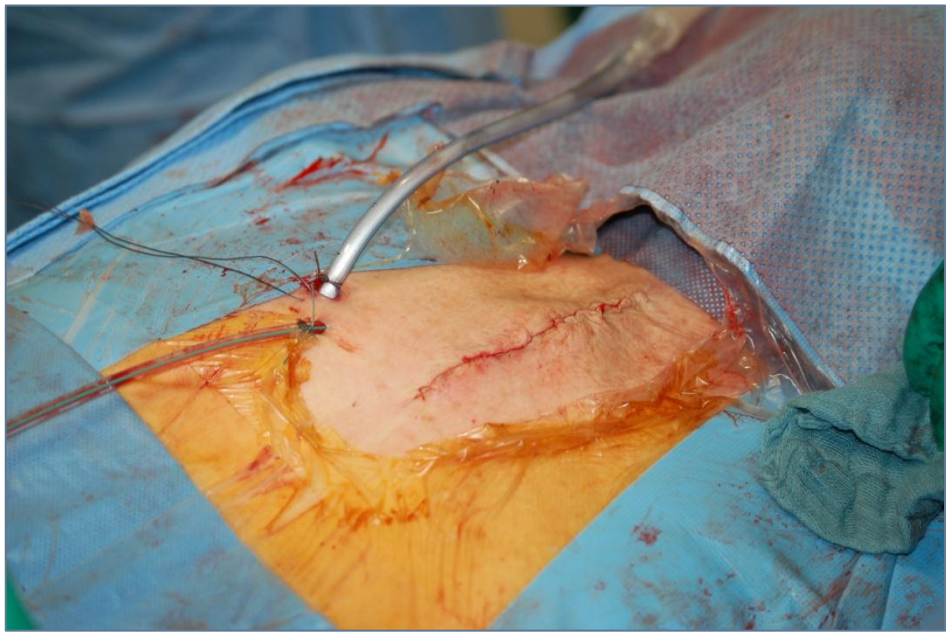






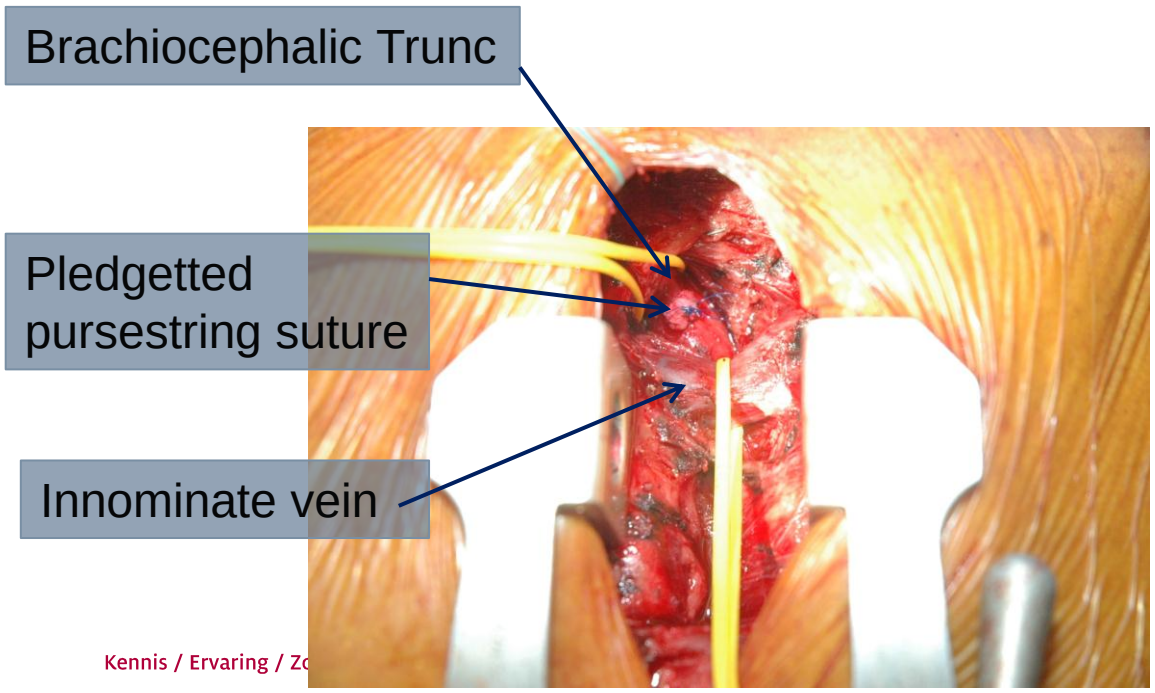
How to perform DA access : finishing

- Removal 18 Fr sheath
- Tying pursestring
- Protamine administration
- Hemostasis
- Redon drain in substernal space
- Pleural drain if necessary
- Steelwire 2x
- Skin closure



Direct aortic access

- Frail patients, with vascular occlusive disease
- Previous CABG, with occlusion of native vessels and open grafts
- Chronic renal failure
- COPD



TAVI vs SAVR : LOWERING THE RISK OF SURGERY

- Preoperative optimalization
  - Investigate and treat anemia (groin hematoma)
  - Optimize pulmonary function (smoking cessation, IMT, Physiotherapy, aerosols, medrol…)
  - Exclude any infection (urinary !)
- Meticulous but expedious surgery by senior surgeons
  - ECC time < 90 min
  - Transfusion trigger on bypass: Het 24 %
  - Higher mean arterial pressure
  - Tight glucose control
  - “Aortic valve replacement in geriatric patients: Determinants of in-hospital mortality”, Bloomstein. *Ann Thorac Surg 2001;71:597*
    - Small body surface (BSA <1.8) and long CPB time (> 124 min) are 2 independent risk factors in early mortality for elderly patients undergoing primary isolated AVR.

TAVI vs. SAVR: LOWERING THE RISK OF SURGERY

- Post-op care
  - Short intubation time but supportive non-invasive ventilation if needed
  - Adequate filling pressure
  - Rythm control
- Principle
  - **In younger patients, the largest possible prosthesis should be implanted to minimize residual gradient. In elderly patients, complex operations just to insert larger prostheses should be avoided.**

TAVI vs.SAVR: PARTICIPATE IN THE HEART TEAM

- Discuss indications for treatment of AS
- Participate in the work up of patients
- Decide together what will be the best option
- Perform TAVI together: surgeon + cardiologist

Too much surgery !!!

CONCLUSION

- Older age alone is not a contraindication for surgery or an indication for TAVI
- Risk scores over- or underestimate the risk
- Alternative access routes have broadened the possibility of TAVI
- Valve-in-valve TAVI is becoming a reality.
- TAVI expansion in Belgium is hampered by restricted reimbursement
- Within 5 years, we will not perform AVR in octagenarians anymore

CONCLUSION