

# Cardiopulmonary Outcome of Normothermic Versus Hypothermic Perfusion in Paediatric Cardiac Surgery

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## Introduction

- The majority of paediatric cardiac surgical operations have been carried out using hypothermic perfusion on cardiopulmonary bypass (CPB).
- Perfusion temperature (normothermia or hypothermia) during cardiopulmonary bypass may have an impact on the cardiopulmonary outcome in paediatric cardiac surgery.<sup>1</sup>

## Objectives

- To measure and compare the arterial lactate level at postoperative 0, 4, 8, 12 and 24 hours between two groups
- To determine and compare the vasoactive inotropic score at postoperative 0, 4, 8, 12 and 24 hours between two groups
- To compare the duration of mechanical ventilation between two groups

## Materials and Method

- A comparative study carried out from September 2021 to August 2023 in 1-12 years old patients with acyanotic congenital heart disease admitted to No. (1) Defence Services General Hospital (1000-Bedded) who underwent elective cardiac surgery.
- Total 92 patients were randomized into Group N (normothermic group) or Group H (hypothermic group).
- In normothermic technique, nasopharyngeal temperature at 35°C-37°C, CPB flow at 2.4-3.5 L/min/m<sup>2</sup> and haematocrit above 30%.
- In hypothermic technique, nasopharyngeal temperature at 28°C-37°C, CPB flow at 2.0-2.4 L/min/m<sup>2</sup> and haematocrit above 24%.
- During CPB, real-time oxygen delivery (DO<sub>2</sub>) and mixed venous oxygen saturation (SvO<sub>2</sub>) was measured by using CDI-550 blood parameter inline monitoring system. DO<sub>2</sub> was maintained above 300 mL/min/m<sup>2</sup> and SvO<sub>2</sub> above 80% in every cases.



Stockert S III Heart lung machine with Terumo CDI-550 blood parameter inline monitor

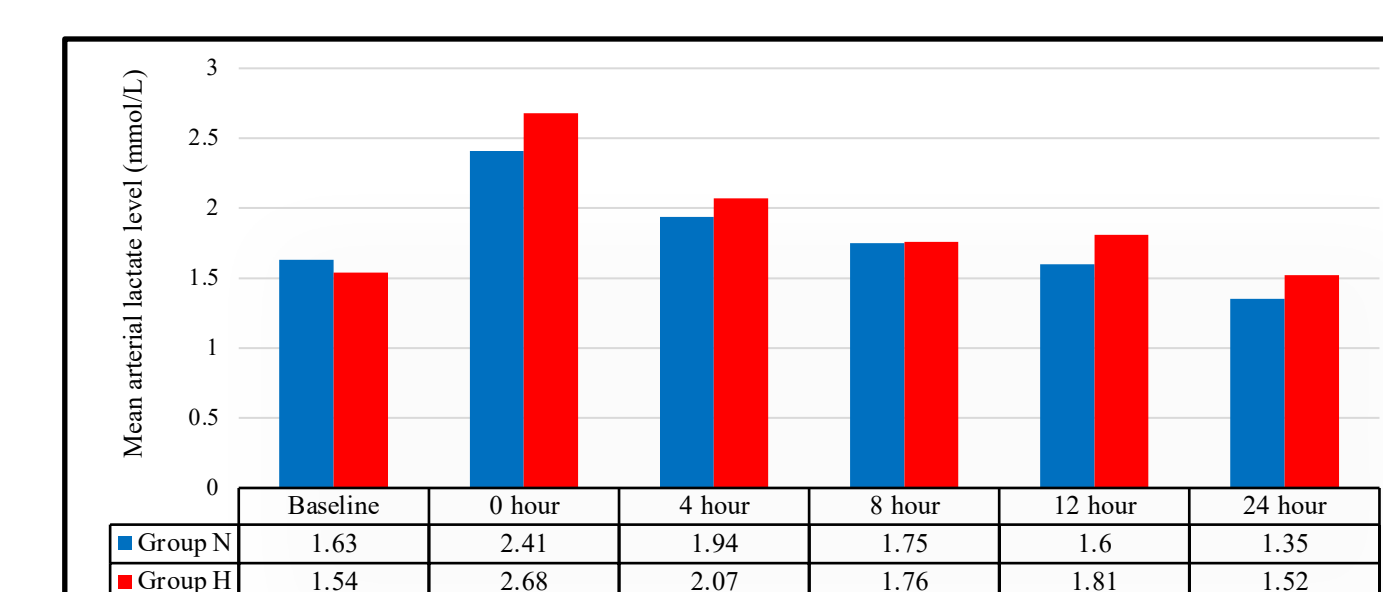


Stockert S III Heater Cooler System

## Results and Discussion

- Arterial lactate level:** no statistical significant results at different time points.

