
反方
弓部手术我们还需要深低温吗？

为防止公说公有理，婆说婆有理

- 1、常温体外循环：鼻咽温35-37℃；
- 2、浅低温体外循环：鼻咽温32-35℃；
- 3、中低温体外循环：鼻咽温26-31℃；
- 4、深低温体外循环：鼻咽温20-25℃；
- 5、超深低温体外循环：鼻咽温15-20℃。

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- 5、超深低温体外循环：鼻咽温15-20℃。

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- 超低温（profound hypothermia）----≤14℃；
- 深低温（deep hypothermia）----14.1-20.0℃；
- 中低温（moderatehypothermia）----20.1-28.0℃；
- 浅低温（mild hypothermia）----28.1-34.0℃

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我们的观点

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第一个层面

深低温的不利方面

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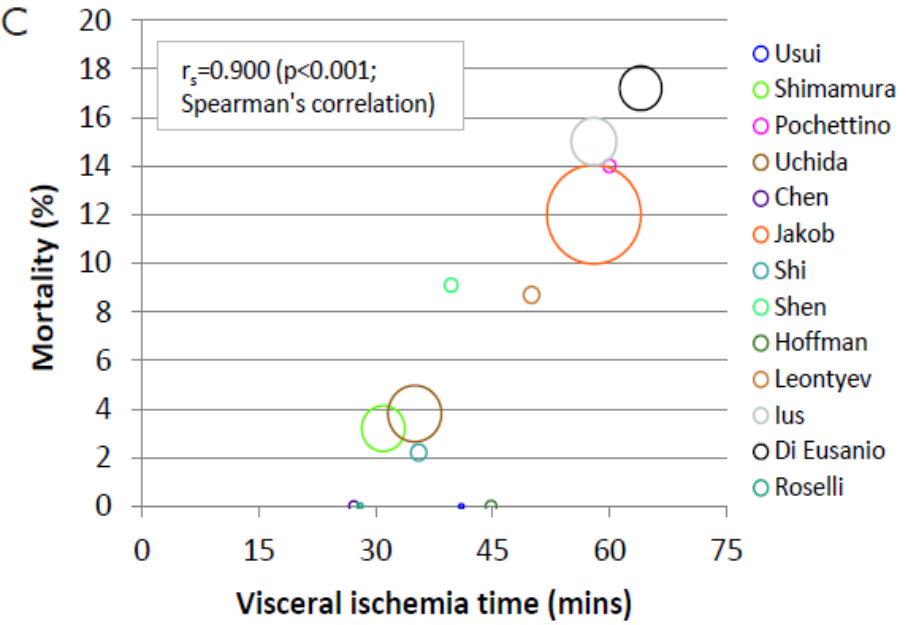
低温本身的危害

