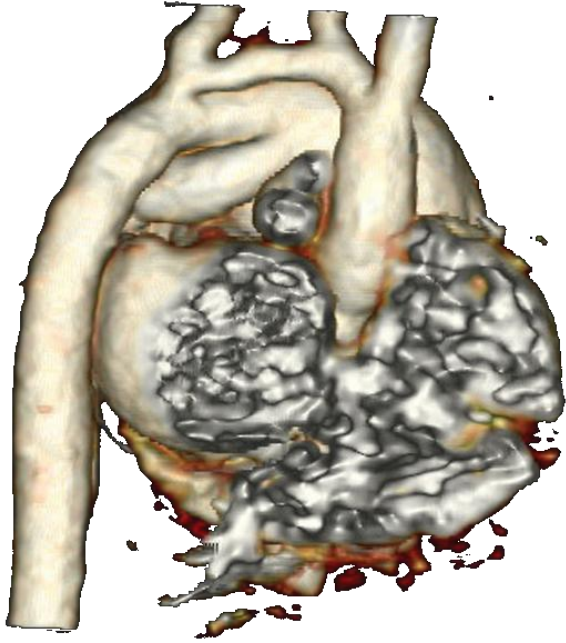
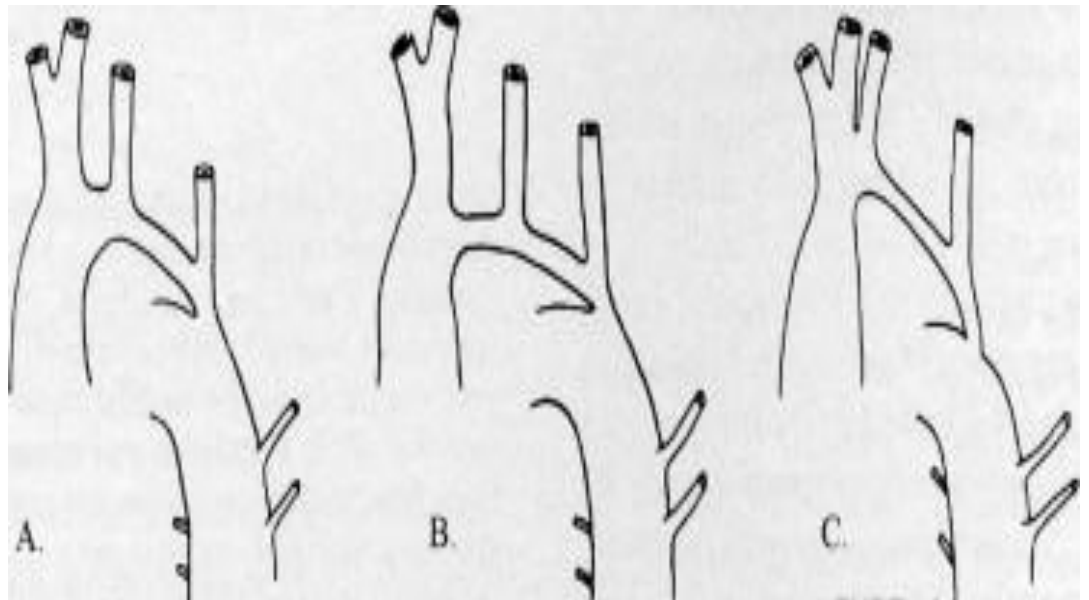
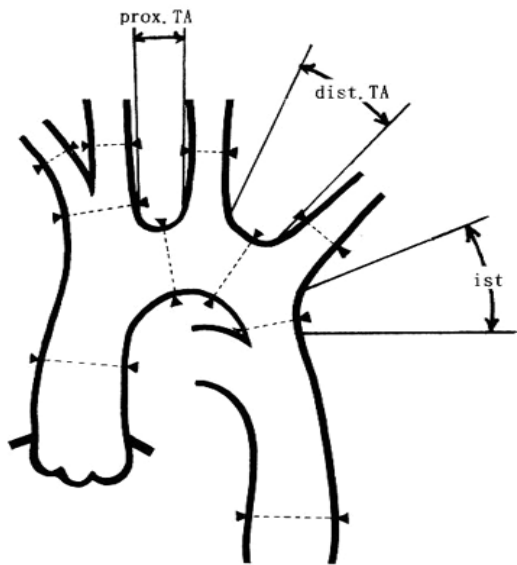


Surgical Treatment of Aortic Arch Hypoplasia



- In the early 1990s, 25% of patients could face mortality related to complications of hypertensive disease
- Early operations and better surgical techniques should naturally decrease the incidence of residual or recurrent hypertension after coarctation repair

- Poorly defined:
- Chỉ số Z nhỏ hơn -2 >>> thiếu sản (can thiệp sớm)

