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Cardiovascular Surgery During Pregnancy and Postpartum An Update 1997-2009

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Cardiac Surgery in Pregnancy

SUMMARY Maternal **1958-1994** Death	Time Period	Fetal Death
–		
33.0%	Zitnik RS, 1969	1958-1968 **5.0%**
20.0%	Becker RM, 1983	1970-1983 1.5%
19.5%	Bernal JM, 1986	1958-1986 2.2%
33.3%	Strickland RA, 1991*	1965-1989 10.0%
	Born D, 1995*	1981-1992

Weiss BM, et al. Am J Obstet Gynecol 1998

Cardiovascular Surgery and Pregnancy Systematic Review 1984-1996

TIMING Maternal n (ECC)	Patients Mortality	Emer-gency	Fetal/ Neonat Mortality
n=161			
DURING GESTATION 30%	70 (59) 6%	23%	
AT DELIVERY	41 (36)	32%	
5%		12%	

Weiss BM, et al. Am J Obstet Gynecol 1998

Cardiovascular Surgery and Pregnancy Systematic Review 1984–1996

INDICATIONS n=161		Patients (%)	Maternal Morbidity	Maternal Mortality
NATIVE VALVE		58 (36%)		19%
9%				
PROSTHETIC VALVE		23 (14%)		23%
9%				
AORTA	Dissection	32 (20%)		34%
22%				
	Aneurysm	17 (11%)		41%
0%				
PULMONARY EMBOLISM		9 (6%)		44%

Cardiovascular Surgery and Pregnancy

Summary 1964-2007	Time Period	Fetal Death	Maternal Death
• 38.5%	Salazar F, 2001* 13.3%	1972-1998	
• 18.6%	Arnoni RT, 2003* 8.6%	1964-2002	
• 25.0%	Immer FF, 2003	1983-1989	37.5%
Dissection of ascending aorta (A)	1990-1994	50.0%	30.0%
	1995-1999	16.7%	0.0%
	2000-2002	10.0%	0.0%

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Systematic search and review of published cases

