



# LA TECNICA TRADIZIONALE DI SOSTITUZIONE DELL'AORTA ASCENDETE E DELL'ARCO



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IRCCS, Istituto Clinico Humanitas  
Rozzano , Milano



## *Prof. Angelo Pierangeli*

**1974: prima sostituzione  
dell'arco aortico in ipotermia  
profonda**

Pierangeli A, Coli G, Donati A, Galli R, Mikus PM, Turinetto B.  
Treatment of aortic arch aneurysm with deep hypothermia and  
circulatory arrest. J Cardiovasc Surg 1975; 16:409-414

Pierangeli A, Coli G, Mikus PM. Sostituzione dell'arco aortico in  
ipotermia profonda per aneurisma. Bull. Scienze Med 1974; 2:1-16

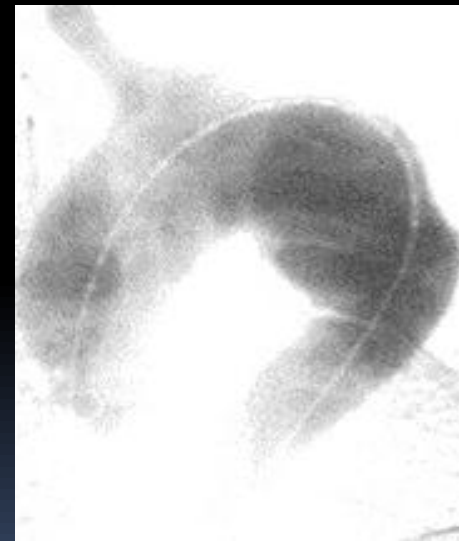


# EZIOLOGIA

ANEURISMI *PRIMITIVI* SONO RARI  
< 10% CHE COINVOLGONO L'ARCO



- DEGENERATIVI
- ATEROSCLEROTICI
- DISSEZIONI CRONICHE
- INFIAMMATORI
- MICOTICI
- TRAUMI
- PSEUDOANEURISMI



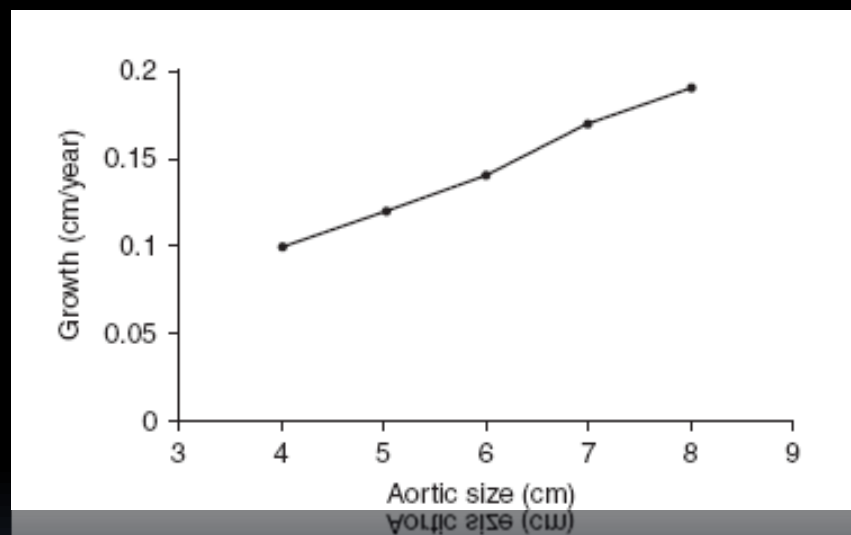
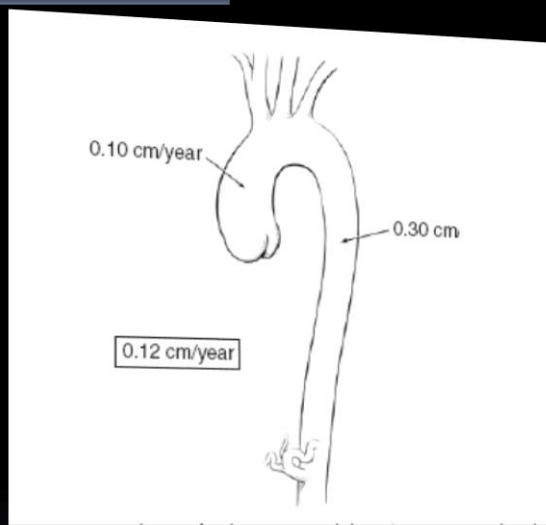




John Eleftheriades  
Yale University

## STORIA NATURALE

### RITMO DI CRESCITA

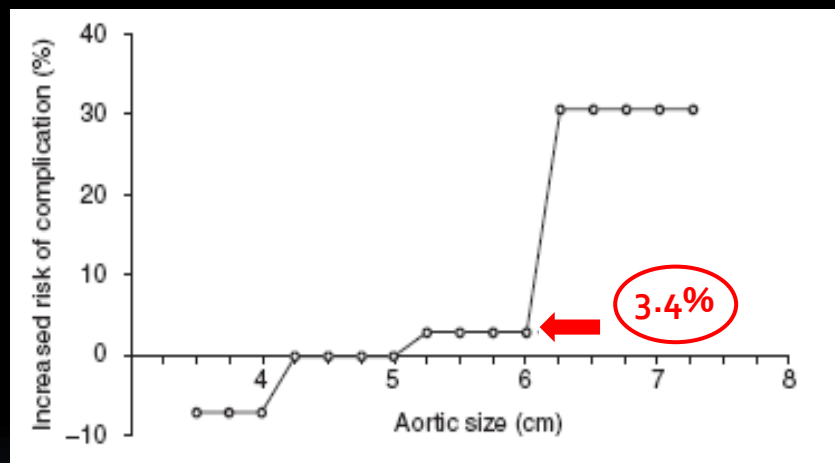




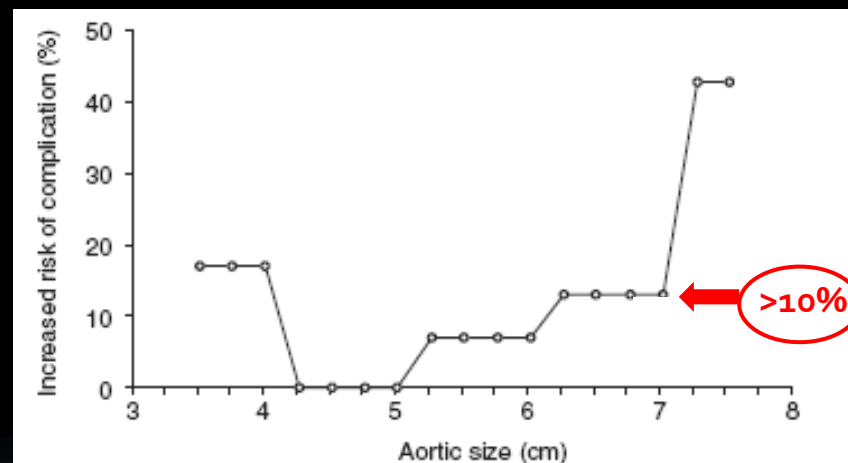
John Eleftheriades  
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## STORIA NATURALE

### RISCHIO di COMPLICANZE



**AORTA ASCENDENTE**



**AORTA DISCENDENTE**



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Yale University

## STORIA NATURALE

QUANDO OPERARE?

**TUTTI GLI ANEURISMI SINTOMATICI  
A PRESCINDERE DAL DIAMETRO**

- DOLORE
- COMPRESSIONE DI TRACHEA O ESOFAGO
- PARALISI DI CORDE VOCALI

**IL PRIMO SINTOMO è *L'EVENTO AORTICO ACUTO***

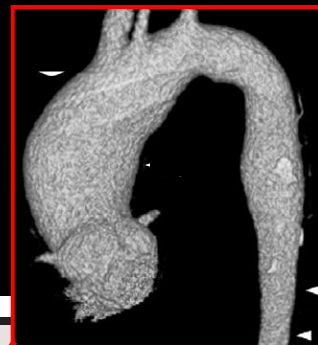




John Eleftheriades  
Yale University

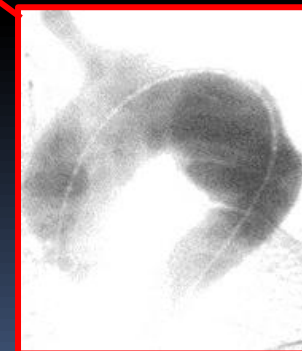
## STORIA NATURALE

### PZ ASINTOMATICI



		Non-Marfan
Ascending		5.5 cm
Descending		6.5 cm

- Storia familiare di aneurisma o dissezione
- Bicuspidia aortica





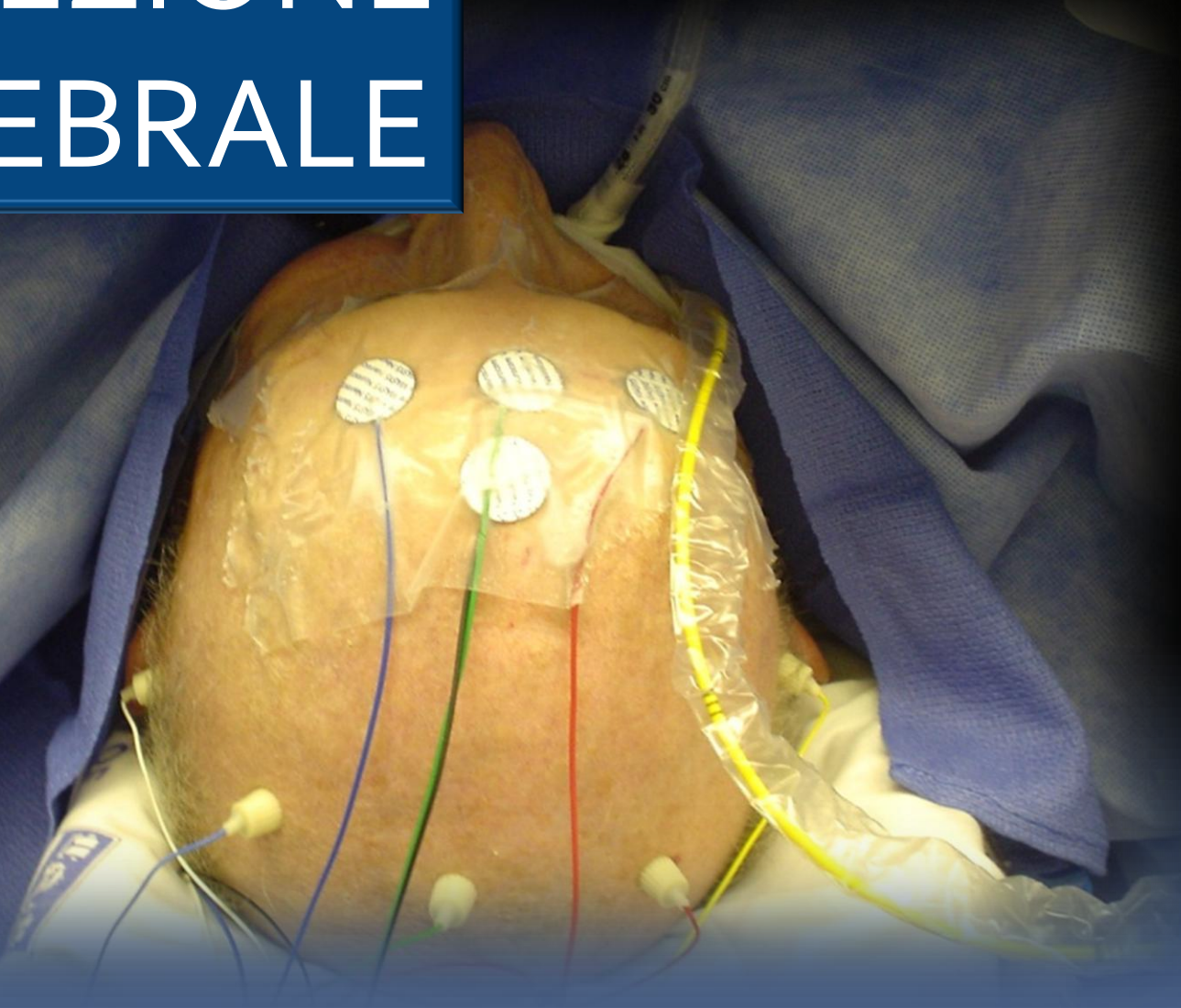
John Eleftheriades  
Yale University

## STORIA NATURALE

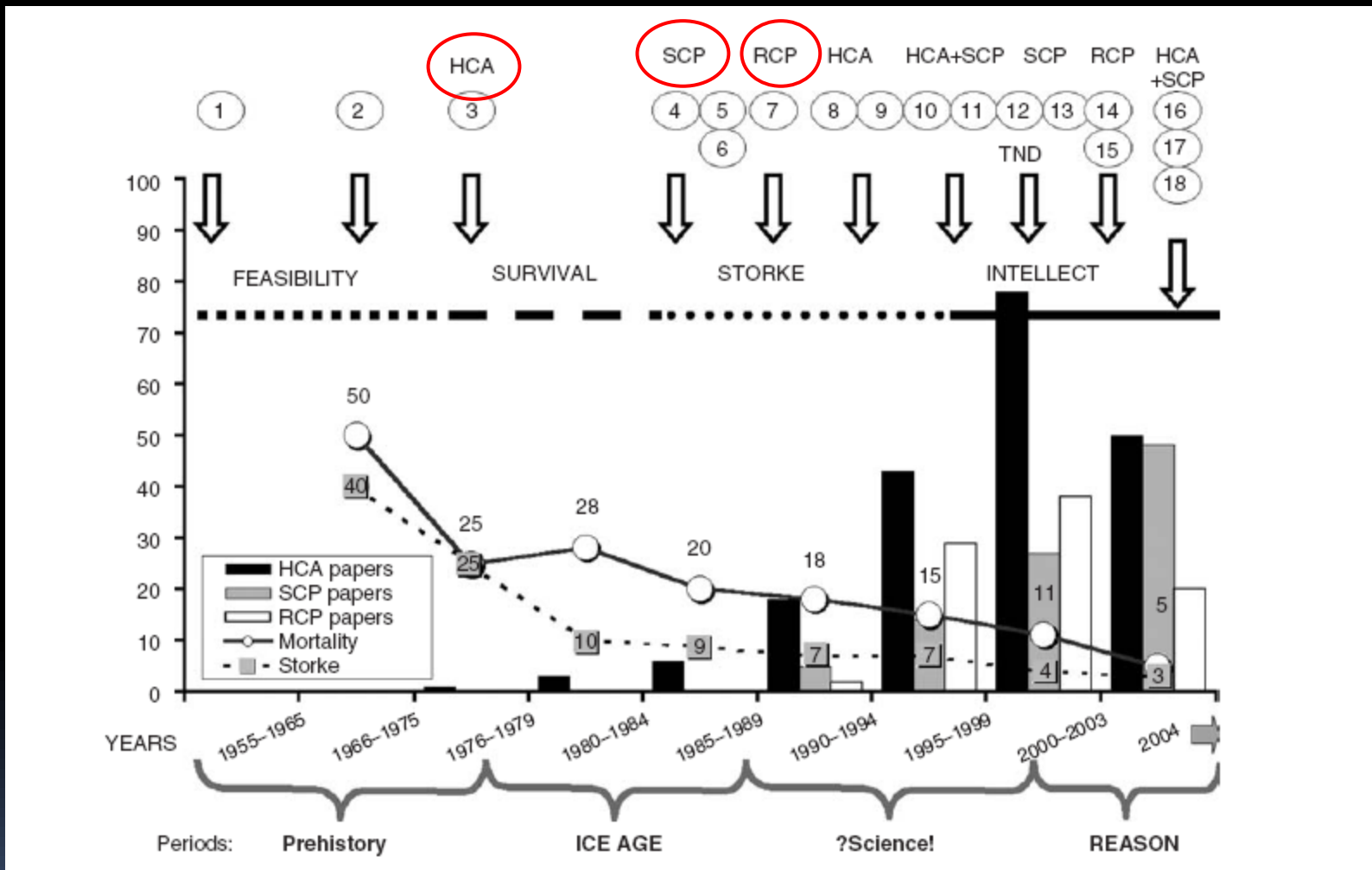
### INDICAZIONI

**CRESCITA > 1 cm/anno**

# PROEZIONE CEREBRALE



# PROEZIONE CEREBRALE



## IPOTERMIA PROFONDA

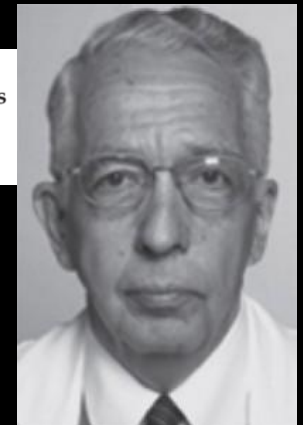
HOW LONG  
and  
HOW COLD?



