


The Convergent Ablation and AtriClip Exclusion of the Left Atrial Appendage in Long-Standing Persistent Atrial Fibrillation

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ABSTRACT: We here present a case of a 54-year-old man with longstanding persistent atrial fibrillation refractory to direct current electrical cardioversion who underwent a concurrent convergent ablation and AtriClip exclusion of left atrial appendage. His preoperative echocardiography revealed dilated 5.8 cm left atrium with a normal left ventricular ejection fraction of 50%. Transmural isolation of pulmonary veins was performed through a subxiphoid approach, and 3 left-sided video-assisted thoracoscopic surgery ports were utilised to occlude the base of the left atrium appendage with the AtriClip device. A peri-operative transoesophageal echocardiogram confirmed left atrium appendage base occlusion, and the patient was in sinus rhythm after having a single 200 kJ direct current cardioversion shock. The postoperative period was uneventful, and the patient was discharged with preprocedural anticoagulant after 24 hours of the procedure and advised to come for follow up after 3 months.

KEYWORDS: Persistent atrial fibrillation, arrhythmia, hybrid ablation, AtriClip device

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Introduction

Atrial fibrillation (AF) is the most widely recognised cardiovascular arrhythmia related to expanded morbidity and mortality commonly caused by stroke or the intensification of heart failure. Atrial fibrillations are very disparate in the fundamental pathophysiology and responsiveness to the treatment modalities.^{1,2} Over the decade's new non-pharmacological treatment modalities acquainted with accomplishing left atrium (LA) appendage exclusion as well as electrical isolation without significant adverse effects. Isolation and exclusion of the left atrial appendage is a reasonable option in contrast to anticoagulation therapy to lessen the rate of ischaemic strokes identified with atrial fibrillation.²⁻⁴

In 2009, the AtriClip device first acquired an administrative CE mark, and since then, several different generations have been added.^{2,5,6} Nowadays, intraoperative TOE (Transoesophageal echocardiography) guided Video-assisted thoracoscopic surgery (VATS) assisted LA appendage exclusion utilising the AtriClip Pro 2 and V device allows consistent and complete exclusion because of direct visualisation of the LA appendage and surrounding structures.^{7,8} The viability of the AtriClip identifies with its capacity to support a high impediment pressure that is flawlessly circulated along the whole base of the LA appendage when contrasted with stapling, stitching, or ligation.⁸⁻¹⁰ The AtriClip device is safe and easy to use, and anticoagulation therapy might be suspended immediately, whenever required.¹¹⁻¹⁴ We present a case of persistent atrial fibrillation (PersAF) refractory to cardioversion and pharmacological therapy, which was successfully treated with hybrid convergent ablation and AtriClip LA appendage exclusion.

Case Report

A 54-year-old man presented with a history of long-standing persistent atrial fibrillation (PersAF) and has been treated with Beta-blocker and Apixaban for the last 8 years. He also had a history of failed DC cardioversion 2 times since 2018. Preoperative echocardiography demonstrated 5.8 cm dilated LA, no intracardiac thrombus and good left ventricular function (Ejection fraction 50%). Based on the multi-disciplinary team (MDT) decision, the patient has undergone convergent subxiphoid epicardial ablation on the beating heart without cardiopulmonary bypass and AtriClip exclusion of LA appendage plus a single 200 kJ direct current (DC) cardioversion. The MDT rationale for the hybrid programme was that the LA size (5.8 cm) and endocardial ablation outcome in long-standing PersAF with this LA size were poor. The patient's informed written consent was obtained; patient confidentiality and data were protected and encrypted.

Under general anaesthesia, a 2 cm midline subxiphoid incision was made, the xyphoid was preserved and raised to allow entry into the pericardium. A 5 mm pericardioscope was utilised to investigate the pericardium cavity outwardly. The coronary sinus and inferior pulmonary veins were identified, and sequential superior and inferior transmural ablation was performed across the back left atrium. A total of 32 points of ablation were performed utilising the 3 cm ablation catheter and 30W RF energy for 90 seconds at each point. Moreover, the baseline temperature (36°C) was monitored with an oesophageal probe throughout the procedure. If the temperature increased by 1°C more than baseline, ablation was stopped to allow deaeration and waited until temperatures returned to baseline.



