Inactivated four-factor prothrombin complex concentrate as a warfarin reversal agent in pediatric patients undergoing orthotopic heart transplantation

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Introduction

- There is a chronic shortage of suitable donor hearts for pediatric patients requiring cardiac transplantation.
- Technological innovation and improved perioperative care has made ventricular assist devices (VADs) a viable strategy for bridge-to-transplantation, with improved survival in pediatric heart failure.
- Patients supported on VADs are predisposed to severe bleeding at the time of orthotopic heart transplant (OHT) due to chronic anticoagulation with vitamin K antagonists (VKA).
- Inactivated 4-factor prothrombin complex concentrate (4F-PCC) is a 4-factor prothrombin complex concentrate which replaces vitamin K dependent clotting factors.
- We hypothesized that the use of 4F-PCC (Kcentra) as opposed to FFP transfusion would lead to less overall transfusion and improved outcomes.

Methods

- Retrospective analysis of consecutive patients with HeartWare HVAD who underwent OHT January 2013 – December 2017
- All patients received pre-op vitamin K.
- Institutional practice change in 2016 to use 4F-PCC for VKA reversal.
- Kcentra group: 25iu/kg 4F-PCC given prior to incision, after direct visualization of donor heart.
- Blood product transfusion under discretion of anesthesiologist, surgeon and intensivist
- Primary outcome: Volume of blood product transfusion (mL/kg) of total blood products, PRBC, FFP, PLT at three different time points: pre-CPB, post-CPB, and first 24 hours in CVICU
- Secondary outcomes: Incidence of postoperative thromboembolism up to POD #7, duration of intubation, ICU and hospital stay

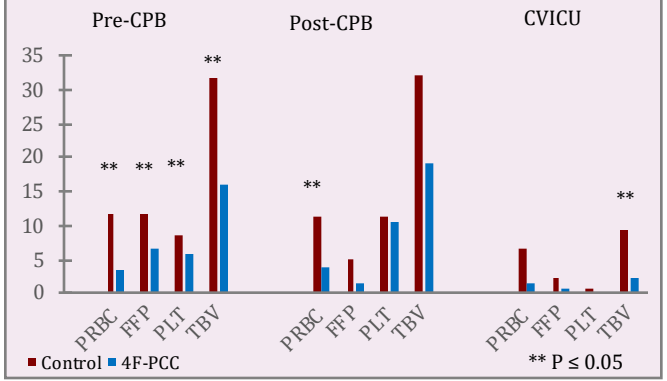
Results

Table 1: Patient demographics

	Control	4F-PCC	P
n	14	14	
Male*	9 (64.3)	9 (64.3)	>0.999
Age, yr†	13.5 [11.2, 16.2]	13.0 [12.2, 15.0]	0.954
Cardiac diagnosis*	12 (85.7)	12 (85.7)	0.385
DCM*	9 (64.3)	12 (85.7)	
Palliated CHD*	4 (28.6)	2 (14.3)	
Retransplantation*	1 (7.1)	0 (0.0)	
Single V disease	2 (14.3)	2 (14.3)	>0.999
Preop INR†	2.2 [1.9, 2.7]	2.3 [2.2, 2.6]	0.617
Preop HCT†	32.3 [29.3, 34.5]	33.3 [31.6, 35.5]	0.443
Preop PLT†	270 [239, 312]	267 [197, 316]	0.537

*Mean, (%) †Median, [Q1, Q3]

Figure 1: Transfusion outcomes



Results, continued

Table 2: Secondary outcomes

	Control	4F-PCC	P
Postoperative thromboembolism, n	0	0	0.241
Time to extubation*	4.0 (5.5)	1.6 (1.9)	0.070
ICU LOS*	17.6 (24.8)	8.6 (3.2)	0.092
Hospital LOS*	36 (51.9)	18.8 (9.1)	0.113

*Mean, (%) †Median [Q1, Q3]

Discussion

- There is only one prior published report on the use of Kcentra in pediatric cardiac surgery.
- Use of 4F-PCC was associated with less blood transfusion prior to and after CPB, and less total blood transfusion within the first 24 hours of ICU stay.
- We found no incidence of postoperative thromboembolism within the group that received 4F-PCC.
- While Kcentra appears to be a safe and effective method for VKA reversal in children with VADs undergoing OHT in this retrospective study, future prospective studies are required to validate the safety and effectiveness of Kcentra in pediatric cardiac surgery.

References

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