Minimally Invasive Tricuspid Valve Surgery Following Previous Cardiac Surgery

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Background: The surgical management of tricuspid valve replacement after previous cardiac surgery is associated with increased mortality and morbidity. New methods of percutaneous and minimally invasive approaches are not widely accepted. The aim of the study was to evaluate short and midterm results of minimally invasive tricuspid valve surgery in high risk patients.

Methods: 44 patients who between November 2008 and December 2019 were operated for severe tricuspid regurgitation, following previous cardiac surgery were retrospectively analysed. Mean age of the patients was 66.9±8.18 years, 37 were female. All patients had previous cardiac operations 36 mitral, 6 mitral and aortic, 2 aortic and 3 coronary surgery. 39 patients underwent mitral valve repair and 5 replacement. Average preoperative NYHA functional class was 3.03±0.50, 36 had persistent and 4 paroxysmal atrial fibrillation. The operation was performed via right minithoracotomy with peripheral cannulation on beating heart without cardioplegia in majority of cases.

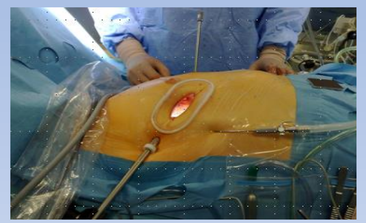
Table 1. Preoperative data

\	Patients n=44
Age (yars)	66.9±8.18
Reoperation	100%
Female sex	86%
Mean preoperative NYHA	3.05±0.49
Logistic Euroscore II	11.4±11.41
Atrial Fibrillation (FAC/FAC)	93.2% (84.1/9.1)
Hypertension	68.0%
Renal failure (HD)	16%
COPD	14.0%
Diabetes mellitus	14.0%
Pulmonary hypertension	43.2
Pacemaker preoperative	31.8%
Cerebrovascular event	18.0%

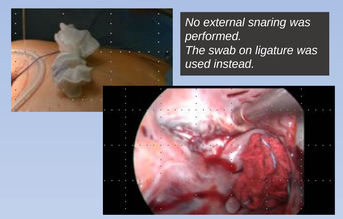
Initial procedure	Patients n=44
AVR	2
AVR/AVPl + MVR/MVPl	6
AVR + TVPl (de Vega)	1
CABG	3
MVR/MVPl	27
TVR/TVPl	2
MVR + TVPl	3

Operative procedure : The right minithoracotomy was used in all cases (Picture 1 & 2). The right femoral & jugular vein was used for venous drainage and femoral artery for arterial return under TEE guidance (Picture 3 & 4).

Picture 1. Operative setup

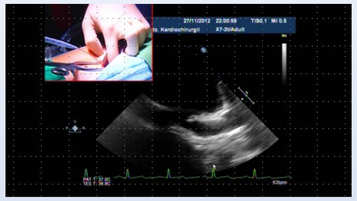


Picture 2. SVC & IVC snaring



Operative procedure: Beating heart surgery was used except for one patient, that required simultaneous closure of perivalvular leak following mitral valve replacement in the past Mild hypotehrmia was used - 34ºC. Venous drainage is augmented with vacuum assistance applying negative pressures of 35 to 70 mmHg as needed.

Picture 3. Venous cannulation



Picture 4. Arterial cannulation

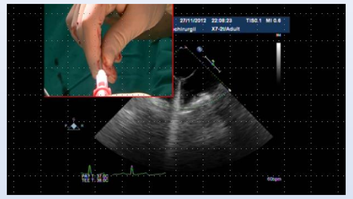


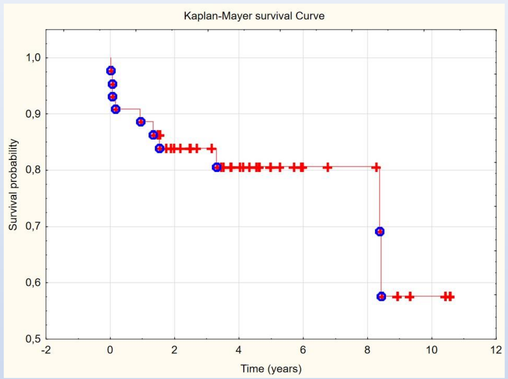
Table 2. Perioperative data

Variable	Patients n=44
Cardiopulmonary bypass time (min)	67.4±41.0
Cross clamp time (min)	0
Minimally invasive access (%)	100%
Replacement (%)	13.6
Repair (%)	86.4
Prosthetic ring size (CE MC3)/Valve size (CE Perimount)	29.4±0.02/29.8±004
TVRepair: GoreTex artifitial cords 2, Alfieri 3, Leaflet patch enlargement 3	
Reoperation for bleeding (%)	9.1%
Postoperative drainage (ml)	832.0±739.36
Transfusion RBC (units)	2.7±3.35
Transfusion FFP (units)	2.5±3.81
Transfusion Cryoprecipitate (US units)	2.1±5.08
Transfusion Platelets (US units)	1.7±4.77
Ventilation time (hrs)	12,0±198.2
ITU stay (days)	3.0±9.43
Hospital stay (days)	13.7±13.10
30-day mortality	4.5%

Picture 5. Pre & postoperative ECHO pictures



Picture 6. Long term survival



Results: 30-day mortality was 4.5%, including one patient that developed stroke and eventually died, with 81% survival probablity at 5 years, 4 patients were reopened for bleeding, 1 patient required new pacemaker implantation, 2 developed lymphocele. Average follow up was 4.2±2.99 years. The average NYHA functional class post operatively was 1.7±0.78. 19 patients were off diuretics following operation, as oppose to all on diuretics preoperatively. During follow up 10 (22.7%) patients died.

Postoperative tricuspid regurgitation decreased significantly. Vena contracta decreased from 10.9±4.71 to 3.8±0.96 and PISA from 12.7±4.12 to 4.3±1.17.

Conclusions: Minimally invasive tricuspid valve operation following previous cardiac surgery is feasible and safe, with law mortality and morbidity. The long term results are less satisfactory due to end stage heart failure upon referral. In view of law operative mortality earlier referral for tricuspid valve surgery should be advocated.