# IPOTERMIA PROFONDA

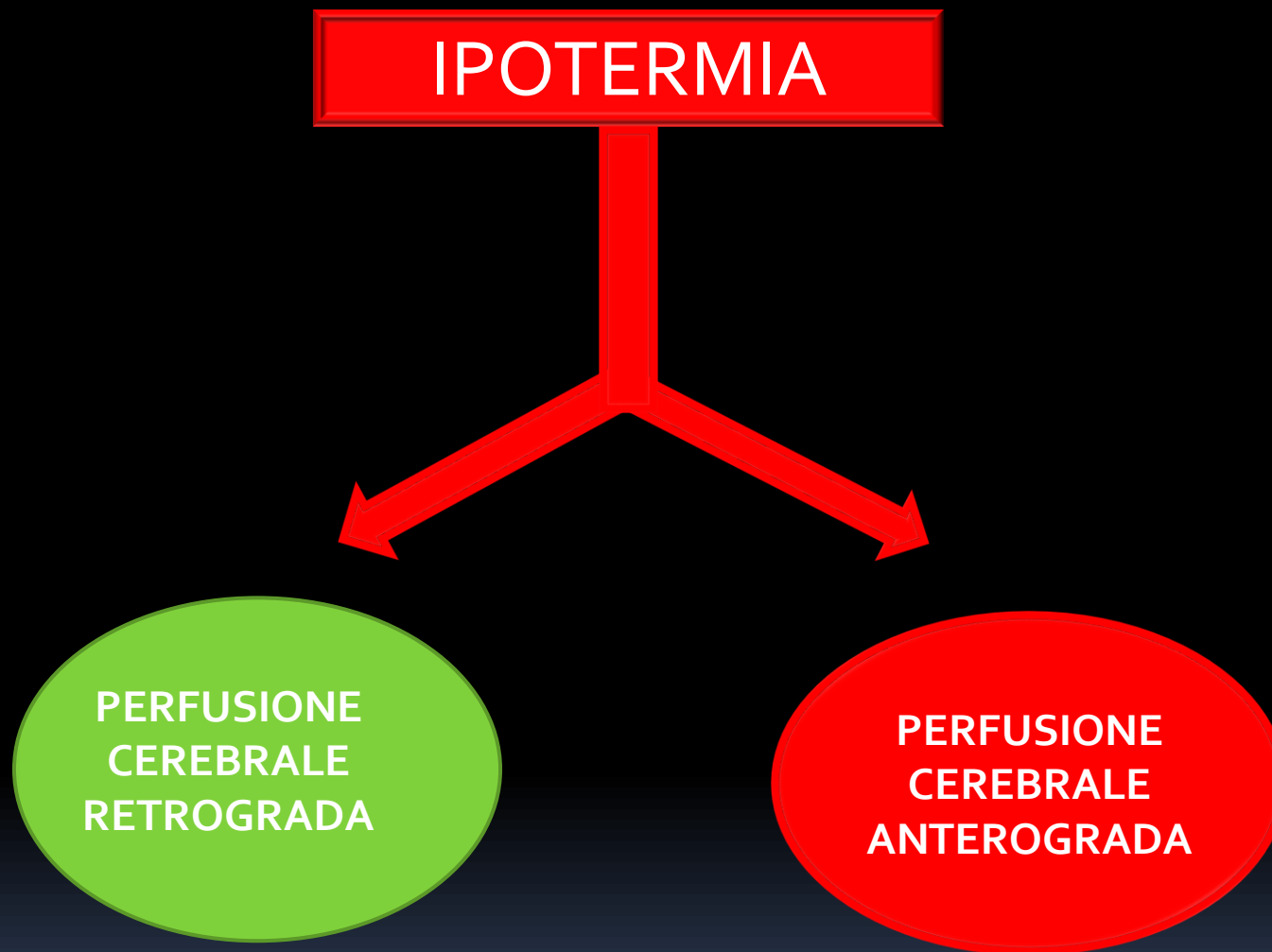
## Cerebral Metabolic Suppression During Hypothermic Circulatory Arrest in Humans

Jock N. McCullough, MD, Ning Zhang, MD, David L. Reich, MD, Tatu S. Juvonen, MD, PhD, James J. Klein, MD, David Spielvogel, MD, M. Arisan Ergin, MD, PhD, and Randall B. Griepp, MD  
 Department of Cardiothoracic Surgery, Mount Sinai Medical Center, New York, New York



Ann Thorac Surg 1999;67:1895-9

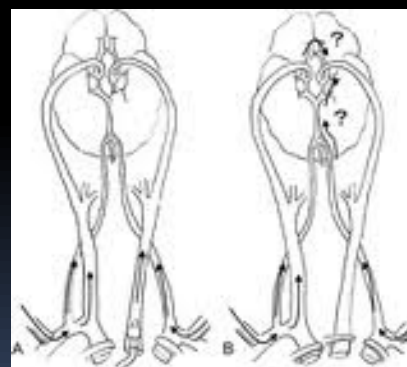
Temperature (°C)	Cerebral Metabolic Rate (% of baseline)	Safe Duration of HCA (min)
37	100	5
30	56 (52-60)	9 (8-10)
25	37 (33-42)	14 (12-15)
20	24 (21-29)	21 (17-24)
15	16 (13-20)	31 (25-38)
10	11 (8-14)	45 (36-62)







De Bakey ME, Crawford ES, Cooley DA, Morris GC Jr. Successful resection of fusiform aneurysm of aortic arch with replacement by homograft. *Surg Gynecol Obstet* 1957;105(6): 657–64





QUANTO  
SANGUE  
MANDARE  
AL  
CERVELLO?



# A QUALE TEMPERATURA?



*Ann Thorac Surg* 1995;59:651-7

## Experimental Study on the Optimum Flow Rate and Pressure for Selective Cerebral Perfusion

Hisashi Tanaka, MD, Teruhisa Kazui, MD, Hiroki Sato, MD, Norio Inoue, MD, Osamu Yamada, MD, and Sakuzo Komatsu, MD

Department of Thoracic and Cardiovascular Surgery, Sapporo Medical University School of Medicine, Sapporo, Japan



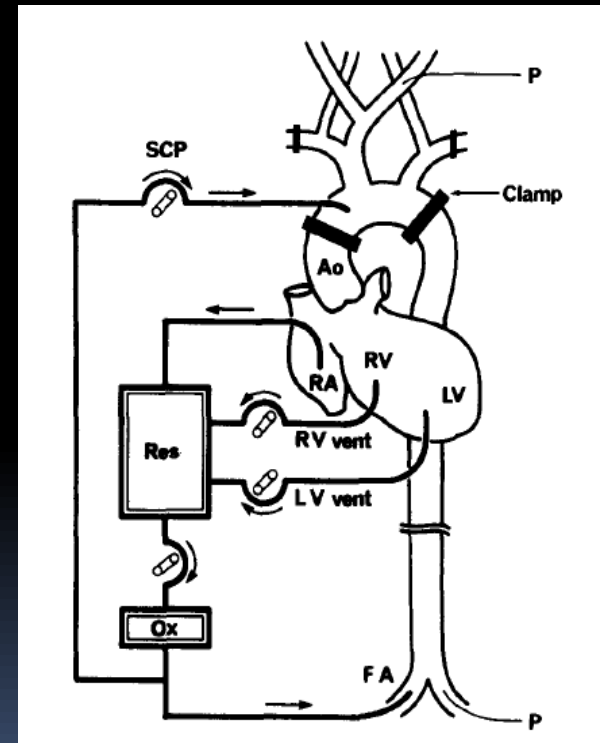
• Flusso cerebrale al 100% | 50% | 25% | 0%

• Ipotermia a 25°C

90 min

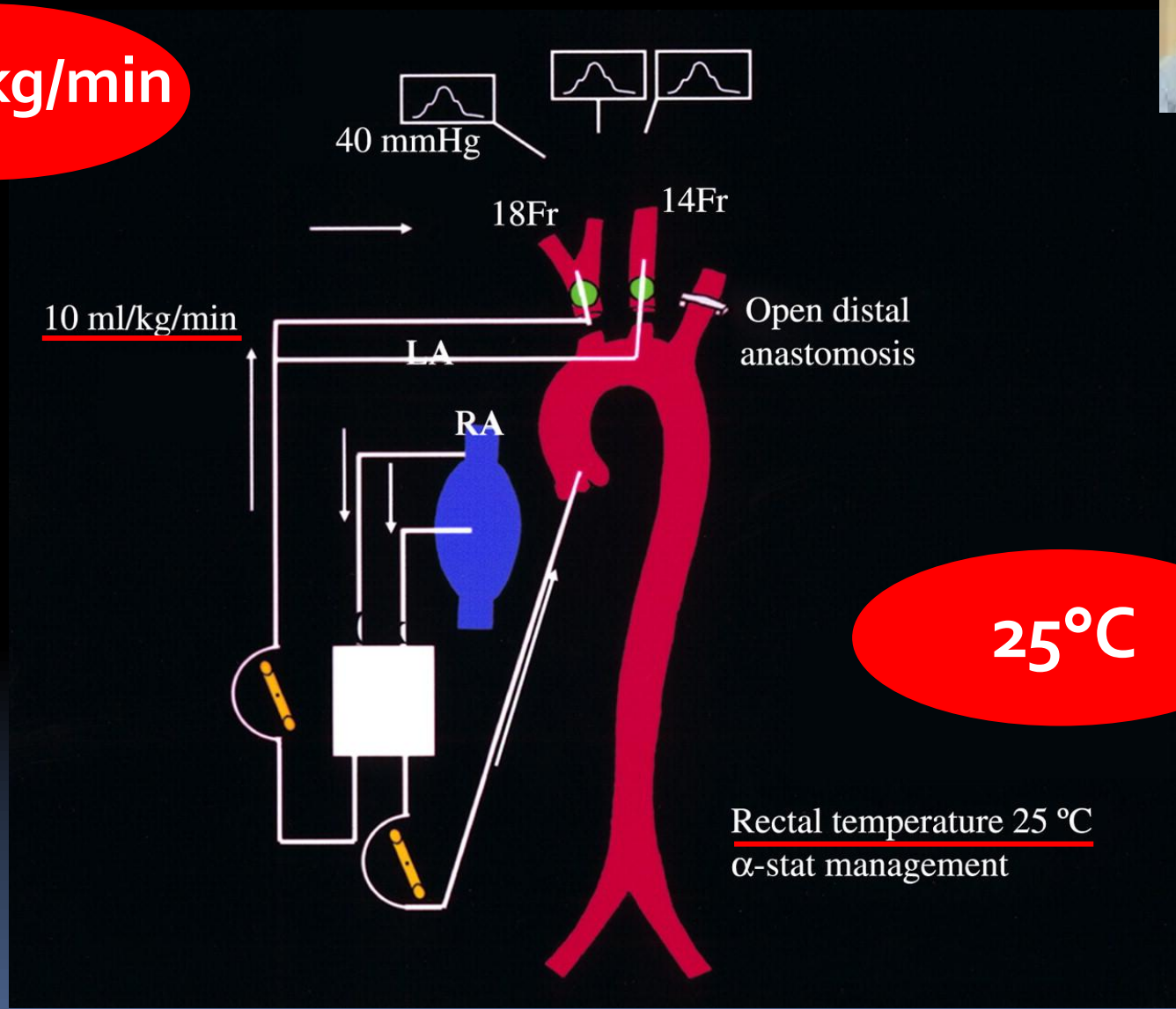
Flusso ottimale 50-100%

Press. a. carotide  $\geq 30$  mmHg





**10 ml/kg/min**

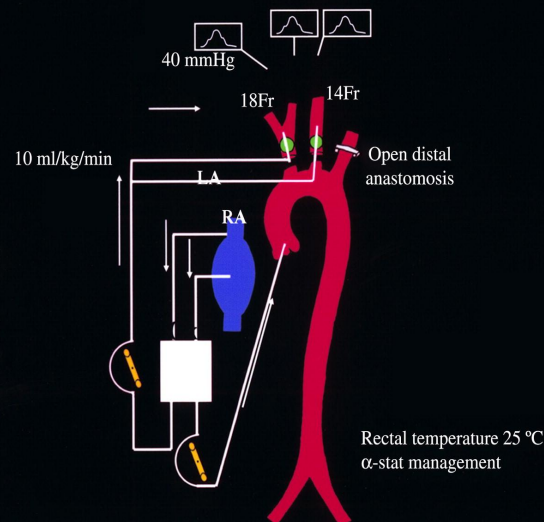


**25°C**

Rectal temperature 25 °C  
α-stat management



**TEMPO** (min) di perfusione cerebrale selettiva (sec. Kazui)



**NON** rappresenta un fattore di rischio per MORTALITA' OSPEDALIERA e OUTCOME NEUROLOGICO

(Ann Thorac Surg 2007;83:3:S796-8)

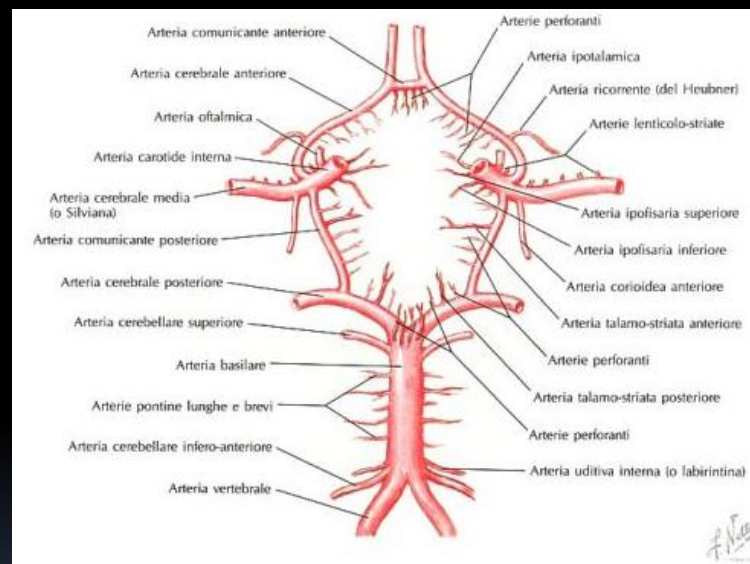
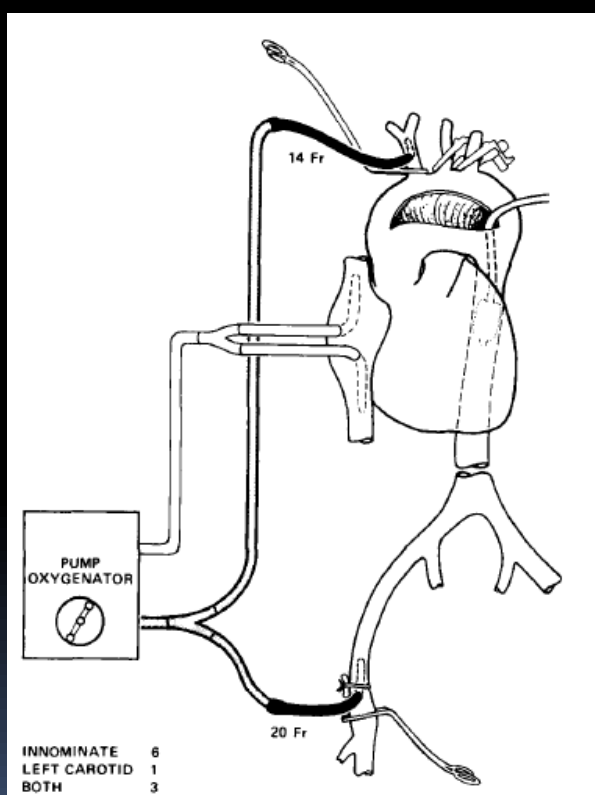


**ESTESA e METICOLOSA RICOSTRUZIONE DELL'ARCO AORTICO**

# A Reconsideration of Cerebral Perfusion in Aortic Arch Replacement

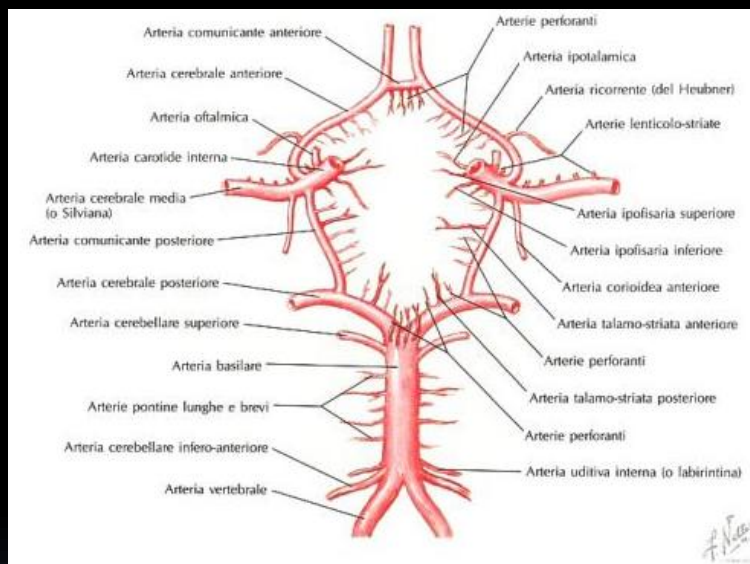
William H. Frist, M.D., John C. Baldwin, M.D., Vaughn A. Starnes, M.D.,  
Edward B. Stinson, M.D., Philip E. Oyer, M.D., Ph.D., D. Craig Miller, M.D.,  
Stuart W. Jamieson, M.B., F.R.C.S., R. Scott Mitchell, M.D.,  
and Norman E. Shumway, M.D., Ph.D.

