

Hemoglobin Level May Be Associated With Early Postoperative Transient Neurologic Events In Patients With Moyamoya Undergoing Extracranial-Intracranial Arterial Bypass



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Introduction

Moyamoya: Japanese word for “hazy like a puff of smoke”

- Rare and progressive pathologic condition
- Characterized by cerebral angiographic findings of intracranial carotid artery stenosis with development of collateral vessels at the base of the brain
- Two etiologies:
 - Primary idiopathic “moyamoya disease”: No known risk factors for development of the condition
 - Secondary “moyamoya syndrome”: Known associated condition (e.g. sickle cell disease, Down’s syndrome)
- Medical treatment has not been shown to slow, stop, or reverse the progression
- Surgical revascularization via extracranial-intracranial (EC-IC) artery bypass has demonstrated efficacy in preventing ischemic attacks and further strokes
 - Associated with relatively high rate of perioperative stroke (estimated 1.6-16.0%)

Study Aim: Evaluate the association between postoperative hemoglobin (Hgb) concentration and early postoperative transient neurologic events (TNEs)

Methods

- Retrospective single center observational study
- Following IRB approval, patients undergoing EC-IC bypass for moyamoya between 2017 and 2019 were identified
- Study population: 24 patients undergoing 34 individual cases for different cerebral hemispheres
- Data obtained by retrospective review of electronic records
- Postoperative Hgb level evaluated upon arrival to the ICU
- Primary outcome: TNEs within 24-hours of surgery

Results

- Incidence of TNEs within first 24 hours postoperatively after EC-IC bypass: 12% (4/34)
- Statistically significant differences noted in several areas, including total post-operative Hgb values, number of patients with post-operative Hgb levels < 10 g/dL, length of ICU stay in days, and total length of hospital stay in days, see Table 1
- Under nominal logistic regression, patients with a postoperative Hgb value < 10 g/dL were significantly more likely to experience TNEs (OR 12, 95% CI 1.053-136.794, *P* = 0.045)
- Subgroup analysis examining patients with a preoperative Hgb <10 g/dL:
 - Statistically significant difference demonstrated between patients who did and did not experience TNEs and those who received an intraoperative transfusion of packed red blood cells (PRBCs) (0% vs. 100% respectively) and those who did not receive a PRBC transfusion (100% vs 0% respectively; *P* = 0.025), see Table 2

Conclusions

- Retrospective analysis demonstrating an association between a postoperative Hgb level < 10g/dL and the occurrence of TNEs in patients with moyamoya within the first 24 hours after EC-IC bypass
- In patients who begin surgery with a Hgb < 10 g/dL, intraoperative transfusion of PRBCs may be associated with a decreased incidence of TNEs in the immediate postoperative period

Table 1. Postoperative characteristics of patients with postoperative transient neurologic events within 24 hours

	All Patients n=34	Transient Neurologic Events		P-value
		Yes n=4	No n=30	
Postoperative Hgb:				
Total Hgb, g/dL	11.0 (9.6-12.8)	9.4 (9.2-10.2)	11.3 (10.3-13.1)	0.012*
Hgb <10 g/dL, n (%)	9 (26%)	3 (75%)	6 (20%)	0.019*
Duration of hospital stay:				
ICU ≥7 days, n (%)	4 (12%)	2 (50%)	2 (7%)	0.012*
Total LOS ≥14 days, n (%)	5 (15%)	2 (50%)	3 (10%)	0.034*

Table 2. Subgroup analyses of differential neurologic outcomes within 24 hours based on intraoperative PRBC administration in patients with preoperative and postoperative hemoglobin <10.0 (g/dL)

	Preoperative Hgb <10 g/dL		
	Transient Neurologic Events		P-value
	Yes n=1	No n=4	
PRBCs given, n (%)	0 (0%)	4 (100%)	0.025*
No PRBCs given, n (%)	1 (100%)	0 (0%)	
	Postoperative Hgb <10 g/dL		
	Transient Neurologic Events		P-value
	Yes n=3	No n=6	
PRBCs given, n (%)	0 (0%)	4 (67%)	0.058
No PRBCs given, n (%)	3 (100%)	2 (33%)	

**P* < 0.05 defined as statistically significant; values are presented as numbers (n) and percentages (%).

References

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