SIMPOSIO

STENOSI AORTICA

Tra procedure diagnostiche, valvuloplastica, TAVI e cardiochirurgia: tutti intorno al malato per la migliore diagnosi e terapia

Moderatori: ***Carlo Antona (Milano), Paolo Colonna (Bari)***

Discussant: ***Paolo Danna (Milano)***

La sostituzione valvolare aortica con tecnica tradizionale. Indicazioni e tecnica.

I vantaggi della sternotomia controbilanciano la ripresa più difficile e gli svantaggi estetici?

Lorenzo Menicanti (San Donato Milanese)


Dinosauri comparsi 230 milioni di anni fa estinti 65 milioni di anni fa

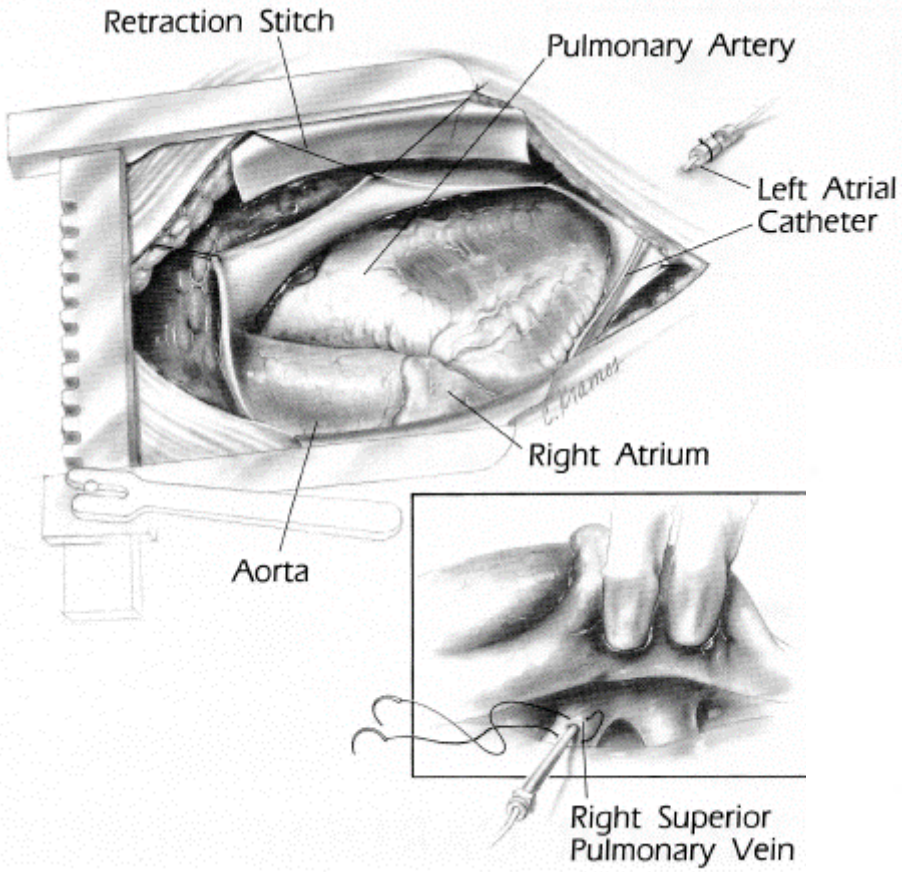

Squali comparsi 420 milioni di anni fa e ancora arzilli

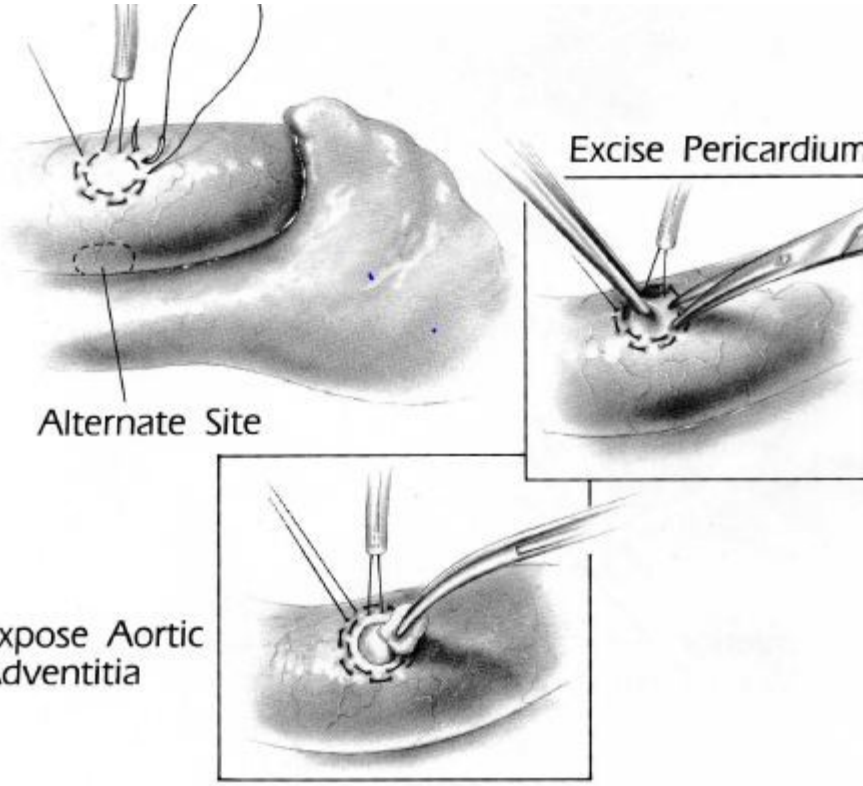
Eugene Braunwald

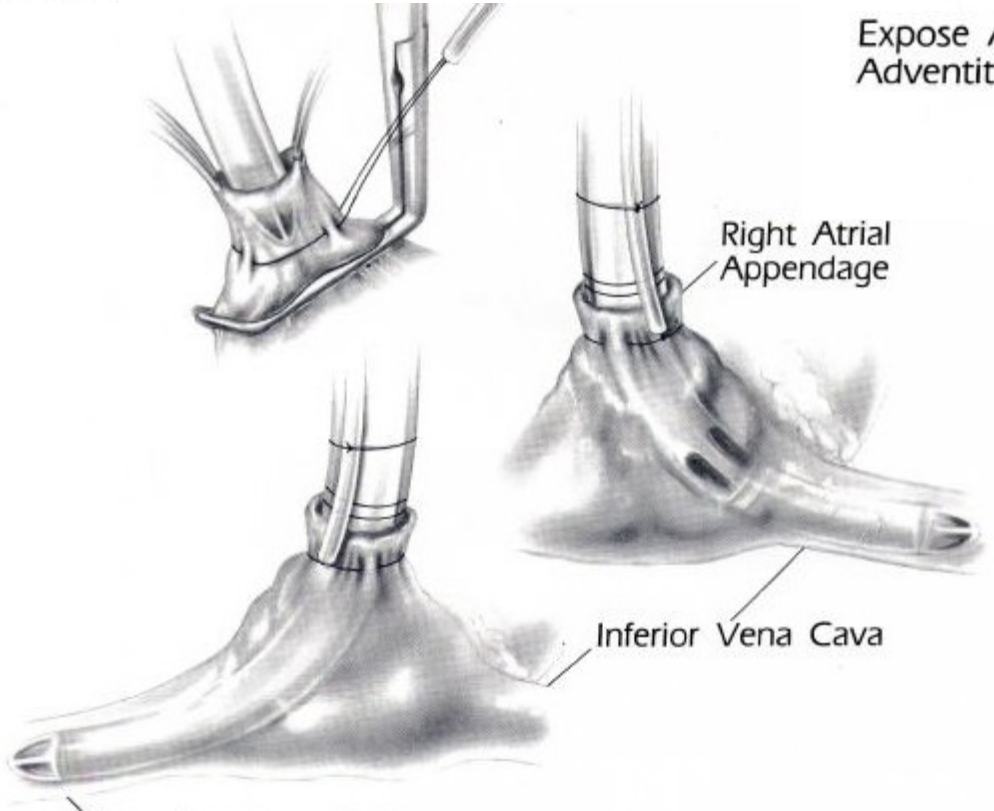
We are facing a new cardiology : the A-V block is not a complication and the use of pace-maker has no consequences, the valve regurgitation becames acceptable , the stroke is accepted because a presumed minimal invasive procedure is performed . Amazing !!!!!!

We can’t stop this trend , but it is not for me !

TECNICA sternotomia mediana







INDICAZIONI sternotomia mediana

SEMPRE

CONTROINDICAZIONI RELATIVE:

REINTERVENTI CON MAMMARIE CHE ATTRAVERSINO LA LINEA MEDIANA

•VANTAGGI sternotomia mediana

- **Controllo totale cuore e grandi vasi**
- **Scelta del punto di cannulazione**
- **Scelta della zona di clampaggio**
- **Gesti chirurgici** associati SICUREZZA
- **Ottimale visibilità della valvola e delle eventuali calcificazioni della parete aortica**
- **Spurgo cavità ventricolare**
- **Controllo accurato emostasi**
- **Velocità di esecuzione**

Open Trans-Sternal Technique is the Preferred Method

Patrick M. McCarthy MD, FACC
Director of the Bluhm Cardiovascular Institute
Chief of Cardiac Surgery Division
Heller-Sacks Professor of Surgery in the Feinberg School of Medicine

Sunday, May 5, 2013
AATS/STS Adult Cardiac Surgery Symposium
AATS 93rd Annual Meeting
Minneapolis, MN

Personal Experience

- '80s-early '90s Right Thoracotomy MVSurgery
- Upper Hemisternotomy
- Heartport