Ann Thorac Surg 42:273-281, Sep 1986





CIRCOLO del WILLIS



CIRCOLO del WILLIS



(k) Normal complete circle



Some variations of the circle of Willis, important for cerebral protection in aortic surgery – a study in Eastern Europeans

Vassil Papantchev<sup>a,e,\*</sup>, Stanislav Hristov<sup>b</sup>, Daniela Todorova<sup>c</sup>, Emanuil Naydenov<sup>d</sup>,  
Adrian Paloff<sup>a</sup>, Dimitar Nikolov<sup>e</sup>, Alexander Tschirkov<sup>e</sup>, Wladimir Ovtsharoff<sup>a</sup>

<sup>a</sup>Department of Anatomy and Histology, Medical University, 1, G. Sofiski Street, 1431-Sofia, Bulgaria

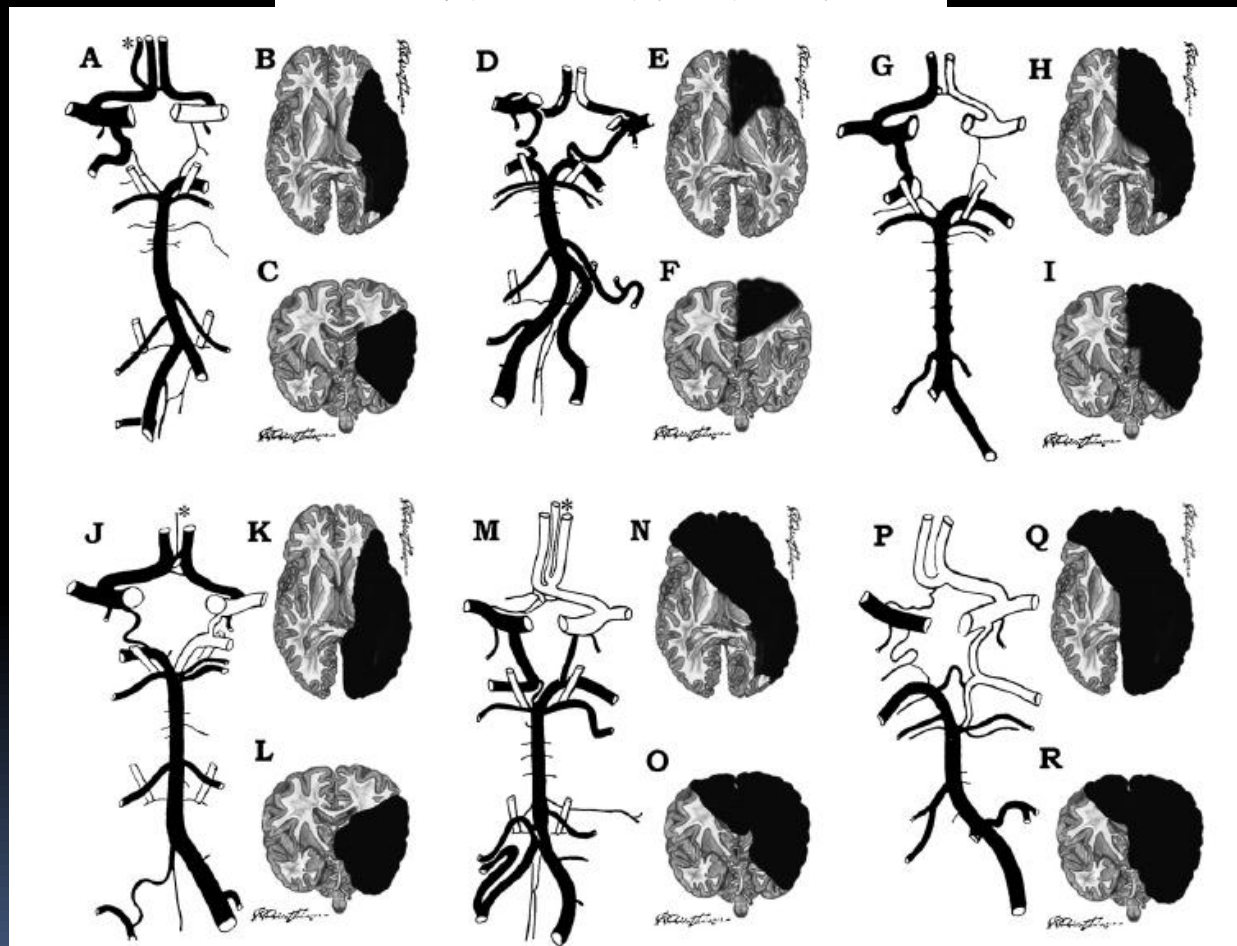
<sup>b</sup>Department of Forensic Medicine, Medical University, 1431-Sofia, Bulgaria

<sup>c</sup>Department of General, Experimental and Genetic Psychology, Sofia University, 1504-Sofia, Bulgaria

<sup>d</sup>Department of Neurosurgery, "St. Ivan Rilski" University Hospital, Medical University, 1431-Sofia, Bulgaria

<sup>e</sup>Department of Cardiac Surgery, "St. Ekaterina" University Hospital, 1431-Sofia, Bulgaria

Received 23 January 2007; received in revised form 5 March 2007; accepted 6 March 2007; Available online: 19 April 2007



## Does anatomical completeness of the circle of Willis correlate with sufficient cross-perfusion during unilateral cerebral perfusion?☆

Paul P. Urbanski<sup>a,\*</sup>, Aristidis Lenos<sup>a</sup>, Juan C. Blume<sup>a</sup>, Volker Ziegler<sup>d</sup>,  
Bernd Griewing<sup>d</sup>, Rainer Schmitt<sup>c</sup>, Anno Diegeler<sup>a</sup>, Michael Dinkel<sup>b</sup>

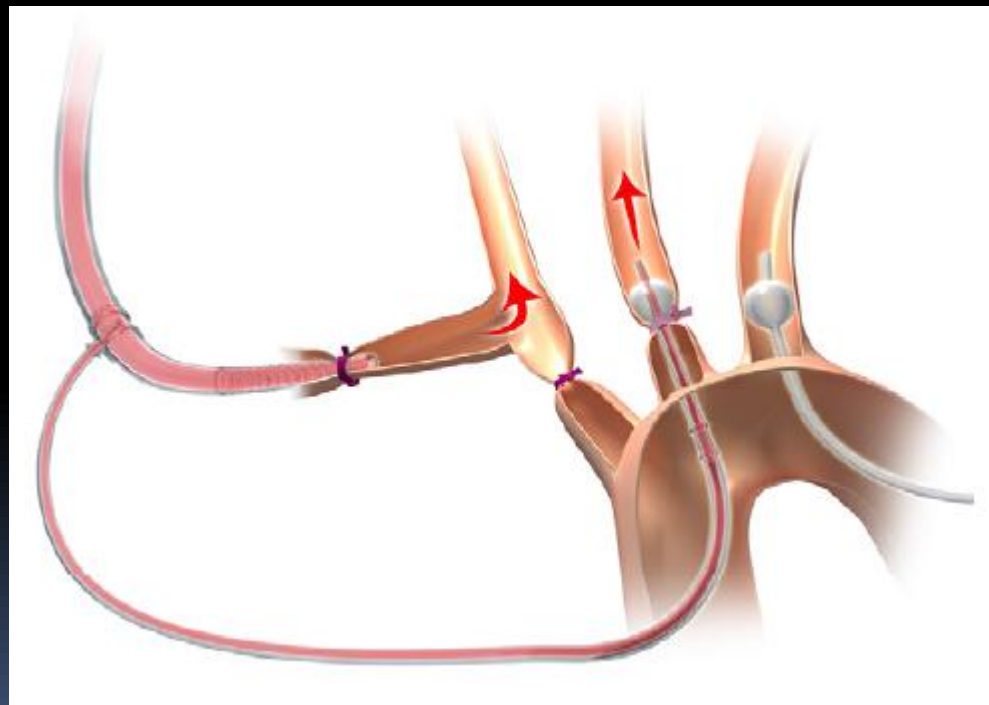
<sup>a</sup>Department of Cardiovascular Surgery, Cardiovascular Clinic Bad Neustadt, Germany

<sup>b</sup>Department of Anesthesiology, Cardiovascular Clinic Bad Neustadt, Germany

<sup>c</sup>Department of Radiology, Cardiovascular Clinic Bad Neustadt, Germany

<sup>d</sup>Department of Neurology, Neurological Clinic Bad Neustadt, Germany

Received 21 August 2007; received in revised form 6 December 2007; accepted 11 December 2007



**Abstract**

**Objectives:** The aim of the study was to evaluate the role of anatomical completeness of the circle of Willis for sufficient brain perfusion during unilateral cerebral perfusion and the methodology of the preoperative and intraoperative functional assessments of adequate cross-perfusion.

**Methods:** This prospective observational study included all elective patients (99) who underwent elective open arch surgery (hemiarch in 74 and arch replacement in 25 patients, respectively) at our institution between September 2004 and September 2006. Preoperative neuro-vascular evaluation included color-coded duplexsonography of the extracranial arteries, cranial CT angiography, and transcranial sonography. A functional test of cerebral cross-perfusion was performed during cross-clamping of the common carotid artery during cannulation by transcranial Doppler, electroencephalography and measurement of cerebrovascular evoked potentials. These examinations

all elective patients (99)

which were completed through measurement of cerebral perfusion during surgery. During mild cross-clamping using unilateral cerebral perfusion was complete in only 59 patients. Eighteen patients had abnormalities within the posterior communicating arteries on both sides, and 9 patients within the anterior and posterior communicating arteries. Nevertheless, functional tests during carotid artery cross-clamping as well as intraoperative cerebral monitoring including transcranial Doppler showed no pathology in any patient, and only one patient with severe aortic valve calcification suffered from embolic minor stroke after surgery. **Conclusions:** The anatomical status of the circle of Willis assessed with cranial CT angiography does not correlate with functional and intraoperative tests examining the cerebral cross-perfusion. The authors do not recommend cranial CT angiography as a preoperative standard examination before open arch surgery in which unilateral cerebral perfusion is scheduled.

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**Keywords:** Aortic arch surgery; Circulatory arrest; Brain protection; Cerebral perfusion; Circle of Willis

**Abstract**

**Objectives:** The aim of the study was to evaluate the role of anatomical completeness of the circle of Willis for sufficient brain perfusion during unilateral cerebral perfusion and the methodology of the preoperative and intraoperative functional assessments of adequate cross-perfusion. **Methods:** This prospective observational study included all elective patients (99) who underwent elective open arch surgery (hemiarch in 74 and arch replacement in 25 patients, respectively) at our institution between September 2004 and September 2006. Preoperative neuro-vascular evaluation included color-coded duplexsonography of the extracranial arteries, cranial CT angiography, and transcranial sonography. A functional test of cerebral cross-perfusion was performed during cross-clamping of the common carotid artery during cannulation by transcranial Doppler, electroencephalography and measurement of somatosensory evoked potentials. These examinations, which were completed through measurement of arterial pressure in both radial arteries, also served as an intraoperative assessment of cerebral perfusion during surgery. During mild hypothermic (30 °C) circulatory arrest with a mean duration of 18 min (range, 7–70) brain protection using unilateral cerebral perfusion was performed in all patients. **Results:** As assessed in preoperative CT angiography, the circle of Willis was complete in only 59 patients. Eighteen patients showed a singular abnormal location within the circle of Willis, 13 patients presented with abnormalities within the posterior communicating arteries on both sides, and 9 patients within the anterior and posterior communicating arteries. Nevertheless, functional tests during carotid artery cross-clamping as well as intraoperative cerebral monitoring including transcranial Doppler showed no pathology in any patient, and only one patient with severe aortic valve calcification suffered from embolic minor stroke after surgery. **Conclusions:** The anatomical status of the circle of Willis assessed with cranial CT angiography does not correlate with functional and intraoperative tests examining the cerebral cross-perfusion. The authors do not recommend cranial CT angiography as a preoperative standard examination before open arch surgery in which unilateral cerebral perfusion is scheduled.

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**Keywords:** Aortic arch surgery; Circulatory arrest; Brain protection; C

one patient

European Journal of Cardio-thoracic Surgery 33 (2008) 402–408

Hemiarch replacement	75
Total/subtotal arch replacement	24
Aortic valve composite graft	50
Valve-sparing root repair <sup>a</sup>	36
CABG	20
Aortic valve replacement	11
Mitral valve repair	8



**Abstract**

**Objectives:** The aim of the study was to evaluate the role of anatomical completeness of the circle of Willis for sufficient brain perfusion during unilateral cerebral perfusion and the methodology of the preoperative and intraoperative functional assessments of adequate cross-perfusion. **Methods:** This prospective observational study included all elective patients (99) who underwent elective open arch surgery (hemiarch in 74 and arch replacement in 25 patients, respectively) at our institution between September 2004 and September 2006. Preoperative neuro-vascular evaluation included color-coded duplexsonography of the extracranial arteries, cranial CT angiography, and transcranial sonography. A functional test of cerebral cross-perfusion was performed during cross-clamping of the common carotid artery during cannulation by transcranial Doppler, electroencephalography and measurement of somatosensory evoked potentials. These examinations, which were completed through measurement of arterial pressure in both radial arteries, also served as an intraoperative assessment of cerebral perfusion during surgery. During mild hypothermic (30 °C) circulatory arrest with a mean duration of 18 min (range, 7–70) brain protection using unilateral cerebral perfusion was performed in all patients. **Results:** As assessed in preoperative CT angiography, the circle of Willis was complete in only 59 patients. Eighteen patients showed a singular abnormal location within the circle of Willis, 13 patients presented with abnormalities within the posterior communicating arteries on both sides, and 9 patients within the anterior and posterior communicating arteries. Nevertheless, functional tests during carotid artery cross-clamping as well as intraoperative cerebral monitoring including transcranial Doppler showed no pathology in any patient, and only one patient with severe anatomical status of the circle of Willis assessed the cerebral cross-perfusion. The authors do not recommend surgery in which unilateral cerebral perfusion is used.

18 min (range, 7–70)

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**Keywords:** Aortic arch surgery; Circulatory arrest; Brain protection; Cerebral perfusion; Circle of Willis

Best evidence topic - Cardiopulmonary bypass  
Is unilateral antegrade cerebral perfusion equivalent to bilateral cerebral perfusion for patients undergoing aortic arch surgery?

