A comparative histopathological study of heparin coated and uncoated polytetrafluorethylene grafts in children with congenital heart defects

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Introduction: Polytetrafluorethylene (PTFE) grafts are used to ensure pulmonary blood flow in children presenting with complex congenital heart defects. Recently, heparin coated grafts are available and are believed to improve inherent graft problems such as thrombosis and excessive and incomplete neointima formation or occlusion. We aimed at comparing the potential histopathological differences of the neointima in uncoated (UCG), and heparin coated (HCG) PTFE grafts.

Methods: 16 grafts (8 UCG, 8 HCG) were explanted. 3 grafts with stents in the distal anastomosis (2 UCG, 1 HCG) were excluded from further histopathological comparison. The specimens were fixed in formalin and embedded in paraffin or in methylmethacrylate. Tissues were characterized by standard and immunohistochemical staining. The thickness of pseudointima proliferation was graded as follows: 0=no cell layers, 1= few layers<100µm, 2=partial layers >100µm, 3=complete layers <300µm, 4=complete layers >300µm, 5=occlusion.

Results: Mean shunt size was 3.4±0.2 mm in UCG, and 3.1±0.2 mm in HCG (p=0.053). Mean time of implantation was 163±75 days in UCG, and 97±52 days in HCG (p=0.091). There were no significant differences in the proportion of patients with functionally single ventricle, body surface area, age at implantation, or implantation type, between both groups. Graft occlusion did not occur. Unplanned graft explantation due to cyanosis was performed in 1 patient in each group. Partial thrombus formation was observed in 1 UCG (p=0.462). There was complete endothelialization in 67% of UCG, and 86% of HCG (p=0.559). The grade of pseudointima proliferation was 1.8±0.4 in UCG, and 1.7±0.5 in HCG (p=0.646).

Conclusions: The histopathological work-up of PTFE grafts revealed equally partial endothelialization and discrete pseudointima proliferation in both groups. The process of endothelialization may be faster in HCG. However, this small series could not demonstrate a superiority of HCG over UCG.