Thoracoscopic Appendage Exclusion With an Atriclip Device As a Solo Treatment for Focal Atrial Tachycardia

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A 15-year-old boy with incessant drug-refractory atrial tachycardia was referred to our department for an ablation procedure. The tachycardia was diagnosed at 13 years of age during routine medical screening for soccer competition. Despite the administration of metoprolol, verapamil, and flecaïnine, the arrhythmia persisted and ventricular response was not controlled. Physical examination was normal except for a heart rate of 130 bpm; no signs of congestive heart failure were found.

Blood examinations revealed normal thyroid function. Twelve-lead ECG showed a narrow QRS tachycardia with positive P waves in II-III-aVF-V1-V2 leads, negative P waves in I-aVL leads, and a short PR interval (Figure 1), suggesting a left atrial origin.1,2 Transthoracic echocardiography showed normal left ventricular size with normal systolic function and normal atrial volumes.

During electrophysiological study, the earliest atrial activation during tachycardia was located on the distal bipole of the coronary sinus catheter, confirming a lateral left atrial origin.1–3 Left atrial access was obtained by transseptal approach with a Brockenbrough needle. Electroanatomic mapping, performed with the CARTO 3 mapping system (Biosense-Webster Diamond Bar, CA), showed a normal left atrial morphology and an eccentric atrial activation from the distal portion of the left atrial appendage (Figure 2).1–3

Radiofrequency was delivered at the site where the earliest local electrogram preceded atrial activation on the distal coronary sinus by 48 milliseconds. However, tachycardia relapsed despite 2 percutaneous ablation attempts (Figure 3).

To eliminate the arrhythmia, epicardial exclusion of the appendage with a minimally invasive occlusion device (Atriclip, AtriCure Inc) was decided. The clip is composed of 2 parallel, straight, rigid titanium tubes covered with a knit-braided polyester sheath. It is designed to be implanted from outside the heart through a thoracoscopic approach.4

In January 2010, the patient underwent the thoracoscopic procedure under general anesthesia with dual-lumen intubation. Three ports were positioned: 1 (5 mm) in the third intercostal space, 1 (10 mm) in the sixth space at the median axillary level, and 1 (10 mm) in the fifth space on the posterior axillary line. Pericardiotomy was performed parallel and posterior to the phrenic pedicle to expose the left atrial appendage and the triangle of Koch. The appendage was retrieved with a forceps, and the AtriClip was deployed. The occlusion was effective and the tachycardia was no longer inducible.

Figure 1. Twelve-lead ECG showed a narrow QRS tachycardia with positive P waves in II-III-aVF-V1-V2 leads, negative P waves in I-aVL leads, and a short PR interval, suggesting a left atrial origin.
appendage. The Marshall ligament was interrupted with diathermy. Through the inferior port (enlarged to 3 cm), a 35-mm clip was deployed with immediate interruption of the arrhythmia (Figure 4). Electric conduction from the excluded left atrial appendage, as assessed by pacing at 20 mA with a bipolar surgical stimulator (Affirm, Estech Inc), was lost seconds after clip deployment.

After an uneventful postoperative course, the patient was discharged on day 5 in sinus rhythm with no medical treatment. One month after the procedure, a computed tomographic scan and echocardiogram showed correct and stable positioning of the Atriclip with no residual flow distal to the clip (Figures 5 and 6). Twenty-four-hour Holter monitoring performed at 1, 3, and 6 months showed stable sinus rhythm with a mean heart rate of 70 bpm and without a single premature beat. The patient is asymptomatic and has now resumed his soccer training.

To the best of our knowledge, this is the first case of appendage clip implantation as a solo procedure.

Disclosures
Dr Benussi has a financial relationship with St. Jude Medical Inc., AtriCure Inc., Medtronic Inc., CryoCath Inc., and Edwards LifeSciences Inc. The other authors report no conflicts.

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References
Figure 4. Left atrial appendage clip closure and consequent immediate interruption of tachycardic beats.

Figure 5. A, Preoperative computed tomographic scan control. B, One-month computed tomographic scan monitoring shows the positioning of the Atriclip and exclusion of the left appendage.
Figure 6. One-month echocardiogram control. No residual flow was detected through the left atrial appendage (Au).
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