Pietro Giorgio Malvindi, Giuseppe Scrascia, Nicola Vitale\*

Department of Cardiac Surgery, Policlinico Hospital, University of Bari, Piazza Giulio Cesare 11, 70124 Bari, Italy

Received 20 May 2008; received in revised form 30 June 2008; accepted 3 July 2008

Summary

A best evidence topic in cardiothoracic surgery was written according to a structured protocol. The question addressed was whether unilateral antegrade cerebral perfusion is equivalent to bilateral cerebral plegia for cerebral protection during aortic arch surgery. Altogether 233 papers were found using the reported search, of which 17 presented the best evidence to answer the clinical question. The author, journal, date and country of publication, patient group studied, study type, relevant outcomes, results, and study weaknesses of these papers are tabulated. These papers documented antegrade selective cerebral perfusion in a total of 3548 patients: bilateral cerebral perfusion in 2949 patients and unilateral perfusion in 599 patients. Both methods of cerebral perfusion resulted in neurological injury rates of <5%, but the period of antegrade cerebral perfusion allowed by bilateral perfusion was significantly higher. While unilateral perfusion allowed around 30–50 min, bilateral perfusion allowed 86 to over 164 min of ASCP with an acceptably low CVA rate. Therefore, we conclude that while both methods are acceptable, once the ASCP time is expected to rise over 40–50 min, bilateral cerebral perfusion is the technique that is best documented to be safe.

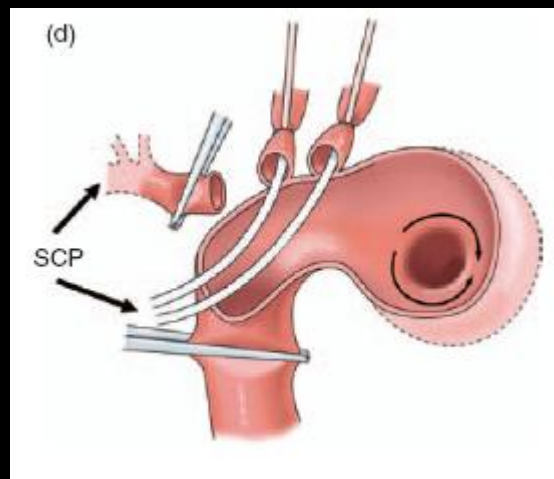
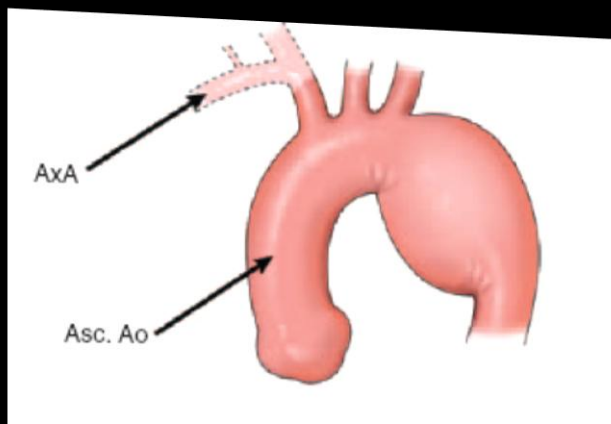
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*Keywords:* Aortic arch surgery; Cerebral perfusion; Neurologic outcome

that while both methods are acceptable, once the ASCP time is expected to rise over 40–50 min, bilateral cerebral perfusion is the technique that is best documented to be safe.



Hitoshi Ogino  
Aichi, Japan



J Thorac Cardiovasc Surg 2008;136:641-9



# TECNICA CHIRURGICA

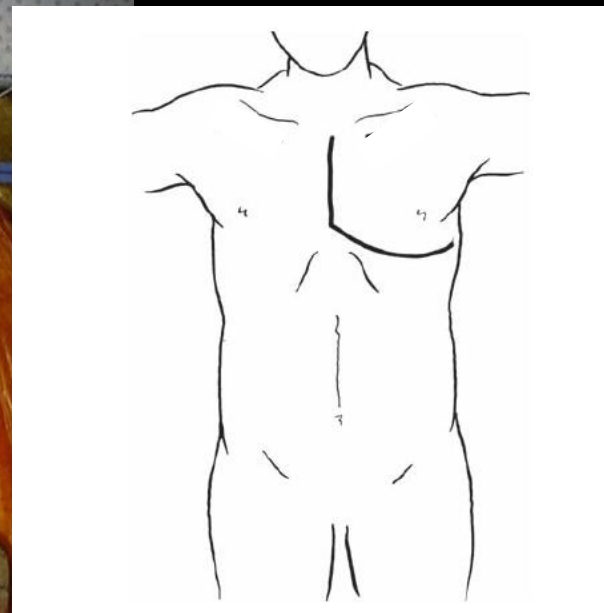
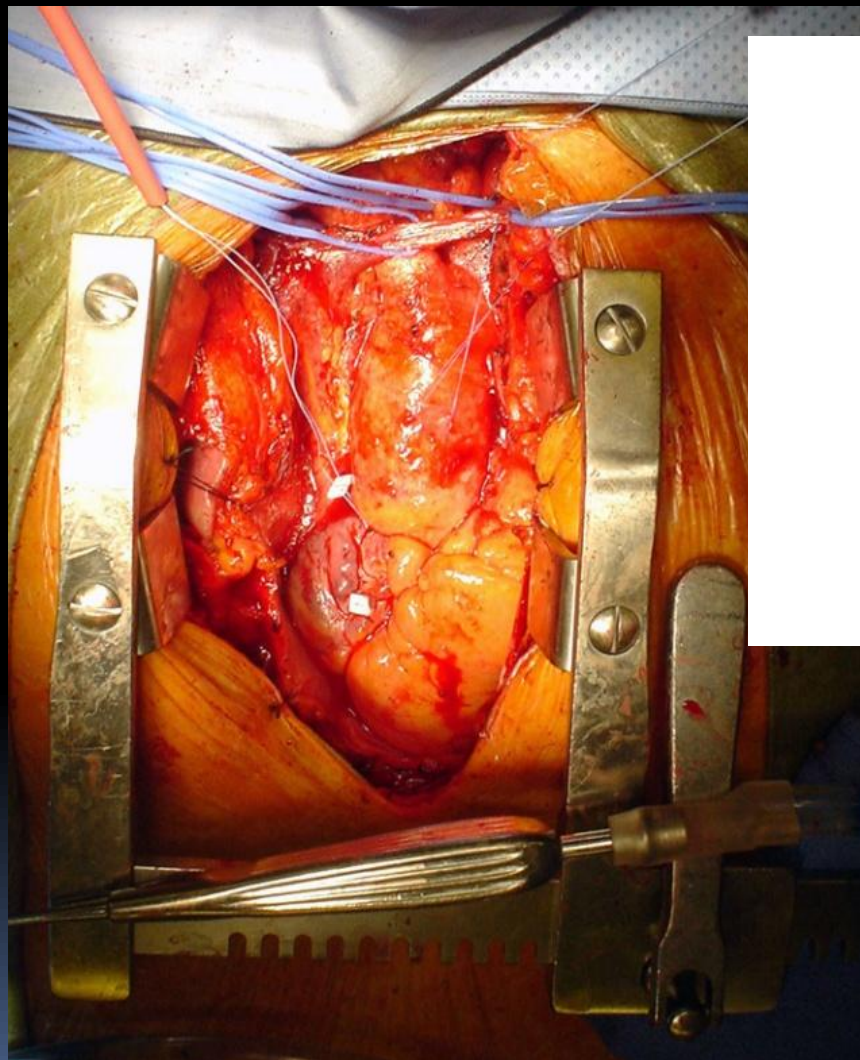


# TECNICA CHIRURGICA



- APPROCCIO
- CANNULAZIONE
- PROTEZIONE CEREBRALE
- EMIARCO
- ARCO TOTALE

## STERNOTOMIA LONGITUDINALE MEDIANA

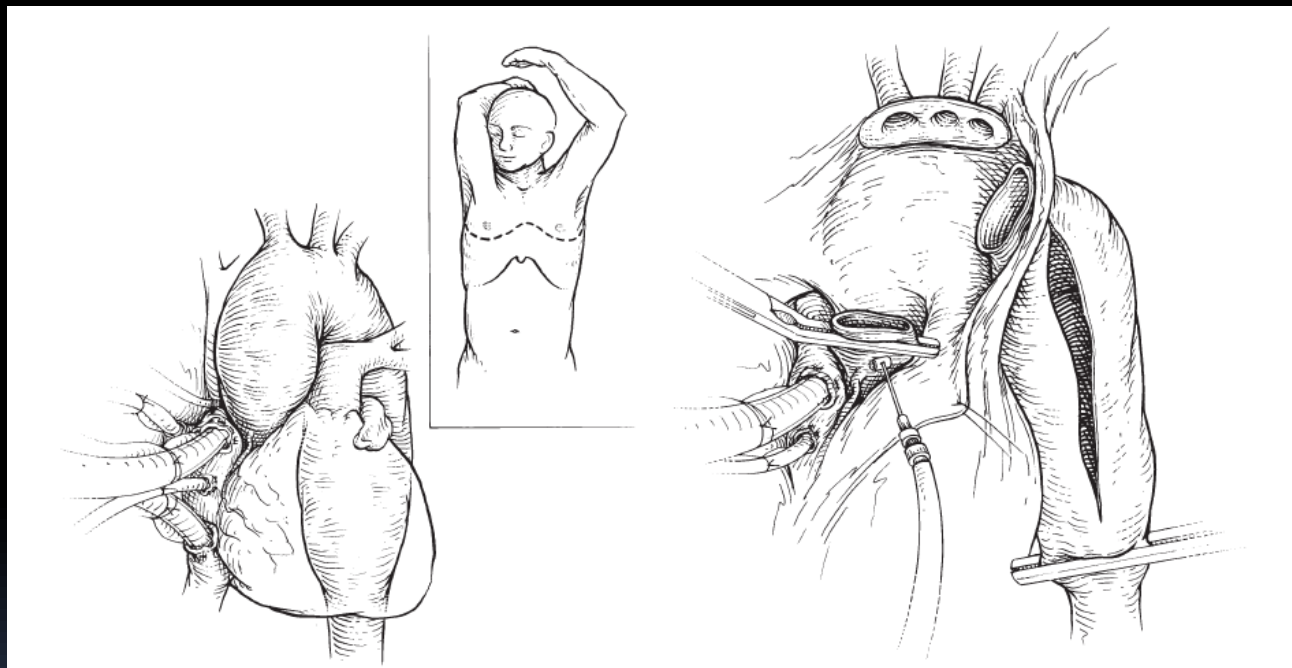


## APPROCCIO

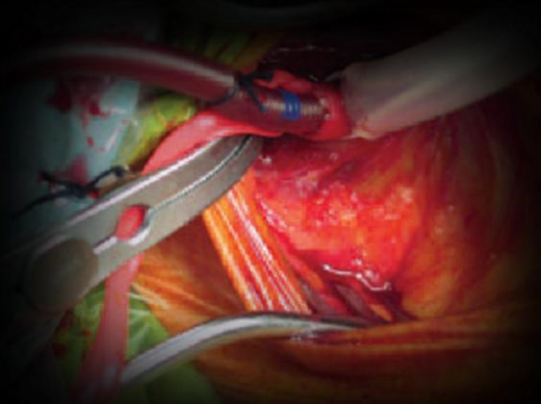
### TORACOTOMIA BILATERALE ANTERIORE (CLAMSHELL)



N. Kouchoukos  
St. Louis USA



# TECNICA CHIRURGICA



- APPROCCIO
- CANNULAZIONE
- PROTEZIONE CEREBRALE
- EMIARCO
- ARCO TOTALE

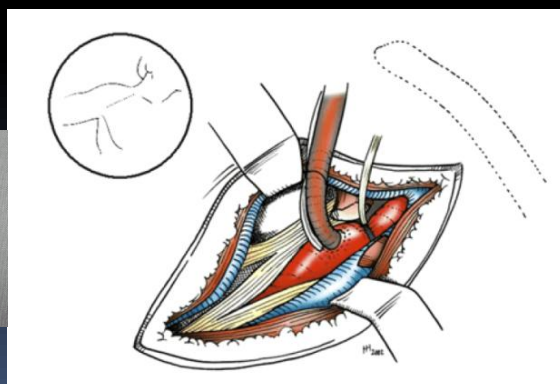
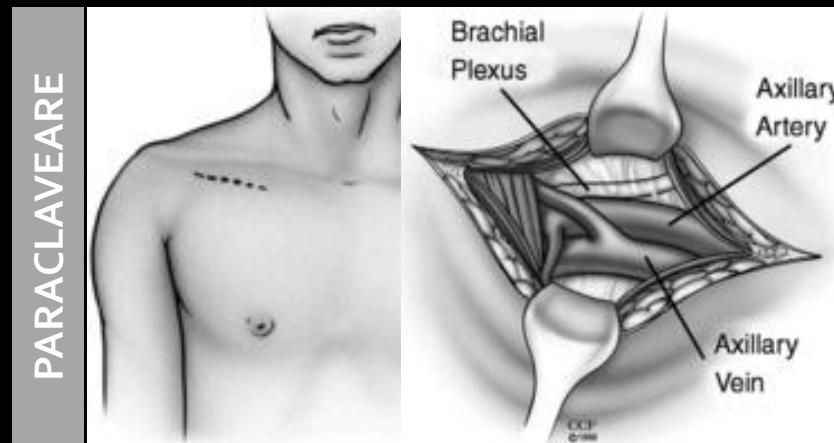
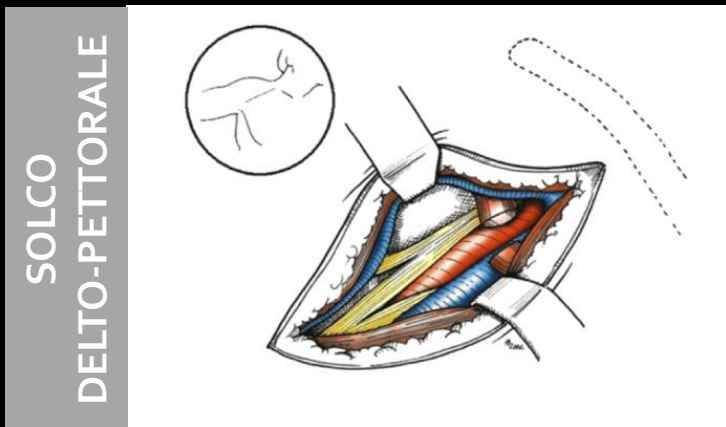
## CANNULAZIONE

