

Minimally Invasive David I Procedure Through Right Anterior Thoracotomy Approach: A Single-center Experience

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BACKGROUND: This study aims to investigate the possibility of aortic valve-sparing root replacement using the reimplantation technique (David I procedure) through right anterior thoracotomy (RAT) approach.

METHODS: From June 2023 to September 2025, 18 patients undergoing isolated David I procedure via RAT approach were retrospectively analyzed at Department of Cardiovascular Surgery, First Affiliated Hospital of Xi’ an Jiaotong University. Right jugular vein, femoral vein and artery were cannulated to establish cardiopulmonary bypass (CPB). Custodiol-HTK cardioplegia were used in all cases. All cases were operated by a single senior cardiac surgeon.

RESULTS: All the patients were male and the mean age was 47.8±6.2 years. Hypertension were seen in 10 patients (56.6%). 3 patients had Marfan syndrome and bicuspid aortic valve (BAV) were seen in 2 patients. 14 patients (77.8%) showed preoperative greater than mild aortic insufficiency (AI). The median pre-operative sinus diameter was 52.3mm (IQR, 51.0–55.9 mm) by intra-operative transesophageal echocardiogram (TEE), and the median aortic annulus was 28.3mm (IQR, 27.1–29.0 mm).The median CPB time was 231minutes (IQR, 215–242 minutes), and median aortic cross-clamp time was 179 minutes (IQR, 175–188 minutes). 28mm tube graft were used in 2 patients, 30mm tube graft in 8 patients, 32mm tube graft in 7 patients, and 34mm in 1 patient. Intra-operative TEE showed good aortic valve coaptation (median coaptation height 8.7mm, [IQR, 8.3–9.0 mm]). There was no more than trivial AI after surgery and trivial AI was central. There were no conversions to full sternotomy or re-exploration for bleeding. The median post-operative red blood cell transfusion was 1 unit (IQR, 1–1 unit). There were no in-hospital deaths. The median ventilation time was 17.3 hours (IQR, 12.6–19.9 hours). The median ICU stay was 3 days (IQR, 2–3 days). The median hospital length of stay was 12 days (IQR, 11–13 days). 10 patients returned to normal activity during 3 weeks after discharge and 6 to 8 weeks in 8 patients. There were no observed deaths in the follow-up period (median 7.3 months, [IQR, 4.3–9.8 months]). Only one moderate AI was observed during followup but no surgical intervention is indicated. Permanent pace-maker insertion was needed only in patient because of complete atrioventricular block during follow-up.

CONCLUSIONS: Minimally invasive David I procedure through RAT approach was possible and associated with low morbidity and mortality according to this small sample size study. We believe that because of its more time-consuming technical nature it should be performed by experienced hands and meticulous patient selection is definitely the key for success. Large cohort study is warranted for its safety and reproducibility.

Demographic data	
mean age	47.8±6.2
Male	18 (100%)
Leaflet morphology	
bicuspid	2(11%)
Marfan syndrome	3(17%)
Pre-operative TEE	
> mild AI	14(78%)
median pre-operative sinus diameter(mm)	52.3 (IQR, 51.0-55.9)
median aortic annulus(mm)	28.3(IQR, 27.1-29.0)
Intraoperative data	
post-op median coaptation height(mm)	8.7(IQR, 8.3-9.0)
tube graft size(mm)	
34	1(6%)
32	7(39%)
30	8(44%)
28	2(11%)
median CPB time(min)	231(IQR, 215-242)
median cross-clamp time(min)	179(IQR, 175-188)
Postoperative data	
red blood cell transfusion(unit)	1 (IQR 1-1)
median ventilation time(h)	17.3 (IQR, 12.6-19.9)
median ICU stay(d)	3(IQR, 2-3)
median hospital length of stay(d)	12(IQR, 11-13 days)
Follow-up	
moderate AI	1(6%)
Permanent pace-maker insertion	1(6%)