- Lower Hemisternotomy ~ 50% @ NMH
- Mini Right Thoracotomy

Now - Near 100% full sternotomy

- **Small skin incision**
- **Pain pump**
- **Tell patients pre-op expect 4 day LOS**

Reason #10

"There is a finite amount of pain in the world and mini-invasive surgery transfers it from the patient to the surgeon"

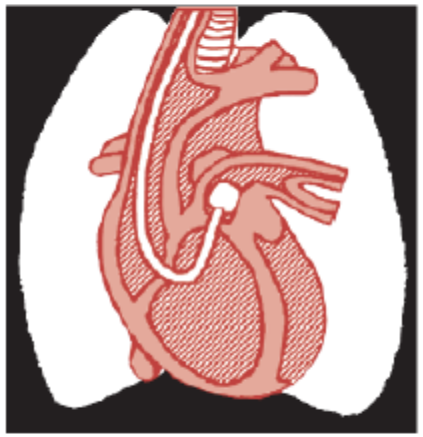
Having the surgeon in pain doesn't sound like a good idea. Is it really less painful?

Most of my patients look like this:

Not like this:

Scars can heal, Aortic Dissections persist

It's NOT Easy to Deal with Inevitable Complications



CASE CONFERENCES

Linda Shore-Lesserson, MD
Mark A. Chaney, MD
Section Editors

CASE 3—2012
Iatrogenic Circumflex Artery Injury During Minimally Invasive Mitral Valve Surgery

Jennifer Banayan, MD,* Richa Dhawan, MD,*
William J. Vernick, MD,† and Patrick M. McCarthy, MD‡

J Cardiothorac Vasc Anesth 2012;26(3):519-9

Beware of Anything in Cardiac Surgery that is Marketed


29-yr-old's heart fixed, by a robot

Northwestern Memorial Hospital
The Bluhm Cardiovascular Institute

I don’t want my patients to have this scan.

Northwestern Memorial Hospital

The Bluhm Cardiovascular Institute

Stephen B Colvin

Leading cardiovascular surgeon who pioneered mitral valve repair techniques.
Born on May 21, 1943, in New York, NY, USA, he died aged 64 years on March 8, 2008, in New York of multiple myeloma.

Minimally Invasive Aortic and Mitral Valve Operation

Stephen B. Colvin, Eugene A. Grossi, Greg Ribakove, and Aubrey C. Galloway

Although minimally invasive approaches for individual aortic and mitral valve surgery are commonplace,[1-3] these techniques are also quite appropriate for those patients with bivalvular (aortic and mitral) disease. Through a small anterior thoracotomy incision, the surgeon gains access to operate on both the aortic and mitral valves. This incision obviates the need for a sternotomy and its attendant complications.[4] This article describes the standard NYU approach for minimally invasive aortic and mitral valve disease.