- AORTA ASCENDENTE/ARCO
- ARTERIA FEMORALE
- ARTERIA ASCELLARE DX
- ARTERIA ANONIMA

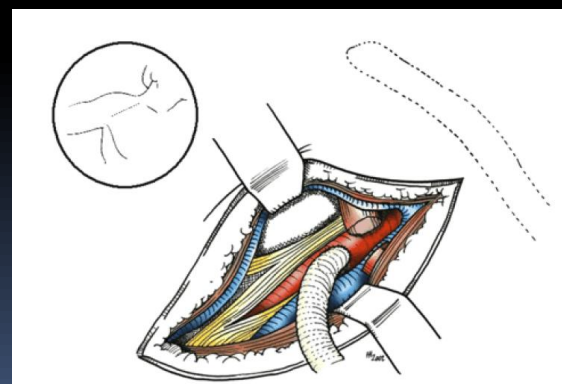


# CANNULAZIONE

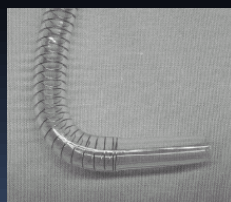
## ARTERIA ASCELLARE DX



**DIRETTA**



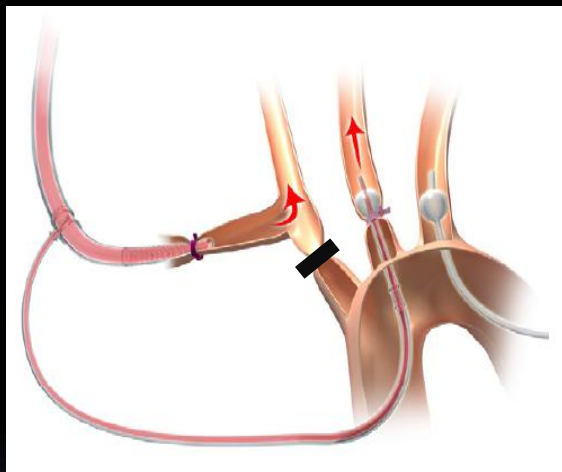
**INDIRETTA**



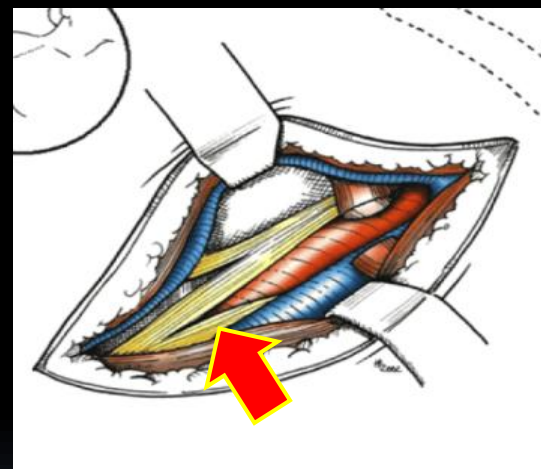
## CANNULAZIONE

### ARTERIA ASCELLARE DX

#### VANTAGGI



#### SVANTAGGI





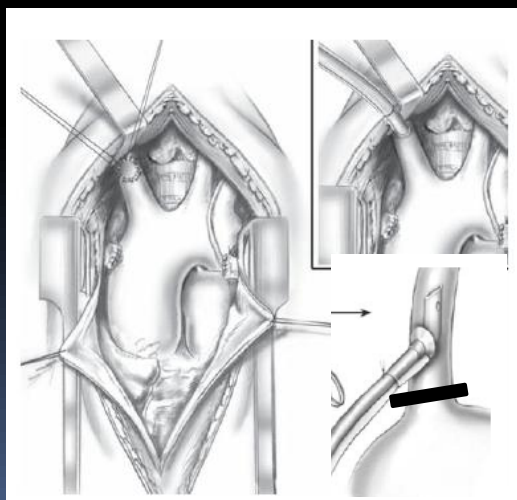
## CANNULAZIONE

### ARTERIA ANONIMA

#### VANTAGGI

- Diam. ~ 10-15 mm
- Libera da placche o calcio
- No ulteriore incisione

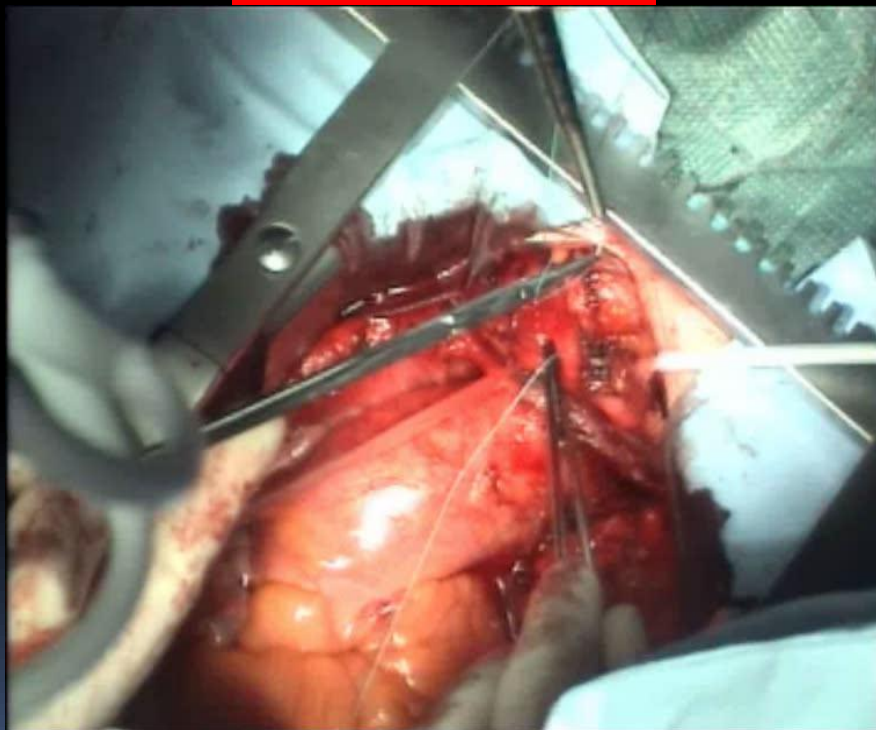
#### SVANTAGGI



# CANNULAZIONE

## ARTERIA ANONIMA

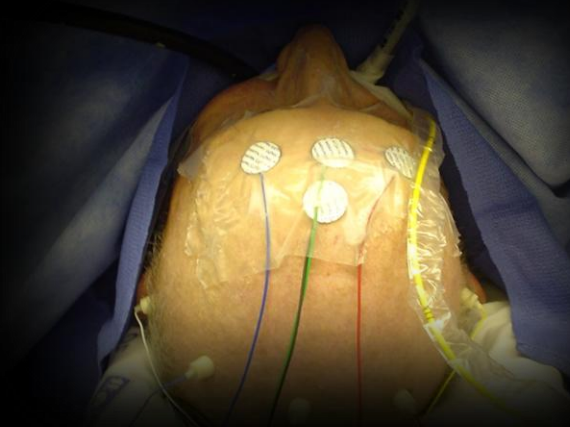
### DIRETTA



### INDIRETTA



# TECNICA CHIRURGICA



- APPROCCIO
- CANNULAZIONE
- **PROTEZIONE CEREBRALE**
- EMIARCO
- ARCO TOTALE

**ARRESTO DI CIRCOLO A 25° C**

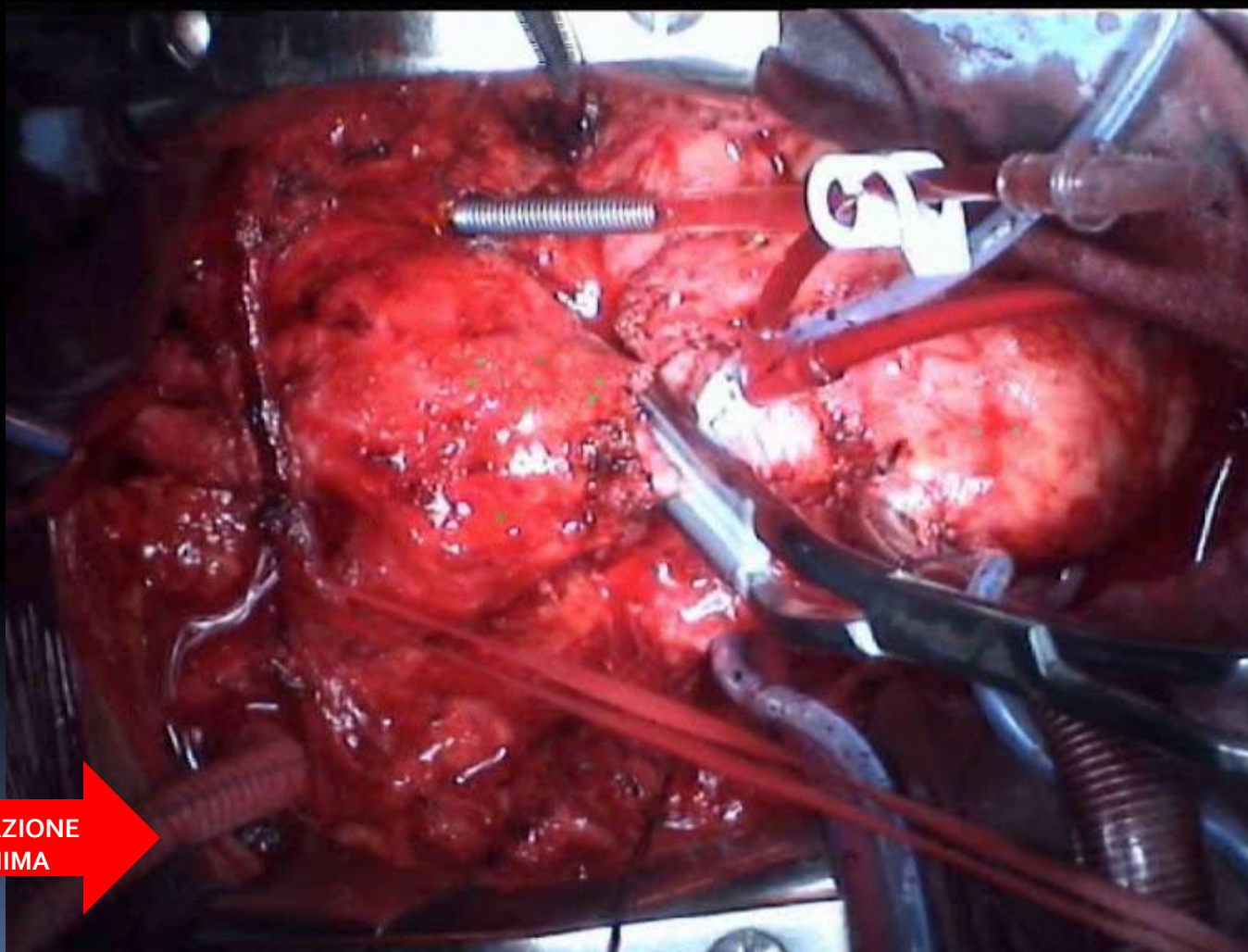
**PERFUSIONE ANTEROGRADA BI-EMISFERICA**





