Congenital Heart Surgery in Patients with Sickle Cell Trait on Cardiopulmonary Bypass: Is Exchange Transfusion Indicated?

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BACKGROUND

- Current practices on sickle cell trait (SCT) patients are based mostly on adult homozygous sickle cell disease studies.
- We aimed to evaluate whether exchange transfusion (ET) prevents complications in patients with SCT and congenital heart disease undergoing cardiopulmonary bypass (CPB) surgery.

METHODS

- Retrospective single center study.
- Patients with SCT diagnosis who underwent CPB surgery (n=36) Jan 1995 - Apr 2016 were included.
- Data collected :
  - ❑*CPB intraoperative measurements:* regional cerebral oxygen saturation (RSO2), nasopharyngeal temperature C, pH.
  - ❑Number of intraoperative blood product units given.
  - ❑On pump hemoglobin S%: calculated based on patient's weight, preoperative hematocrit, and hemoglobin S% (HbS%).
- Two groups were created:

1.Non-ET patients

2.ET managed patients

- Postoperative complications were collected and a composite outcome was created.

RESULTS

Table. Demographics and Primary Outcomes.

	No ET (n=15) N (%)	Operative ET (n=21) N (%)	p-value
Age	9m (3d-14y)	4y (3m-19y)	.032
Weight, kg	8 (3-79)	14 (4-69)	.056
CPB (min)	135 (89-253)	162 (74-315)	.404
DHCA Time (min)	10 (10-24)	33 (13-44)	.400
RSO2 minimum	67 (44-71)	63 (33-76)	.677
Minimum, °C	28 (17.8-32.3)	32 (17.7-36.7)	.127
Minimum pH	7.33 (7.25-7.46)	7.31 (7.09-7.41)	.558
Hemoglobin S (%)			
Preoperative	35 (7-66)	37 (31-42)	.331
On-Pump	23 (4-41)	24 (8-34)	.258
Postoperative	33 (9 – 37)	11 (0 – 14)	.038
# Blood product units	3 (0-5)	5 (3-19)	<.001

Data reported as frequency (percentage) or median (range). DHCA, deep hypothermic circulatory arrest; ET, exchange transfusion; RSO2, regional cerebral O2 saturation.

- **6 complications:** 2 acute chest syndromes, 1 vaso-occlusive event, 1 hemolytic anemia, 1 thrombocytopenia, and 1 hypoxic-ischemic brain injury
- 2 (13%) in non-ET group vs 4 (19%) in ET group (p=.999).

Figure 1. Composite outcome across time by HbS% and ET group.

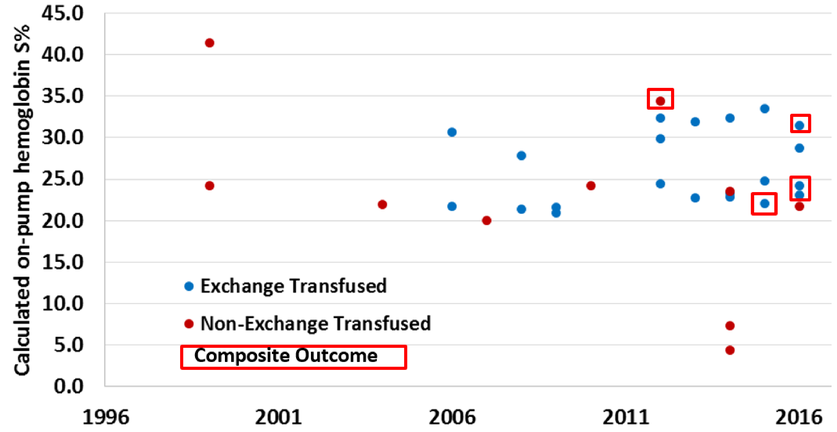
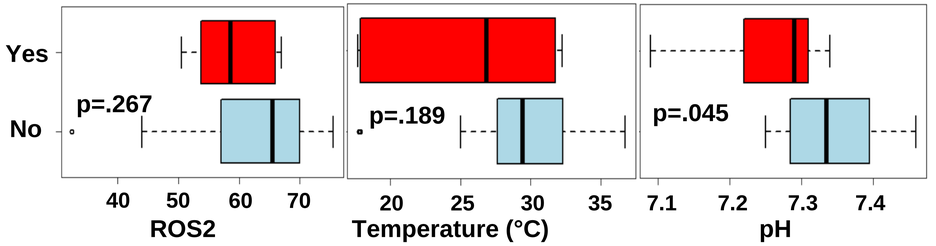


Figure 2. Minimum CPB measurements by composite outcome presence.



CONCLUSIONS

- Lower pH on CPB appeared to be an important risk for SCT complications. However, ET performance during CPB surgery was not.
- This exploratory study merits confirmation in a larger randomized prospective study