Mini Root Surgery. Intermediate And Late Outcomes

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BACKGROUND: There is still little data on minimally invasive approach for patients with aortic root aneurysm. In following study we wanted to present partial upper sternotomy approach for these patients. The objective of the current report was to report early surgical data as well as remote outcomes in patients undergoing minimally invasive aortic root surgery.

METHODS: Between 2011 and 2021, 178 selected low- and intermediate risk patients (mean age: 64.1±11.3; 70.1% men; EuroSCORE II 2.58±3.26) underwent minimally invasive aortic surgery. Redo-surgeries, endocarditis cases and acute dissections were excluded. The "V" shaped partial upper sternotomy was performed through a 6-cm skin incision from the notch to the third or fourth intercostal space depending on surgeons' preference and preoperative imaging. Patients were divided into minimally invasive root repair/replacement, supracoronary aorta replacements and supracoronary aorta replacements with concomitant AVR; CPB was provided via direct aortic cannulation and two stage cannula to right atrium. According to our previous experience we set that 67 mm of aortic diameter as a exclusion criteria of minimally invasive approach.

Table 1. Preoperative data	Supracoronary aortic replacement (82)	Supracoronary aortic replacement + AVR (44)	Root replacement/ repair (41)
Age (y.o.)	62.2±11.8	65.3±10.0	66.4±11.1
Male	60 (73.1%)	32 (72.7%)	25 (61.0%)
BMI	28.5±3.4	29.9±4.6	27.7±2.6
EuroSCORE II	2.70±2.36	2.50±3.64	2.25±1.71
Hypertension	56 (68.3%)	34 (77.3%)	30 (73.2%)
PHT	0 (0.0%)	0 (0.0%)	0 (0.0%)
CAD	24 (29.3%)	14 (31.8%)	13 (31.7%)
COPD	7 (8.5%)	5 (11.4%)	2 (4.9%)
Diabetes	11 (13.4%)	4 (9.1%)	3 (7.3%)
CKD	6 (7.3%)	7 (15.9%)	3 (7.3%)
Previous MI	8 (9.8%)	2 (4.5%)	2 (4.9%)
Previous PCI	5 (6.1%)	4 (9.1%)	5 (12.2%)
Previous TIA/stroke	0 (0.0%)	1 (2.3%)	1 (2.4%)
Connective tissue disorder	0 (0.0%)	0 (0.0%)	1 (2.4%)
Ejection fraction (%)	59.4±5.3	56.3±10.6	56.2±8.9

Table 1. Preoperative data

RESULTS: The mean follow-up was 5 year. 42 patients (23.9%) underwent minimally invasive aortic root surgery. 16 (8,9%) patients had root reimplantation, 26 patients (14,6%) had root reimplantation (19- bioprosthesis; 7- mechanical conduit). Average aortic diameter was 6.00±0.46cm. The cardiopulmonary bypass and aortic cross-clamp time were on average longer by 44 to 92 minutes for ECC and by 33 to 71 minutes for x-clamp in patients undergoing supracoronary aortic replacements with AVR and minimally invasive root surgery respectively. There was no case of conversion to full sternotomy in root surgery group. Median duration of intensive care unit stay was 3.0 [1.0-4.0] days. Thirty-day mortality was 0.6%. Within investigated follow-up, there was one late reoperation due to aortic valve thrombosis; remote survival was estimated at 94.7%. Freedom from reoperation at was observed in 91%.

Table 2. Postoperative data	Total (167)	Supracoronary aortic replacement (82)	Supracoronary aortic replacement + AVR (44)	Root replacement/ repair (41)
30-day mortality	1 (0.6%)	1 (1.2%)	0 (0.0%)	0 (0.0%)
Cardiac tamponade and/or rethoracotomy for bleeding	12 (7.2%)	7 (8.5%)	3 (6.8%)	2 (4.9%)
Periprocedural MI	2 (1.2%)	1 (1.2%)	1 (2.3%)	0 (0.0%)
Respiratory failure	7 (4.2%)	2 (2.4%)	1 (2.3%)	1 (2.4%)
Prolonged ICU stay	3 (1.8%)	1 (1.2%)	2 (4.5%)	0 (0.0%)
Neurologic complications	5 (3.0%)	2 (2.4%)	2 (4.5%)	1 (2.4%)
Pulmonary embolism	1 (0.6%)	1 (1.2%)	0 (0.0%)	0 (0.0%)
Multiogran failure	3 (1.8%)	2 (2.4%)	1 (2.3%)	0 (0.0%)
Gastrointestinal complications	3 (1.8%)	1 (1.2%)	1 (2.3%)	1 (2.4%)
Acute kidney failure	8 (4.8%)	4 (4.9%)	3 (6.8%)	1 (2.4%)
Sternal wound infection	2 (1.2%)	0 (0.0%)	2 (4.5%)	0 (0.0%)
ECMO	3 (1.8%)	1 (1.2%)	2 (4.5%)	0 (0.0%)
VAD	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)

Table 2. Postoperative data

CONCLUSIONS: The study proved that minimally invasive aortic surgery performed through "V" shaped partial upper sternotomy is feasible and safe in selected patients regardless of the extent of repair, from supracoronary aorta replacements to complex root repairs.

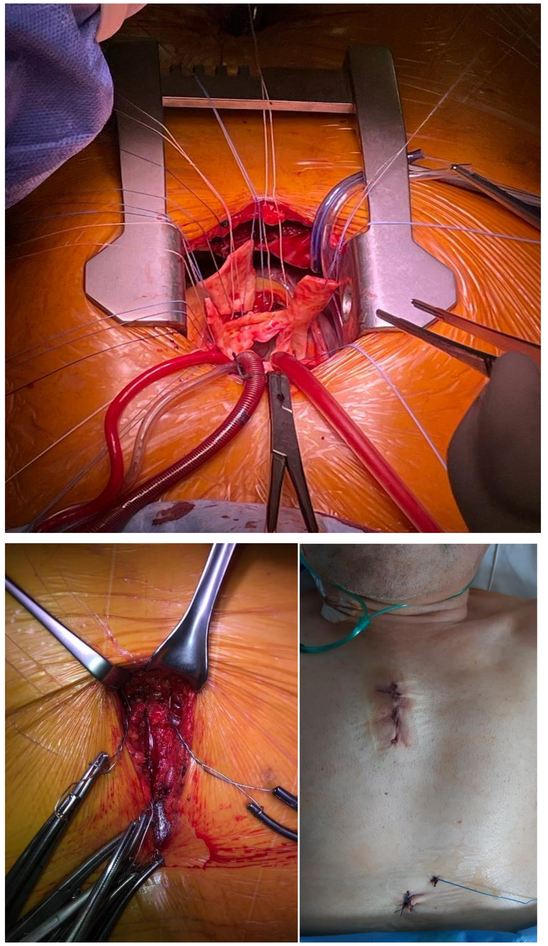


Figure 1. Intra and postoperative view.