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Commentary on "Post-Embolization Hemoglobin Changes: When to Consider Re-intervention"

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Background

Hospital inpatients acutely bleeding are at high risk of mortality [1], and embolisation is a pillar of the value provided by interventional radiology to health care. Studies addressing the mortality rate are the foundation of this pillar. I read with interest the recent article from Torkian et al. "Post-Embolization Hemoglobin Changes: When to Consider Re-intervention". The authors performed a retrospective observational study in patients who were embolised for acute bleeding, and should be congratulated for their efforts and statistical expertise [1].

The authors assessed trends in haemoglobin (Hgb) levels by defining "Hgb drift" after embolisation, and the authors assessed multiple different outcomes including re-bleeding rate and all-cause 30-day mortality. The authors conclude that all patients have a similar pattern of Hgb decline followed by upwards shift after embolisation, and that this should be considered when transfusing blood products. They also found that patients with Hgb drop of more than 15% have a higher chance of re-bleeding but a similar all-cause 30-day mortality rate.

Complexities in Resuscitation

As the authors point out, assessment of bleeding is multifactorial and difficult. Resuscitation should include a combination of packed red blood cells, fresh frozen plasma, and platelets [2]. The aim should be to maintain adequate end-organ perfusion whilst also correct coagulation factor deficiency which has been shown to be the biggest contributor of bleeding-induced coagulopathy [2]. Important biochemical factors to monitor include Hgb, platelets, coagulation profile, and fibrinogen. As such, Hgb level as a *single* surrogate of bleeding does risk oversimplifying this complex pathway. There are also other Hgb confounders to consider, such as pre-existing anaemia and haemodilution. It is interesting to see that 15% Hgb reduction did not predict mortality ($p = 0.605$) despite the high mortality rate, highlighting the complexity in this single test as a surrogate. The authors' subsequent use of all-cause 30-day mortality is an excellent real-world endpoint as it has greater measurable implications.

Statistical Endpoint

In defining novel endpoints, there is now a movement towards highly measurable but less traditional endpoints in IR clinical studies [3]. Traditional endpoints such as mortality or length-of-stay are becoming less popular and a common example of this trend is "target lesion revascularisation" being used instead of claudication distance or Rutherford criteria in peripheral vascular disease trials [3]. Novel thinking is necessary in statistics, but value will be

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preserved if traditional endpoints remain at the forefront as the primary outcome. Torkian et al. achieved this balance by preserving a mortality analysis even though it was not the statistical focus of the study.

End-Organ Perfusion

One additional covariate the authors could have assessed was a measure of end-organ perfusion, such as lactate or creatinine/eGFR. Assessing for acute kidney injury is a valuable tool because pre-renal azotaemia can influence the ability to shift fluid after large volume transfusion [4]. In addition, renal perfusion can be impacted by repeated loads of iodinated contrast from CT and catheter angiography during a vulnerable period of hypovolaemia [4].

Clinical Follow-up

A particular undertone in the study of Torkian et al. is the necessity of clinical follow-up, as the authors showed re-bleeding occurred in 49.7% of patients. Particularly for our trainees, these figures highlight the value in remembering that duty of care continues after the intervention, and that active follow-up is underpinned by ethical principles, expected by our patients, and mandated as a quality marker in standards of practice [5].

Conclusion

The authors should be applauded for showing a novel way to predict re-bleeding and highlighting the necessity of follow-up. By researching and innovating on the topic of acute haemorrhage, IR continues to expand on its enormous value to health care.

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Declarations

Conflict of interest The authors declare that they have no conflict of interest.

Ethical Approval For this type of study, formal consent is not required.

Consent for Publication For this type of study, consent for publication is not required.

Informed Consent For this type of study, formal consent is not required.

References

1. Torkian P, Jalaeian H, Wallace S, Shrestha P, Talaie R, Golzarian J. Post-Embolization hemoglobin changes: when to consider re-intervention. Cardiovasc Intervent Radiol. 2023;3:1–9. https://doi.org/10.1007/s00270-023-03386-1.
2. British Committee for Standards in Haematology, Stainsby D, MacLennan S, Thomas D, Isaac J, Hamilton PJ. Guidelines on the management of massive blood loss. Br J Haematol. 2006;135(5):634–41. https://doi.org/10.1111/j.1365-2141.2006.06355.x.
3. Reekers JA. For the times they are a-changin'? CVIR Endovasc. 2019;2:5. https://doi.org/10.1186/s42155-018-0045-x.
4. Ohno Y, Maekawa Y, Miyata H, Inoue S, Ishikawa S, Sueyoshi K, Noma S, Kawamura A, Kohsaka S, Fukuda K. Impact of periprocedural bleeding on incidence of contrast-induced acute kidney injury in patients treated with percutaneous coronary intervention. J Am Coll Cardiol. 2013;62(14):1260–6.
5. Royal Australian and New Zealand college of radiologists. Standards of practice for interventional radiology and interventional neuroradiology version 1.0. Available from URL: https://www.ranzcr.com/documents/5591-standards-of-practice-for-interventional-radiology-and-interventional-neuroradiology/file. Accessed 20 March 2023.