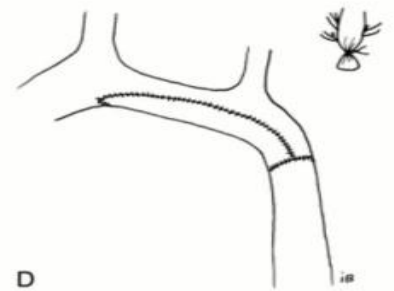
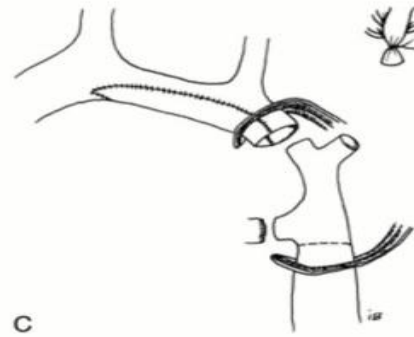
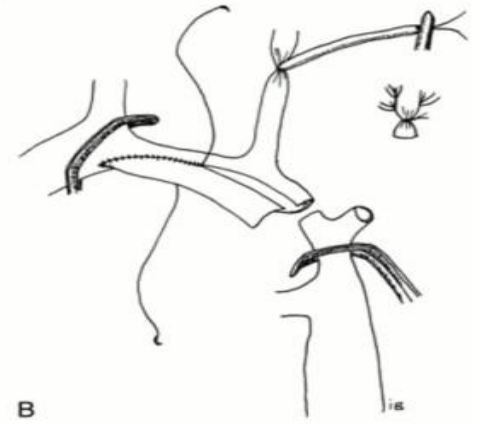
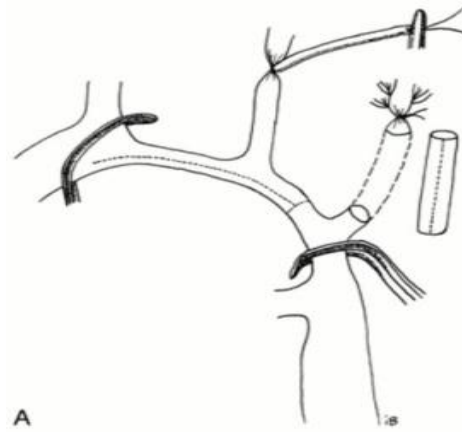
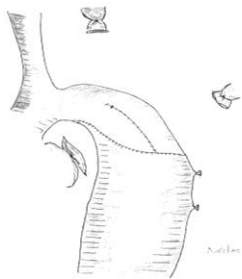
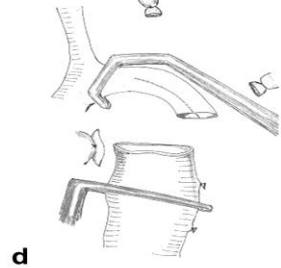
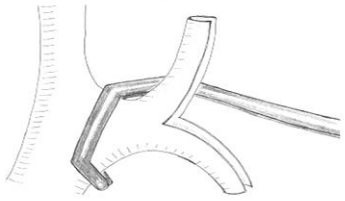
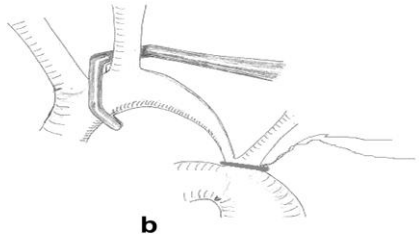
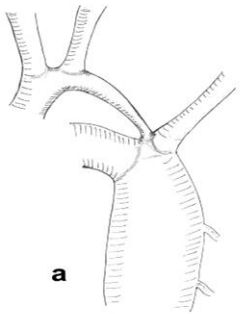
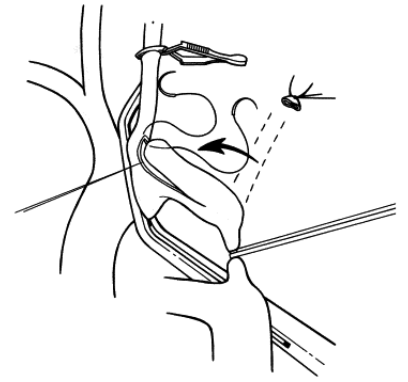
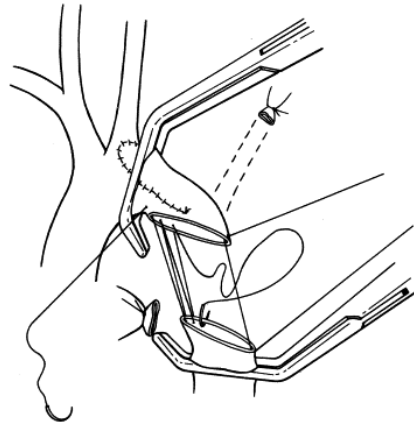
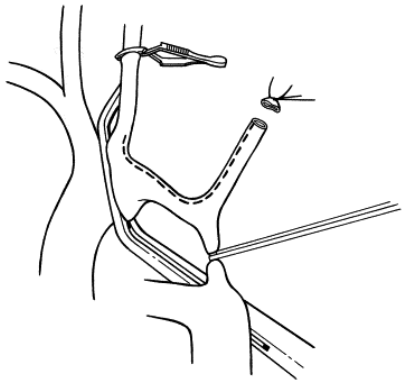


- ❖ Surgical era
 - 1984–1989: 80 (26)
 - 1990–1999: 151 (50)
 - 2000–2004: 74 (24)
- ❖ Arch repair technique
- ☐ Sternotomy 74 (24)
 - **End-to-side anastomosis 58 (78)**
 - Extended end-to-end anastomosis 7 (10)
 - Patch repair 6 (8)
 - Subclavian flap repair 1 (1)
 - Miscellaneous arch repair 2 (3)
- ☐ Thoracotomy 231 (76)
 - **Subclavian flap repair 96 (42)**
- Extended end-to-end anastomosis 85 (37)
- End-to-side anastomosis 19 (8)
- End-to-end anastomosis 17 (7)
- Patch repair 8 (4)
- Miscellaneous arch repair 6 (3)
- ❖ Associated cardiac procedures
 - Sternotomy 70/74 (95)
 - **Ventricular septal defect closure 49 (66)**
 - Atrial septal defect closure 25 (34)
 - Arterial switch operation 17 (23)
 - Pulmonary artery banding 11 (15)
 - Left ventricular outflow obstruction repair 10 (14)
 - Other 14 (19)
 - Thoracotomy 31/231 (13)
 - **Pulmonary artery banding 29 (13)**
 - Other 2 (1)
- ❖ Intraoperative data
 - Median clamp time (min) 21 (7–272)
 - Median time on bypass (min) 134 (34–340)

Neonatal aortic arch surgery results: literature summary.