Team Approach

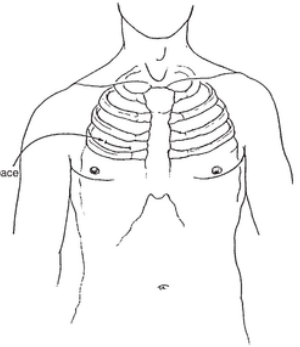
As fully described in another article in this issue (p 176), the minimally invasive approach for valvular heart surgery requires a team approach for intraoperative patient care. Although the minimally invasive double-valve operation does not rely on "endoclamp" technology,[5] the anesthesiologist should be facile with placement of a coronary sinus catheter. Transesophageal echocardiography (TEE) is a mainstay of the procedure for both catheter placement and monitoring and requires excellent echocardiographic skills, either from an echocardiologist or from cardiac anesthesia personnel trained in this discipline.[6] The benefits of the minimally invasiveapproach to the patient are predicated on this critical mass of required skills.

Operating Room Setup

The patient is positioned on the table in the standard fashion in a supine position without the necessity to move the chest in either direction. After endotracheal intubation with a single-lumen tube, a TEE probe is placed, and the aorta is visualized and evaluated. Care is taken to note the presence of aortic atheromatous disease or concomitant anomalies such as an atrial septal defect or a persistent left superior vena cava. Such information may change the intraoperative strategy.

Next, the anesthesiologist places a coronary sinus cardioplegia catheter through a percutaneous right internal jugular introducer. Although this is not absolutely necessary, it facilitates the operation by obviating the need for handheld cardioplegia cannulas. After this catheter is placed under TEE guidance, a brief fluoroscopic exam with a coronary sinus angiogram is performed. This confirms appropriate placement of the catheter in the coronary sinus and verifies that the catheter has not been advanced into a small tributary coronary vein.

SURGICAL TECHNIQUE



I After the patient is prepped and draped, a small groin incision is made, and the femoral vein is identified and prepared with vessel loops and snares. Typically, it is not necessary to use the femoral artery for retrograde arterial perfusion, because the ascending aorta is immediately accessible and will be directly cannulated. A skin incision on the right anterior chest over the third interspace is performed, and an intercostal incision is made.

Operative Techniques in Thoracic and Cardiovascular Surgery, Vol 5, No 3 (August), 2000: pp 212-220

"……Lorenzo, you know , I am working in New York and marketing is the base of the activity …."

Minimally invasive aortic valve replacement versus aortic valve replacement through full sternotomy: the Brigham and Women's Hospital experience

Robert C. Neely, Marko T. Boskovski, Igor Gosev, Tsuyoshi Kaneko, Siobhan McGurk, Marzia Leacche, Lawrence H. Cohn

Division of Cardiac Surgery, The Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts, USA

Methods: Our mini AVR approach is through a hemi-sternotomy (HS). We performed a propensity-score matched analysis of all patients undergoing isolated AVR via FS or HS at our institution since 2002, resulting in 552 matched pairs. Baseline characteristics were similar. Operative characteristics, transfusion rates, in-hospital outcomes as well as short and long term survival were compared between groups.

Conclusions: Our study confirms the clinical benefits of minimally invasive AVR via HS, which includes decreased transfusion requirements, ventilation times, intensive care unit and hospital length of stay without compromising short and long term survival compared to conventional AVR via FS.

Ann Cardiothorac Surg 2015;4(1):38-48

Table 1 Demographics and operative characteristics of 1,702 full and 1,319 hemi-sternotomy aortic valve replacement patients

Characteristics	Group [No. of patients]		P value (≤)
	Full sternotomy [1,702]	Hemi-sternotomy [1,319]	
Surgical history and operative outcomes			
Emergent operation, N (%)	41 (2.4)	5 (0.4)	0.001
Previous CABG, N (%)	174 (10.2)	121 (9.2)	0.386
Previous valve surgery, N (%)	207 (12.2)	40 (3.0)	0.001
Preop IABP placement, N (%)	4 (0.3)	1 (0.1)	0.395
Perfusion time (Med/IQR) (min)	120/90-171	100/79-129	0.001
Cross-clamp time (Med/IQR) (min)	82/64-119	69/55-91	0.001
Bioprosthesis, N (%)	1,304 (76.6)	1,133 (85.9)	0.001
Mechanical valve, N (%)	398 (23.4)	186 (14.1)	0.001
Valve size ≤21 mm, N (%)	536 (31.5)	460 (34.9)	0.051
Intra-op IABP placement, N (%)	23 (1.4)	9 (0.7)	0.105

Table 2 Demographics and operative characteristics of full and hemi-sternotomy matched groups

Characteristics	Group [No. of patients]		P value (≤)
	Full sternotomy [552]	Hemi-sternotomy [552]	
Surgical history and operative outcomes			
Emergent operation, N (%)	9 (1.6)	3 (0.5)	0.144
Previous CABG, N (%)	64 (11.6)	59 (10.7)	0.635
Previous valve surgery, N (%)	53 (9.6)	40 (7.2)	0.193
Pre-op IABP placement, N (%)	2 (0.4)	1 (0.2)	0.625
Perfusion time (Med/IQR) (min)	124/90-169	106/87-135	0.001
Cross-clamp time (Med/IQR) (min)	80/62-114	76/63-97	0.005
Bioprosthesis, N (%)	432 (78.3)	454 (82.2)	0.112
Mechanical valve, N (%)	120 (21.7)	98 (17.8)	0.112
Valve size ≤21 mm, N (%)	165 (29.9)	174 (31.6)	0.602
pRBC transfused, N (%)	154 (27.9)	110 (20.0)	0.003
Units per transfused patient (Med/IQR)	2.0/1-3	2.0/1-3	0.584
Intra-op IABP placement, N (%)	6 (1.1)	3 (0.5)	0.506

Table 4 Clinical outcomes for full and hemi-sternotomy matched cohorts

Outcomes	Group [No. of patients]		P value (≤)
	Full sternotomy [552]	Hemi-sternotomy [552]	
Postoperative complications			
Reoperation for bleeding, N (%)	10 (1.8)	9 (1.6)	1.000
Redo valve procedure, N (%)	4 (0.7)	0 (0.0)	0.124
Permanent stroke, N (%)	16 (2.9)	12 (2.2)	0.567
New onset renal insufficiency, N (%)	19 (3.4)	8 (1.4)	0.049
New dialysis requirement, N (%)	4 (0.7)	0 (0.0)	0.124
Cardiac arrest, N (%)	13 (2.4)	5 (0.9)	0.094
New onset atrial fibrillation, N (%)	140 (25.4)	97 (17.6)	0.002
In-hospital outcomes			
Ventilation time (Med/IQR) (hours)	6.3/3.9-11.2	5.7/3.5-10.3	0.022
Vent requirement >24 hours, N (%)	52 (9.4)	32 (5.8)	0.031
Total ICU stay (Med/IQR) (hours)	45/24-87	42/24-71	0.039
Postop length of stay (Med/IQR) (days)	7/5-10	6/5-8	0.001
Operative mortality, N (%)	19 (3.4)	14 (2.5)	0.385
30-day readmissions, N (%)	63 (11.5)	67 (12.2)	0.707

ICU, intensive care unit; N, number; Med, median; IQR, interquartile range.

