

## How to perform distal perfusion?

*Distal perfüzyon nasıl yapılmalı?*

### Ertekin Utku Ünal

Department of Cardiovascular Surgery, Türkiye Yüksek İhtisas Training and Research Hospital, Ankara, Turkey

I have read the article by Balkanay et al.<sup>[1]</sup> with great interest. Antegrade cerebral perfusion (ACP) during hypothermic circulatory arrest is the standard cerebral protection method during aortic arch surgery. The primarily accepted concept is the certain use of ACP, even if the method providing the ACP comprises variety of techniques (unilateral or bilateral/proximal brachial, axillary, subclavian or arch vessels directly for cannulation site/direct or graft-using for cannulation technique). There is no common consensus as to the temperature, the method of ACP, or distal perfusion. As related to the Balkanay et al.'s<sup>[1]</sup> report, one of the primarily discussed issues is the distal/visceral perfusion. It has been reported that only about 30% of European centers perform distal perfusion during ACP.<sup>[2]</sup>

Balkanay et al.<sup>[1]</sup> are to be congratulated for their technique related to perfusion of lower body during considerably long re-warming phase. The surgical technique of aortic arch surgery can be defined as a two-edged sword. The distal-first technique which Balkanay et al.<sup>[1]</sup> also used, may prolong ACP period; however, it enables distal perfusion technique, whereas the arch-first technique may prolong visceral ischemia. However, I have some concerns about the technique. Firstly, what is the set-up for cardiopulmonary bypass lines? Is there any separate roller-pump head for the femoral arterial line or not? If not, how could you be certain not to steal from cerebral perfusion with one roller-pump head? In my opinion, the flow of arterial lines cannot be isolated at a desired value with only one roller-pump head. Secondly, visceral ischemia up to 60 min was shown to be tolerable, even at higher temperatures.<sup>[3,4]</sup> Aortic arch surgery can be performed safely at moderate hypothermia. The re-warming phase can be shortened with higher temperatures. As a result,

drawbacks of deep hypothermia (i.e., coagulopathies, or inflammatory responses) can be eliminated. Thus, I would like to know the authors' perspective related to arch surgery with moderate hypothermia. Thirdly, the authors mentioned that the period of distal anastomosis was approximately 15 min which is same for visceral ischemia. Following distal anastomosis, early re-warming period was initiated. Therefore, what is the highest temperature just before cross-clamp removal in your series? Moreover, how long is the mean ACP period? I believe the authors' opinion about these concerns would be very beneficial for the readers.

### Declaration of conflicting interests

The author declared no conflicts of interest with respect to the authorship and/or publication of this article.

### Funding

The author received no financial support for the research and/or authorship of this article.

## REFERENCES

1. Balkanay OO, Göksedef D, Ömeroğlu SN, İpek G. A useful cannulation strategy to facilitate re-warming during total arch replacement. *Turk Gogus Kalp Dama* 2016;24:603-5.
2. De Paulis R, Czerny M, Weltert L, Bavaria J, Borger MA, Carrel TP, et al. Current trends in cannulation and neuroprotection during surgery of the aortic arch in Europe. *Eur J Cardiothorac Surg* 2015;47:917-23.
3. Pacini D, Pantaleo A, Di Marco L, Leone A, Barberio G, Murana G, et al. Visceral organ protection in aortic arch surgery: safety of moderate hypothermia. *Eur J Cardiothorac Surg* 2014;46:438-43.
4. Kamiya H, Hagl C, Kropivnitskaya I, Bothig D, Kallenbach K, Khaladj N, et al. The safety of moderate hypothermic lower body circulatory arrest with selective cerebral perfusion: a propensity score analysis. *J Thorac Cardiovasc Surg* 2007;133:501-9.

### Author Reply

First of all, we would like to thank you for your valuable and constructive comments that included and punctuated nearly all of the most important points in our article.

We usually choose different surgical techniques in different situations, not only the mentioned technique.



Available online at  
www.tgkdc.dergisi.org  
doi: 10.5606/tgkdc.dergisi.2017.14296  
QR (Quick Response) Code

Received: January 02, 2017 Accepted: March 26, 2017

Correspondence: Ertekin Utku Ünal, MD, Türkiye Yüksek İhtisas Eğitim ve Araştırma Hastanesi, Kalp ve Damar Cerrahisi Kliniği, 06230 Sıhhiye, Ankara, Turkey.

Tel:+90 312 - 306 17 14 e-mail: utkuunal@gmail.com

©2017 All right reserved by the Turkish Society of Cardiovascular Surgery.

For instance, in cases with peripheral arterial disease, abdominal aortic aneurysms or dissection, we do not prefer using femoral artery cannulations as the first-line procedure.

In our opinion, both arch-first or distal-first techniques have several advantages and disadvantages and they should be chosen in a patient and clinical situation-based manner.

In addition, antegrade perfusion rates are measured indirectly by continuous left upper arm arterial pressure monitoring. We standardized the pressure rates just before the clamping of the proximal part of the left subclavian artery.

One option to maintain an adequate antegrade cerebral perfusion is to use separate roller-pump and line for axillary/antegrade route different from the femoral arterial line, as mentioned. However, we usually prefer using a Y-shaped line with single roller-pump. In the latter option, during hypothermic total circulatory arrest and antegrade cerebral perfusion period, femoral arterial line is totally clamped and cerebral perfusion is maintained in an adequate level by measuring the continuous left upper extremity arterial pressures. For the re-warming process, we measure resistance levels of both arms of the Y-shaped arterial line and we partially clamp the femoral line to equalize them.

Our highest temperature just before total circulatory arrest period is 23 °C; however, we prefer using deep hypothermia with a mean value of 18.8 °C. During distal anastomosis, fully antegrade cerebral perfusion is maintained. During arch anastomosis, distal parts of pre-hand-made trifurcated graft are anastomosed to brachia-cephalic, left common carotid, and left subclavian arteries, respectively. Cerebral perfusion is maintained using right axillary artery perfusion in this period. This anastomotic process of aortic arch has a mean duration of 23 min. After completion of these anastomoses, the clamp is relocated to the proximal part of the trifurcated graft, and fully antegrade cerebral perfusion is re-achieved.

In our opinion, there is not enough level of evidence to use mild instead of deep hypothermia in total aortic arch surgery. However, we follow the current literature closely and hopefully.

## REFERENCES

1. Balkanay OO, Göksedef D, Ömeroğlu SN, İpek G. A useful cannulation strategy to facilitate re-warming during total arch replacement. Turk Gogus Kalp Dama 2016;24:603-5.

Ozan Onur Balkanay, Deniz Göksedef, Suat Nail Ömeroğlu, Gökhan İpek

*Correspondence:* Ozan Onur Balkanay, MD. İstanbul Üniversitesi Cerrahpaşa Tıp Fakültesi Kalp ve Damar Cerrahisi Kliniği, 34098 Cerrahpaşa, Fatih, İstanbul, Turkey.

Tel: +90 212 - 414 30 00 / 23129 e-mail: balkanay@doctor.com