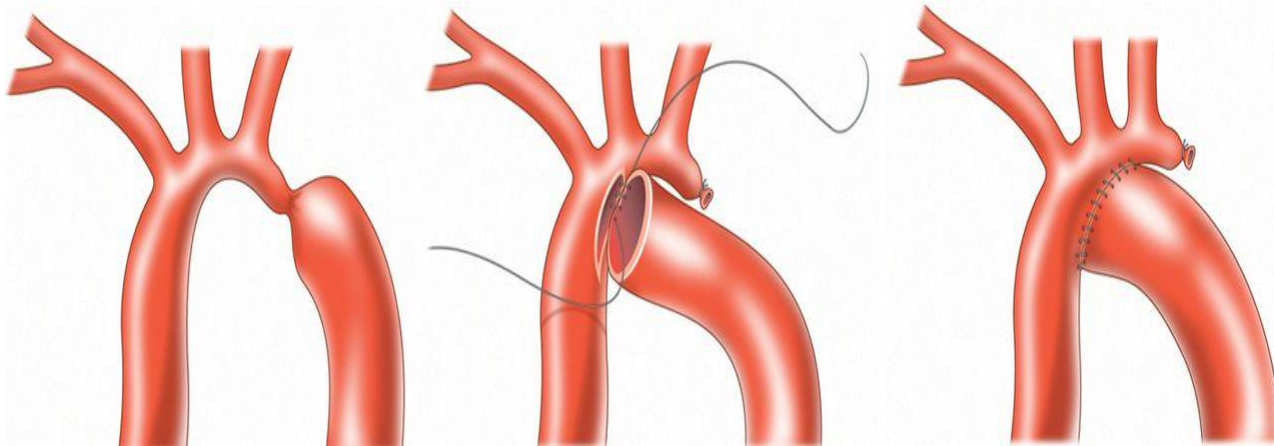
Author	Arch anomaly	Strategy cerebral protection	Arch repair technique (patients)	Patients	Mortality			No patients with recurrent arch obstruction	Freedom from arch reoperation	Reference
					Late (%)	Early (%)	Overall (%)			
Irwin 1991	IAA	Off pump	Tube graft	20	0	25	25	–	95%	ATS 1991;52:632–7
Karl 1992	IAA	DHCA	Direct anastomosis	55	–	–	25	11	69% at 4 years	JTCVS 1992;104:688–95
Sandhu 1995	CoA	DHCA	Direct anastomosis (54) Patch (3) Subclavian flap (2) Tube graft (1)	60	11.7	3.8	15	2	No information	AJC 1995;75:370–73
	AAH									
Serraf 1996	IAA	DHCA	Direct anastomosis (59) Tube graft (12) Patch (8)	79	18.9	12.1	30	15	7 patients operated	JTCVS 1996;112:1150–60
Mainwaring 1997	IAA	Off pump	Tube graft	27	4	15	18	–	55% at 5 years	ATS 1997;64:1782–6
Tlaskal 1998	IAA	DHCA	Direct anastomosis (24)	40	50	–	50	7	5 patients operated	EJCTS 1998;14:235–42
		Off pump	Tube graft (10) Others (6)							
Fulton 1999	IAA	DHCA	Direct anastomosis (66) Others (6)	72	2.8	9.7	13	11	47% at 12 years	ATS 1999;67:177–81
Schreiber 2000	IAA	DHCA	Direct anastomosis (84) Patch (9)	94	37	12	38	20	40% at 15 years	ATS 2000;70:1896–901
Elgamal 2002	CoA	DHCA	Arch advancement	65	4.6	3	7.6	1	0% at 5 years	ATS 2002;73:1267–73
Oosterhof 2004	IAA	DHCA	Direct anastomosis (60) Tube graft (11)	85	50	7	53	17	60% at 5 years	ATS 2004;78:1696–702
			Direct anastomosis + patch (12) Modified Norwood (2)							
CHSS 2005	IAA	ASCP	Direct anastomosis (267)	453	–	–	33	109	72% at 15 years	JTCVS 2005;129:343–50
		DHCA Off pump	Direct anastomosis + patch (125) Tube graft (59) Others (2)							
Brown 2006	IAA	DHCA	Left carotid swing down (43)	65	7.6	16.6	23	15	60% at 15 years	EJCTS 2006;29:666–73
		Off pump	Direct anastomosis (18) Tube graft (2) Patch (2)							
Morales 2006	IAA	ASCP DHCA	Arch advancement	60	11.6	11.3	21.6	–	100% at 5 years	ATS 2006;82:1577–84
Lim 2007	IAA	ASCP	Direct anastomosis	69	0	1.5	1.5	1	98.6% at 5 months	EJCTS 2007;31:242–48
	CoA									
	HAA									

IAA=Interrupted aortic arch, CoA=Coarctation of aorta, AAH=Aortic arch hypoplasia, DHCA=Deep hypothermic cardiac arrest, ASCP=Antegrade selective cerebral perfusion.



