

Is There a Need For Cerebral Perfusion during Deep Hypothermic Circulatory Arrest ?

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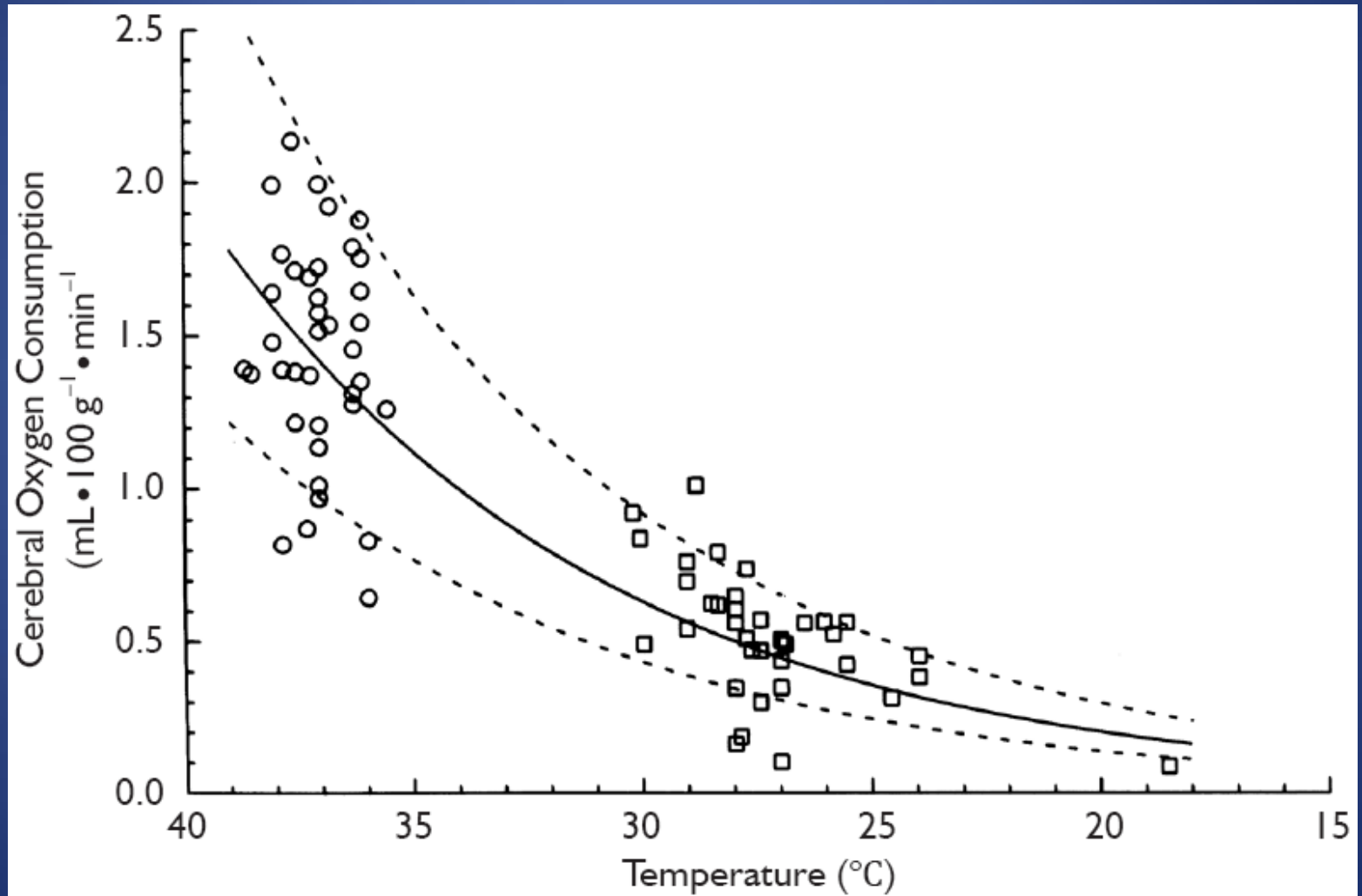
Aortic arch surgery