- 1. 血液系统—凝血障碍—出血及微血栓；
- 2. 氧代谢异常；
- 3. 肝肾等腹腔脏器的功能抑制；
- 4. 脑血管自主调节丧失；

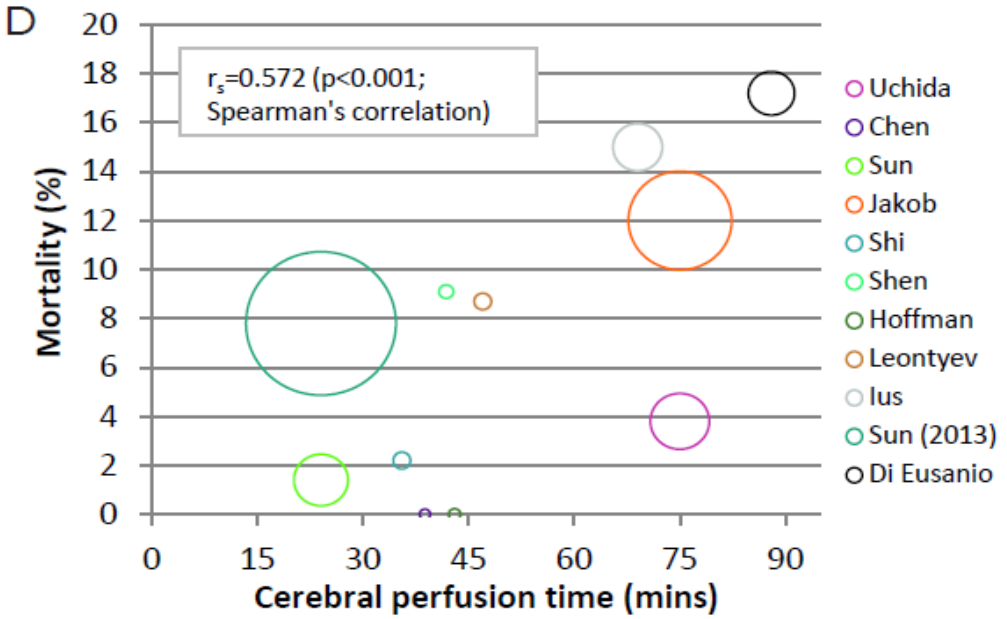
低温所致时间延长的危害

时间就是生命

- 内脏缺血时间



- 脑灌注时间



Tian DH, Ann Cardiothorac Surg, 2014

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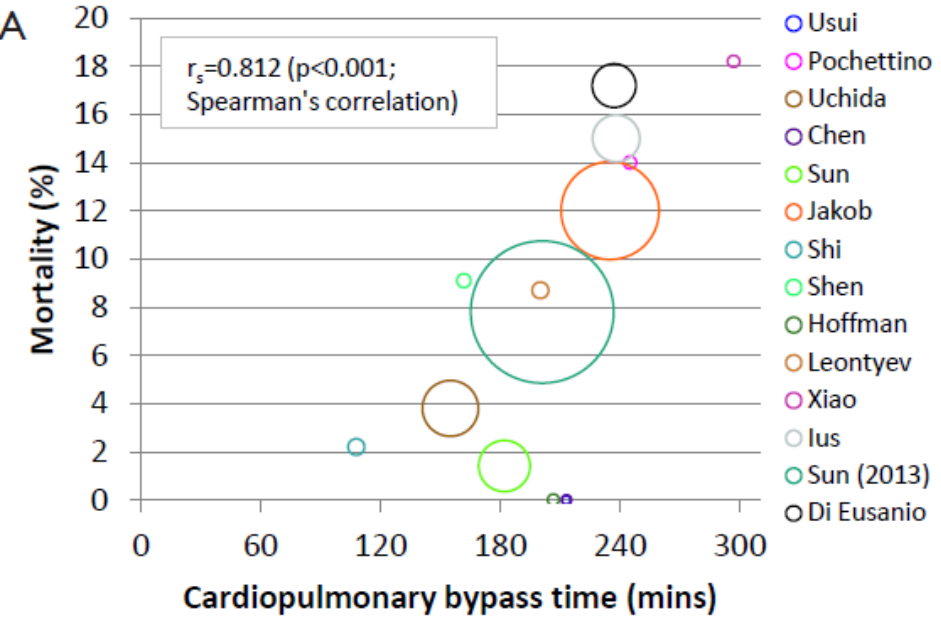
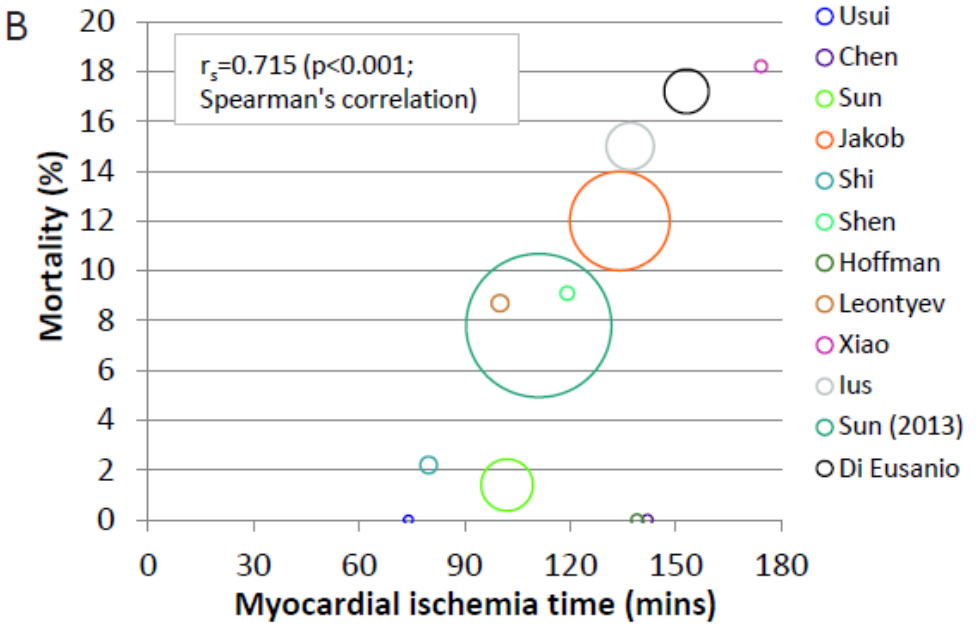
- 体外循环时间



- 心肌缺血时间



Tian DH, Ann Cardiothorac Surg, 2014.