Inclusion criteria

Maternal diagnosis made antepartum

Intention to continue pregnancy

Goal Timing and indication for surgery

Maternal and fetal/neonatal outcome

Cardiopulmonary bypass and hypothermia

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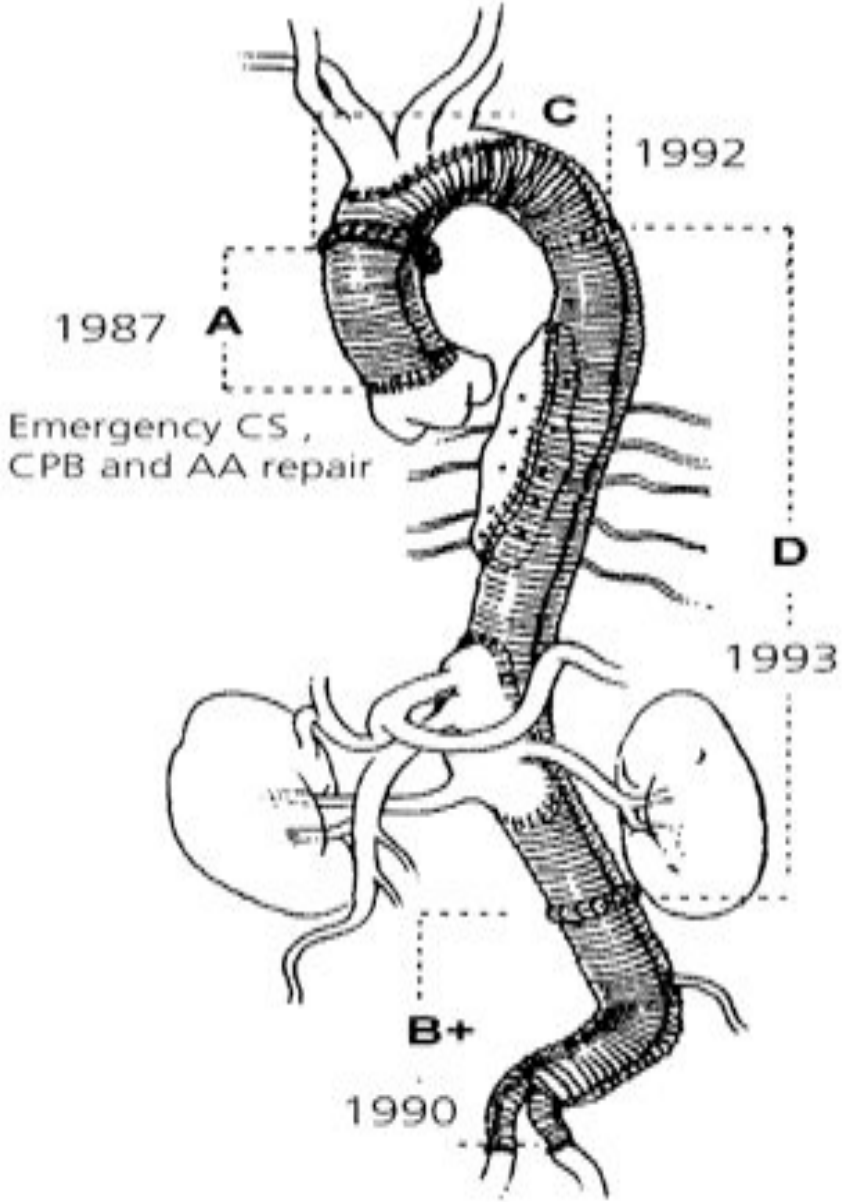
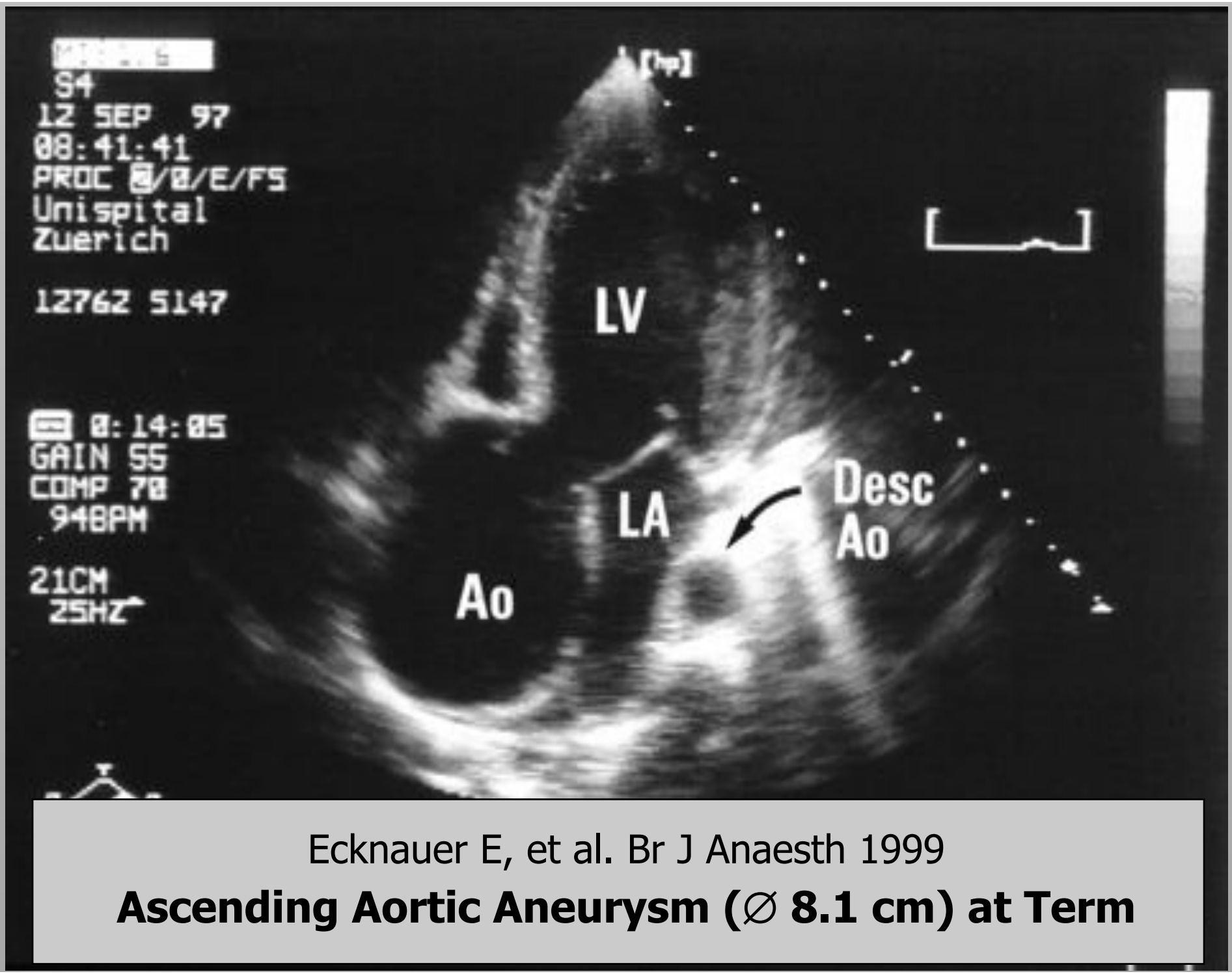
INDICATIONS n=236	Non-ECC + ECC, n	Maternal Death, n	Fetal/Neonat Death, n*
NATIVE VALVE	60 + 35	1 (1.1%)	11/94 (11.7%)
PROSTHETIC VALVE	30	2 (6.7%)	9/29 (31.0%)
AORTA Coarctation	3 + 1	0	0
Dissection	3 + 63	8 (12.1%)	10/65 (15.4%)
Aneurysm	3 + 10	0	0
CARDIAC TUMOR	12	0	1/12 (8.3%)
VARIA (PE,CHD,CAD)	2 + 14	0	2/16 (12.5%)