- Cerebral protection is the principle concern
- Significant post-operative neurological complications occur in 5-10%

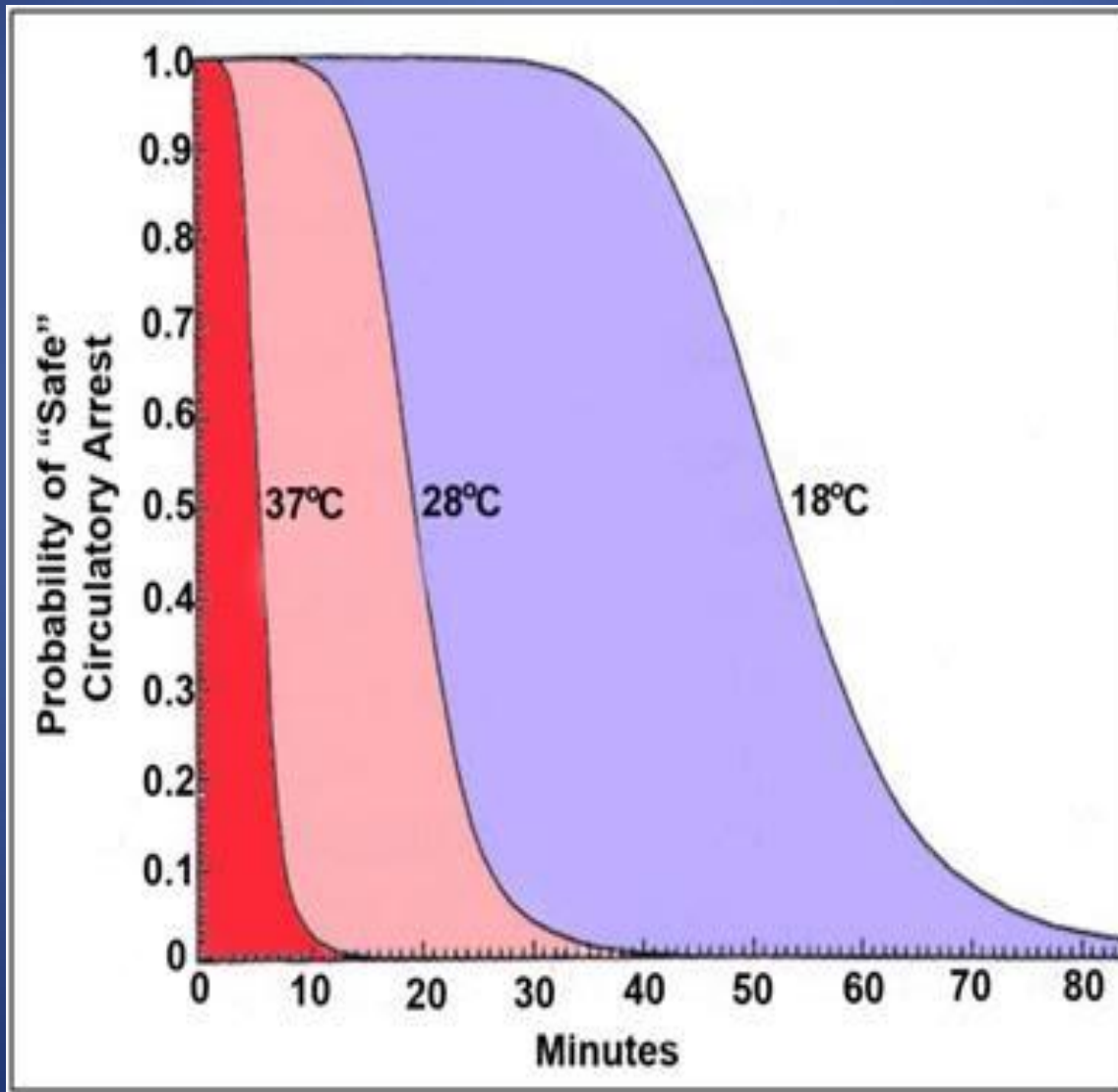
Methods of cerebral protection

- Deep Hypothermic Circulatory Arrest (DHCA)
- DHCA+ Retrograde cerebral perfusion (RCP)
- Mild/Mod hypothermia +Antegrade cerebral perfusion (ACP)

