Intraoperative/Perioperative Non-autologous Red Blood Cell Transfusion is Associated with Higher Organ System Complications in Type A Aortic Dissection Repair

Qianyun Luo[1], Renxi Li[2], Stephen J. Huddleston[1]

[1]Division of Cardiothoracic Surgery, Department of Surgery, University of Minnesota Medical School, Minneapolis, MN
[2]George Washington University Medical School, Washington, DC

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Disclosure

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Blood transfusion and outcomes after repair of Stanford type A aortic dissection: analysis from the Nationwide Inpatient Sample

- Red blood cell (RBC) transfusion associated with adverse outcomes in cardiac surgery procedures.
- Outcomes in patients having intraoperative/perioperative non-autologous RBC transfusion in patients who underwent Stanford Type A Aortic Dissection (TAAD) repair have not been studied using a nationwide database.

Study aim

- **Conduct a population-based examination of the effect of intraoperative/perioperative non-autologous RBC transfusion on the in-hospital outcomes after surgical repair of TAAD using the National/Nationwide Inpatient Sample (NIS) database.**

Methods- National Inpatient Sample database

- Patients who underwent TAAD repair during the last quarter of 2015-2020 were selected from the National Inpatient Sample (NIS) database.
- Patients with preoperative RBC transfusion were excluded.
- Patients with and without intraoperative/perioperative non-autologous RBC transfusion were stratified into two groups.
- Multivariable logistic regressions, adjusting for demographics, comorbidities, hospital characteristics, primary payer status, and transfer status, were used to compare in-hospital outcomes.

Patient characteristics: non-autologous RBC transfusion and TAAD repair

- 4,145 TAAD cases total
- Among all patients who underwent TAAD repair, 1048 (25.28%) patients were included in the transfusion cohort.
- The transfusion group were more likely to be female, Hispanic, Asian, and have older age, diabetes, depression, renal malperfusion, anemia, thrombocytopenia, and under emergent admission.

Results: non-autologous RBC transfusion and TAAD repair

- Patients with and without nonautologous RBC transfusion had comparable in-hospital mortality (16.32% vs 14.47%, aOR=1.113, 95 CI=0.906-1.367, p=0.31).
- The transfusion group had higher risks of:
  - myocardial infarction (7.25% vs 4.91%, aOR=1.492, 95 CI=1.118-1.990, p<0.01),
  - respiratory complications (25.67% vs 20.99%, aOR=1.268, 95 CI=1.073-1.499, p<0.01),
  - mechanical ventilation (39.22% vs 29.93%, aOR=1.448, 95 CI=1.237-1.689, p<0.01)
  - acute kidney injury (51.81% vs 47.56%, aOR=1.191, 95 CI=1.023-1.386, p=0.02).
- All other in-hospital complications, hospital length of stay (LOS), and total hospital charge were all comparable between the two groups. there.

Table. In-hospital outcomes comparing patients with nonautologous RBC transfusion and those with no transfusion who went under TAAD repair.

	RBC transfusion (n = 1,048)	No transfusion (n = 3,097)	aOR for RBC transfusion/no transfusion (95% CI)	p-value
Mortality	171 (16.32%)	448 (14.47%)	1.113 (0.906-1.367)	0.31
MACE	134 (12.79%)	320 (10.33%)	1.294 (1.033-1.621)	**0.03**
MI	76 (7.25%)	152 (4.91%)	1.492 (1.118-1.99)	**<0.01**
Stroke	46 (4.39%)	124 (4%)	1.075 (0.739-1.564)	0.70
TIA	1 (0.1%)	11 (0.36%)	0.227 (0.029-1.797)	0.16
Neurological complications	50 (4.77%)	144 (4.65%)	0.965 (0.677-1.376)	0.85
Pericardial complications	210 (20.04%)	542 (17.5%)	1.109 (0.924-1.331)	0.27
Pacemaker implantation	11 (1.05%)	50 (1.61%)	0.642 (0.332-1.242)	0.19
Cardiogenic shock	200 (19.08%)	527 (17.02%)	1.11 (0.919-1.341)	0.28
Respiratory complications	269 (25.67%)	650 (20.99%)	1.268 (1.073-1.499)	**<0.01**
Mechanical ventilation	411 (39.22%)	927 (29.93%)	1.448 (1.237-1.695)	**<0.01**
AKI	543 (51.81%)	1473 (47.56%)	1.191 (1.023-1.386)	**0.02**
Post-procedural renal failure	20 (1.91%)	43 (1.39%)	1.282 (0.748-2.199)	0.37
VTE	28 (2.67%)	66 (2.13%)	1.335 (0.846-2.106)	0.21
PE	2 (0.19%)	7 (0.23%)	0.826 (0.167-4.09)	0.81
Infection	103 (9.83%)	268 (8.65%)	1.18 (0.92-1.514)	0.19
Sepsis	5 (0.48%)	3 (0.1%)	4.395 (1.036-18.64)	**0.04**
Deep wound complication	6 (0.57%)	20 (0.65%)	0.924 (0.368-2.323)	0.87
Superficial wound complication	18 (1.72%)	55 (1.78%)	1.012 (0.588-1.742)	0.97
Vascular complication	51 (4.87%)	155 (5%)	0.978 (0.703-1.361)	0.90
Diaphragmatic paralysis	4 (0.38%)	8 (0.26%)	1.562 (0.461-5.287)	0.47
Reopen surgery	31 (2.96%)	61 (1.97%)	1.557 (0.999-2.427)	0.05
Transfer out	386 (36.83%)	996 (32.16%)	1.076 (0.913-1.268)	0.38
	Mean ± SD	**Mean ± SD**	**F score**	**p-value**
Admission to operation (hours)	0.70 ± 2.25	0.94 ± 2.98	0.63	0.43
LOS (days)	14.50 ± 12.04	13.72 ± 12.76	0.83	0.36
Total hospital charge (US dollars)	431,521 ± 323,310	445,105 ± 490,784	2.48	0.12

Abbreviations: AKI, acute kidney injury; aOR, adjusted odds ratio; CI, confidence interval; LOS, length of stay; MACE, major adverse cardiovascular event; MI, myocardial infarction; NA, not applicable; PE, pulmonary embolism; SD, standard deviation; TAAD, type A aortic dissection; TIA, transient ischemic attack; VTE, venous thromboembolism.

Conclusions: non-autologous RBC transfusion and outcomes after TAAD repair

- While intraoperative/perioperative non-autologous RBC transfusion was not associated with in-hospital mortality, it was linked to higher risks of major organ system complications.
- While the causal relationships cannot be established, these findings might be insightful for postoperative management in patients receiving intraoperative/perioperative non-autologous RBC transfusion in TAAD repair.
- Use of pharmacologic agents to correct coagulopathy after TAAD repair might decrease postoperative complications.