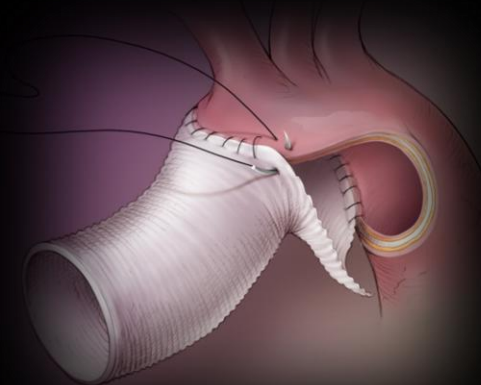
## ARRESTO DI CIRCOLO A 25° C

### PERFUSIONE ANTEROGRADA BI-EMISFERICA



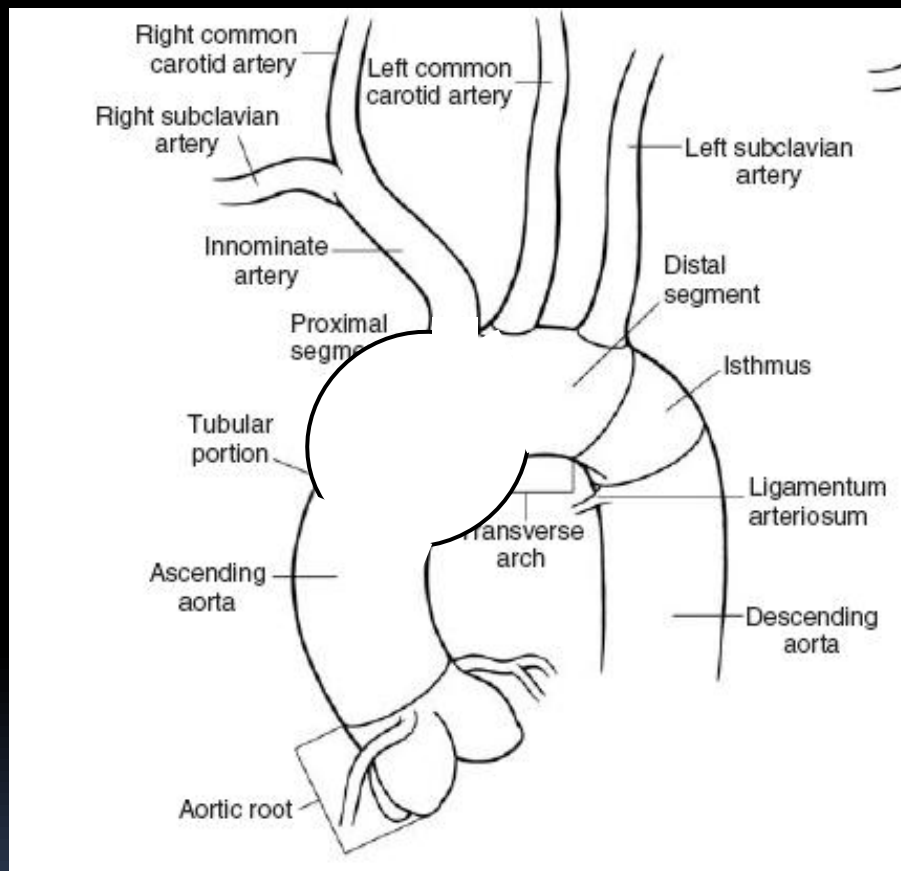
CANNULAZIONE  
A. ANINIMA

# TECNICA CHIRURGICA



- APPROCCIO
- CANNULAZIONE
- PROTEZIONE CEREBRALE
- EMIARCO
- ARCO TOTALE

## EMIARCO

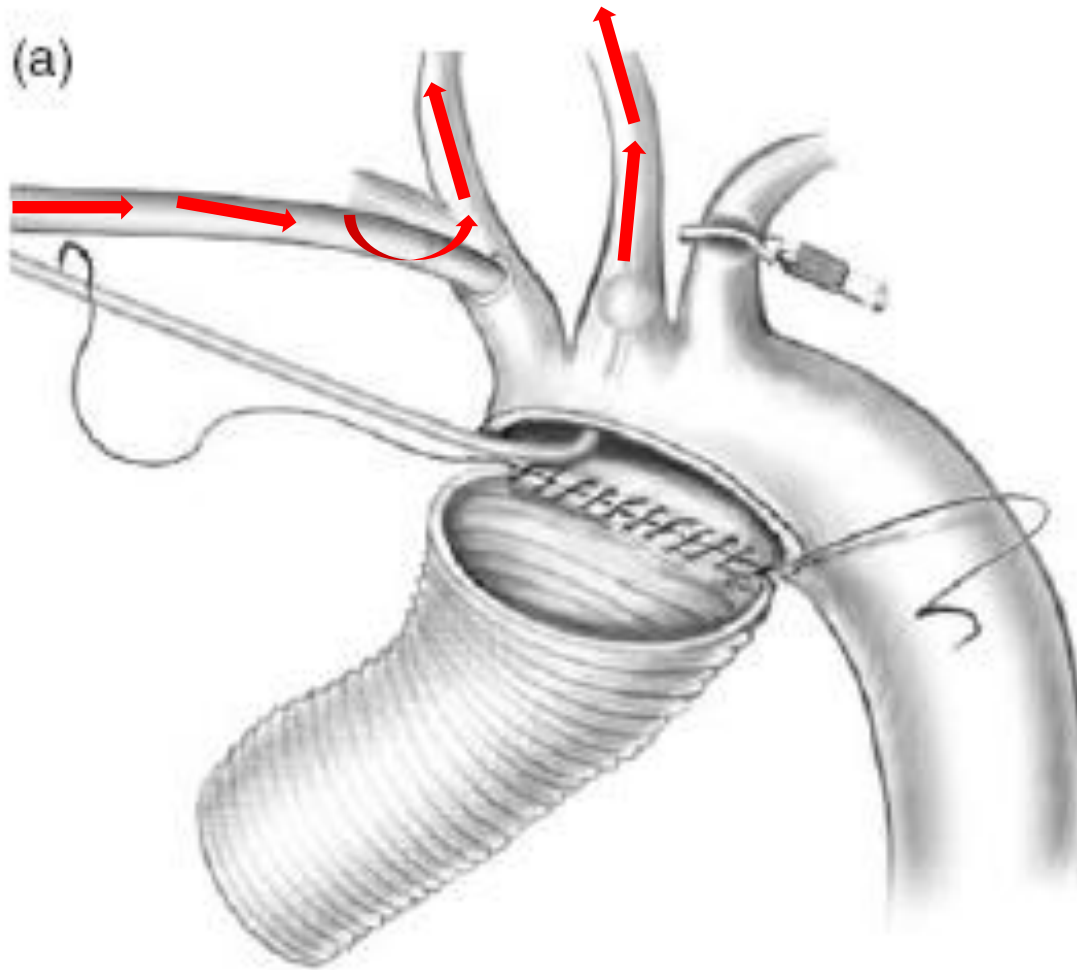




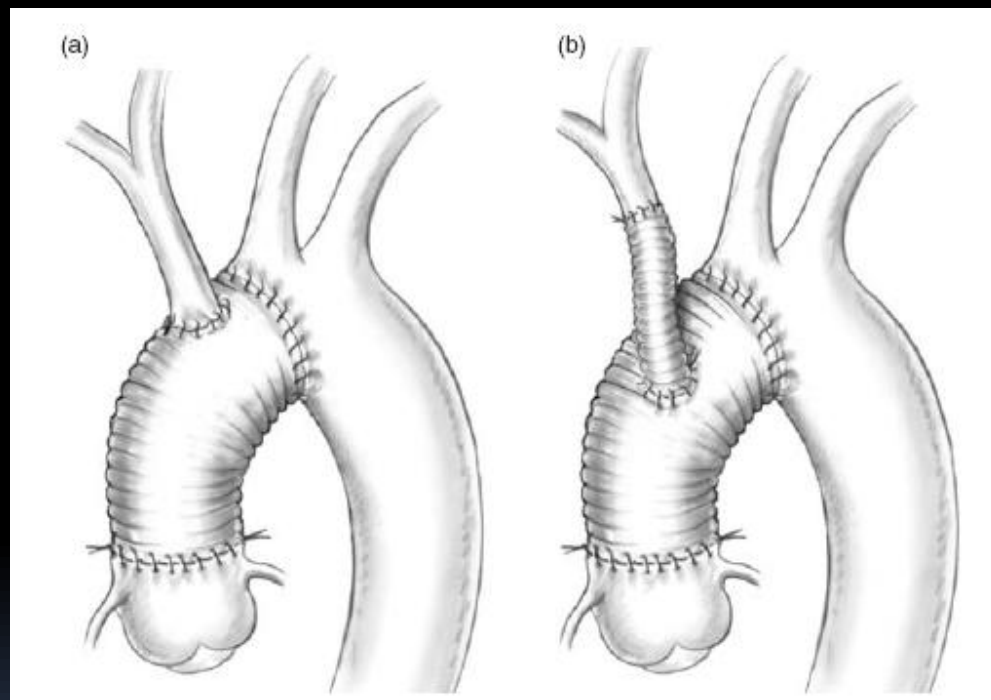
## EMIARCO



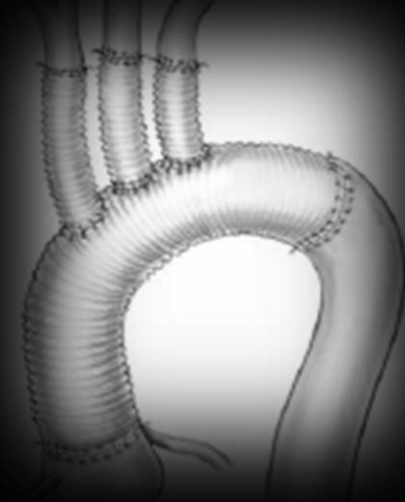
## EMIARCO



## EMIARCO

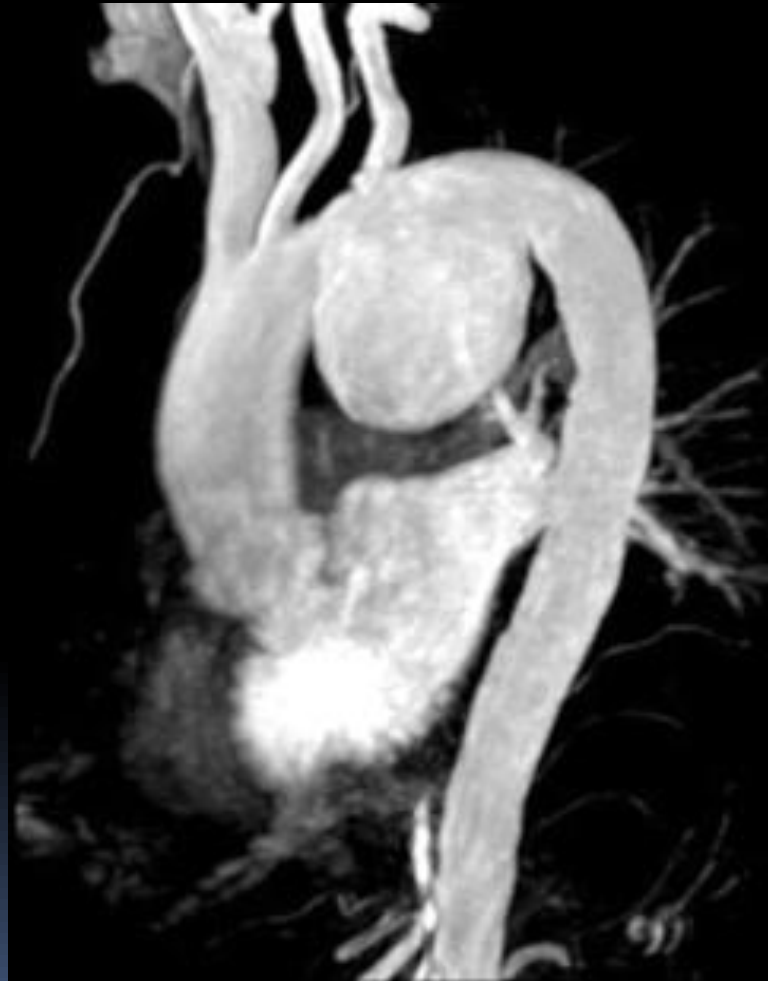


# TECNICA CHIRURGICA



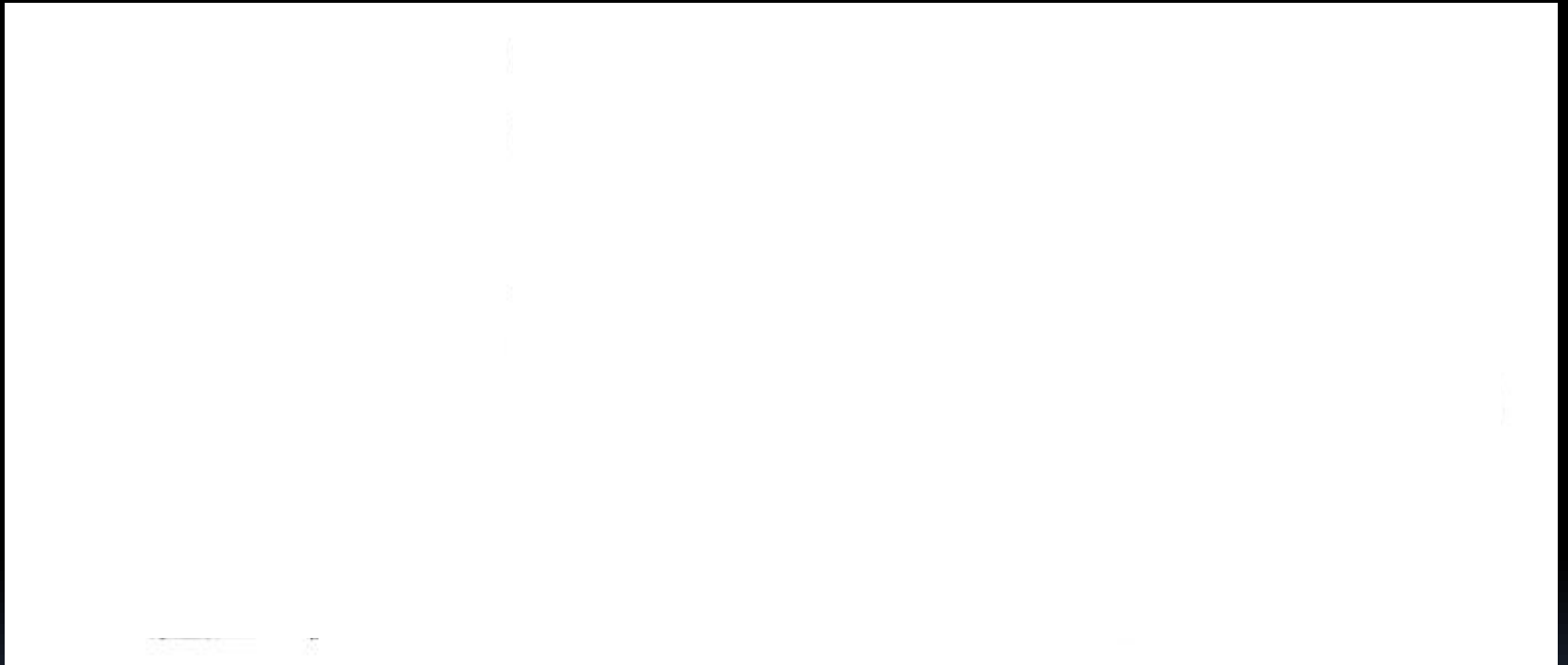
- APPROCCIO
- CANNULAZIONE
- PROTEZIONE CEREBRALE
- EMIARCO
- ARCO TOTALE

## ARCO TOTALE



# ARCO TOTALE

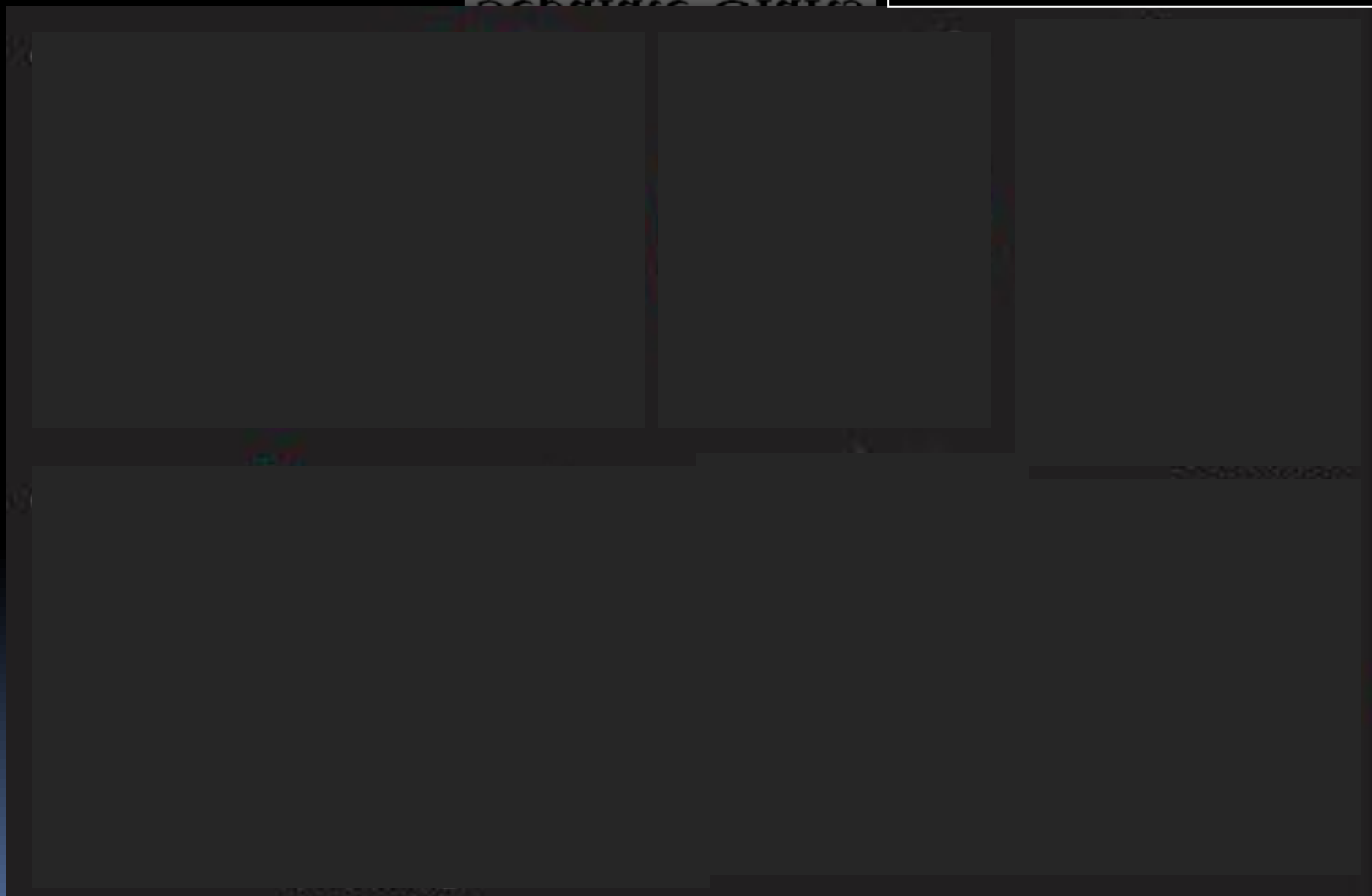
**En Bloc**



## ARCO TOTALE

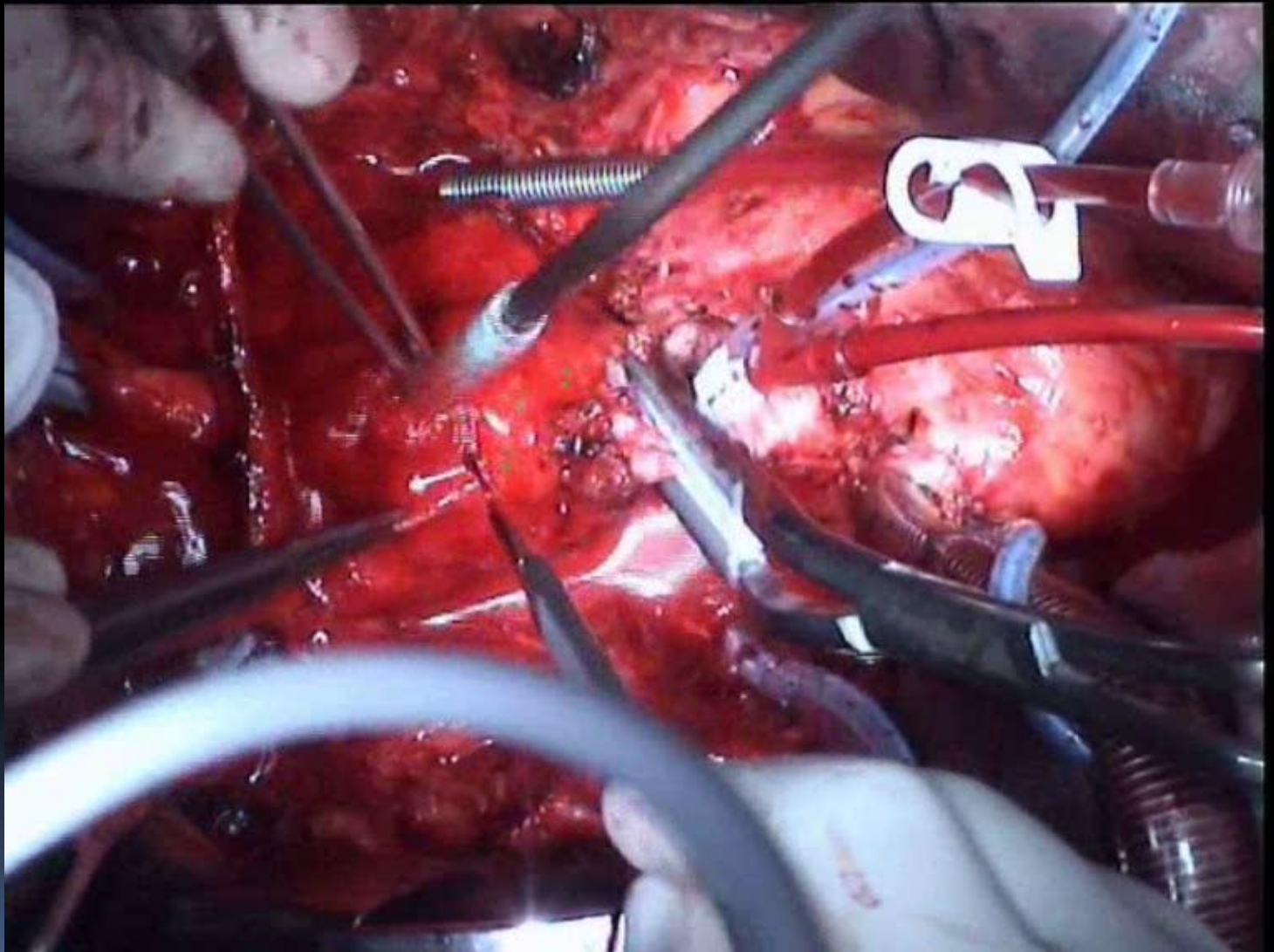
### Separate Grafts

(J Thorac Cardiovasc Surg 2001;121:491-9)