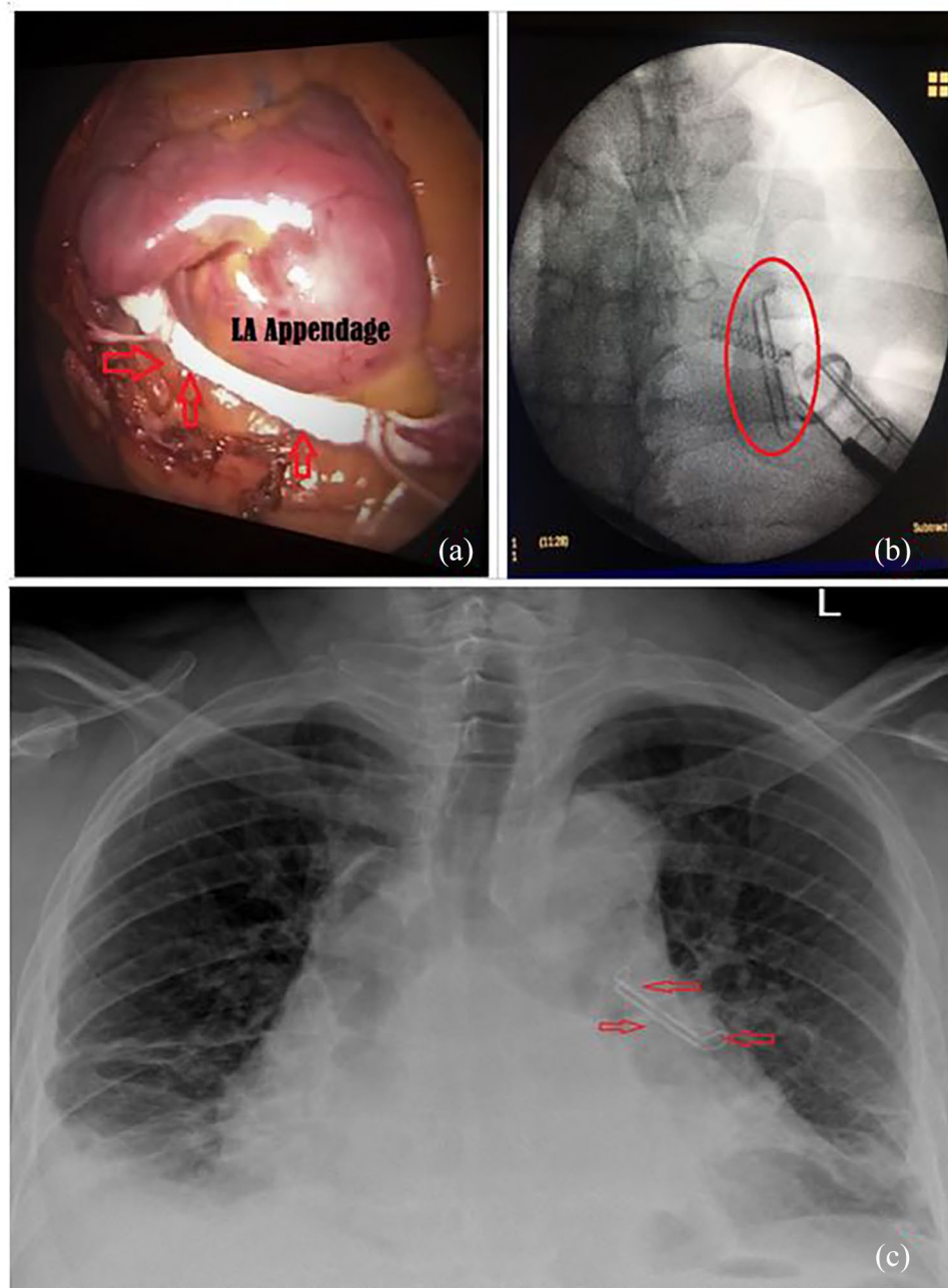


Figure 1. (a) Per-operative images illustrate AtriClip (Red arrow) exclusion of base of the LA Appendage, (b) C-arm guided intraoperative image of AtriClip (Red circle), and (c) postoperative Chest X-ray on Day-1 showing AtriClip (Red arrow) with Normal radiological findings.

Each area had multiple ablations until macroscopically the area was discoloured.

Following pulmonary vein (PV) isolation, 3 left VATS ports (5 mm port in the second intercostal space (ICS), 5 mm port in the mid-axillary line at fourth ICS, and 12 mm port in the sixth ICS in the posterior axillary) line were performed. A double lumen endotracheal tube was placed prior to the beginning of the case. The left lung was deflated, and the pericardium was opened parallel and below the phrenic nerve. The LA appendage was envisioned and measured, and a 35 mm pro-2 AtriClip device were deployed through the lower 12 mm port around the base of the LA appendage. The patient was in

sinus rhythm towards the finish of the hybrid procedure after having a single DC cardioversion shock at 200 kJ. The post-procedural period was uneventful, and the patient was discharged on the first postoperative day with satisfactory biochemical, chest X-ray and echocardiography findings (Figure 1). Postprocedural medication includes Edoxaban, oral Lansoprazole and the patient was advised to come for follow-up in the Electrophysiology clinic after 3 months. The anticoagulant Edoxaban was prescribed as per the Electrophysiology Consultant Cardiologist opinion and on an individual basis dependent upon CHA_2DS_2VASC score. Though the patient was on a beta-blocker preoperatively, we

did not need to restart his beta-blocker postoperatively as the patient was in sinus rhythm and heart rate was 68 beats per minute (regular) till following up at 6 months. Follow-up echocardiography at 6 months was also satisfactory with good biventricular function, and we endeavour to evaluate the patient with a formal Holter monitoring at 1 year postoperatively.