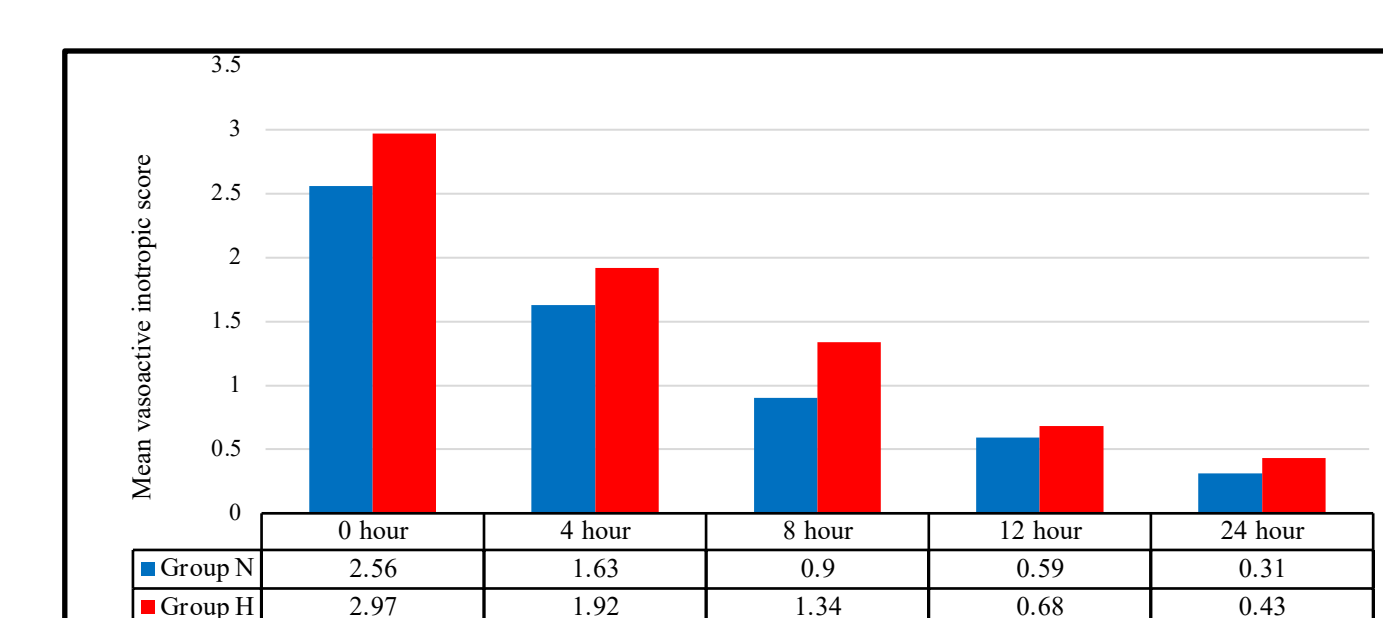
Times	Arterial lactate level (mmol/L)		p-value
	Group N (n=46) Mean ± SD	Group H (n=46) Mean ± SD	
Baseline	1.63±0.74	1.54±0.53	0.253
0 hour	2.41±1.02	2.68±0.88	0.388
4 hour	1.94±0.68	2.07±0.83	0.196
8 hour	1.75±0.48	1.76±0.61	0.087
12 hour	1.60±0.45	1.81±0.50	0.920
24 hour	1.35±0.50	1.52±0.48	0.375



- Lactate level of 4.8 mmol/L or higher was associated with postoperative complications, including haemodynamic, pulmonary, and renal profile.<sup>2</sup> In this study, the mean serum arterial lactate level at different time points were less than 4.8 mmol/L in both normothermic and hypothermic groups.