## ARCO TOTALE

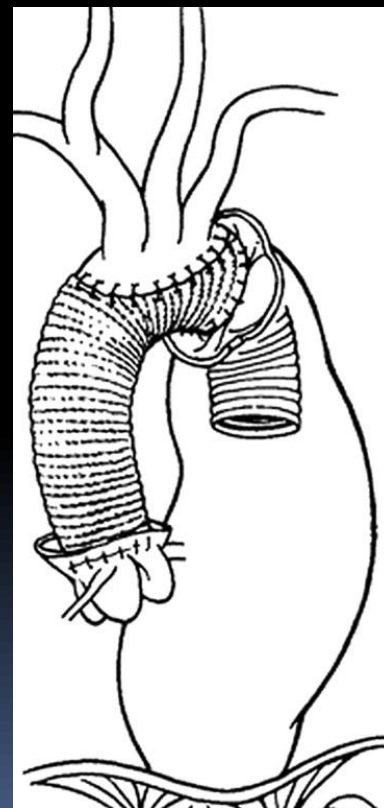
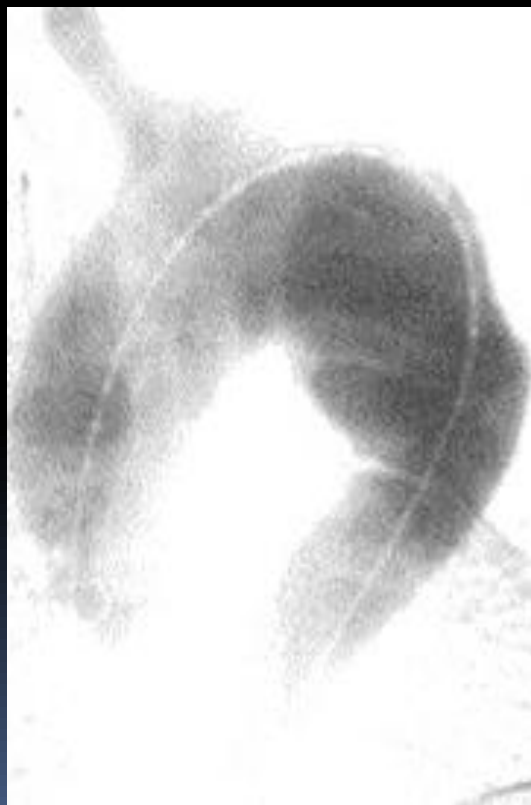




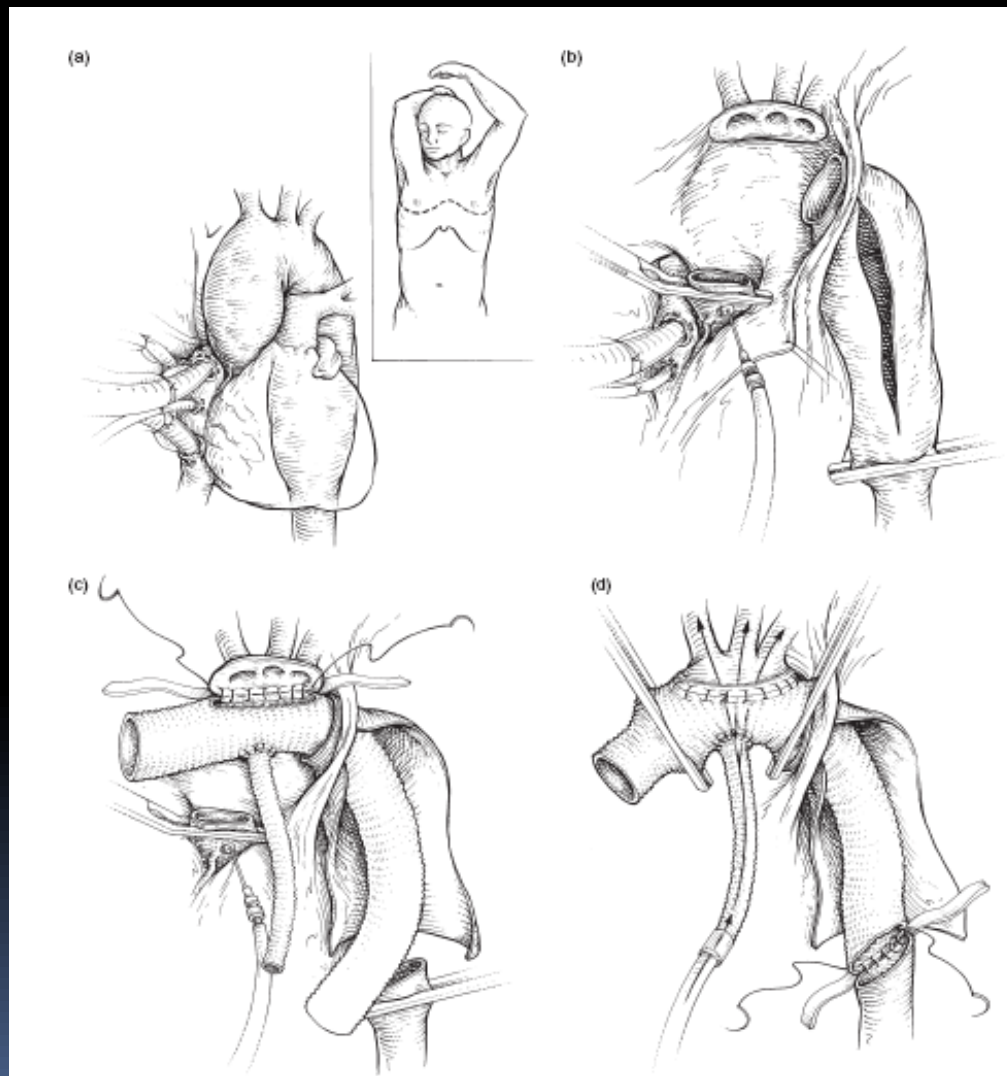
Hans Borst  
Hanover, Germany

## ELEPHANT TRUNK TECHNIQUE

INTRODOTTA DA BORST NEL 1984 PER IL TRATTAMENTO DOUBLE STAGE DELLA MALATTIE ESTESE DELL'AORTA

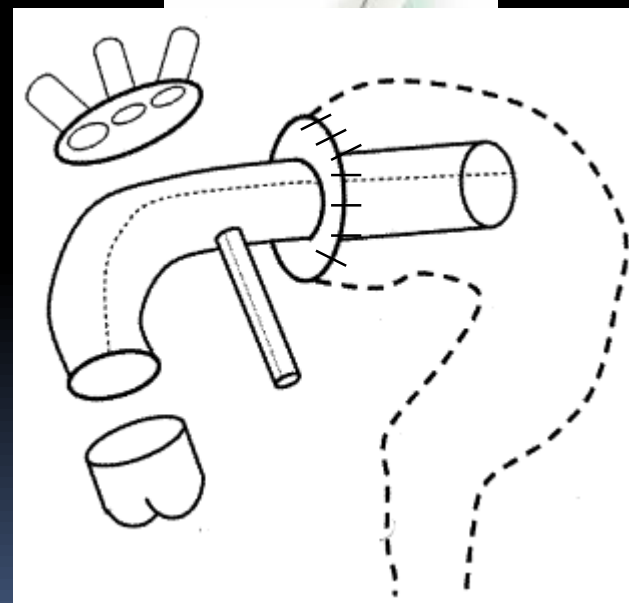
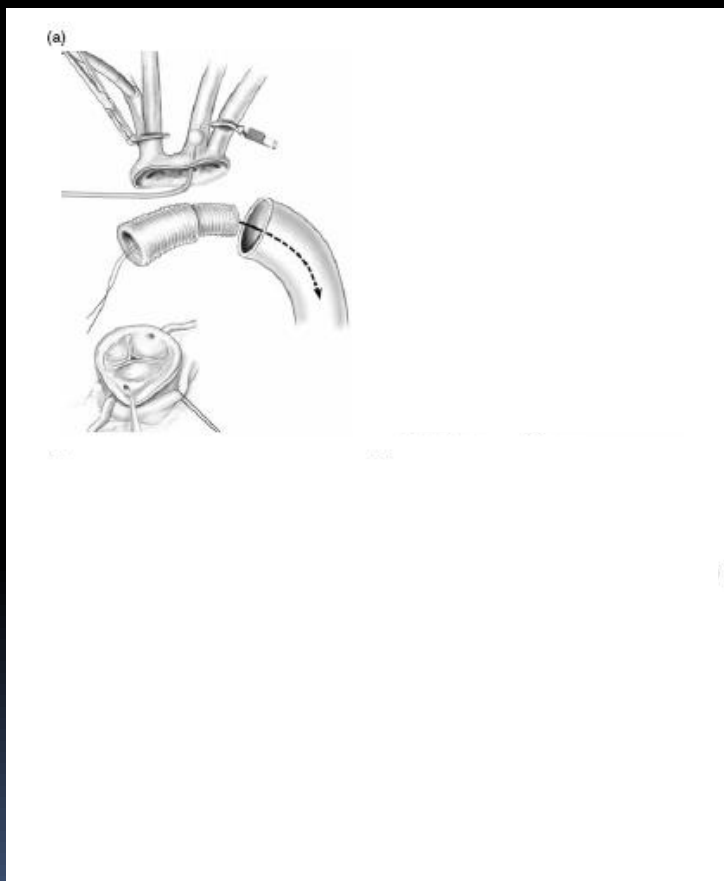


## SINGLE STAGE



# ARCO TOTALE

## ELEPHANT TRUNK



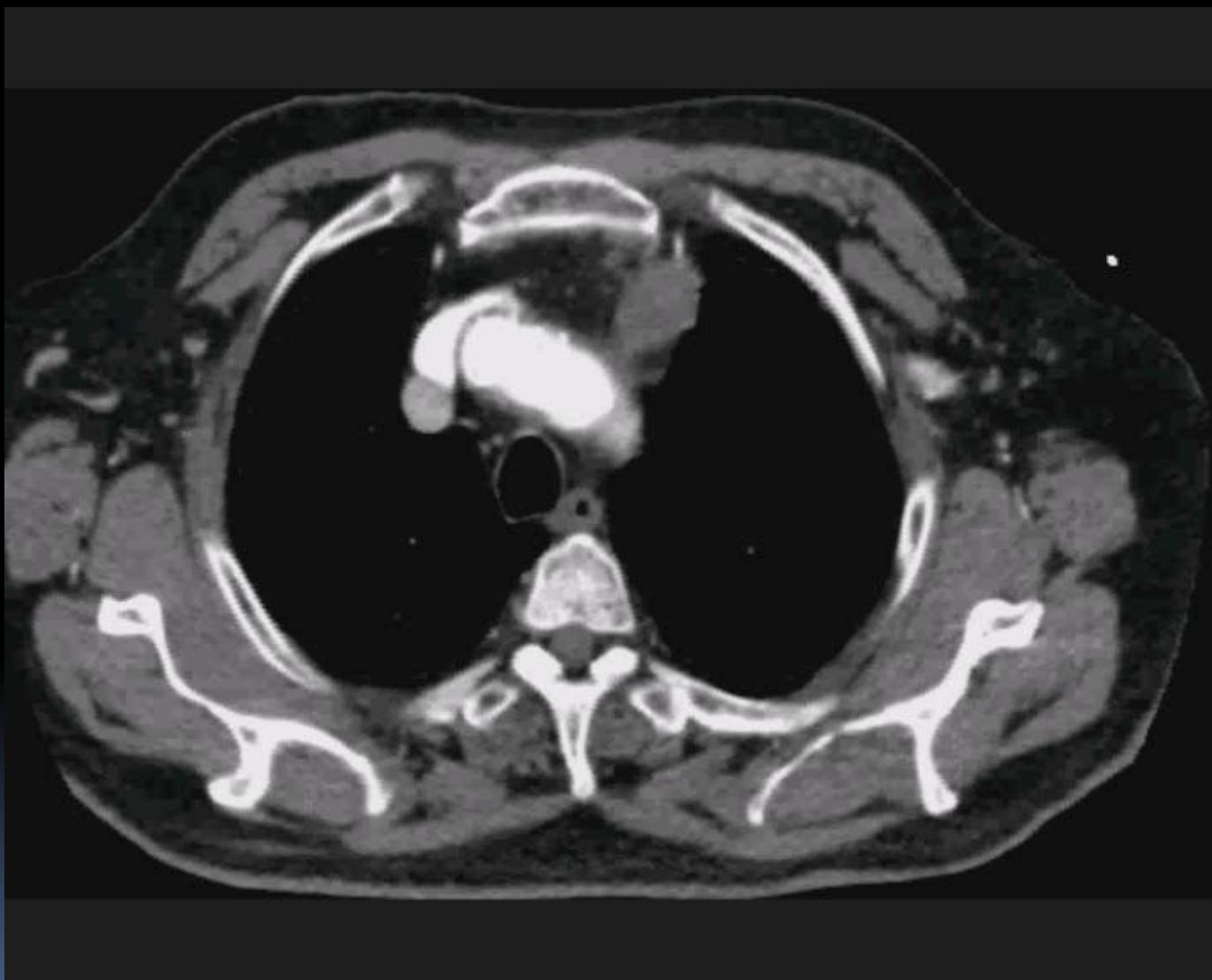
## ARCO TOTALE

### ELEPHANT TRUNK: SECOND STAGE

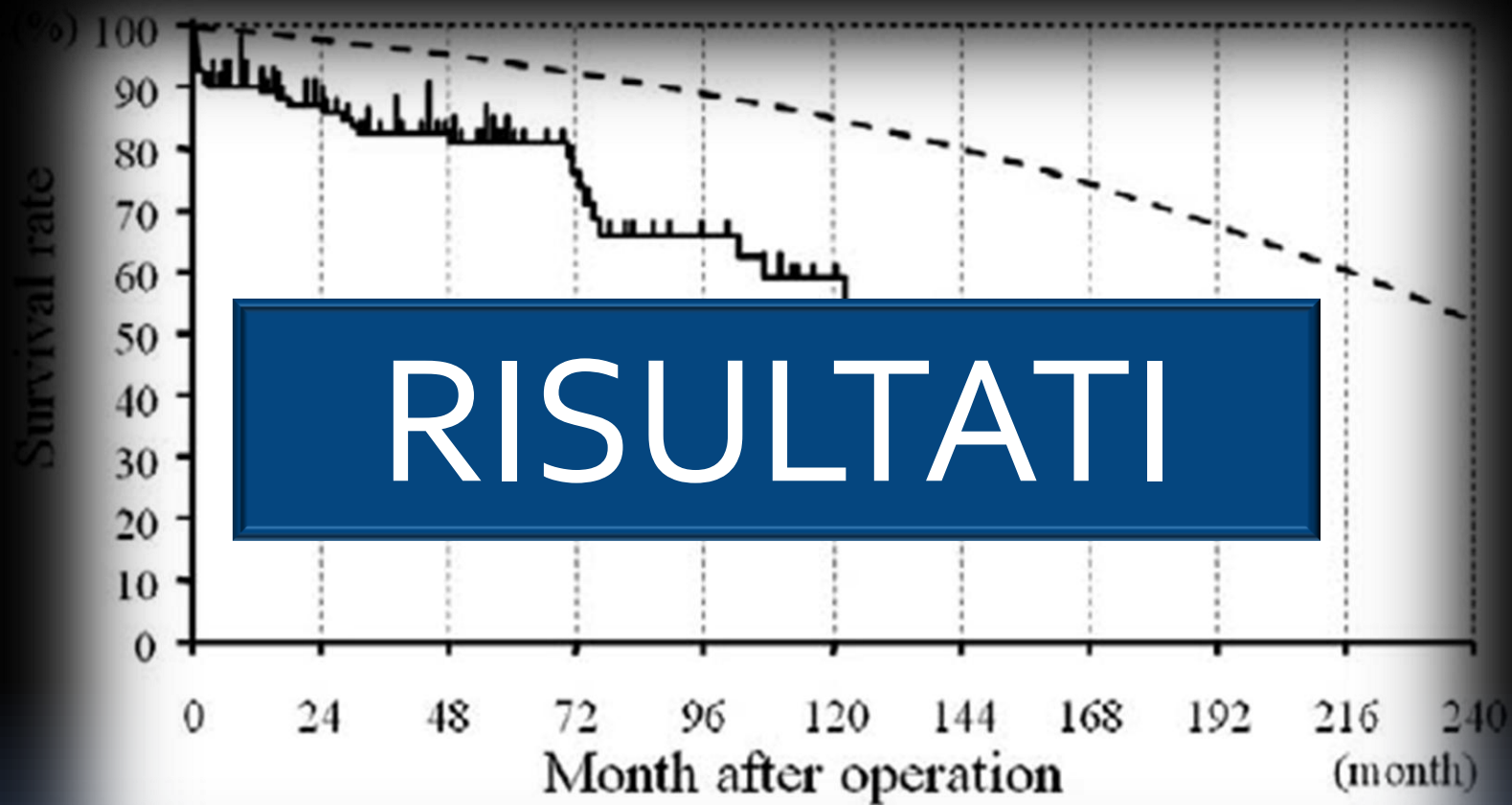
TEMPISTICA

- ROTTURA di ARCO  STESSA SEDUTA
- ARCO SINTOMATICO  STESSO RICOVERO
- ARCO STABILE  < 6 SETTIMANE

## ELEPHANT TRUNK + ANTEGRADE GRAFT







Patient at risk								
n= 122	80	55	31	21	10	6	3	2



	n. Pts	Emi- Arco	Arco Totale	Elettivi	PCA	PCR	Mort. 30 gg	Deficit Neuro Perm.
Kazui 2007	<b>472</b>		420	343	472	—	<b>9.3 %</b>	<b>4.7 %</b>
Spielvogel 2007	<b>150</b>	—	150	150	150	—	<b>4.7 %</b>	<b>4.1 %</b>
Ogino 2008	<b>531</b>	91	440	394	531	—	<b>4 %</b>	<b>2.9 %</b>
Patel 2011	<b>721</b>		308	404	400	641	<b>5 %</b>	<b>4,7 %</b>
Okada 2012	<b>321</b>	—	321	215	321	—	<b>4.4 %</b>	<b>4.4 %</b>
Zierer 2012 (multicentrico)	<b>1002</b>	684	318		1002		<b>5 %</b>	<b>3 %</b>
Misfeld 2012	<b>636</b>	454	182	417	365	51	<b>11 %</b>	<b>11 %</b>