Babatasi, et al. Eur J. Cardio-thorac Surg 1997

Pregnancy with Aortic Dissection in Ehler-Danlos Syndrome



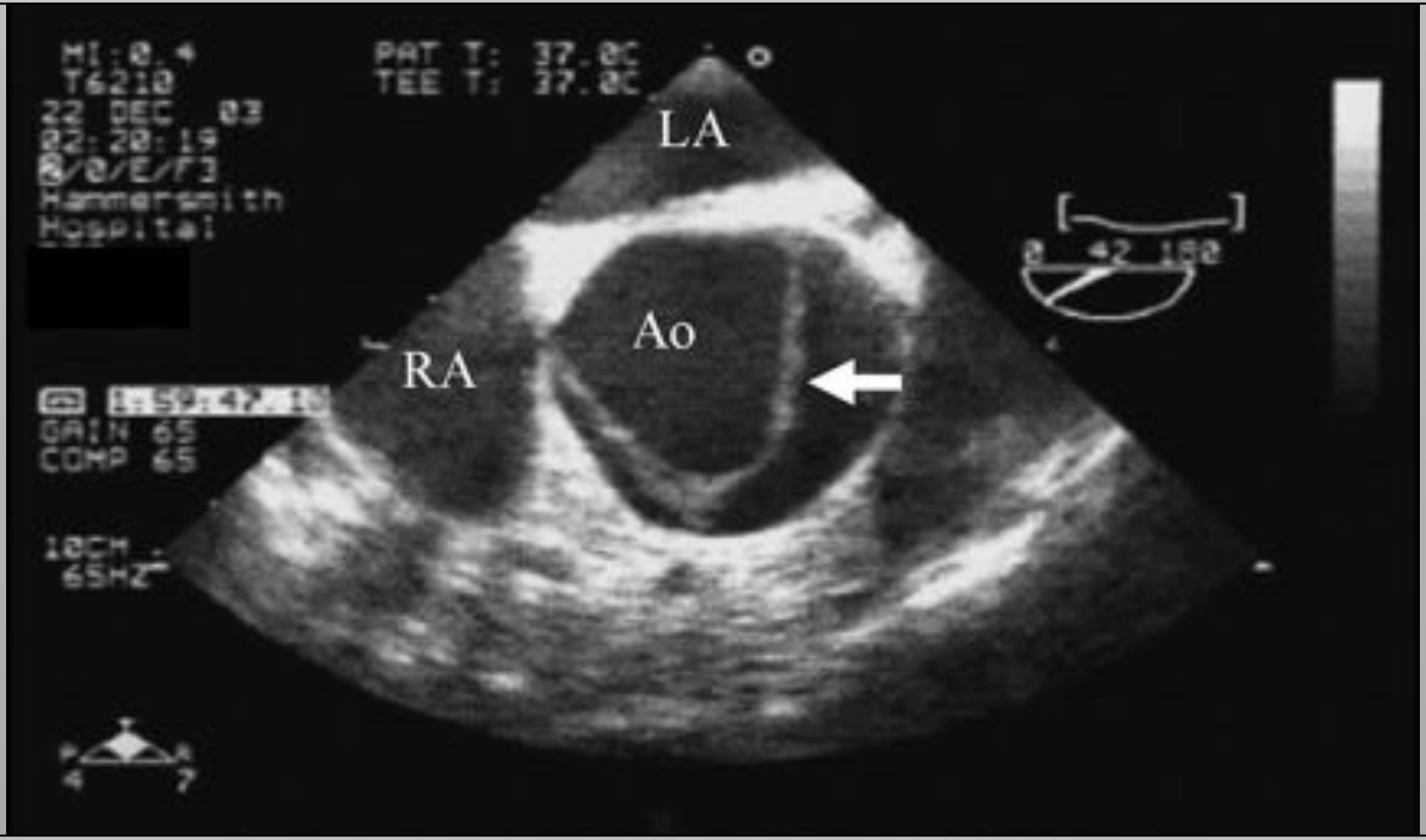


Ecknauer E, et al. Br J Anaesth 1999

