

Hartman's is a safe and cost effective alternative to HAS for postop. fluid resuscitation in paediatric cardiac surgery

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Background

Resuscitation fluid use forms an integral part of postoperative cardiac surgery management, affecting outcomes especially delayed sternal closure, duration of ventilation & PICU stay and risk of acute kidney injury (AKI). We transitioned from using primarily colloids (5% HAS) as resuscitation fluids to a predominant balanced crystalloid (Hartman's) based strategy in 2018 to reduce use of blood products and reduce costs associated with procurement, transport, storage of HAS.

Aim

The aim of this quality improvement initiative was to determine safety and efficacy of the changed fluid strategy

Methods

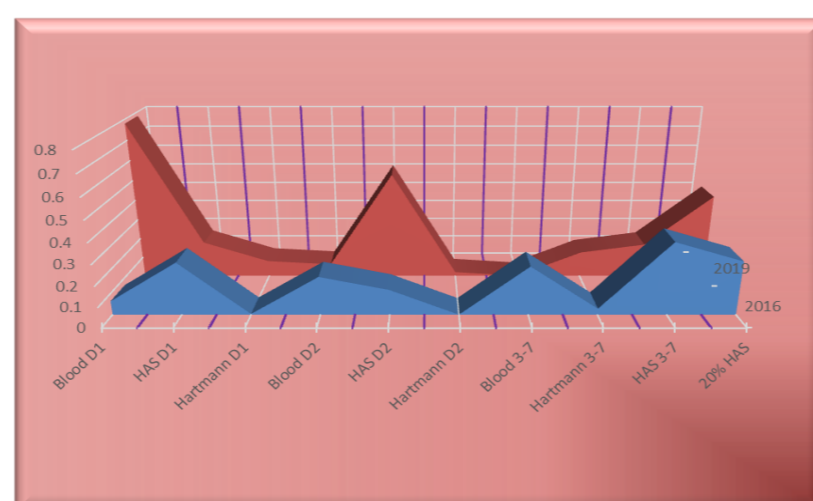
This was a retrospective, before-and-after cohort study of infants' ≤ 90 days undergoing cardiac surgery in a tertiary PICU during two different 12-month time intervals. A total of 146 infants were included: 59 from 2016 to reflect the practice where 5%-HAS was predominant resuscitation fluid and 87 from 2019 when the practice of Hartman based resuscitation fluid was firmly established. Data were collected from electronic records regarding patient demographics (age, weight), Surgical parameters (RACHS, CPB, cross clamp time, delayed chest closure) and postoperative clinical parameters (acidosis/lactate on admission, chest closure day, use of blood products, Resuscitation fluid received during first week of PICU stay, inotropes, PICU stay, extubation day, AKI, co-morbidities & other procedures). The primary outcome variables were length of PICU stay and chest closure day.

Results

The two cohorts were comparable in baseline characteristics. There was no significant difference in length of PICU stay, delayed chest closure and prevalence of AKI between the two cohorts.

Table 1: Baseline Characteristics, clinical parameters and outcome measures

Variable	HAS (2016)	Hartman's (2019)
Age (days) mean	25	28
Weight (kg) mean	3.3	3.4
Mean Length of stay	4.8	6.06
CPB (min) mean	183	210
Cross clamp time (min) mean	90	103.59
High lactate n(%)	8 (53.3)	20 (68.96)
Chest Closure day (med)	3.4	3
Chest exploration n(%)	3 (20)	6 (20.6)
Cardiac arrest n(%)	0 (0)	2 (6.8)
Inotropes n(%)	13 (86.6)	28 (96.5)
AKI n(%)	6 (40)	3 (10.3)
PD n(%)	7 (46)	9 (31)
Steroid n(%)	2 (13.3)	18 (62)
Antibiotics n(%)	2 (13.3)	18 (62)
Arrhythmias n(%)	0 (0)	11 (37.93)
Co-morbidities n(%)	5 (33.3)	1 (3.4)
Other procedures n(%)	5 (33.3)	3 (10.3)
ECMO	1 (6.6)	1 (3.4)



Association of fluid use with length of stay in the two cohorts

Discussion

This retrospective study done as quality improvement initiative to determine safety and efficacy of Hartman's as a predominant resuscitation fluid shows that it can safely replace HAS and is cost-effective. There was a trend towards prolonged PICU stay with use of HAS however it was not statistically significant. There was no significant difference in delayed chest closure and incidence of AKI between the two cohorts.

Limitations

The main limitations are:

- Limitations inherent to retrospective methodology
- Quality of data/documentation
- No specific parameters/outcome for resuscitation fluid use
- Potential variation in practice over time

Recommendations

- Hartman's can be safely used as a cost effective replacement for HAS in postoperative cardiac surgery fluid resuscitation
- Adequately powered multi-centre randomised controlled trials are needed

References

1. Dingankar AR et al. Albumin 5% versus crystalloids for fluid resuscitation in children after cardiac surgery. PCCM. 2018;19(9):846–53.
2. Farris K et al. Balanced Crystalloids Versus Albumin 5% for Fluid Resuscitation in Children After Cardiac Surgery, Critical Care Medicine: January 2021 - Volume 49 - Issue 1 - p 202