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Aortic arch reconstruction in the Norwood procedure using a curved polytetrafluorethylene patch

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OBJECTIVE: Children with hypoplastic left heart syndrome and related malformations inherently have an hypoplastic aortic arch. The aortic arch reconstruction in the Norwood procedure is classically carried out using an enlarging curved homograft patch on the inner curvature of the neo-aorta. The widespread lack of homografts makes an alternative patch material a desired product.

METHODS: Between 4/2007 and 12/2014 we alternatively used curved polytetrafluorethylene (PTFE) patches known from peripheral vascular surgery in 76 out of 171 Norwood procedures. The suture was done using prolene 6/0. In the other operations pulmonary homograft patches were implanted. The decision for either patch material was made due to anatomic reasons, preferring PTFE patches in larger aortas.

A retrospective analysis was carried out concerning postoperative course and long term follow up regarding aortic arch interventions and reoperations.

RESULTS: The arch augmentation with the prosthetic material could be carried out in all 76 preoperatively selected patients. There were no material associated operative or postoperative complications. There were no significant differences regarding aortic clamp time or bypass time between the groups. 30 day mortality was 6.5 %. Presently 22 pts. are in stage II and 36 pts. after Fontan completion. 9 children died late during follow up (12.7%) and 4 are lost to follow up. One aortic isthmus dilatation was carried out 12 months after the Norwood procedure, no arch reoperation was necessary. In the remaining patients the aortic arch didn't show need for intervention during the complete follow up. Potential gradients were assessed echocardiographically and invasively at time of angiography for fenestration closure.

CONCLUSIONS: The curved PTFE patch showed good qualities in operative technical demands and excellent long term results. In selected cases of hypoplastic left heart syndrome it can be well used as alternative to the commonly used pulmonary homograft. Its advantages are its availability, durability and lower costs. Its stiffness makes the application in very tiny aortas difficult.