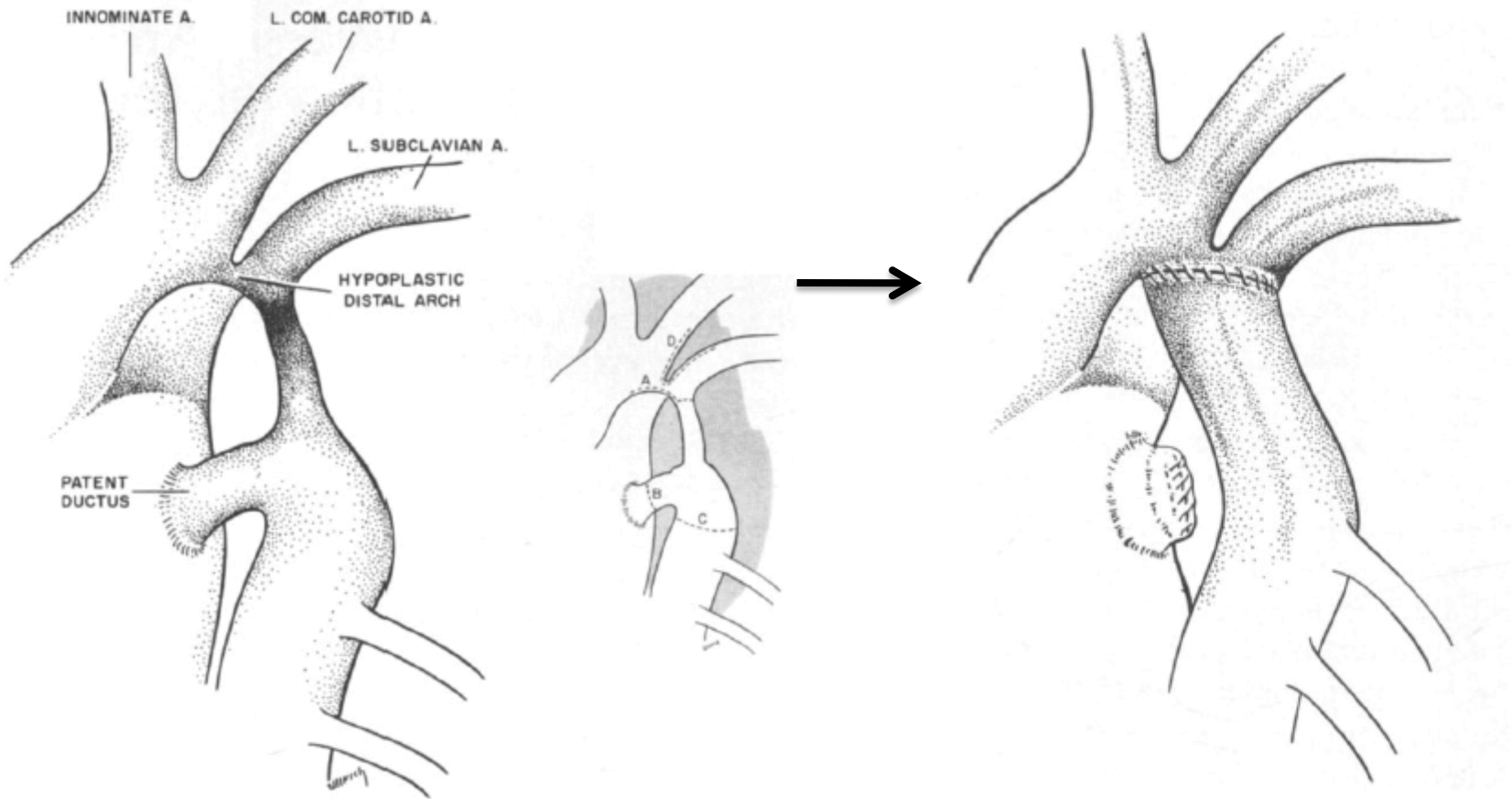
One stage repair owes

- Tissue to tissue technique
- Selective cerebral perfusion



A Method of Enlarging the Distal Transverse Arch in Infants with Hypoplasia and Coarctation of the Aorta

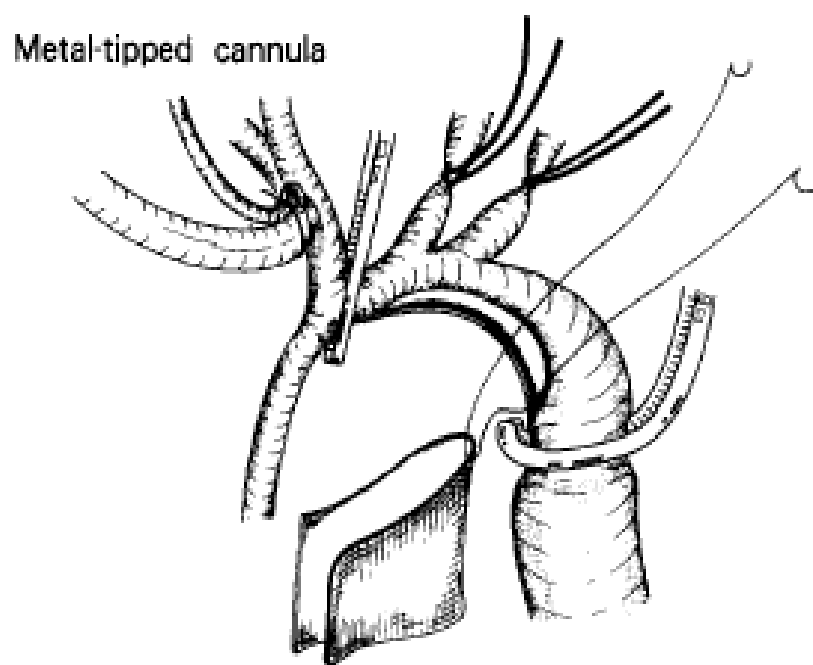
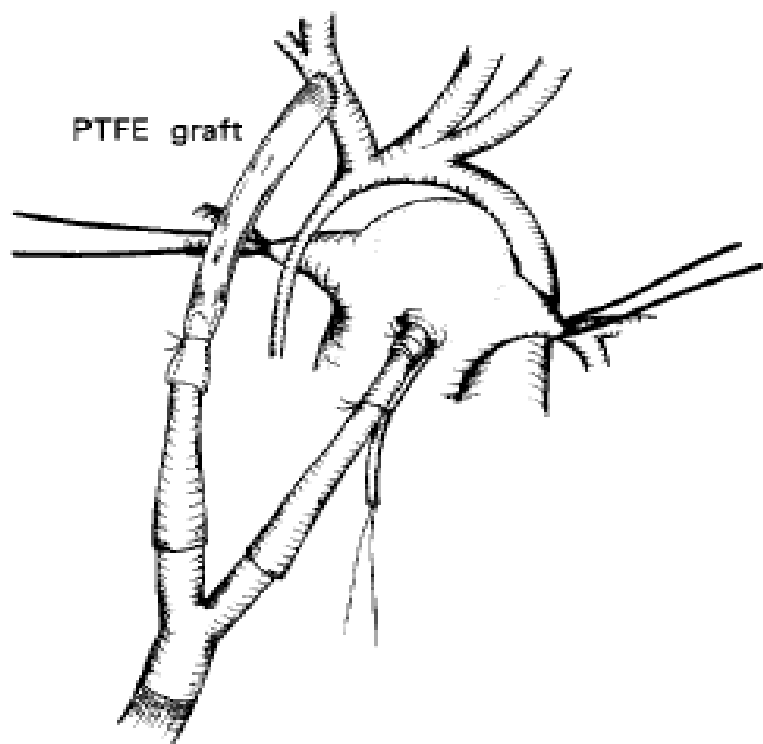
Joseph J. Amato, M.D., Harold F. Rheinlander, M.D.,
and Richard J. Cleveland, M.D.