Ascending Aortic Aneurysm (∅ 8.1 cm) at Term

Evans PJ, et al. Int J Obstet Anesth 2006

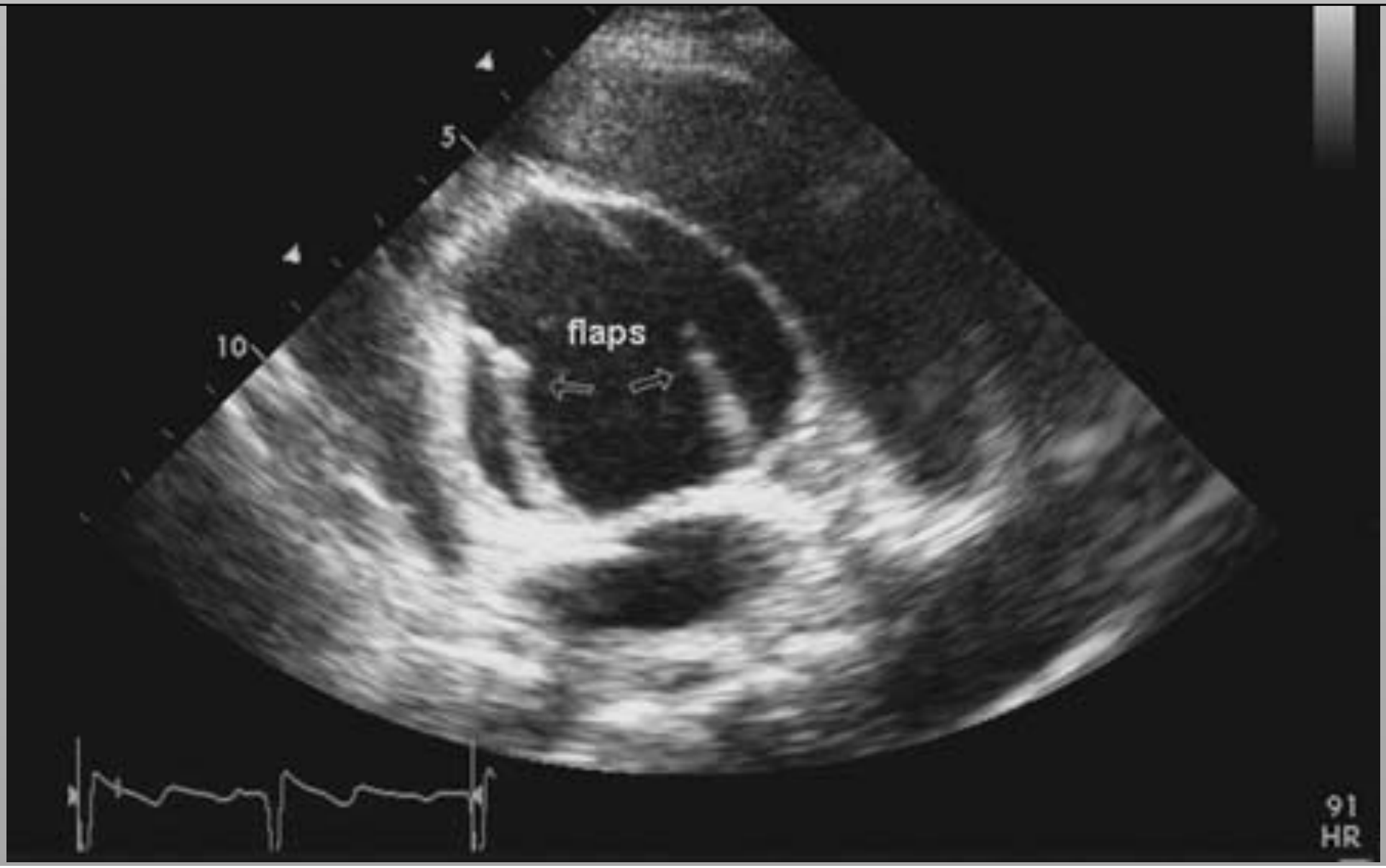
Cardiorespiratory Symptoms in Late Pregnancy



