The Heart Surgery Forum

Heart Surg. Forum **2026**; 29(2): 50914
https://doi.org/10.31083/HSF50914

Letter to the Editor

Response to 'Clinical Application of Three Antegrade Cerebral Perfusion Strategies in Acute DeBakey Type I Aortic Dissection'

Imthiaz Manoly[1,*], Zainab Afzal[2]

[1]Department of Cardiothoracic Surgery, Mohammed Bin Rashid University of Medicine and Health Sciences, Dubai Health, Dubai, United Arab Emirates

[2]University College of Medicine & Dentistry, Lahore, Pakistan

*Correspondence: iamanoly@dubaihealth.ae (Imthiaz Manoly)

Academic Editor: Guo-Wei He

Submitted: 27 August 2025 Accepted: 16 September 2025 Published: 11 February 2026

It was with great interest that we read the study by Cai *et al.* [1] comparing unilateral (uACP), bilateral (bACP) and total antegrade cerebral perfusion (tACP) strategies utilized in the management of acute DeBakey type I aortic dissection, Clinical Application of Three Antegrade Cerebral Perfusion Strategies in Acute DeBakey Type I Aortic Dissection' Heart Surgery Forum 2025; 28(7): E546–E554 *doi: 10.59958/hsf.8417.*

The salient features of the outcome are tabulated below (Table 1). The authors presented insightful findings that indicated total (tACP) had achieved the lowest transient neurological dysfunction, and a better postoperative recovery progress than bACP or uACP, despite having the longest selective cerebral perfusion duration (median = 36 minutes). Our Aortic team started with uACP for all the Aortic surgeries, necessitating antegrade cerebral perfusion and evolved to bACP with moderate hypothermic circulatory arrest (24–28 °C) [2].

Although this study could pave the way for more comparative studies, the definition and the surgical techniques implemented for different ACP strategies was not very clear. In the surgical technique section, the authors mentioned that the ascending aorta was cannulated in the tACP which would have been difficult unless the description was meant to be different. In the pictorial representation, tACP was demonstrated as having the cannulae in all the major supra-aortic vessels. If this was also done as end to end anastomosis, like they mentioned about the bACP, this was not documented raising the question of how they achieved shortest cardiopulmonary bypass time. In spite of positive results achieved, these findings appear to be arguable as one would expect the bACP to be better than uACP which was not true in this study. Also, conventional surgical principles indicate that extended duration of artificial cerebral perfusion correlate with increased neurological risk, as established in prior literature associating selective cerebral perfusion with neurocognitive decline [3].

Interestingly, although the transient neurological dysfunction (TND) was the highest in uACP cohort (37.5%) and the lowest in tACP (10.6%), the permanent neurological dysfunction (PND) incidence was paradoxically higher in the bACP cohort (28.6%) compared to both uACP (12.5%) and tACP (17.7%). This contradictory pattern challenges a purely linear interpretation of neurological outcomes and may reflect the multifactorial nature of cerebral injury during these complex surgeries. What may also contribute to this discrepancy may be small sample sizes and the temporal differences between the groups, also with a potential of evolving surgical experience and perioperative management. These observations underscore the need for cautious interpretation of neurological outcomes underlying the importance of larger, carefully controlled studies to elucidate how nuances in perfusion and patient factors collectively influence both transient and permanent neurological outcomes in acute DeBakey type I aortic dissection repair.

One could justify that results of Cai *et al.* [1] group be due to better learning curve and evolving with complete cerebral coverage and meticulous techniques. The transition of uACP strategy to bACP and even tACP with good numbers emphasize the surgical complexity and perfusion management that has evolved overtime.

The authors were transparent about limitations that contextualize their positive findings. The unilateral ACP (uACP) group was relatively smaller in contrast to others (n = 28), potentially introducing a selection bias that brought about exaggerated observed differences in TND. Additionally, each perfusion strategy was implemented across different time periods (uACP: 2020, bACP: 2021–2022, tACP: 2023–2024, introducing a confounding 'time bias' as surgical techniques, anesthesia, perfusion management, and postoperative care may have improved overtime. The authors mitigated these factors through a consistent surgical team, standardization of protocols, and confirmed balanced baseline characteristics. However, incremental improvements that were made over time cannot be entirely excluded. Furthermore, as a single-center study, it may limit the generalizability of these results, warranting caution. Larger, multi-center, randomized trials comparing ACP strategies under standardized conditions would be valuable in advancing our understanding of optimal cerebral protection in acute aortic dissection surgery. The pros

Table 1. Comparison of the three antegrade cerebral perfusion strategies.