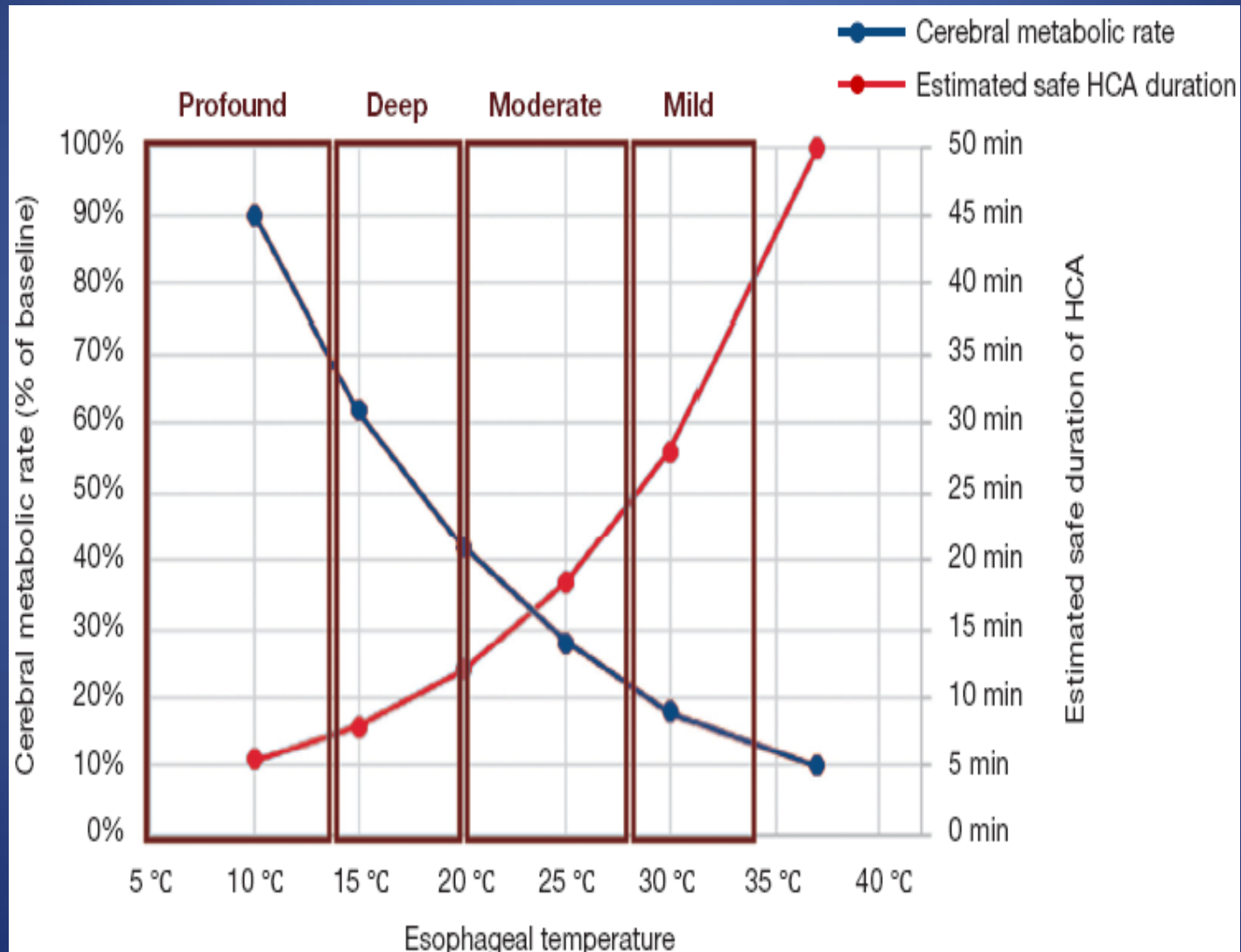
Temperature and cerebral protection



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Advantages and limitations of each cerebral strategy