Table 5 Clinical outcomes of reoperative full and hemi-sternotomy matched groups

Outcomes	Group [No. of patients]		P value
	Full sternotomy [116]	Hemi-sternotomy [116]	
Postoperative complications			
Reoperation for bleeding, N (%)	5 (4.3)	3 (2.6)	0.722
Redo valve procedure, N (%)	1 (0.9)	0 (0.0)	1.000
Permanent stroke, N (%)	5 (4.3)	4 (3.4)	1.000
New onset renal insufficiency, N (%)	10 (8.6)	2 (1.7)	0.034
New dialysis requirement, N (%)	3 (2.6)	0 (0.0)	0.124
Cardiac arrest, N (%)	6 (5.2)	3 (2.6)	0.499
New onset atrial fibrillation, N (%)	29 (25.0)	21 (18.1)	0.264
Hospitalization outcomes			
Ventilation time (Med/IQR) (hours)	9.8/5.9-23.9	10.5/5.9-19.5	0.948
Vent requirement >24 hours, N (%)	30 (25.9)	23 (19.8)	0.348
Total ICU stay (Med/IQR) (hours)	61/30-122	70/34-116	0.902
Postop length of stay (Med/IQR) (days)	8/6-13	8/6-11	0.501
pRBC transfused postoperatively, N (%)	42 (36.2)	31 (26.7)	0.157
Units per transfused patient (Med/IQR)	2.0/1-3	2.0/1-3	0.711
Operative mortality, N (%)	7 (6.0)	6 (5.2)	1.000
30-day readmissions, N (%)	17 (14.7)	13 (11.1)	0.544

ICU, intensive care unit; N, number; Med, median; IQR, interquartile range.

Minimally invasive aortic valve replacement using right minithoracotomy is associated with better outcomes than ministernotomy

Antonio Miceli, MD, PhD, Michele Murzi, MD, Danyiar Gilmanov, MD, Raffaele Fugà, MD, Matteo Ferrarini, MD, Marco Solinas, MD, and Mattia Glauber, MD

Objective: To compare the outcomes of right minithoracotomy (RT) versus ministernotomy (MS) in patients undergoing minimally invasive aortic valve replacement (AVR).

Methods: From January 2005 to December 2011, 406 patients underwent minimally invasive AVR, of whom 251 patients were in the RT group and 155 were in the MS group.

Results: The overall in-hospital mortality was 1.2% with no difference between the 2 groups (1.2% in RT vs 1.3% in MS). Patients undergoing minimally invasive AVR using RT had a lower incidence of postoperative atrial fibrillation (19.5% vs 34.2%, $P = .01$), shorter ventilation time (median, 7 vs 8 hours; interquartile range, 5-9 vs 6-12 hours, $P = .003$), intensive care unit stay (median 1 vs 1 day; interquartile range, 1-1 vs 1-2 days; $P = .001$), and hospital stay (median, 5 vs 6 days; interquartile range, 5-6 vs 5-8 days; $P = .0001$). No difference was found in terms of cardiopulmonary time, crossclamping time, postoperative stroke, re-exploration for bleeding, or blood transfusion.

Conclusions: Minimally invasive AVR using RT was associated with lower postoperative morbidities and a shorter hospital stay than MS. (J Thorac Cardiovasc Surg 2014;148:133-7)

TABLE 1. Baseline characteristics

Characteristic	RT (n = 251)	MS (n = 155)	*P* value
Age (y)	67.2 ± 12.8	68.5 ± 11.5	.27
Female gender	86 (34.3)	74 (47.7)	.09
COPD	35 (14)	24 (15.5)	.75
Hypertension	169 (67.3)	116 (74.8)	.13
Diabetes mellitus	48 (19)	35 (22.6)	.47
NYHA class III-IV	65 (25.9)	41 (26.5)	.9
LVEF (%)	56.7 ± 8.5	56.2 ± 6.7	.68
LVEF <35%	7 (2.8)	8 (5.2)	.34
Extracardiac vasculopathy	25 (10)	22 (14.2)	.26
Pulmonary hypertension	25 (10)	22 (14.2)	.26
Aortic valve disease			.67
Aortic stenosis	130 (51.8)	87 (56.1)	
Aortic regurgitation	51 (20.3)	30 (19.3)	
Mixed	70 (27.9)	38 (24.5)	
EuroSCORE	5.1 (2.7-9.7)	5.5 (3.2-9)	.45

(J Thorac Cardiovasc Surg 2014;148:133-7)

Variable	RT (n = 251)	MS (n = 155)	*P* value
Mortality	3 (1.2)	2 (1.3)	1
Stroke	3 (1.2)	2 (1.3)	1
Re-exploration for bleeding	12 (4.8)	5 (3.2)	.61
Blood transfusion	51 (20.3)	40 (25.8)	.24
New-onset postoperative AF	49 (19.5)	53 (34.2)	.01
Ventilation time (h)	7 (5-9)	8 (6-12)	.003
ICU stay (d)	1 (1-1)	1 (1-2)	.001
Ward stay (d)	5 (5-6)	6 (5-8)	.0001

Data presented as n (%) or median (range). *RT*, Right minithoracotomy; *MS*, ministernotomy; *AF*, atrial fibrillation; *ICU*, intensive care unit.

(J Thorac Cardiovasc Surg 2014;148:133-7)

TABLE 2. Intraoperative characteristics

Variable	RT (n = 251)	MS (n = 155)	*P* value
Ascending aortic–femoral venous cannulation	227 (90.4)	154 (99.4)	.01
CPB time (min)	124.9 ± 38.2	122.2 ± 36.7	.48
Crossclamp (min)	89.7 ± 28.3	84.3 ± 25.3	.07
Conversion to sternotomy	4 (1.6)	3 (1.9)	1

Data presented as n (%) or mean ± standard deviation. *RT*, Right minithoracotomy; *MS*, ministernotomy; *CPB*, cardiopulmonary bypass.

