

Short-term Follow-up After Epicardial Left Atrial Appendage Clip Occlusion Via The Anterior Pathway During Minimally-invasiv Cardiac – “Nordpass Maneuver”

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OBJECTIVES Epicardial left atrial appendage occlusion (LAAO) through the transverse sinus using a clip placement can pose technical challenges in minimally invasive cardiac surgery via a right anterolateral minithoracotomy (MICS). This case series aimed to assess the short-term safety outcomes of a new endoscopic anterior pathway for epicardial LAAO during MICS, known as the "Nordpass."

METHOD: All patients undergoing MICS with concomitant LAAO utilizing an epicardial clip device (AtriClip Pro 1 or 2, AtriCure, Dayton, OH, USA) were included between January 2022 and May 2024. Perioperative data were collected retrospectively and analyzed.

RESULTS: This case series comprised 36 patients (median age: 63, interquartile range (IQR); 57, 709), with 17 of them being male. Preoperative left ventricular function was 58% (IQR: 50, 60), and EuroScore II was 1.8% (IQR: 1.1, 2.9).

All patients underwent echo-guided LAAO clip placement on the beating heart under cardiopulmonary bypass support. The "Nordpass" technique was successfully applied in 35 out of 36 patients.

In addition to LAAO, mitral valve reconstruction was performed in 26 patients, mitral valve replacement in 5 patients, and tricuspid valve reconstruction or replacement in 7 patients (two isolated cases and five in combination with other procedures), with 21 patients receiving additional cryoablation. One patient each underwent tricuspid valve replacement, removal of right atrial thrombus, and atrial septal defect (ASD) occluder removal with ASD patch closure as reoperation. Two patients had endocarditis as their primary diagnosis.

Intraoperative transesophageal echocardiographic monitoring demonstrated successful LAA closure in all cases where a clip was applied. There were no conversions to sternotomy, no reoperations due to bleeding, one postoperative stroke, no myocardial infarctions, and no in-hospital deaths.

The average length of hospital stay was 10 days (IQR: 8, 16), with one patient passing away during follow-up.

Table 1 – 3 presents the perioperative.

Conclusion: These findings suggest that the anterior endoscopic pathway may represent a safe and effective technique for epicardial LAAO during MICS via a right anterolateral mini-thoracotomy.

TABLE 1. Preoperative patients characteristics

Variable (n=35)	Number of patients or median (1st quartile, 3rd quartile)
Age, years	63 (57, 70)
Body mass index, kg/m²	27 (23.2, 32.6)
Left ventricular ejection fraction, %	58 (50, 60)
Creatinin, µmol/l	82 (70, 113)
EuroScore II	1,8 (1.1, 3.9)
Male	17
Diabetes mellitus	7
Hypertension	21
Coronary artery diseases	4
Pulmonary artery pressure ≥ 60 mmHg	4
Nicotine abuse	6
Hyperlipidaemia	11
Chronic obstructive pulmonary disease	1
Peripheral artery disease	0
Peroperative dialysis	2
Sinus rhythm	16
NYHA stage ≥ III	10
Prior myocardial infarction	1
Prior cerebrovascular accident	4

EuroSCORE, European System for cardiac Operative Risk Evaluation; NYHA, New York Heart Association functional classification for congestive heart failure

TABLE 2. Procedural details

Variable (n=35)	Number of patients or median (1st quartile, 3rd quartile)
Length of surgery, minutes	255 (234, 280)
Cross clamp time, minutes	112 (100, 129)
Beating heart LAAO	35
LAAO clip size	
40 mm	6
45 mm	14
Successful "Nordpass" manoeuvre	35
Surgery performed	
Mitral valve repair	26
Mitral valve replacement	5
Tricuspid valve repair	7
Tricuspid valve replacement	1
Atrial septal defect closure	2
Right atrial thrombectomy	1
Ablation for atrial fibrillation	21
Conversion to sternotomy	0

LAAO, left atrial appendage occlusion

TABLE 3. Postoperative Clinical Outcomes and Complications

Variable (n=35)	Number of patients or median (1st quartile, 3rd quartile)
New hemodialysis	3
Cardiac arrhythmias	19
Intracardial thrombus	0
Myocardial infarction	0
Cardiopulmonary resuscitation	0
Low cardiac output	2
Reoperation for bleeding	1
Cerebrovascular accident	1
Postoperative cognitive dysfunction	4
Sepsis	1
Red blood cells, units	20 (0, 4)
Platelets, units	7
Fresh frozen plasma, units	4
Pneumonia	14
Respiratory failure	2
Reintubation	1
Trachostomy	1
New pacemaker	1
Total length of stay intensive care unit, days	4 (2, 5)
Total length of stay in hospital, days	10 (8, 16)
Inhospital mortality	0
Readmission	8
Death during Follow-up	1
Overall mortality	2