Technique	Advantage	Limitation	Comment
DHCA	Avoids manipulating of diseased aorta	Questions of safety for long periods of DHCA , may cause coagulopathy	Generally used in more straightforward cases
HCA+ACP	Permits longer period of circulatory arrest than with DHCA only	Requires the handling of sclerotic vessels; may result in the release of emboli	Controversies regarding ideal site of cannulation for optimal perfusion
DHCA+RCP	Simple, cooling of brain tissue, flushes cerebral vasculature of toxic metabolic products and micro-emboli	Perfusion may be limited to the brain's surface	Becoming less popular

Comparison studies

DHCA vs RCP vs ACP

Is there a need for adjunct cerebral protection in conjunction with deep hypothermic circulatory arrest during noncomplex hemiarach surgery?

DHCA/ACP/RCP: Stroke 5.4%/6.2%/6.4% (NS)

Mortality 4.7%/2.6%/2.6% (NS)

Kaneko et al. JTCVS 2014

Moderate hypothermia during aortic arch surgery is associated with reduced risk of early mortality

HCA (17)+ACP/HCA (23)+ACP: Stroke 7.6%/2.8% (p=0.07)

Mortality 7.7%/0.7% (p<0.01)

Tsai et al. JTCVS 2013

Moderate Versus Deep Hypothermic Circulatory Arrest for Elective Aortic Transverse Hemiarch Reconstruction

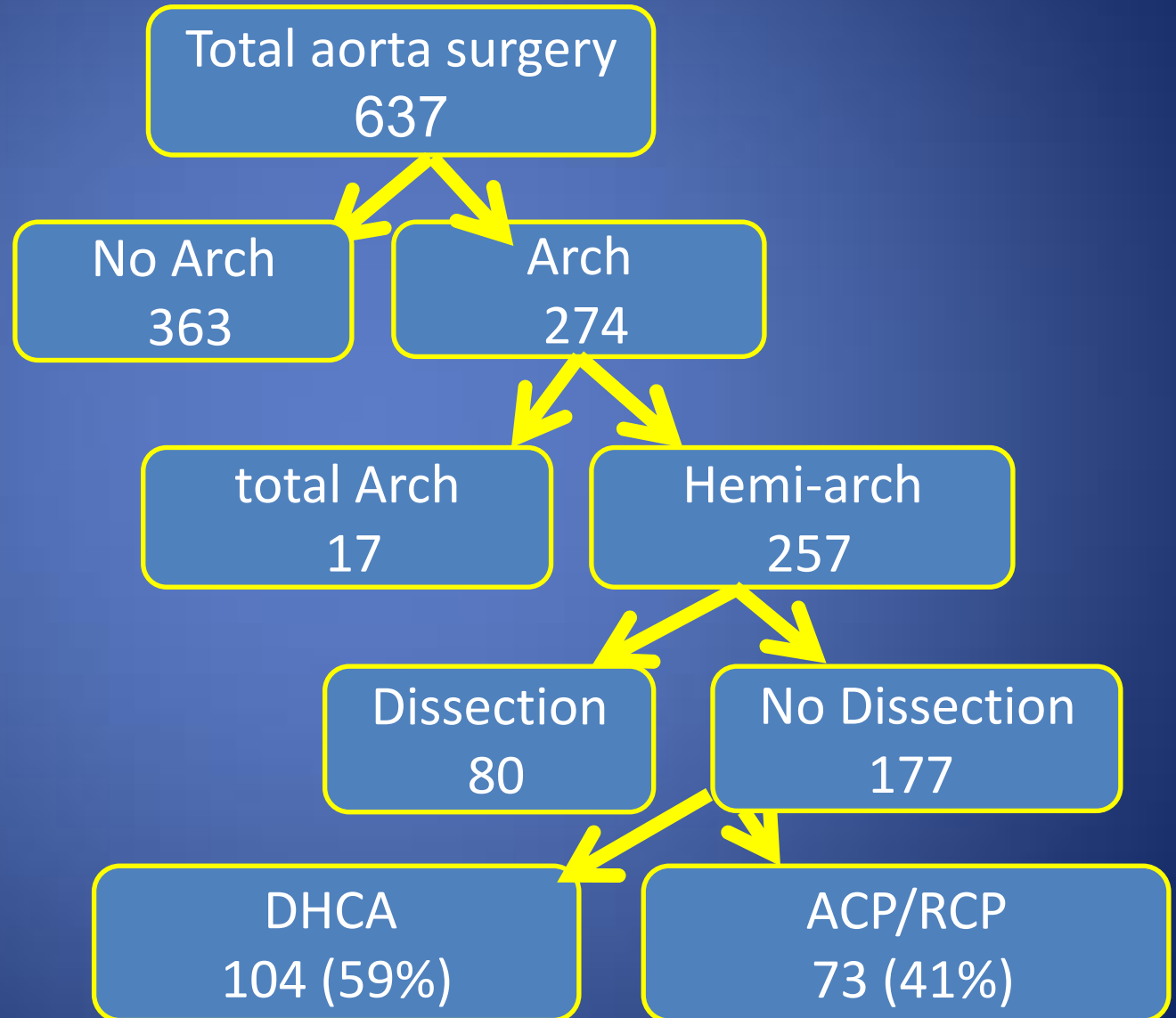
DHCA+RCP/MHCA+ACP : Stroke 0%/2% (NS)