(J Thorac Cardiovasc Surg 2014;148:133-7)

Aortic Cross-Clamp Time, New Prostheses, and Outcome in Aortic Valve Replacement

Marco Ranucci[1], Alessandro Frigiola[2], Lorenzo Menicanti[2], Serenella Castelvecchio[1], Carlo de Vincentiis[2], Valeria Pistuddi[1], for the Surgical and Clinical Outcome Research (SCORE) Group

Departments of [1]Cardiothoracic and Vascular Anesthesia and Intensive Care and [2]Cardiac Surgery, IRCCS Policlinico San Donato, Milan, Italy

Results: The AXCT was an independent predictor severe cardiovascular morbidity, with an increas risk of 1.4% per 1 min increase. Patients with a l ventricular ejection fraction ≤40%, and also diabe patients, showed the most relevant clinical benef induced by a reduction in AXCT.

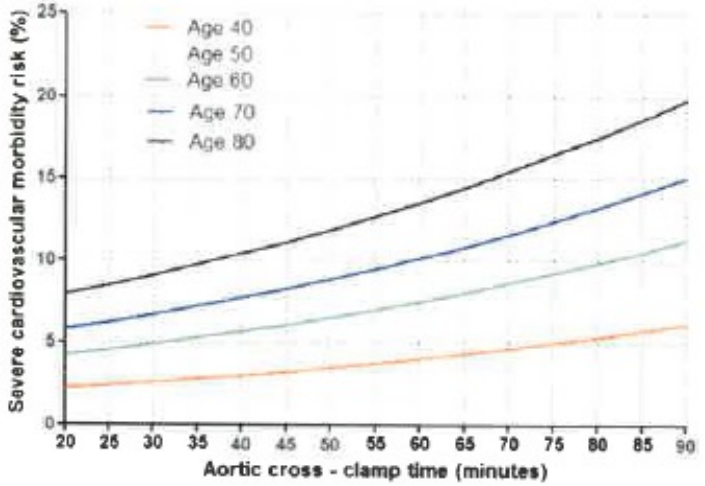


Figure 2: Changes in aortic-cross clamp time dependency for severe cardiovascular morbidity risk at different values of age.

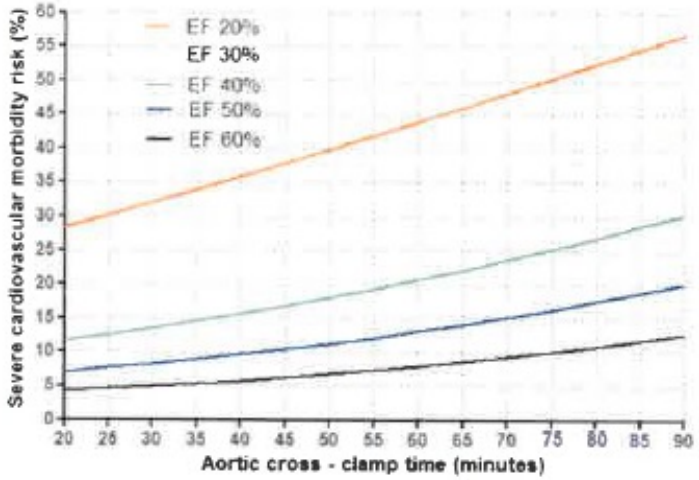


Figure 4: Changes in aortic-cross clamp time dependency for severe cardiovascular morbidity risk at different values of left ventricular ejection fraction.

The Journal of Heart Valve Disease 2012;21:732-739

SVAo Isolata
2000 - 2014

2389 pazienti

Classe di età	Mortalità (%)
18-60	0.8
60-80	2.1
> 80	3.0
Globale	1.9

IRCCS POLICLINICO SAN DONATO

SVAo Isolata
2000 - 2014

2389 pazienti
Età mediana 69 aa (20-99)

Trasfusioni ematiche	31%
Revisioni emostatiche	3.1%
	Mediana
Tempo clampaggio Tempo di CEC Stroke	44 minuti 56 minuti 0,4%
Degenza in TIPO	2 giorni
Degenza Ospedaliera	7 giorni
Revisioni Sternali	0.3%
Incidenza di PM definitivo	~ 3%

IRCCS POLICLINICO SAN DONATO

Sostituzione valvolare aortica 2000-2014
IRCCS Policlinico San Donato

	Isolata 2389	con CABG 1226
Classe di età	**Mortalità %**	**Mortalità %**
18-60	**0.8**	**3.5**
60-80	**2.1**	**4.1**
> 80	**3.0**	**7.7**
Globale	**1.9**	**4.9**

SVAo Isolata 2389 età mediana 69 aa

Trasfusioni ematiche	31%
Revisioni emostatiche	3.1%

	Mediana
Tempo clampaggio	44 minuti
Tempo di CEC	56 minuti
Stroke	0,4%
Degenza in TIPO	2 giorni
Degenza Ospedaliera	7 giorni
Revisioni Sternali	0.3%
Incidenza di PM definitivo	~ 3%

Svao +CABG 1226 età mediana 72 aa

Trasfusioni ematiche	60 %
Revisioni emostatiche	3.1 %

	Mediana
Tempo clampaggio	77 minuti
Tempo di CEC	104 minuti
Stroke	0,6 %
Degenza in TIPO	2 giorni
Degenza Ospedaliera	7 giorni
Revisioni Sternali	0.3 %
Incidenza di PM definitivo	7.7 %

Early and intermediate outcome after aortic valve replacement with a sutureless bioprosthesis: Results of a multicenter study

Antonino S. Rubino, MD,[a] Giuseppe Santarpino, MD,[b] Herbert De Praetere, MD,[c] Keiichiro Kasama, MD,[c] Magnus Dalén, MD,[d] Ulrik Sartipy, MD,[d] Jarmo Lahtinen, MD,[e] Jouni Heikkinen, MD,[e] Wanda Deste, MD,[a] Francesco Pollari, MD,[b] Peter Svenarud, MD, PhD,[d] Bart Meuris, MD, PhD,[c] Theodor Fischlein, MD,[b] Carmelo Mignosa, MD, FECTS,[a] and Fausto Biancari, MD, PhD[e]

Methods: This is a retrospective analysis of 314 patients (mean age, 77.9 ± 5.0 years, mean European System for Cardiac Operative Risk Evaluation II, 9.0% ± 7.6%) who underwent aortic valve replacement with the Perceval S valve with (94 patients) or without (220 patients) concomitant coronary artery bypass surgery at 5 European centers.

