

Survival and catheter interventions after Norwood surgery

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Introduction:

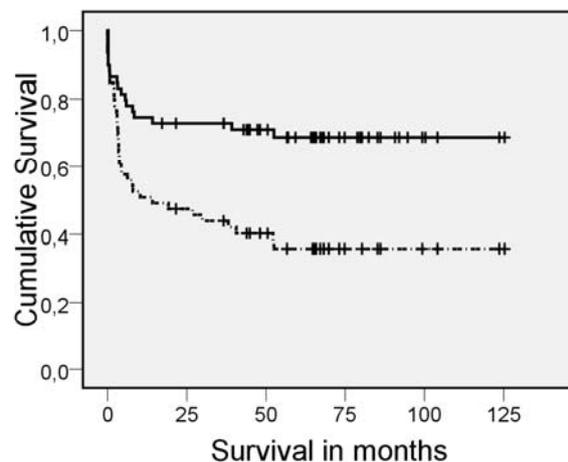
Hypoplastic left heart syndrome and other functionally single ventricle malformations can be palliated with the Norwood procedure. The mortality and morbidity of the procedure is still considerable. We describe the results of Norwood surgery and the need for catheter interventions in patients after Norwood surgery in a single center.

Methods:

From 1999 to 2009 all patients surgically palliated by the Norwood procedure were included in a retrospective study. In the early years the pulmonary blood flow was supplied by a modified BT-shunt or central shunt, which later changed to a right-ventricle to pulmonary-artery shunt. Obstructions in the pulmonary branches or aortic arch, even mild or moderate, were treated by catheter interventions.

Results:

A total of 60 patients were palliated by the Norwood procedure, 19 received a BT/central shunt and 41 a RV-PA shunt. Early mortality, that is death within 30 days of surgery, was 13% (N = 8; 4 BT/central, 4 RV-PA). Mean age at the Glenn procedure was 5.5 months (range 3 – 10) and at completion of the Fontan circulation 3.2 years (range 2.1 – 4.7). The 5-year survival after surgery was 69% (figure solid line) with a mean follow-up of 5.7 years (range 1.5 – 10.4). A total of 50 catheter interventions were performed in 24 patients surviving more than 30 days after surgery (46%), not including closure of fenestrations (24 patients). The 5 year intervention free survival after Norwood surgery was 36% (figure dashed line). In 13 patients (4 BT/central, 9 RV-PA) 16 aortic arch dilatations were performed, in one patient followed by placement of a stent. In 12 patients (2 BT/central, 10 RV-PA) diagnosed with a stenosis of the left or right pulmonary artery branch, 16 stents were implanted and in 6 of these patients 8 balloon dilatations were performed in a separate session. Eight collaterals were closed in 6 patients by coils or plugs and in one patient a balloon dilatation of vena anonyma stenosis was performed.



Conclusion:

In this series of patients the long-term survival after Norwood surgery is good. During follow-up catheter interventions are often required to further optimize hemodynamics in this vulnerable group of patients.