



ISCHAEMIC STROKE, PREVENTABLE WITH TISSUE ADHESIVE

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LETTER TO THE EDITOR

This Letter comments on the following case report:

Abu-Abaa M, Dawood G, Arshad H, Mousa A, Jumaah O. Acute ischaemic stroke by a different mechanism. *EJCRIM* 2022;9:doi:10.12890/2022_003618.

KEYWORDS

Acute ischaemic stroke, air embolism, CVC, central venous catheter

LEARNING POINTS

- Many cases of gas embolism-related stroke are preventable by following guidelines.
- Sealing the tract where central venous catheters have been removed with tissue glue prevents air entrainment into the vascular system.
- Early hyperbaric treatment is essential, and the location of the nearest hyperbaric unit should be known whenever invasive procedures are undertaken.

Abu-Abaa et al.^[1] should be commended for an excellent case report highlighting important aspects of gas embolism and also the need to look for solutions to prevent a commonly encountered problem. Clarity about the following issues is required: what was the reason for removing the central venous catheter (CVC) in the supine rather than the Trendelenburg position? Did the patient manage to hold her breath after given instructions?

Many patients are critically unwell when a CVC is inserted. By the time the catheter is removed they are usually much better, but often still too unwell to hold their breath for a few minutes in the Trendelenburg position, sometimes managing to do so for only a few seconds if at all^[2]. The patients who are much better are often allowed to get out of bed and even

go home after an observation period of 30 minutes following removal^[3,4]. These and numerous other case reports indicate the risk of air embolism (AE) when CVCs are removed. Measures to decrease the risk of iatrogenic AE are often ignored or deemed too cumbersome to implement. The risk does not disappear after the magical 30 minutes in the Trendelenburg or horizontal position. It has been shown that a fibrinous sheath forms after a few days^[2]. No amount of encouragement will prevent patients removing the required airtight dressing for days on end and several reports indicate dressings loosened when patients were washing or shaving. That would leave such a tract as a direct conduit from the exterior to the venous system in the chest where negative pressure is generated with breathing.



A potential solution was suggested in a similar situation^[5], where a suture was used to encircle and occlude the tract. This is an excellent solution to prevent catastrophic air entrainment but needs a degree of surgical skill and takes time. As an alternative we have introduced the practice of occluding the opening with a couple of drops of tissue adhesive (cyanoacrylate). We still follow all the usual guidelines, but it is very easy to teach junior doctors and senior nurses to 'seal' the tract with confidence using the glue. This is a material commonly used nowadays instead of sutures to close wounds or in addition to sutures to repair various tissues.

The authors correctly indicate the need for urgent hyperbaric oxygen therapy (HBOT) in cases of cerebral gas embolism. The hyperbaric protocol used in this case will also be of interest in a publication like this, as well as the total time elapsed since the event and the start of HBOT. Finally, it is important to be aware that the Intensive Care Society (ICS) guidance in the United Kingdom also advocates HBOT as the definitive treatment modality and can be accessed in the guideline section of the ICS on their website.

In conclusion, we have pointed out an easy and effective method to decrease the risk of AE when CVCs are removed and pointed out that a guideline does exist with emphasis on HBOT.

REFERENCES

1. Abu-Abaa M, Dawood G, Arshad H, Mousa A, Jumaah O. Acute ischaemic stroke by a different mechanism. *EJCRIM* 2022;9:doi:10.12890/2022_003618.
2. Brockmeyer J, Simon T, Seery J, Johnson E, Armstrong P. Cerebral air embolism following removal of central venous catheter. *Mil Med* 2009;174:878–881.
3. Oyama N, Sakaguchi M, Kitagawa K. Air tract in the thrombus: paradoxical cerebral air embolism through a residual catheter track. *J Stroke Cerebrovasc Dis* 2012;21:905.e11–13.
4. Clark DK, Plaizier E. Devastating cerebral air embolism after central line removal. *J Neurosci Nurs* 2011;43:193–196; quiz 7–8.
5. Letachowicz K, Golebiowski T, Kuzstal M, Penar J, Letachowicz W, Weyde W, Klinger M. Over-catheter tract suture to prevent bleeding and air embolism after tunnelled catheter removal. *J Vasc Access* 2017;18:170-172.