Isolated AVR	
Aortic crossclamping time (min)	39 ± 15
Aortic crossclamping time <30 min	64 (29.1)
Cardiopulmonary bypass time (min)	66 ± 23
Cardiopulmonary bypass time <60 min	93 (42.3)

Conclusions: The sutureless Perceval S valve is associated with excellent early survival in high-risk patients, particularly among those undergoing an isolated procedure. Further studies are needed to prove the durability of this bioprosthesis. (J Thorac Cardiovasc Surg 2014;148:865-71)

Postoperative outcomes	No. (%)
Implantation success	313 (99.7)
Intraoperative paravalvular leak	
None	274 (87.3)
Mild	38 (12.1)
Severe	2 (0.6)
Prosthesis dislodgment	1 (0.3)
Conversion to conventional AVR	2 (0.6)
Stroke	6 (1.9)
De novo dialysis	5 (1.6)
Pacemaker implantation	25 (8.0)
Reoperation for bleeding	8 (2.5)
Intensive care unit stay (d)	3.2 ± 3.4
In-hospital stay (d)	13.4 ± 6.5
In-hospital/30-d mortality	10 (3.2)
After isolated procedure	3 (1.4)
After combined procedure	7 (7.4)
Prosthesis-related early mortality	0 (0)

Aortic Valve Replacement Through Right Anterior Minithoracotomy: Can Sutureless Technology

Table 3. Clinical Outcome of Propensity-Matched Patients[a]

Variables	C Group (n = 133)	S Group (n = 133)	*p* Value
CPB time, median (IQR), min	120 (105–155)	90 (78–108.5)	<0.0001
Aortic cross-clamping time, median (IQR), min	88 (77–110)	56 (48–72.5)	<0.0001
Implanted prosthesis diameter, mean ± SD, mm	23.3 ± 1.9	24.2 ± 1.5	<0.0001
In-hospital mortality	2 (1.5)	1 (0.8)	0.62
Conversion to median sternotomy	4 (3.0)	3 (2.3)	1.0
Permanent CVA (stroke)	0	2 (1.5)	0.5
Transient CVA	1 (0.8)	2 (1.5)	0.62

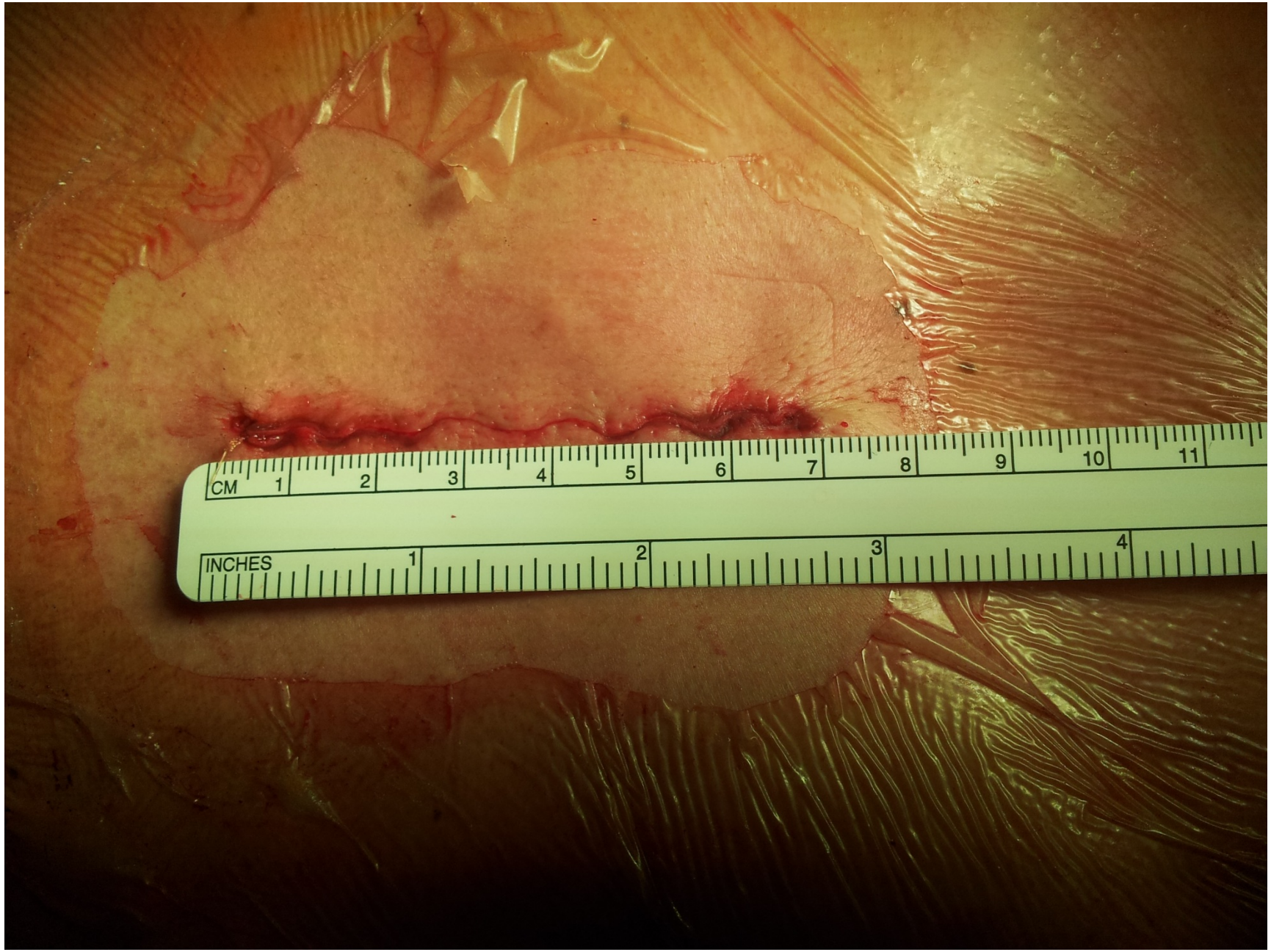
implanted through right anterior minithoracotomy.

