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114.SICKLE CELL DISEASE, SICKLE CELL TRAIT AND OTHER HEMOGLOBINOPATHIES, EXCLUDING THALASSEMIAS: CLINICAL AND EPIDEMIOLOGICAL

Preoperative Exchange Transfusion for Patients with SCD Systematic Review

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Introduction:

Sickle cell disease (SCD) is the most common genetic disease world wide with the highest prevalence in Africa, Middle east, and east Asia. Surgeries in patients with SCD are associated with a higher rate of perioperative complications, however, there is no solid recommendations in the guidelines to advice perioperative transfusion strategies in patients with SCD. This review investigated the current available evidence in the literature to provide a clearer guidance. Methods:

PubMed and Embase electronic search identified 655 articles related to randomized controlled trials and observational studies about the safety of perioperative transfusion in SCD. After removing duplicates and non-relevant articles 39 articles were evaluated in full text for eligibility, of which 24 studies were found eligible for inclusion in qualitative analysis and 16 studies with 3486 participants eligible for inclusion in the quantitative analysis. Assessment of quality and risk of Bias was done using the Cochrane tool for RCTs and ROBBINS-I tool for observational non randomized studies. The safety outcomes of perioperative transfusion, including acute chest syndrome (ACS), painful crisis, neurological complications, fever, minor or major bleeding, thrombosis, intensive care unit (ICU) admission, and all-cause mortality were assessed in comparison to SCD patients undergoing surgeries with conservative transfusion strategy. The risk ratio (RR) with 95% confidence intervals (CI) were calculated for the desired outcomes, the data was combined in forest plots and meta-analysis using the random-effects model.

Results:

Of the 24 studies included, 13 studies had the control arm as no transfusion in comparison to perioperative transfusion, while the remaining studies had conservative strategy guided by hemoglobin level as a control. Sixteen studies reported ACS among SCD patients who received perioperative transfusion (n=1890) versus conservative transfusion strategy (n=1596) (RR= 0.91, 95% CI 0.58-1.41, I2= 58%) (Figure 1-A). Fifteen studies reported painful crisis with perioperative transfusion (n=1856) versus conservative transfusion strategy (n=1532) (RR= 0.94, 95% CI 0.53-1.68, I2= 63%) (Figure 1-B). Neurological complications associated with the perioperative transfusion in SCD (n=1590) compared to conservative transfusion strategy (n=1250) were reported in nine studies (RR= 1.38, 95% CI 0.54-3.57, I2= 0%). Seven studies reported fever as a post-operative complication following perioperative transfusion in SCD (n= 1243) versus conservative transfusion (n= 922) (RR= 1.36, 95% CI 0.94-1.97, I2= 51%). Six studies reported bleeding following perioperative transfusion in SCD (n= 477) (RR= 4.32, 95% CI 1.75-10.68, P=0.002, I2= 0%) (Figure 1-C). Three studies reported thrombotic events following the perioperative transfusion in SCD (n= 885) versus conservative transfusion (n= 53) versus conservative transfusion (n= 147) (RR= 4.99, 95% CI 0.98-25.48, I2= 0%). Mortality was reported in six studies with perioperative transfusion (n= 1320) versus conservative transfusion (n= 977) (RR= 0.67, 95% CI 0.05-8.75, I2= 71%).

According to this systematic review and meta-analysis Perioperative transfusion in SCD resulted in significantly higher rate of bleeding compare to conservative strategies while the rates of acute chest syndrome, painful crisis, fever, neurological complications, thrombosis, ICU admission, and mortality remained similar between the two strategies.

Figure 1. Forest plots of clinical outcomes of perioperative blood transfusion among patients with SCD compared to conservative transfusion strategy