Mortality 1%/1% (NS)

Transfusion 61%/38% (p<0.01)

Vallabhajosyula Ann Thorac 2015

Methods



Methods

- Anesthesia: barbiturate, fentanyl and propofol
- Ice on head, NIRS
- DHCA: 18-22 degrees core temperature (urinary bladder)
- RCP: 18-22 degrees, 500cc cold blood, 25mmhg CVP
- ACP: mainly unilateral Rt. axillary artery graft

Patient's Data

	DHCA only	ACP/RCP
Total	104	73
Male (%)	62 (60%)	46 (63%)
Age	61±6	62±13
HTN	69 (66%)	45 (62%)
Diabetes Mellitus	8 (8%)	4 (5%)
Dialysis	1 (1%)	0 (0)
COPD	10 (10%)	3 (4%)
Marfan	4 (4%)	2 (3%)
(%) Ejection fraction	56±8	56±7
Logistic EuroScore	14±15	12±9

P value was insignificant in all parameters

Operative Data

	DHCA only	ACP/RCP	P value
CPB-time	101±39	116±44	0.05
Clamp-time	73±32	89±43	0.02
Arrest time (IQR)	14±9 (10-16)	22±13 (14-27)	0.01
Concomitant Procedure			
AVr	66(63%)	43(59%)	NS
AVR	4(3.7%)	2(2.6%)	NS
MVr	1(1%)	2(2.6%)	NS

Results

	DHCA(n=104)	ACP/RCP (n=73)	P
Mortality	3 (3%)	3 (4%)	NS
Dialysis	0 (0)	5 (7%)	0.01
Stroke	6 (6%)	3 (4%)	NS
PC>2	42 (40%)	30 (41%)	NS
Deep sternum infection	1 (1%)	1 (1%)	NS
Prolonged ventilation	5 (5%)	2 (3%)	NS
Reopen for bleeding	4 (4%)	3 (4%)	NS
Hospital duration (days) median (range)	7 (5-10)	6 (5-10)	NS
ICU (h) median (range)	28 (23-72)	39 (23-65)	NS
Ventilation time (h) median (range)	14 (8-18)	19 (9-20)	NS

Summary and Conclusions

- Early outcome and neurological complications were comparable between DHCA versus HCA and ACP/RCP
- DHCA can be done safely with excellent outcome in elective non-complex arch repair with arrest times lower than 25 minutes

Summary and Conclusions

- Plan your surgical strategy
- Selection of appropriate cases with the appropriate perfusion
- Prepare for intraoperative surprise

Always the same tactics ?

Anesthesia for deep hypothermic circulatory arrest



DR / SAMI SAMIR