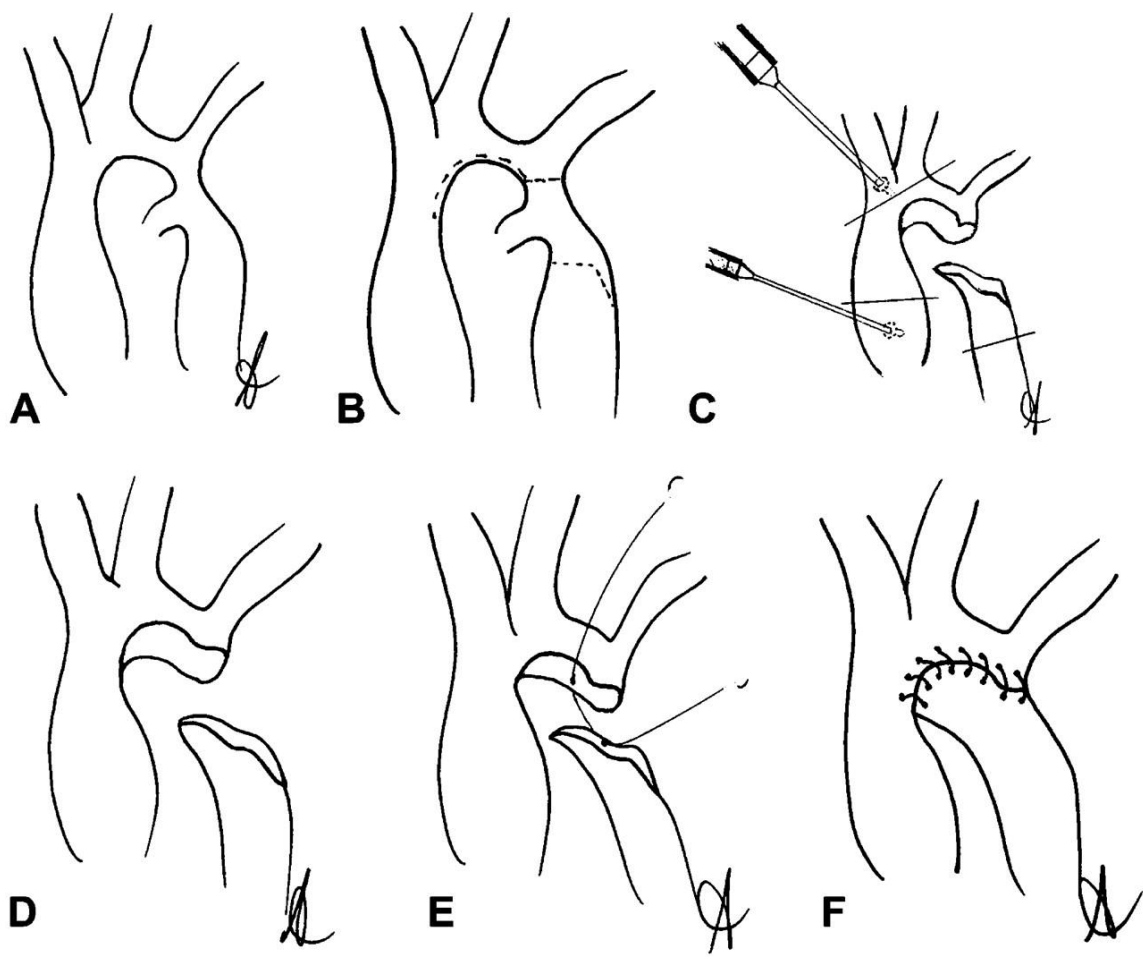


Selective Cerebral Perfusion Technique During Aortic Arch Repair in Neonates

Toshihide Asou, MD, Hideaki Kado, MD, Yutaka Imoto, MD, Yuichi Shiokawa, MD, Ryuji Tominaga, MD, Yoshito Kawachi, MD, and Hisataka Yasui, MD