A) Forest plot of acute chest syndrome

	Transfusion		Conservative / None		Risk Ratio		Risk Ratio	
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% C	CI M-H, Random, 95% CI	
Al Darwish, 2019	3	83	3	90	5.2%	1.08 [0.23, 5.22]	1	
Al-Jaouni, 2006	7	188	5	181	7.7%	1.35 [0.44, 4.17]	1 · · · · · · · · · · · · · · · · · · ·	
Al-Samak, 2008	2	39	2	46	4.0%	1.18 [0.17, 7.99]	I	
Aziz, 2011	1	16	0	24	1.7%	4.41 [0.19, 102.00]	1 .	
Casbard, 2005	3	65	4	49	5.8%	0.57 [0.13, 2.41]	· · · · ·	
Elshinawy, 2020	1	49	0	48	1.7%	2.94 [0.12, 70.43]	· · ·	
Haberkern, 1997	10	110	47	157	11.8%	0.30 [0.16, 0.57]		
Howard, 2013	1	34	9	33	3.7%	0.11 [0.01, 0.80]		
Koshy, 1995	14	731	6	257	9.1%	0.82 [0.32, 2.11]		
Marulanda, 2009	0	15	0	8		Not estimable		
Salvi, 2022	0	139	2	139	1.9%	0.20 [0.01, 4.13]	• • •	
Tole, 2018	6	22	5	115	8.0%	6.27 [2.10, 18.76]	· · · · · · · · · · · · · · · · · · ·	
Vichinsky, 1995	64	303	60	301	14.5%	1.06 [0.77, 1.45]	i —	
Vichinsky, 1999	7	34	19	64	10.7%	0.69 [0.32, 1.48]	· · · · ·	
Waldron, 1999	13	48	16	59	11.9%	1.00 [0.53, 1.87]	1 	
Wali, 2003	1	14	1	25	2.3%	1.79 [0.12, 26.40]	ı	
Total (95% CI)		1890		1596	100.0%	0.91 [0.58, 1.41]	+	
Total events	133		179					
Heterogeneity: Tau ² =	0.32; Chi2	= 33.49	, df = 14 (P = 0.	002); l ² =	58%		0.01 0.1 1 10 1	
Test for overall effect:	Z = 0.43 (F	P = 0.67	")				0.01 0.1 1 10 1 Favors Transfusion Favors Conservative/ None	

B) Forest plot of painful crisis

	Transfusion		Conservative / None		Risk Ratio		Risk Ratio		
Study or Subgroup	Events	Total	Events	Total	Weight	ight M-H, Random, 95% CI	I M-H, Random, 95% Cl		
Al Darwish, 2019	2 83	83	1	90	4.3%	2.17 [0.20, 23.48]			
Al-Jaouni, 2006	5	188	3	181	8.0%	1.60 [0.39, 6.62]			
Al-Samak, 2008	6	39	2	46	7.4%	3.54 [0.76, 16.54]			
Aziz, 2011	3	16	0	24	3.2%	10.29 [0.57, 186.79]			
Casbard, 2005	0	65	3	49	3.1%	0.11 [0.01, 2.05]	+		
Elshinawy, 2020	2	49	1	48	4.3%	1.96 [0.18, 20.90]			
Haberkern, 1997	3	110	44	157	9.7%	0.10 [0.03, 0.31]			
Howard, 2013	1	34	3	33	4.8%	0.32 [0.04, 2.95]			
Koshy, 1995	35	731	25	257	13.9%	0.49 [0.30, 0.81]			
Marulanda, 2009	0	15	0	8		Not estimable			
Salvi, 2022	8	139	10	139	11.3%	0.80 [0.33, 1.97]			
Tole, 2018	2	22	1	115	4.4%	10.45 [0.99, 110.36]	· · · · · · · · · · · · · · · · · · ·		
Vichinsky, 1995	27	303	42	301	14.1%	0.64 [0.40, 1.01]			
Waldron, 1999	4	48	0	59	3.2%	11.02 [0.61, 199.74]			
Wali, 2003	3	14	4	25	8.4%	1.34 [0.35, 5.15]			
Total (95% CI)		1856		1532	100.0%	0.94 [0.53, 1.68]	•		
Total events	101		139						
Heterogeneity: Tau ² =	0.57; Chi ²	= 35.62	, df = 13 (P = 0.	0007); l2 :	= 63%		0.01 0.1 1 10 100		
Test for overall effect:	Z = 0.21 (F	P = 0.83)				Favors Transfusion Favors Conservative / None		

C) Forest plot of bleeding events

	Transfusion		Conservative / None		Risk Ratio			Risk Ratio		
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% C	1	M-H, Rand	M-H, Random, 95% CI	
Aziz, 2011	1	16	0	24	8.3%	4.41 [0.19, 102.00]			-	
Elshinawy, 2020	4	49	2	48	30.1%	1.96 [0.38, 10.20]		0	-	
Koshy, 1995	20	731	1	257	20.4%	7.03 [0.95, 52.13]				
Marulanda, 2009	0	15	0	8		Not estimable				
Tole, 2018	2	22	2	115	22.5%	5.23 [0.78, 35.16]		-		
Wali, 2003	4	14	1	25	18.7%	7.14 [0.88, 57.83]				
Total (95% CI)		847		477	100.0%	4.32 [1.75, 10.68]			-	
Total events	31		6							
Heterogeneity: Tau ² =	0.00; Chi ²	= 1.40,	df = 4 (P = 0.84); l ² = 0%			-	1		
Test for overall effect:	Z = 3.17 (F	P = 0.00	2)				0.01	0.1 Favors Transfusion	1 10 10 Favors Conservative /None	

Figure 1

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