Methods. Five hundred fifteen patients undergoing primary aortic valve replacement through a right anterior minithoracotomy (269 conventional versus 246 sutureless prostheses) between 2004 and 2014 were reviewed. The most common sutured prostheses were Carpentier-Edwards Perimount and Medtronic Mosaic, and the Sorin Perceval S mainly composed the sutureless prosthesis group. One hundred thirty-three pairs of patients were propensity matched and retrospectively analyzed.

Results. Cardiopulmonary bypass ($p < 0.0001$) and cross-clamping ($p < 0.0001$) times were shorter in the sutureless group (S group). We observed the same in-hospital mortality (1 versus 2; $p = 0.62$) and incidence of postoperative stroke and pacemaker implant between valves. 32 versus 15 months (overall median, 21 months). Overall Kaplan-Meier survival rate was 87.2% versus 97.0% ($p = 0.33$) and 50% versus 100% ($p = 0.02$) in elderly patients for sutured versus sutureless prostheses, respectively. Freedom from reoperation at follow-up ($p = 0.64$) and transaortic gradients (12 versus 11 mm Hg; $p = 0.78$) did not differ in the two groups.

Conclusions. In the present limited cohort of patients, sutureless prostheses reduced operative times for aortic valve replacement and the duration of mechanically assisted ventilation and might have influenced early and mid-term survival. Larger studies are needed to confirm our data and compare long-term outcomes.

(Ann Thorac Surg 2014;98:1585–92)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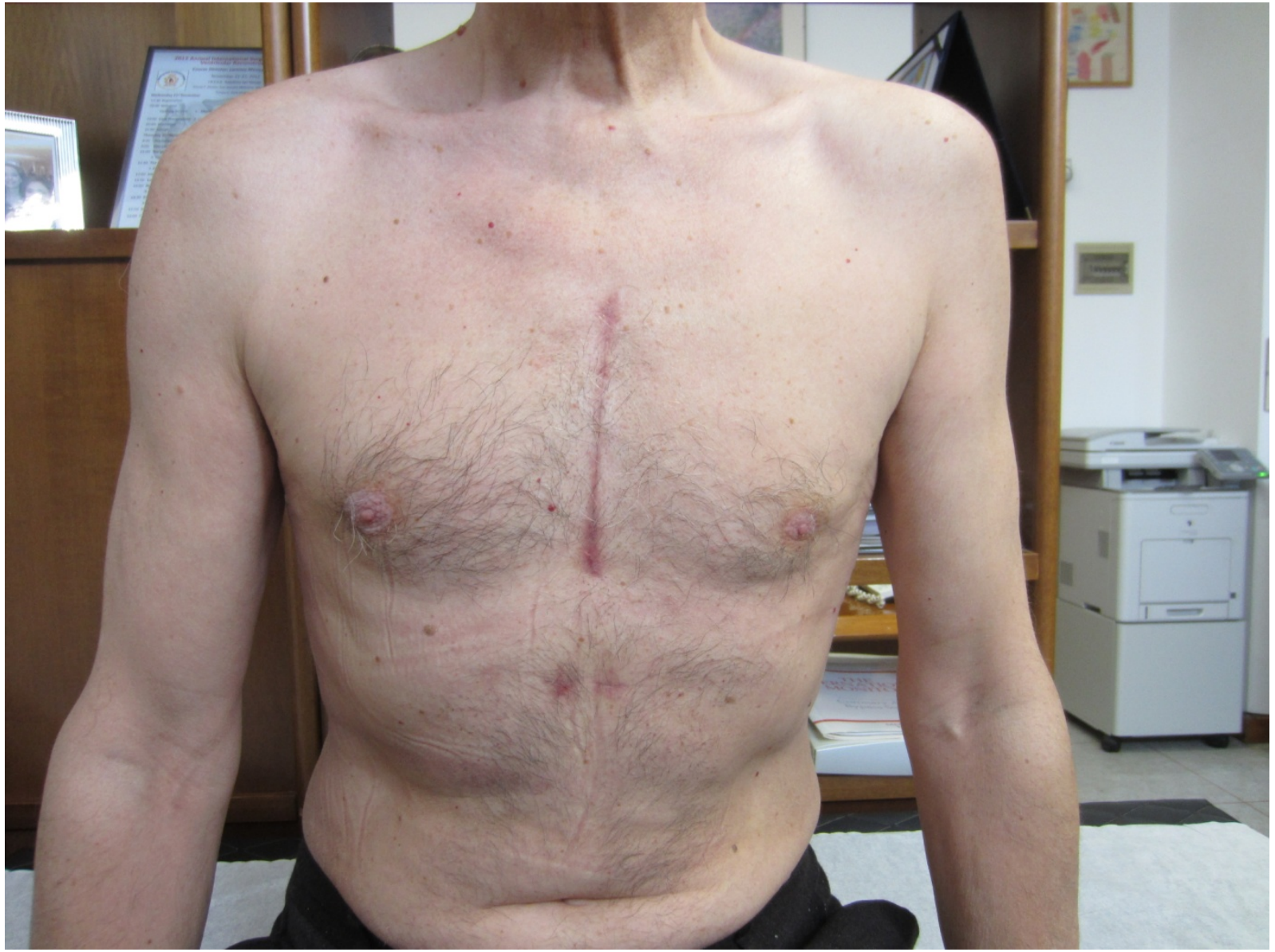
INCHES 1 2 3 4



Sternotomia con incisione limitata

Ministernotomy Versus Median Sternotomy for Aortic Valve Replacement: A Prospective, Randomized Study

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Background. Minimally invasive aortic valve replacement reduces surgical trauma and, supposedly, postoperative pain, blood loss, and length of stay. A prospective, randomized study was designed to prove these theoretical advantages.

Methods. Forty patients undergoing isolated, elective aortic valve replacement were randomized into two equal groups. Patients in group M underwent aortic valve replacement through a ministernotomy (reversed L or reversed C). In group S, a median sternotomy was used. The anesthetic and surgical protocol was identical for both groups. Pain was evaluated on a daily basis. Pulmonary function tests were performed preoperatively and before hospital discharge in all patients.

Results. There were two deaths in each group. Cross-clamp time was longer in group M: 70 ± 19 minutes versus 51 ± 13 minutes in group S ($p = 0.005$). There were no statistically significant differences between groups M and S in pump time (95 ± 20 minutes versus 83 ± 19 minutes), extubation time (9.9 hours in both groups), chest drainage (479 ± 274 mL/ 24 hours versus 355 ± 159 mL/ 24 hours), transfusion requirements (27% in both groups), pain evaluation (1.34 ± 1.3 versus 2.15 ± 1.5), length of stay (6.2 ± 2.3 days versus 6.3 ± 2.5 days), and cosmetic appraisal. Forced vital capacity decreased 26% from preoperative reference values in group M and 33% in group S (p = not significant). Forced expiratory volume in 1 second decreased 22% and 35%, respectively (p = not significant).