Lewis S, et al. Peripartum acute aortic dissection. Br J Anaesth 2005

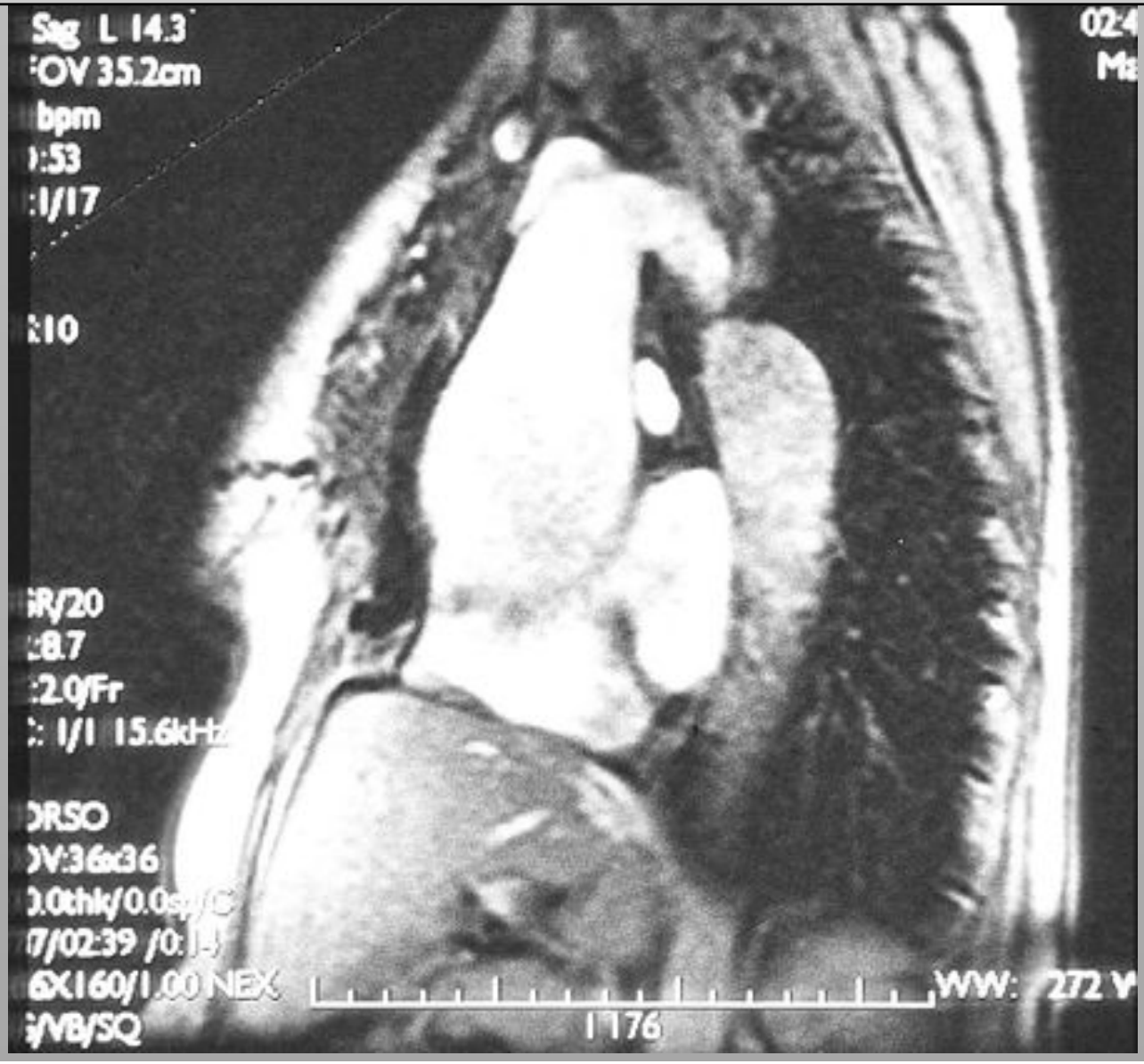
Shaker WH, et al. J Card Surg 2008

Acute Type A Aortic Dissection
at Seven Weeks of Gestation in a Marfan Patient



Koelble N, et al. J Cardioth Vasc Anesth 2001

Shone's Anomaly and Ascending Aortic Aneurysm in Late Pregnancy



Cardiovascular Surgery During Pregnancy and Postpartum 1997–2009

TIMING	Non-ECC + ECC, n	Surgery weeks'	Maternal Death, n	Fetal/ Neonat Death, n*
DURING	5 + 22/128 (4.7%)	22.9±7.1	53 + 76 (21.1%)	1 + 5 (7–39)
AT	1 + 4/63 (5.0%)	34.4±3.2	14 + 46 (7.9%)	0 + 3 (26–38)
DELIVERY				

Extracorporeal Circulation During Pregnancy 1997–2009

INDICATIONS n=76	n	Surgery, weeks'	Maternal Death, n	Fetal/Neonat Death, n
NATIVE VALVE	23	22.0±5.8	0	8/22 (36.4%)
PROSTHETIC VALVE	22	18.3±8.7	2 (9.1%)	8/21 (38.1%)
AORTA Coarctation	1	20	0	0
Dissection	14	22.7±7.4	5 (35.7%)	4/13 (30.1%)
Aneurysm	5	14.2±5.8	0	0
CARDIAC TUMOR	6	24.8±4.2	0	0
VARIA	5	19.4±6.0	0	2/4 (50.0%)

Extracorporeal Circulation During Pregnancy 1997–2009

Maternal age, years	28.3±5.0 (18–39)	Duration of ECC, min (n=30)	97.0±26.5 (18-367)
Surgery, weeks'	20.6±5.0 (7–38)	Fetal monitoring, n	25 (33%)
Maternal death, n	5/76 **6.6.%**	Fetal/neonatal death, n	22/74 **29.7%**
Delivery, weeks'	Vaginal, n 35.7±3.9 (25-40)	19 (25%) Cesarean, n Not reported, n	29 (38%) 28 (37%)

Extracorporeal Circulation During Pregnancy 1997–2009

TEMPERATURE MANAGEMENT		Fetal/Neonatal Death (n=22)*
NOT REPORTED, n	32 (38.8%)	14 (43.8%)
NORMOTHERMIA (>34°C), n	26 (34.2%)	4 (15.4%)
MODERATE HYPOTHERMIA, n	11 (14.5%)	1 (9.1%)
DEEP HYPOTHERMIA (<28°C) ± Circulatory arrest, n	7 (9.2%)	3 (42.9%)

*IUD before surgery excluded, twins and triplets included

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Conclusions

- Acquired valvular heart diseases and aortic dissection make the major indications for surgery during pregnancy and postpartum.
- Maternal outcome and risks of cardiovascular surgery during pregnancy remain unchanged, as compared to the period 1984-1996 and to all previous decades.

Cardiovascular Surgery During Pregnancy and Postpartum 1997-2009

Conclusions

- Fetal/neonatal outcome of maternal surgery with ECC is unpredictable. The risks remain high as in all previous decades.
- High-flow, normothermic ECC and cesarean delivery (as early as possible in the 3rd trimester) might improve both, the fetal-neonatal and maternal outcome of surgery.