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第二层面

喜新厌旧的条件

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可以不用深低温的理由

- 手术技术的提高，大大缩短需停循环时间；
- 选择性脑灌注的应用，手术期间脑部无需停循环；
- 中低温可以降低机体氧耗，满足大多数手术需要；
- 文献研究的支持

The Journal of Thoracic and Cardiovascular Surgery

Volume 125, Issue 4, April 2003, Pages 849–854

62316||

Cardiopulmonary Support and Physiology

Deep hypothermic circulatory arrest and antegrade selective cerebral perfusion during ascending aorta-hemiarch replacement: A retrospective comparative study ☆ ☆☆

Marco Di Eusanio, MDa, Ronald M.J. Wesselink, MD, PhDb, Wim J. Morshuis, MD, PhDa, Karl M. Dossche, MD, PhDa, Marc A.A.M. Schepens, MD, PhDa

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The safety of moderate hypothermic lower body circulatory arrest with selective cerebral perfusion: A propensity score analysis

Hiroyuki Kamiya, MD, Christian Hagl, MD, Irina Kropivnitskaya, Dietmar Böthig, MD, Klaus Kallenbach, MD, Nawid Khaladj, MD, Andreas Martens, MD, Axel Haverich, MD, and Matthias Karck, MD

Conclusions: Our results suggest that moderate lower body circulatory arrest can be safely performed for aortic arch repair. In fact, postoperative inflammatory response tended to be lower in patients with moderate lower body circulatory arrest than those with deep lower body circulatory arrest, and deep lower body circulatory arrest was a strong risk factor for reexploration for bleeding.

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J Thorac Cardiovasc Surg 2007;133:501-9

The Journal of Thoracic and Cardiovascular Surgery

Volume 138, Issue 5, November 2009, Pages 1081–1089

Acquired cardiovascular disease

Selective antegrade cerebral perfusion via right axillary artery cannulation reduces morbidity and mortality after proximal aortic surgery

Michael E. Halkos, MD[a], Faraz Kerendi, MD[a], Richard Myung, MD[a], Patrick Kilgo, MSc[b], John D. Puskas, MD[a], Edward P. Chen, MD[a,*]

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Systematic Review

A meta-analysis of deep hypothermic circulatory arrest versus moderate hypothermic circulatory arrest with selective antegrade cerebral perfusion

David H. Tian[1], Benjamin Wan[1], Paul G. Bannon[1,2], Martin Misfeld[3], Scott A. LeMaire[4,5], Teruhisa Kazui[6], Nicholas T. Kouchoukos[7], John A. Elefteriades[8], Joseph Bavaria[9], Joseph S. Coselli[4,5], Randall B. Griepp[10], Friedrich W. Mohr[3], Aung Oo[11], Lars G. Svensson[12], G. Chad Hughes[13], Tristan D. Yan[1,2]

Conclusions: The present meta-analysis indicated the superiority of MHCA+SACP in terms of stroke risk.

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Ann Cardiothorac Surg 2013;2(2):148-158

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

Prashanth Vallabhajosyula, MD, MS, Arminder S. Jassar, MD, Rohan S. Menon, BS, Caroline Komlo, BS, Jacob Gutsche, MD, Nimesh D. Desai, MD, PhD, W. Clark Hargrove, MD, Joseph E. Bavaria, MD, and Wilson Y. Szeto, MD

Division of Cardiovascular Surgery and Department of Anesthesia, University of Pennsylvania, Philadelphia, Pennsylvania

Conclusions. MHCA with antegrade cerebral perfusion yields excellent and equivalent outcomes to DHCA for elective aortic hemiarch reconstruction. MHCA significantly improves intraoperative times and, importantly, reduces transfusion requirements compared with DHCA with a retrograde cerebral perfusion strategy.

(Ann Thorac Surg 2015;99:1511–7)

第三层面

不用深低温需要注意的关键点

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- 预估手术时间
- 保证合理重要脏器的灌注
- 监测
- 随机应变

目前的潮流

中低温停循环+选择性脑灌注

需进一步研究

1.ACP or RCP？

2.单侧or双侧？

3.流量？

4.插管损伤及栓子？

5.急诊？

谢谢

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强烈推荐直接DHCA的文献

Deep hypothermic circulatory arrest

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Ann Cardiothorac Surg 2013;2(3):303-315