Discussion

The LA appendage is a common source of clots development in atrial fibrillation, and approximately 90% of thromboembolic strokes are thought to emerge from the LA appendage in patients with AF.^{4,7-10} In a recent LAAOS (Left Atrial Appendage Occlusion Study) III, Whitlock et al¹¹ has conclusively provided the evidence of LA management in AF and observed the risk of ischaemic stroke or systemic embolism was lower with combined therapy of LA appendage occlusion and warfarin than warfarin alone. There have been other studies both in pharmacological and surgical modalities of diminishing the risk of ischaemic thromboembolic stroke in AF and found that the occlusion of the LA appendage might be more secure and proficient than warfarin in avoidance of ischaemic stroke.^{5-8,12} In a recent multicentre randomised controlled Convergence of Epicardial and Endocardial Ablation for the Treatment of Symptomatic Persistent AF study (CONVERGE trial),¹² researchers evaluated the safety and efficacy of convergent in comparison to catheter ablation for long-standing persistent AF treatment. This CONVERGE trial achieved primary safety and effectiveness endpoints and observed better outcomes with a hybrid transmural ablation than a catheter-based endocardial-only ablation strategy.¹²

In a recent study, Geršak and Jan evaluated long-term efficacy outcomes for the convergent procedure and observed promising study results which demonstrated the ability to maintain sinus rhythm in a persistent and longstanding AF patients.¹³ The Atriclip conveys the hypothetical advantages of safe and expeditious electrical isolation of the LA appendage, debulking of the enlarged LA with ablation and subsequent fibrosis and shrinking of the LA, decreased surgical bleeding risk compared to cut and saw surgical Maze operation, and avoidance of post-procedural anticoagulation therapy.¹⁰⁻¹⁵ This strategy provides multiple advantages, including diminishing thromboembolic risk and the recurrence of AF because the Atricure clip at the base of the LA appendage is electrically silent, which renders the LA appendage electrically silent terminating any signals from this area. However, recurrence of AF cannot be entirely prohibited as this is predominantly connected with pulmonary vein reconnection.^{8-12,15} In a study, Mahapatra et al demonstrated approximately two-thirds percentage of atrial arrhythmia free survival rates in hybrid ablation, which was significantly higher than the cryoablation population.¹⁶ However, few authors also observed higher recurrence rates of AF in traditional hybrid ablation, and the most acceptable clarification of their disappointment is that

they utilised a unipolar RF ablator and synchronous endocardial and epicardial ablation techniques.¹⁴⁻¹⁷ A few published data observed that a bipolar ablator device is more effective in producing transmural lesions and electrical isolation of the LA appendage tissue, hence providing better outcome.¹⁵⁻¹⁸

Recently, several small studies observed that hybrid ablation with the exclusion of LA appendage provides improved outcome, and progress rates revealed up to about 90% in PersAF patients with a dilated LA or who had a failed catheter ablation.¹²⁻¹⁵ Although this hybrid approach improves arrhythmia outcomes, significant impediments, including effective treatment of transmural injuries, cannot be ensured, and endocardial ablation, especially mitral isthmus, cannot be performed.^{5,16-20} In the absence of studies in the literature of randomised controlled study powered sufficiently, our clinical experience favours the benefits of the convergent ablation and Atriclip exclusion of LA appendage in long-standing PersAF cases. However, despite the good clinical outcome, some rare complications like phrenic nerve palsy (~1%), atrio-oesophageal fistula (<1%), cardiac tamponade (~1%), stroke (<1%), pericardial effusion (1-2%), pleural effusion (<1%), severe pericarditis (~5%) and prolong hospital stay following convergent ablation and exclusion of LAA need to be acknowledged.^{21,22} A recent randomised aMAZE trial showed that concurrent LA appendage exclusion and PVI were not superior to PVI alone at preventing arrhythmia recurrence, which researchers believe is due to potential bias in enrolment of the majority of early persistent AF patients and need further evaluation to confirm the aMAZE trial findings.²³ Also, the current case report is based on short-term clinical outcomes, which we believe is a limitation of the case report and needs long-term follow-up to observe post-procedural prognostic outcomes, especially arrhythmia-free survival rate.

Conclusion

The concurrent convergent ablation to isolate the bilateral pulmonary veins, posterior left atrium and the Atriclip exclusion of the LA appendage appear to be a safe, easily reproducible, feasible and effective minimally invasive procedure in long-standing persistent AF. However, randomised control trials with large samples are required to confirm our findings and evaluate the safety, efficacy and long-term outcome of convergent ablation with LAA exclusion among long-standing PersAF patients.

Author Contributions

RR, AM - Conceptualization, Data Curation, Methodology & Writing- Original Draft Preparation, Review and Editing Manuscript. RK, VC - Conceptualization, Supervision, Writing- Review and Editing Manuscript. All authors have read and approved the final version of the manuscript.

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