

**Comparative study between three solutions for  
cardioplegia in pediatric cardiac surgery:  
Histidine-Tryptophan-Ketoglutarate(HTK)  
solution, Blood cardioplegia, and crystalloid  
(St.Thomas) cardioplegia.**

Thesis

Submitted for partial fulfillment of MD degree in Anesthesiology.

By

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## ABSTRACT

**Background:** Cardiac surgery is an established and effective treatment for children with congenital heart defects. Cardiopulmonary bypass provides alterations of the physiological status of the patients. In neonates and infants, those effects of CPB are often more pronounced than in adults. Cardioplegia is the solution used to arrest and protect the heart during aortic cross-clamping. Crystalloid and blood cardioplegia are both widely used in clinical practice. Custodial-HTK solution is an intracellular cardioplegic solution containing histidine, tryptophan and ketoglutarate. In the present study, we compared the myocardial protective effects of 3 types of cardioplegia solution: The histidine–tryptophan–ketoglutarate (HTK) solution, blood and St. Thomas cardioplegia in pediatric cardiac surgery.

**Patients and methods:** 60 children aged 3-10 years of either sex who underwent elective cardiac surgery for acyanotic heart diseases using cardiopulmonary bypass were included in this prospective randomized study. Patients were randomly allocated (by closed envelope method) to three groups: Group A ( $n=20$ ) received HTK cardioplegia. Group B ( $n=20$ ) received blood cardioplegia. Group C ( $n=20$ ) received St. Thomas cardioplegia. Hemodynamic parameters, arterial blood gases, central venous pressure, duration of CPB, aortic cross clamping and the whole surgical duration, mechanical ventilation duration and the length of ICU stay were measured. Venous blood samples were collected for measurement of cardiac marker proteins (CK-MB) and troponin (t). Use of inotropic support, requirement for defibrillations and pacemaker requirements were also recorded.

**Results:** The main findings in our results were that troponin(t) levels were not statistically significant different among the study groups except that recorded 24 hours, with the highest level was in the group (B) and the lowest one in the group (C). CK-MB levels also were not statistically significant different among the study groups except that recorded after 12 hours the highest one in group (C) and the lowest one in group (B). **Conclusion:** Single dose of cold HTK cardioplegia in pediatric cardiac surgery is as effective as multiple doses of cold blood and crystalloid (St. Thomas) cardioplegia in protecting the myocardium.