Department of Cardiovascular Surgery, Fukuoka Children's Hospital, and Division of Cardiac Surgery, Research Institute of Angiocardiology, Kyushu University, Fukuoka, Japan





- Deep hypothermic circulatory arrest: seizures, choreoathetosis and the high impact on the neuro-developmental outcome
- Antegrade selective cerebral perfusion:
- Perfusion rate: $50 \text{ ml kg}^{-1} \text{ min}^{-1}$

- (a) there were no differences regarding the neurological complications, but a significant favorable impact of the bihemispheric ACP on hospital mortality did appear
- (b) in 8% of their patients, Willis's circle was incomplete or absent, and in those patients, left-hemispheric perfusion was put at risk

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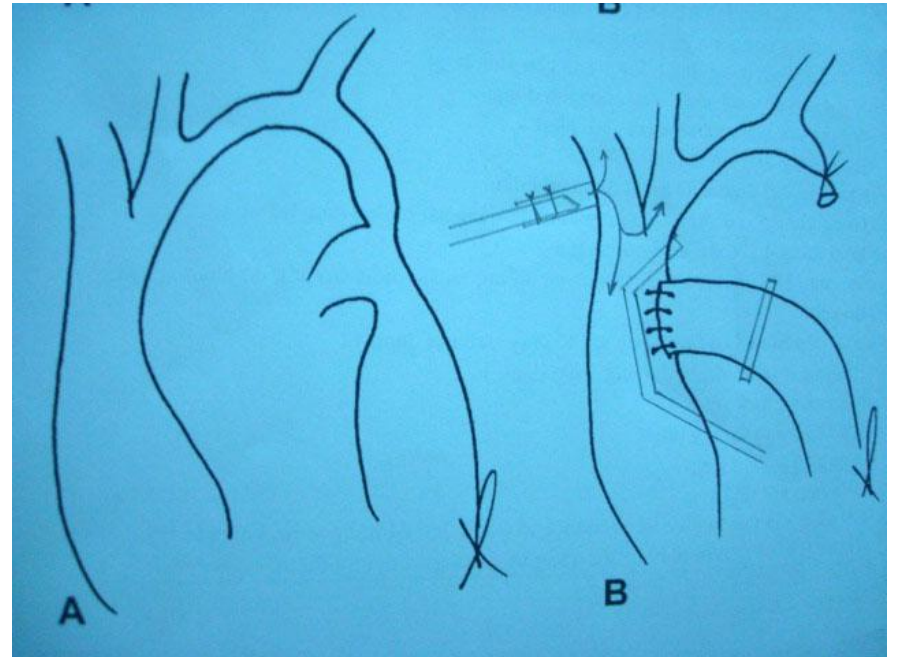
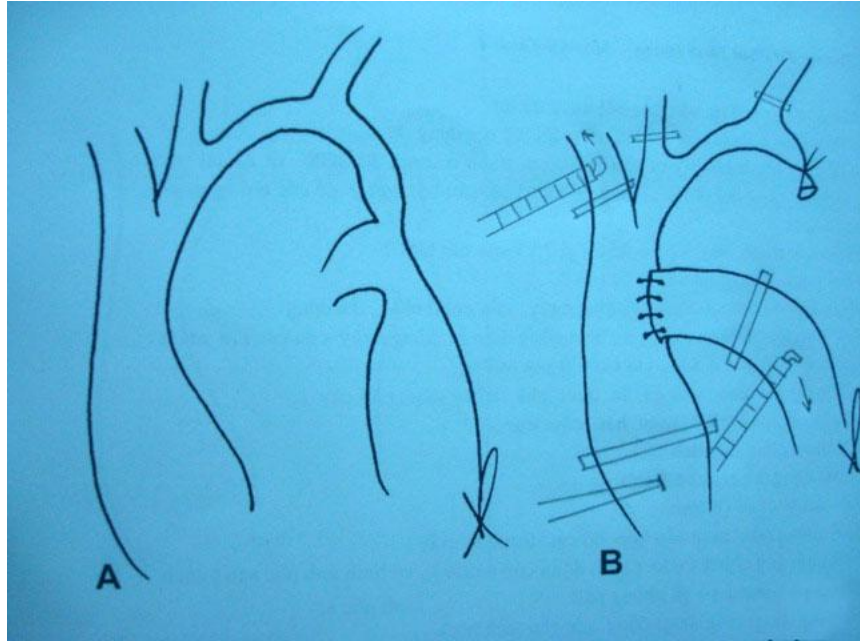
- **Dossche** KM, Schepens MA, Morshuis WJ, Muysoms FE, Langemeijer JJ, Vermeulen FE.
Antegrade selective cerebral perfusion in operations on the proximal thoracic aorta. Ann Thorac Surg. 1999 Jun;67(6):1904-10; discussion 1919-21.

- The transcranial Doppler oximeter (NIRS, Somanetics, or INVOS) is a re-liable tool for an estimation of left hemispheric perfusion

❖ [Apostolakis E, Akinosoglou K.](#)

The methodologies of hypothermic circulatory arrest and of antegrade and retrograde cerebral perfusion for aortic arch surgery. [Ann Thorac Cardiovasc Surg.](#) 2008 Jun;14(3):138-48.