Parameter	uACP	bACP	tACP
Cannulation sites	Right axillary artery only	Brachiocephalic trunk + left common carotid artery	Brachiocephalic trunk + left common carotid artery + left subclavian artery
Number of patients (n)	28	87	92
Cardiopulmonary bypass (CPB) time (median)	230 min	240 min	224 min (shortest)
Lower-body circulatory arrest time (median)	30.5 min	28 min (shortest)	31 min
Selective cerebral perfusion time (median)	32.5 min	30 min (shortest)	36 min (longest)
Lowest nasopharyngeal temp (median)	23.7 °C	24.05 °C	24.8 °C (highest)
Post-op awakening time (median)	380 min (longest)	257.5 min	185 min (shortest)
Tracheal intubation time (median)	37.65 min	26.45 min	18 min (shortest)
ICU stay (median)	7.1 days	6.3 days	4.7 days (shortest)
Transient neurological dysfunction (TND)	37.5% (highest)	18.2%	10.6% (lowest)
Permanent neurological dysfunction (PND)	12.5%	28.6%	17.7%
Paraplegia	12.5%	1.3%	4.7%
Renal failure	20.8%	5.2%	7.1%
Mortality	14.3%	11.5%	7.6%

Table 2. Pros and cons of three antegrade cerebral perfusion strategies.

Strategy	Pros	Cons
uACP	Classical antegrade perfusion strategy when the three supra-aortic branches are relatively unaffected.	Highest incidence of TND. Uneven blood-flow distribution. Heavy reliance on collateral circulation. Less optimal for extensive lesions or complex procedures.
bACP	More appropriate for prolonged circulatory arrest, extensive arch lesions, or cerebrovascular anomalies. Reduces risk of localized ischemia compared to uACP.	Insufficient to meet perfusion demands for all cerebral regions in extensive supra-aortic vessel involvement.
tACP	Provides blood flow to the entire brain including posterior circulation and bilateral “blind spots”. Significantly lower TND. Shorter awakening, extubation, and ICU stay. Superior overall neuroprotection.	Requires separate cannulation of all three supra-aortic vessels. Imposes higher demands on surgical expertise and intraoperative monitoring.

and cons of each strategy are tabulated for better understanding (Table 2).

The factors that demonstrated the recommendation of the use of tACP may partially reflect temporal trends, incorporating small sample effects in comparing groups, or center-specific practices, but primarily underscores the perfusion strategy's direct impact. Notably, Cai *et al.*'s results [1] suggest that the extent of cerebral coverage and the precision of operative technique in tACP can offset, or even surpass, the theoretical risks posed by longer perfusion times. Their data show both a markedly diminished rate of TND compared to uACP (37.5%) and bACP (18.2%), and hence superior outcomes in terms of postoperative extubation and ICU duration in the tACP cohort. This could may well point to a more linear relationship between perfusion technique and neurological outcome; one where comprehensive cerebral protection and refined intraoperative management may be more determinative than duration alone.

Author Contributions

IM and ZA participated in the conception and the drafting of the letter, following to review of the article and the literature review. Both authors read and approved the final manuscript. Both authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

Not applicable.

Acknowledgment

The authors wish to thank the authors of the original study group who published an important paper which could help the fraternity to make an educated decision in the management of similar surgical procedures.

Funding

This research received no external funding.

Conflict of Interest

The authors declare no conflict of interest.

References

[1] Cai J, Liu J, Feng Y, Xia J, Luo C, Lei Z. Clinical Application of Three Antegrade Cerebral Perfusion Strategies in Acute DeBakey Type I Aortic Dissection. The Heart Surgery Forum. 2025; 28: E546–E554. https://doi.org/10.59958/hsf.8417.

[2] Manoly I, Uzzaman M, Karangelis D, Kuduvalli M, Georgakarakos E, Quarto C, *et al*. Neuroprotective strategies with circulatory arrest in open aortic surgery - A meta-analysis. Asian Cardiovascular & Thoracic Annals. 2022; 30: 635–644. https://doi.org/10.1177/02184923211069186.

[3] Uysal S, Lin HM, Fischer GW, Di Luozzo G, Reich DL. Selective cerebral perfusion for thoracic aortic surgery: association with neurocognitive outcome. The Journal of Thoracic and Cardiovascular Surgery. 2012; 143: 1205–1212. https://doi.org/10.1016/j.jtcvs.2012.01.012.