Objective: To investigate the surgical outcomes of the deferred Norwood procedure by bilateral PAB (BPAB) versus the neonatal Norwood procedure.

Methods: This retrospective study examined 46 patients with HLHS and its variants undergoing the Norwood procedure for single-ventricle physiology in 2004–2022 at three institutions. The patients were divided into two groups: Norwood procedure in neonates, including a rapid 2-stage Norwood procedure (group N, n=23), and staged Norwood procedure in infants after BPAB (group I, n=23). Median age and body weight at Norwood procedure were 8 (3–16) days and 2.9 (2.6–3.2) kg in group N and 112 (78–144) days and 4.4 (3.8–5.0) kg in group I (both P<0.001). Preoperative risk factors, surgical results, survival rates, Fontan candidacy, and long-term complications were compared. Multivariate Cox regression analysis was performed to investigate the risk factors for all events associated with Fontan surgery.

Results: Early survival rates after the Norwood procedure were 91.3% (21/23) in both the groups. Late survival rates after the Norwood procedure were similar at the 10-year follow-up between groups (N, 75.7%; I, 64.6%; P=0.50). Fontan completion rates were similar between groups (N, 70.0%; I, 73.3%; P=0.99). Group N showed a higher PA index before bidirectional cavopulmonary shunting (group N, 177 [147–243] mm2/m2 vs. group I, 152 [146–163] mm2/m2; P=0.03); this trend continued until 5 years after Fontan completion (P=0.01). Group I underwent more numbers of interventions to PA through the entire observational period (Group N: 0 (0–2) times versus Group I: 3 (0–4) times, P=0.02). Group N showed a lower rate of freedom from PLE than Group I at 9.0 years after Fontan operation (Group N: 90.0% versus Group I: 52.5%, P=0.04), although incidences of other Fontan associated events, including arrythmias and Fontan associated liver diseases, showed no significant difference. Multivariate Cox regression analysis revealed that the Norwood procedure in infants and a diameter of ascending aorta <2 mm before Norwood procedure were independent risk factors for all events associated with Fontan.

Conclusions: Fontan candidacy and survival rates were similar regardless of Norwood procedure timing, while catheter interventions to pulmonary arteries during interstage and post-Fontan procedure increased in infants after BAPB. Early Norwood procedure timing may incur lower rates of late Fontan-associated events such as PLE.