PCA: Perfusionone Cerebrale anterograda

PCR: Perfusionone Cerebrale Retrograda

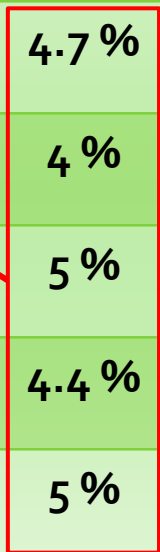
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**4-5 %**



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>1996  


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**4,1 %**

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## FATTORI di RISCHIO INDIPENDENTI

	MORTALITA' 30 gg	DEFICIT NEURO PERMANENTI
Kazui 2007	<ul style="list-style-type: none"> <li>• tempo CEC</li> <li>• età</li> <li>• IRC</li> <li>• pgresso STROKE</li> <li>• REDO arco</li> <li>• ischemia mesenterica</li> </ul>	<ul style="list-style-type: none"> <li>• tempo CEC</li> <li>• pgresso STROKE</li> </ul>
Ogino 2008	<ul style="list-style-type: none"> <li>• IRC</li> <li>• tempo procedura</li> <li>• aneurismi rotti</li> </ul>	<ul style="list-style-type: none"> <li>• n.d.</li> </ul>
Patel 2011	<ul style="list-style-type: none"> <li>• età</li> <li>• tempo CEC</li> <li>• tempo HCA</li> <li>• bassa FE</li> </ul>	<ul style="list-style-type: none"> <li>• BPCO</li> <li>• dissezione tipo A</li> <li>• tempo HCA</li> <li>• estensione aneurisma alla discendente</li> </ul>
Okada 2012	<ul style="list-style-type: none"> <li>• età</li> <li>• malperfusione cerebrale</li> </ul>	<ul style="list-style-type: none"> <li>• nil</li> </ul>
Zierer 2012 (multicentrico)	<ul style="list-style-type: none"> <li>• dissezione tipo A</li> <li>• CABG concomitanti</li> </ul>	<ul style="list-style-type: none"> <li>• pgresso STROKE</li> </ul>
Misfeld 2012	<ul style="list-style-type: none"> <li>• tempo CEC</li> <li>• dissezione tipo A</li> <li>• arco totale</li> <li>• pgresso IMA</li> </ul>	<ul style="list-style-type: none"> <li>• dissezione aortica tipo A</li> <li>• età</li> <li>• tempo HCA</li> <li>• arco totale</li> </ul>

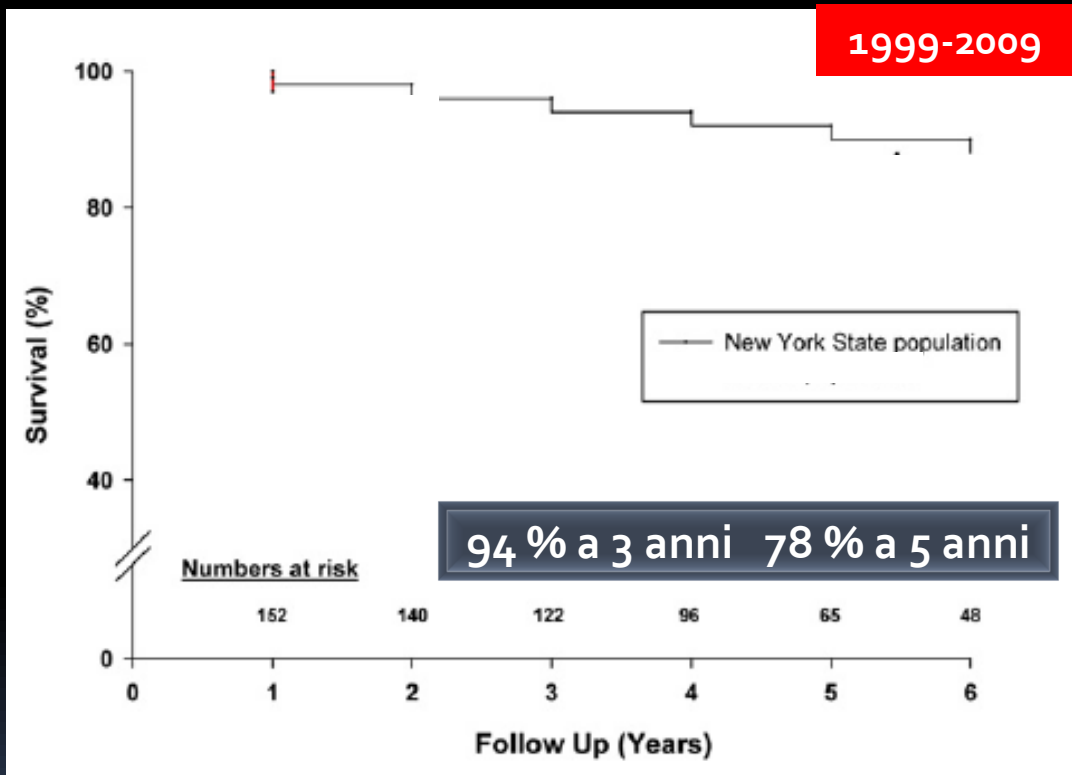
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# SOPRAVVIVENZA A DISTANZA

**Long-term outcome after aortic arch replacement with a trifurcated graft**

Moritz S. Bischoff, MD,<sup>a</sup> Robert M. Brenner, MS,<sup>a</sup> Johannes Scheumann, MS,<sup>a</sup> Carol A. Bodian, DrPH,<sup>b</sup> Randall B. Griep, MD,<sup>a</sup> Steven L. Lansman, MD, PhD,<sup>c</sup> and David Spielvogel, MD<sup>c</sup>



J Thorac Cardiovasc Surg 2010;140:S71-6

**ETA' : FATTORE DI RISCHIO**

## SOPRAVVIVENZA A DISTANZA

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60% DEI PAZIENTI: REINTERVENTO SULL'AORTA



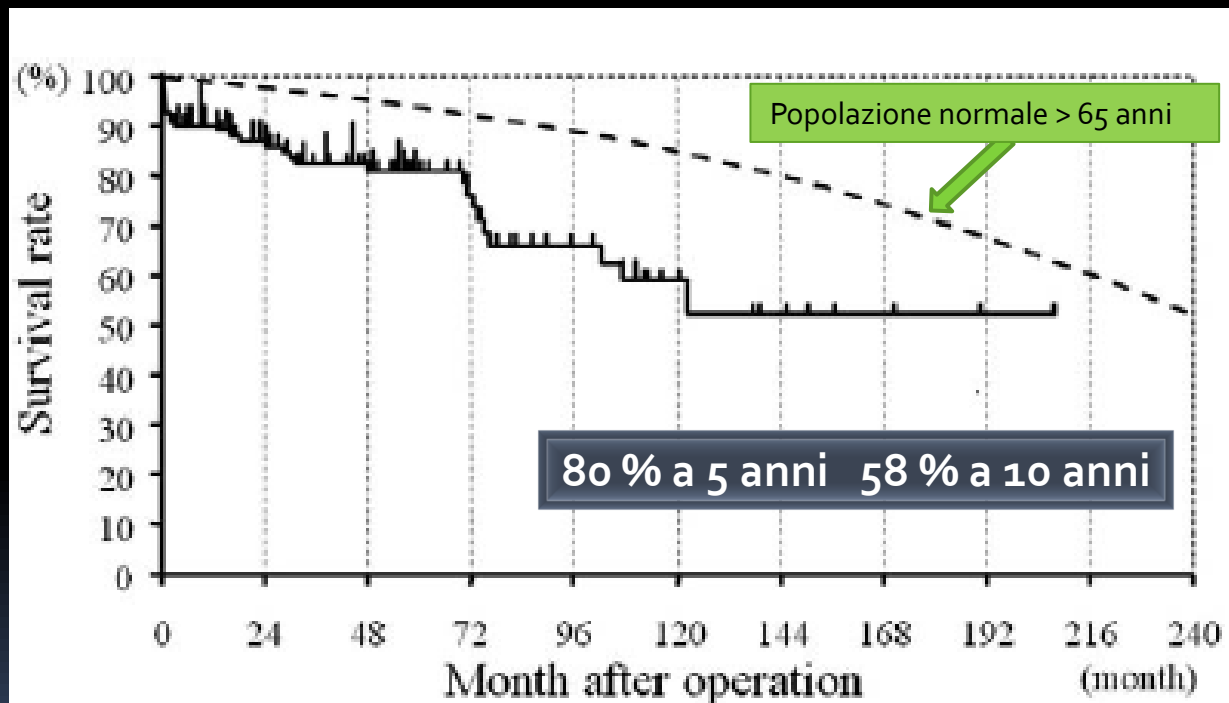
- > CASI: SECOND STAGE E.T
- 1 CASO: REINTERVENTO SULL'ARCO

# SOPRAVVIVENZA A DISTANZA

## Early and Long-Term Outcome of Total Arch Replacement Using Selective Cerebral Perfusion

Masahito Minakawa, MD, PhD, Ikuo Fukuda, MD, PhD, Sanae Yamauchi, MD, Kenichi Watanabe, MD, Tomonori Kawamura, MD, Satoshi Taniguchi, MD, PhD, Kazuyuki Daitoku, MD, PhD, Yasuyuki Suzuki, MD, PhD, and Kozo Fukui, MD, PhD

Department of Thoracic and Cardiovascular Surgery, Hirosaki University School of Medicine, Hirosaki, Japan



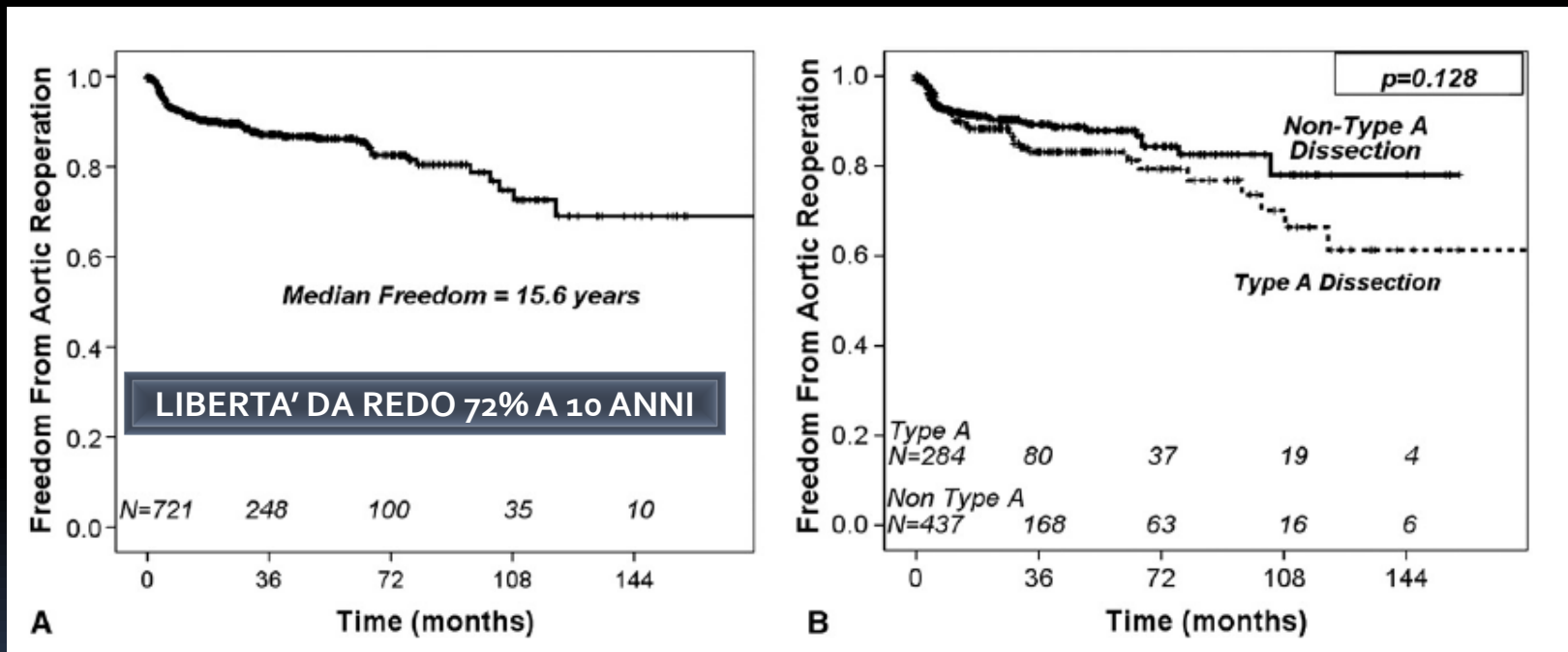
Ann Thorac Surg 2010;90:72-7

# REINTERVENTO SULL'AORTA

**Open arch reconstruction in the endovascular era: Analysis of 721 patients over 17 years**

Himanshu J. Patel, MD, Christopher Nguyen, BS, Amy C. Diener, RN, BSN, Mary C. Passow, RN, BSN, Diane Salata, RN, BSN, and G. Michael Deeb, MD

J Thorac Cardiovasc Surg 2011;141:1417-23



**4/82 PZ RIOPERATI SULL'ARCO**

# CONCLUSIONI



## CONCLUSIONI

- LA CHIRURGIA TRADIZIONALE DELL'ARCO AORTICO E' , NELLE MIGLIORI MANI, CARATTERIZZATA DA MORTALITA' E MORBILITA' BASSE
- I RISULTATI DELLA CHIRURGIA DELL'ARCO DIPENDONO PRINCIPALMENTE DALLA QUALITA' DELLA PROTEZIONE CEREBRALE
- LA PERFUSIONE CEREBRALE ANTEROGRADA, HA ALLUNGATO IL PERIODO "SICURO" DI ARRESTO CIRCOLATORIO (ANCHE OLTRE I 90 MIN) PERMETTENDO UNA PIU' ESTESA E METICOLOSA RICOSTRUZIONE DELL'ARCO

## CONCLUSIONI

- FATTORI QUALI ETA' AVANZATA, IRC, PREGRESSO STROKE E COMPROMISSIONE VENTRICOLARE SN, SONO PREDITIVI DI MORTALITA' E IDENTIFICANO GRUPPI DI PAZIENTI CHE POTREBBERO ESSERE CANDIDATI A TECNICHE MENO INVASIVE (IBRIDA O ENDOVACOLARE)
- L'INCIDENZA DI REINTERVENTO SUL SEGMENTO AORTICO TRATTATO E' ESTREMAMENTE BASSA

## CONCLUSIONI

- LA CHIRURGIA TRADIZIONALE RAPPRESENTA ,OGGI, IL TRATTAMENTO DI SCELTA NELLA PATOLOGIA CRONICA DELL'ARCO AORTICO

“L'uomo e la sua sicurezza devono costituire la prima preoccupazione per ogni *avventura tecnologica*. Non lo dimenticate mai quando siete immersi nei vostri calcoli e nelle vostre equazioni”

Albert Einstein