

The single-center experience of minimally invasive redo valve surgery through right mini-thoracotomy

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BACKGROUND: This study aims to present the single-center experience of minimally invasive valve surgery via right mini-thoracotomy for patients with prior cardiac surgery requiring valve surgery.

METHODS: A retrospective analysis was conducted on patients who underwent redo minimally invasive valve surgery through right mini-thoracotomy at the Department of Cardiovascular Surgery in the First Affiliated Hospital of Xi'an Jiaotong University from Feb 2023 to Apr 2024.

RESULTS: A total of 36 patients underwent redo minimally invasive valve surgery, including 13 males and 23 females, with an average age of 54.7 years. Eight cases underwent Isolated aortic valve surgery, with three using sutureless aortic valves. A total of three cases underwent composite multivalve surgery involving aortic valve procedures. Four cases underwent isolated MVR (mitral valve replacement), and 6 cases underwent mitral and tricuspid valve surgery. There were 13 cases of isolated tricuspid valve surgery, including 10 cases of TVP (tricuspid valve repair) and 3 cases of TVR (tricuspid valve replacement).One case of hybrid surgery involved minimally invasive TVR combined with TAVI (transcatheter aortic valve implantation).The average CPB (cardiopulmonary bypass) duration for the 36 patients was 114.3 minutes, with 19 patients utilizing an on-pump beating heart technique. The average aortic cross-clamp time for the remaining 17 patients was 95.3 minutes. All surgeries were successful, with an average ICU stay of 3.3 days and an average total postoperative stay of 10.9 days. No patient died during the perioperative period. Three patients returned to the operating room due to bleeding, one experienced postoperative cerebral hemorrhage, another suffered a stroke, one encountered ventricular fibrillation, and one underwent CRRT (continuous renal replacement therapy) due to perioperative renal dysfunction.

CONCLUSIONS: Minimally invasive valve surgery through right mini-thoracotomy for patients with previous cardiac surgery is safe and feasible, with fast postoperative recovery, short hospitalization, and low incidence of perioperative complications. It is a safe alternative to median sternotomy for redo valve surgery.

Table1 Preoperative baseline characteristics

Demographics		
Age(years)		54.7±12.3
Male sex		13(36.1%)
BMI(kg/m2)		22.6±3.0
Comorbidities		
Hypertension		10(27.8%)
Diabetes mellitus		2(5.6%)
CAD involvement		4(11.1%)
Cerebrovascular disease		7(19.4)
Chronic kidney disease		1(2.8%)
Atrial fibrillation		22(62.9%)
NYHA functional class		
IV		6(16.7%)
≤III		30(83.3%)
Echocardiography		
LVEF(%)		61±9.7
Previous cardiac surgeries		
ASD Repair		3(8.3%)
VSD Repair		3(8.3%)
Other Congenital anomaly		2(5.6%)
AVP		1(2.8%)
AVR		3(8.3%)
AVR+MVR+TVP		2(5.6%)
MVR		8(22.2%)
MVR+TVP		3(8.3%)
MVP+TVP		3(8.3%)
AVR/AVP+TVP/TVR+Valsalva Repair		2(5.6%)
Valve surgery+CABG		3(8.3%)
Aorta		2(5.6%)
TAVI		1(2.8%)

table2: Operative data

surgery		
AVR		8(22.2%)
AVR+MVP		1(2.8%)
AVR+TVP		1(2.8%)
AVP+MVP+TVP		1(2.8%)
MVR		4(11.1%)
MVR+TVP		6(16.7%)
TVP		10(27.8%)
TVR		3(83.3%)
TVP+TAVR		1(2.8%)
Aorta		1(2.8%)
Minimally invasive approach		
left parasternal second intercostal incision		8(22.2%)
left parasternal third intercostal incision		3(8.3%)
The fourth intercostal space at the anterior axillary line		24(66.7%)
combined incision		1(2.8%)
Cardiopulmonary bypass time(minutes)		114.3±55.7
Cross-clamp time(minutes)		95.3±30.6
Conversion to sternotomy		0%

Table3: Postoperative outcomes

30-day mortality postoperative	0(0%)
Stroke	1(2.8%)
cerebral hemorrhage	1(2.8%)
Renal failure requiring dialysis	1(2.8%)
Reoperation for bleeding	3(8.3%)
Low cardiac output syndrome	0(0%)
Ventricular fibrillation	1(2.8%)
Cardiac arrest	0(0%)
ICU stay(days)	3.3±5.1
Postoperative hospital stay(days)	10.9±6.2