

Outcomes associated with occlusive thrombosis and its management in pediatric patients after cardiac surgery

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Introduction: Thrombosis is an important cause of morbidity and mortality after pediatric cardiac surgery. Multiple treatment options are available for these patients, with progressive intensity associated with increased risk of adverse events. We sought to explore the balance of adverse outcomes of thrombosis versus adverse effects of therapy.

Methods: Patients with ≥ 1 radiologically-confirmed occlusive thrombus after cardiac surgery (2002-2009) were reviewed. Information collected on each thrombus included patient characteristics, clot characteristics, hemostatic system activity before surgery and at the time of clot diagnosis, treatment details and outcomes.

Results: A total of 400 occlusive clots in 203 patients (median age 2 months) were included. Clots were identified in veins (n=281;70%), arteries (n=58;15%), brain (n=18;5%), heart (n=14;4%), surgical shunts (n=20;5%) and pulmonary circulation (n=9;2%). Mechanical/surgical clot removal was performed to address 43 clots in 27 patients. Indications for removal included occlusion of a cardiac structure/shunt/pulmonary vein/artery in 17(63%), occlusion of venous return in 9(33%) and hepatic infarction in 1(4%). Most patients (85%) who underwent mechanical/surgical clot removal did not require further antithrombotic therapy; however, 7(26%) did not survive to hospital discharge.

Thrombolytics were given to 19 patients. Indications included multiple (>5) clots for 6(32%), valve thrombosis for 5(26%), occlusion of a cardiac structure/shunt/pulmonary vein/artery in 3(16%) and occlusion of peripheral vessels non-responsive to unfractionated heparin in 5(26%). Major bleeding complications were seen in 8/19(42%) patients who received thrombolytics, and 6/19(32%) patients did not survive to hospital discharge. For patients who survived to hospital discharge, the prevalence of clot resolution was 13% at 6 weeks after diagnosis, and 37% and 58% after 3 and 6 months.

Factors associated with clot resolution included non-venous clot (HR:2.43,p<0.001), lower fibrinogen level at diagnosis (HR:1.23,p=0.03), higher enoxaparin dose at discharge (HR:1.74,p=0.03) and use of thrombolytics (HR:2.29,p=0.002). Severe bleeding complications occurred in 30 patients (15%).

Associated factors included older age diagnosis (OR:1.15/year,p=0.04), higher fibrinogen level at diagnosis (OR:1.67/unit,p=0.009), longer duration of unfractionated heparin treatment (OR:1.05/day,p=0.02) and use of thrombolytics (OR:5.84,p=0.001).

Conclusions: Escalation of antithrombotic treatment was associated with both increased effectiveness and increased risk of bleeding complications. Both outcomes should be considered when selecting therapy for these patients.