Impact of an Intraoperative Blood Transfusion Protocol on Perioperative Transfusion for Craniosynostosis

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Background

- Children undergoing craniofacial reconstruction are at risk for substantial blood loss resulting in exposure to allogenic blood products
- Strict perioperative transfusion protocols have been shown to limit blood product exposure[1]
- In 2016 we deployed strict *intraoperative* transfusion guidelines based upon clinical evidence identifying transfusion triggers and goals

Methods

- We queried our local data from the pediatric craniofacial surgery perioperative registry identifying children who underwent cranial vault surgery between 2013-2017
- Patients were divided into 2 cohorts: pre-protocol and post-protocol based upon implementation of intraoperative transfusion guidelines on 11/1/16
- We extracted demographic and perioperative data with respect to transfusion outcomes
- Sub-analyses were conducted with respect to "simple" vs "complex" cranial vault reconstruction

Results

Table 1: Patient Demographics

All Patients	Pre (n=149)	Post (n=54)	P Value
Age (months)*	9±11	11±20	0.5696
Weight (kg)*	8±3	8±2	0.3778
Sex			
Female	49 (33%)	18 (33%)	
Male	100 (67%)	36 (67%)	
ASA Score**			0.12
1	22 (15%)	15 (28%)	
2	105 (70%)	35 (65%)	
3	21 (14%)	4 (7%)	
4	1 (1%)	0 (0%)	
Procedure**			0.3038
FOA/Anterior Vault	37 (25%)	17 (31%)	
Total Vault	4 (3%)	1 (2%)	
Open Strip/modified PI	101 (68%)	31 (57%)	
Endoscopic assisted	5 (3%)	5 (9%)	
Lefort III/monobloc	2 (1%)	0 (0%)	
Preoperative Hct (%)	37±3	36±3	0.0417
Intraop Lowest Hct (%)	25±4	24±3	0.0262
Antifibrinolytic**			0.0463
No	16 (11%)	1 (2%)	
Yes	133 (89%)	53 (98%)	
Surgery Time (min)	122 (79, 178)	106 (83, 188)	0.93
LOS (days)*	4±2	4±1	0.1724

*Median and interquartile range. P value based on Wilcoxon rank-sum test
**Fisher's exact test

Table 2: Intraoperative Transfusion Outcomes

All Repairs	Pre (n=149)	Post (n=54)	% Change
PRBC transfusion			
No	13 (9%)	7 (13%)	
Yes	136 (91%)	47 (87%)	-4
PRBC (mL)	131 (106, 220)	114 (82, 150)	-13
PRBC (mL/kg)	18 (13, 26)	14 (10, 21)	-22
***Simple* Repairs**	**Pre (n=106)**	**Post (n=36)**	**% Change**
PRBC transfusion			
No	11 (10%)	7 (19%)	
Yes	95 (90%)	29 (81%)	-10
PRBC (mL)	124 (100, 181)	104 (74, 121)	-16
PRBC (mL/kg)	17 (11, 25)	14 (10, 17)	-18
***Complex* Repairs**	**Pre (n=43)**	**Post (n=18)**	**% Change**
PRBC transfusion			
No	2 (5%)	0 (0%)	
Yes	41 (95%)	18 (100%)	5
PRBC (mL)	199 (119, 245)	133 (114, 313)	-33
PRBC (mL/kg)	20 (14, 31)	18 (13, 29)	-10

Continuous values are medians and interquartile ranges.

Intraoperative Transfusion Protocol
Give 10 mL/kg crystalloid bolus prior incision
Check baseline Hgb/Hct after initial crystalloid bolus
Goal Hgb throughout case and by case end = 8 g/dL Transfuse aliquots of 5 mL/kg PRCBs as dictated by this goal
Follow Hgb/Hct every 30-60 minutes
Consider albumin 5%, if Hgb > 8 g/dL
Consider vasopressor support

Conclusions

- A strict intraoperative transfusion protocol led to reduced allogenic blood product exposure
- The impact of our protocol was greater in simple craniosynostosis compared to complex repairs
- Lack of strict adherence to our protocol likely limited the magnitude of its impact

Implications

- Our data supports the use of perioperative transfusion protocols to limit allogenic blood exposure in children
- Future investigation should include evaluation of how best to ensure adherence to a protocol

References

1. Stricker PA et al. Effect of transfusion guidelines on postoperative transfusion in children undergoing craniofacial reconstruction surgery. Pediatr Crit Care Med. 2012. 13(6):e357-e362
2. Stricker PA et al. Perioperative Outcomes and Management in Pediatric Complex Cranial Vault Reconstruction: A Multicenter Study from the Pediatric Craniofacial Collaborative Group. Anes. 2017; **126:** 276-287

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