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OXIDATIVE STRESS MARKERS AS DETERMINANTS OF EARLY POSTOPERATIVE COMPLICATIONS IN CHILDREN WITH CONGENITAL HEART DISEASE

Ashurova Difuza Tashpulatovna

DSc professor, department of Pediatrics,
Tashkent State Medical University,
d.ashurova7900@mail.ru,
ORCID 0000-0003-1252-7988

Turaeva Yulduz Shukhrat qizi

MSc, department of Pediatrics,
Tashkent State Medical University,
abdukamilovayulduz@gmail.com,
ORCID 0009-0002-2073-7440

Abstract: Early postoperative complications remain a major cause of morbidity after surgical correction of congenital heart disease (CHD) in children, particularly in patients with pulmonary hypertension (PH), who represent a high-risk subgroup of 1-3g. Growing evidence suggests that oxidative stress contributes to postoperative organ dysfunction following cardiopulmonary bypass; however, its clinical significance in pediatric CHD populations has not been sufficiently quantified of 4-6g.

Material and methods

This prospective comparative study included 100 children with CHD undergoing surgical correction. Patients were stratified according to the presence of pulmonary hypertension (PH group, n = 52; non-PH group, n = 48). A control group comprised 20 age-matched healthy children. Markers of antioxidant defense, including superoxide dismutase (SOD) activity and total antioxidant status (TAS), were assessed in the early postoperative period. The incidence and structure of early postoperative complications were analyzed.

Results

Children with pulmonary hypertension demonstrated a marked depletion of antioxidant defense mechanisms. Median SOD activity was significantly lower in the PH group compared with the non-PH group (90.3 vs 119.0 U/mL) and healthy controls (210.0 U/mL; $p < 0.01$) [6,7]. TAS values were likewise reduced in patients with PH (0.11 mmol/L vs 0.16 mmol/L in non-PH children; $p < 0.05$). Clinically, the presence of PH was associated with a substantially higher incidence of early postoperative complications (59.6% vs 22.9%), predominantly respiratory failure (28.8% vs 10.4%) [8,9]. These findings indicate a close association between impaired antioxidant capacity and postoperative vulnerability in this population.

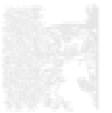
Conclusion

Severe impairment of antioxidant defense represents a key pathophysiological feature in children with CHD and pulmonary hypertension and is strongly associated with early postoperative complications. Assessment of oxidative stress markers, particularly SOD and TAS, may provide clinically meaningful information for perioperative risk stratification and support individualized management strategies aimed at improving early postoperative outcomes in high-risk pediatric patients [6,10].

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