- ❖ *Pigula FA, Siewers RD, Nemoto EM. Regional perfusion of the brain during neonatal aortic arch reconstruction. [J Thorac Cardiovasc Surg](#) 1999; 117: 1023–1024.*

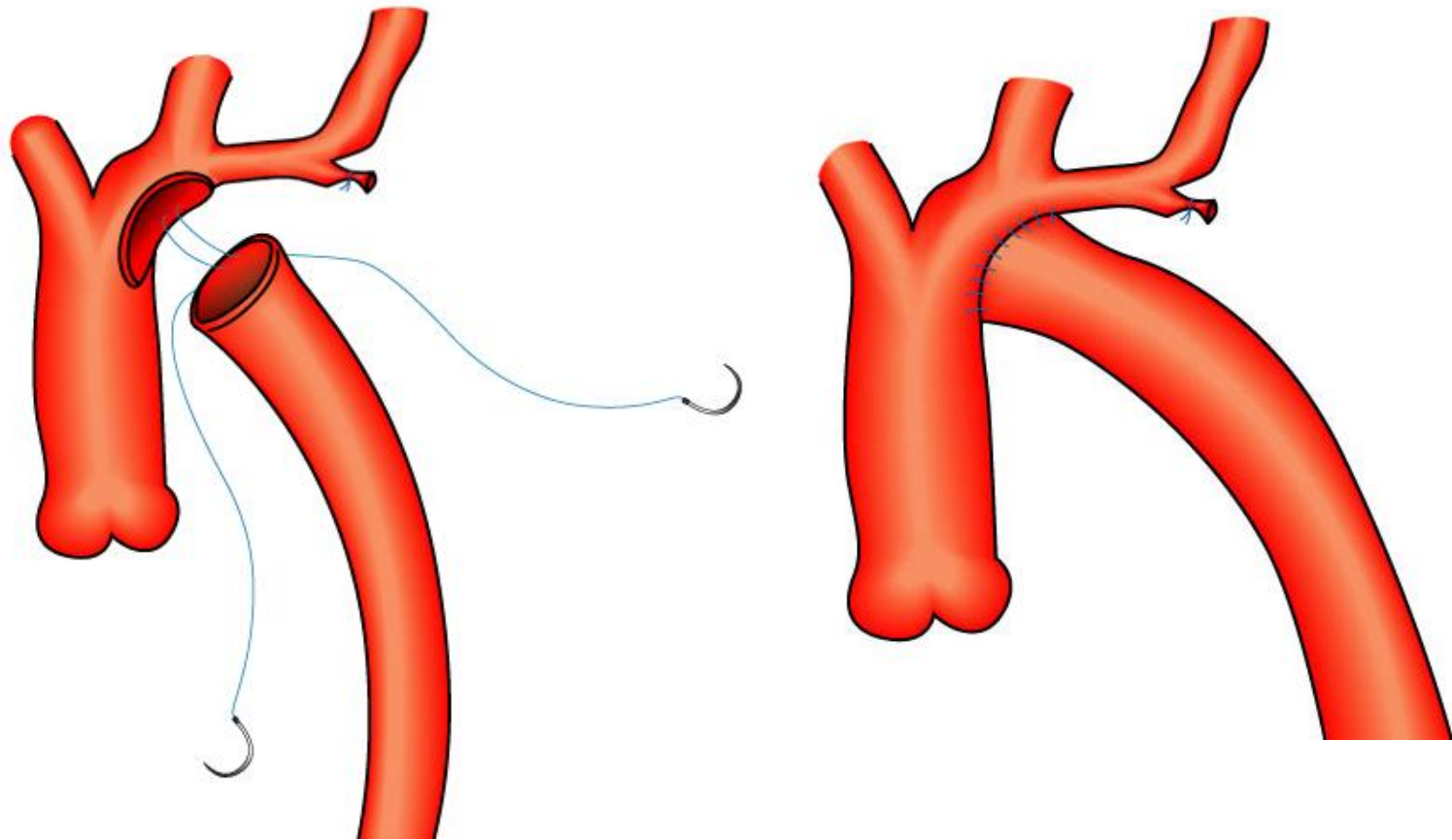


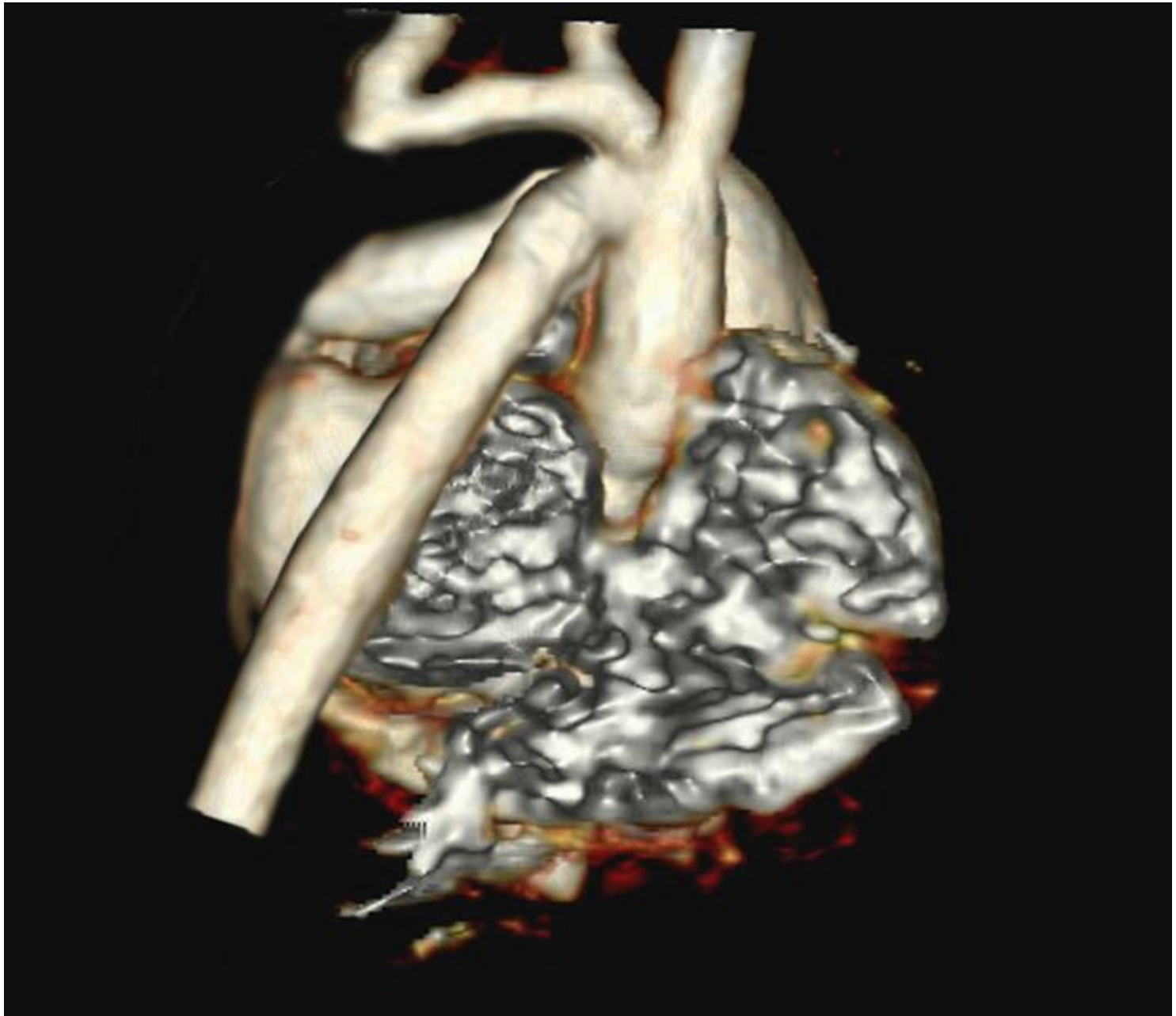
Potential Cx. of Surgery :

Change in arch geometry

- Early : airway problem
- Late : stiff aorta

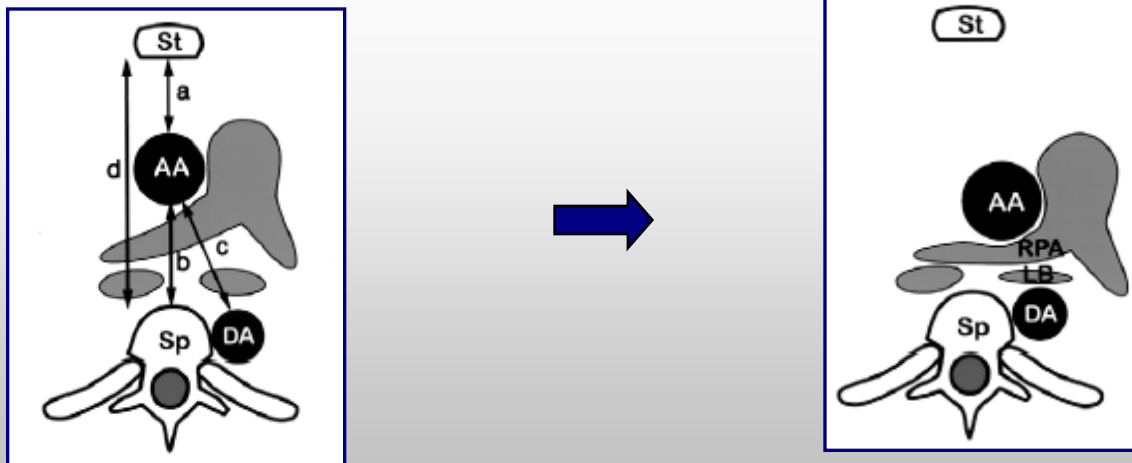
End to Side anastomosis





■ *Bronchial compression by posteriorly displaced ascending aorta in patients with congenital heart disease*

- ◆ Retrospectively review CT findings of 8 pts. with posteriorly displacement of the ascending aorta
 - Truncus arteriosus, TOF, PDA, PA with VSD, CoA
- ◆ Focused on *Aortopulmonary space*



■ *Three-dimensional computed tomography in children with compression of the central airways complicating congenital heart disease*

◆ 49 children

- TOF(18),cc-TGA(6), d-TGA(2), DORV(5),VSD(5), PDA(2),CoA(3),others (8)
- Stenosis site : Trachea (21), bronchus (28)

◆ Surgical intervention in 25

- Aortopexy(5), pulmonary arteriopexy(2), pulmonary arterial aneurysmorrhaphy(5),transposition of pulmonary artery(2), division of anomalous vessel(5), thymectomy(3), Lecompte maneuver(1), lobectomy(2)

◆ **CT** is useful in evaluation of obstruction of airway in children

- The transcranial Doppler oximeter (NIRS, Somanetics, or INVOS) is a re-liable tool for an estimation of left hemispheric perfusion

❖ [Apostolakis E, Akinosoglou K.](#)

The methodologies of hypothermic circulatory arrest and of antegrade and retrograde cerebral perfusion for aortic arch surgery. [Ann Thorac Cardiovasc Surg.](#) 2008 Jun;14(3):138-48.

- ❖ *Pigula FA, Siewers RD, Nemoto EM. Regional perfusion of the brain during neonatal aortic arch reconstruction. [J Thorac Cardiovasc Surg](#) 1999; 117: 1023–1024.*

Summary

- End to side technique
- Airway problem
- Antegrade selective cerebral perfusion
- Monitoring of ACP