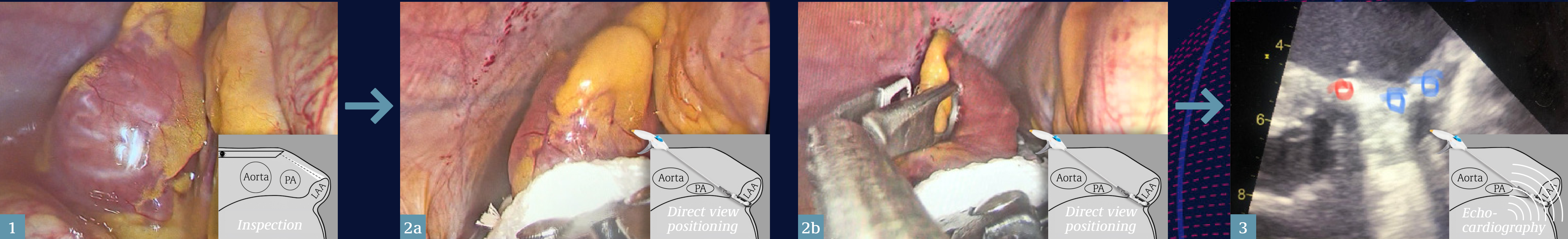


Anterior pathway for epicardial left atrial appendage clip occlusion during minimally-invasive cardiac surgery:

A SINGLE-CENTER CASE SERIES

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OBJECTIVES: Epicardial left atrial appendage occlusion (LAAO) by placing a clip through the transverse sinus can be technically challenging during minimally-invasive cardiac surgery via a right anterolateral mini-thoracotomy (MICS). This case series aimed to test the feasibility of the new endoscopic anterior pathway for epicardial LAAO during MICS called the „Nordpass“.

METHOD: All patients with MICS with concomitant LAAO using an epicardial clip device (AtriClip Pro 1, AtriCure, Dayton, OH, USA) between January 2022 and November 2022 were included. The preoperative, intraoperative, and postoperative data were retrospectively collected and analyzed.

SURGICAL TECHNIQUE: Minimally invasive cardiac surgery for atrioventricular valves was performed in the usual manner. The „Nordpass“ was performed in all patients before cardioplegic arrest as follows. Opening the pericardium and carefully inserting the endoscope, passing it from the right lateral to the left ventral side toward the left shoulder (Fig. 1). Compressing the beating heart and/or the great arteries (in rare cases, the aorta) gently dorsally with the suction device, resulting in precise exposure

of the LAA. In case of complex visualization of the anatomical structures, placement of a rubber band through the transverse sinus and gently pull posteriorly. LAAO clip sizing. Passing the pre-bent (approximately 30 degrees to the right) and opened LAAO clip device (AtriClip Pro 1 or AtriClip Pro 2, AtriCure, Dayton, OH, USA) over the LAA apex – passive working of the LAA into the clip (Fig. 2a, 2b). The beating heart’s volume load helps the LAA work its way into the clip with minimal passive support. Closing the clip. Verification of the clip placement by transesophageal echocardiography and Doppler of the circumflex artery (Fig. 3). Due to an unsatisfactory result, the LAAO clip can be repositioned a maximum of five times. Release the clip under continuous downward pressure to secure the position of the clip.

RESULTS: Table 1 – 3 presents the perioperative.

CONCLUSIONS: This suggests that the anterior endoscopic pathway may be a safe and effective technique for epicardial LAAO during MICS via a right anterolateral mini-thoracotomy.

TABLE 1. Preoperative patients characteristics

Variable (n=13)	Number of patients or median (1st quartile, 3rd quartile)
Age, years	64 (51, 65)
Body mass index, kg/m ²	28.3 (22.2, 34.6)
Left ventricular ejection fraction, %	55 (50, 60)
Creatinin, µmol/l	86 (71, 183)
EuroScore II	2.7 (1.9, 3.6)
Male	7
Diabetes mellitus	3
Hypertension	8
Coronary artery diseases	1
Pulmonary artery pressure ≥ 60 mmHg	1
Nicotine abuse	5
Hyperlipidaemia	5
Chronic obstructive pulmonary disease	1
Peripheral artery disease	0
Peroperative dialysis	2
Sinus rhythm	4
NYHA stage ≥ III	10
Prior myocardial infarction	1
Prior cerebrovascular accident	2

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=13)	Number of patients or median (1st quartile, 3rd quartile)
Length of surgery, minutes	240 (210, 253)
Cross clamp time, minutes	93 (73, 114)
Beating heart LAAO	13
LAAO clip size	
40 mm	3
45 mm	10
Successful “Nordpass” manoeuvre	13
Surgery performed	
Mitral valve repair	7
Mitral valve replacement	2
Tricuspid valve repair	3
Tricuspid valve replacement	1
Atrial septal defect closure	1
Right atrial thrombectomy	1
Ablation for atrial fibrillation	5
Conversion to sternotomy	0

LAAO, left atrial appendage occlusion

TABLE 3. Postoperative Clinical Outcomes and Complications

Variable (n=13)	Number of patients or median (1st quartile, 3rd quartile)
New hemodialysis	2
Cardiac arrhythmias	6
Intracardial thrombus	0
Myocardial infarction	0
Cardiopulmonary resuscitation	0
Low cardiac output	1
Reoperation for bleeding	0
Cerebrovascular accident	0
Postoperative cognitive dysfunction	2
Sepsis	1
Red blood cells, units	2 (0, 4)
Platelets, units	0
Fresh frozen plasma, units	0
Pneumonia	1
Respiratory failure	2
Reintubation	1
Tracheostomy	1
New pacemaker	0
Total length of stay intensive care unit, days	4 (2, 6)
Total length of stay in hospital, days	9 (8, 16)
Inhospital mortality	0
Overall mortality	1