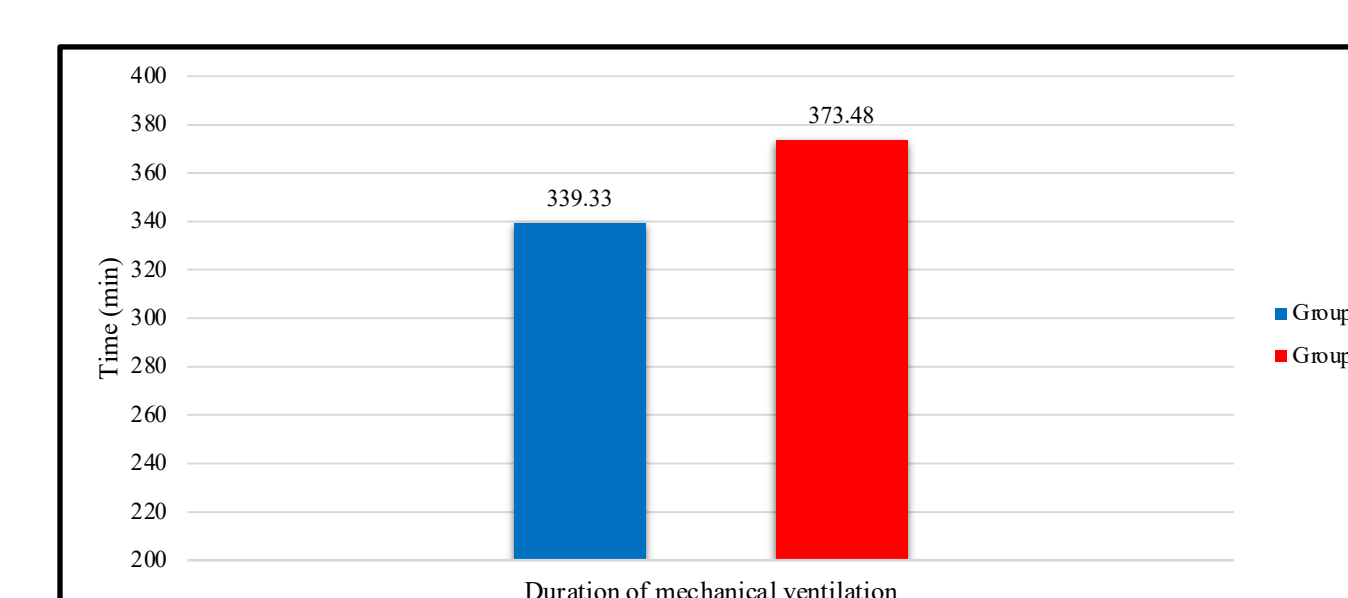
- Vasoactive inotropic score:** not significant at all time points.

Times	Vasoactive inotropic score		p-value
	Group N (n=46) Mean ± SD	Group H (n=46) Mean ± SD	
0 hour	2.56±2.85	2.97±2.98	0.878
4 hour	1.63±2.02	1.92±2.36	0.384
8 hour	0.90±1.45	1.34±1.81	0.095
12 hour	0.59±1.13	0.68±1.33	0.339
24 hour	0.31±0.85	0.43±1.06	0.201



- Maximum VIS greater than or equal to 20 indicates an increased likelihood of a poor clinical outcome.<sup>3</sup> Because this study was conducted in simple acyanotic cases, the magnitude of inotropic support was reduced in comparison to other studies.

- Duration of mechanical ventilation:** no statistically significance between two groups (*p*-value 0.255).



- Timely tracheal extubation has been an important element of cardiac surgery and extubation after more than 24 hours is referred to as prolonged mechanical ventilation.<sup>4</sup> Since it was conducted in acyanotic cases, duration of mechanical ventilation was less than 24 hours in every cases.

## Conclusion

- Despite the present study may not offer the positive evidence of normothermic perfusion in paediatric patients, it can be concluded that normothermic perfusion is as safe as hypothermic perfusion in paediatric patients requiring correction of simple congenital cardiac defects.

## References:

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