Conclusions. This study has failed to prove the theoretical advantages of minimally invasive aortic valve replacement. With this technique, cross-clamp time is longer than with a median sternotomy.

(Ann Thorac Surg 1999;67:1583–8)

Comparison of Minithoracotomy and Conventional Sternotomy Approaches for Valve Surgery

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Objective: To compare patients undergoing valve surgery through a minithoracotomy approach with a matched group undergoing conventional valve surgery.

Design: Control study.

Setting: University hospital, single center.

Participants: Forty-one consecutive patients scheduled for valve surgery by minithoracotomy approach were matched with a similar group of patients operated on by the sternotomy approach.

Interventions: Criteria for matching included type of valve procedure (aortic valve replacement or mitral valve repair), age, surgeons, and left ventricular function. Two surgeons performed the surgical procedures. Perioperative care was standardized for all patients. Operative and postoperative data were recorded.

Measurements and Main Results: The 41 pairs of patients were correctly matched, except for left ventricular function (n = 1). Twenty patients underwent mitral valve repair and 62 aortic valve replacement. Preoperative demographic data and clinical characteristics were similar in both groups. Cardiopulmonary bypass, aortic clamping, and surgery times were longer in the minithoracotomy group ($p < 0.05$). In 3 patients, the minithoracotomy approach had to be converted into a sternotomy during the surgical procedure for better visualization. Minithoracotomy patients had significantly increased postoperative total blood loss ($p < 0.05$). No difference was found between the groups for extubation time and intensive care or in-hospital lengths of stay.

Conclusion: These results suggest that valve surgery is feasible in many cases through minithoracotomy. Nevertheless, this approach increases surgical complexity and in this comparative study no significant benefit was shown.

KEY WORDS: cardiovascular anesthesia, minimally invasive surgery, minithoracotomy, sternotomy, valve surgery

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Best evidence topic - Valves

Is ministernotomy superior to conventional approach for aortic valve replacement?

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Summary

A best evidence topic in cardiac surgery was written according to a structured protocol. The question addressed was: is ministernotomy superior to conventional approach for aortic valve replacement (AVR)? Altogether, more than 115 papers were found using the reported search, of which six represented the best evidence to answer the clinical question. The authors, journal, date and country of publication, patient group studied, study type, relevant outcomes and results of these papers are tabulated. We conclude that ministernotomy can be performed safely for AVR, without increased risk of death or other major complication; however, few objective advantages have been shown. Ministernotomy can be offered on the basis of patient choice and cosmesis rather than evident clinical benefit.

Keywords: Ministernotomy; Minimally invasive; Aortic valve replacement; Humans

Thorac Cardiovasc Surg. 2002 Dec;50(6):337-41.

Midterm results and quality of life after minimally invasive vs. conventional aortic valve replacement.

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Abstract

BACKGROUND: This study compares early and mid-term results as well as the quality of life (QOL) between the minimally invasive and conventional aortic valve replacement (AVR).

METHODS: Between 7/97 and 4/01, 70 patients (mean age 64.3 +/- 1.3 years) underwent minimally invasive AVR (group M) through an L-shaped ministernotomy. The results were compared to those of 70 conventional AVR (group C) patients during the same period. Patients were equally matched according to age, sex, ejection fraction, valvular lesion, and valve prosthesis. In groups M and C, follow-up was 98.5 % and 95.4 % complete and averaged 34.0 +/- 10.3 and 33.1 +/- 12.9 months, respectively.

RESULTS: There were no hospital deaths in group M but two deaths in group C (p = n. s.). Conversion to full sternotomy was necessary in two group M patients. Cross-clamping time (71 +/- 15 min vs. 58 +/- 18 min), cardiopulmonary bypass time (105 +/- 22 min vs. 84 +/- 24 min), and time of surgery (228 +/- 45 min vs. 184 +/- 48 min) were significantly longer in group M. No statistically significant differences between the two groups for postoperative ventilation time, transfusion rate, ICU stay or length of hospital stay were recorded. At the end of follow-up, 98.5 % vs. 96.9 % of the patients were free of thromboembolism (p = n. s.), 100.0 % vs. 96.9 % were free of endocarditis (p = n. s.), and 98.5 % vs. 100.0 % were free of reoperation (p = n. s.) in group M compared to group C. Survival was 97.0 % vs. 91.9 % (p = ns). No differences in any of the 8 QOL categories, in patient satisfaction with the operative result or in judgment of the cosmetic aspect were noted among groups.

CONCLUSIONS: This study has failed to show any advantage of minimally invasive AVR in early or midterm follow-up.

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Surgical results of aortic valve replacement via partial upper sternotomy: comparison with median sternotomy

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Background: the theoretical advantages of mini-invasive cardiac surgery are shorter hospitalisation, better surgical results and costs reduction. In November 1997 we started a non-coronary mini-invasive surgery program using a partial upper median sternotomy. This study has been conceived to retrospectively compare two groups of patients who underwent isolate aortic valve replacement using the conventional and the mini-invasive technique.

Material and methods: in Group A 100 patients (mean age 62±12 years; 58 male) underwent isolated aortic valve replacement through a partial upper median sternotomy. Group B was composed by the last 100 patients (mean age 63±8 years; 56 male) who underwent the same operation through a conventional median sternotomy. For both groups we recorded the ECC and ischaemic times, postoperative intubation time, total postoperative bleeding, intensive care unit length of stay and total hospitalisation time. Major and minor complications were reported.

Results: operating times, were significantly longer in Group A ($p<0.001$). Mechanical ventilation time, ICU and total hospital stay, and total postoperative bleeding showed no significant difference. Adjunctive statistical evidenced the absence of learning curve. Mortality and other complications failed to reveal any significant difference between the two groups.

Conclusions: in our experience, partial upper median sternotomy does not increase surgical risks but failed to demonstrate clear advantages. Apart for an increase in operating times, the surgical results are similar to those of a conventional median sternotomy with only improvement in the aesthetical aspect. In our opinion, this supports the conviction that this approach can be proposed to selected patients, to obtain a better cosmethical result for the same given risk.

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