The Heart Surgery Forum #2005-1006
8 (3), 2005 [Epub April 2005]
doi:10.1532/HSF98.20051006

Online address: http://cardenjennings.metapress.com/link.asp?id=112496

Surgical Treatment of Lone Atrial Fibrillation in an Awake Patient

Gianluigi Bisleri MD,[1] Tomaso Bottio MD, PhD,[1] Aldo Manzato MD,[2] Claudio Muneretto MD[1]

[1]Division of Cardiac Surgery, University of Brescia Medical School, [2]Section of Cardiothoracic Anesthesia, Spedali Civili di Brescia, Brescia, Italy

ABSTRACT

Surgical treatment of atrial fibrillation recently gained new popularity since the introduction of different energy sources and the development of minimally invasive techniques as an alternative to the original "cut-and-sew" technique. However, closed-chest ablation procedures are not feasible in presence of pericardial or pleural adhesions. To our knowledge, this is the first report of surgical treatment of atrial fibrillation in a conscious patient by means of a high epidural anesthesia. Since evidence of fibrothorax was found, a conscious patient suffering from lone atrial fibrillation underwent a beating-heart pulmonary veins isolation with a microwave device through a standard sternotomic approach. At 6 months follow-up, the patient is in stable sinus rhythm, without any palpitation nor electrocardiographic evidence (Holter monitoring) of recurrent atrial fibrillation.

INTRODUCTION

Since its introduction in 1989 by Cox and colleagues [Cox 1989], surgical treatment of atrial fibrillation experienced a new dawn during the past few years, thanks mainly to the introduction of various energy sources and lesion sets that simplified the complex original "maze" technique. Further technical development allowed a minimally invasive closed-chest approach in patients suffering from lone atrial fibrillation [Argenziano 2003, Bisleri 2005, Saltman 2003].

Recently, an innovative anesthesiological approach has been introduced in cardiac surgery [Aybek 2003, Karagoz 2003]: by means of high-thoracic epidural analgesia alone, a cardiac operation can be performed on the conscious patient, without general anesthesia and endotracheal intubation. Our aim was, therefore, to assess the feasibility of a beating-heart epicardial pulmonary veins isolation under epidural anesthesia in a patient with lone atrial fibrillation and fibrothorax, in whom a closed-chest surgical approach was not feasible.

CASE REPORT

A 78-year-old male patient had been on permanent atrial fibrillation for almost ten years despite antiarrhythmic therapy with propafenone. At the age of 30, the patient underwent a procedure of therapeutical pneumothorax due to tuberculosis. The patient had been smoking for the past 40 years (more than 10 cigarettes/day). Once admitted in our division, the patient underwent routine preoperative assessments: the functional respiratory test revealed a moderate impairment of the lung function, due to the presence of obstructive disease at the level of the small airways. A multislice CT scan of the thorax depicted the presence of retractions of the right emithorax with evidence of fibrothorax and calcific plaques on the anterior and posterior thoracic wall, a common ostium for the right pulmonary veins, two separate ostia for the left pulmonary veins and a left atrial appendage free of thrombi. The transthoracic echo evidenced a moderately enlarged left atrium (antero-posterior diameter= 50 mm) with a normal left ventricular ejection fraction (>55%).

Since closed-chest surgical treatment of atrial fibrillation was not recommended due to the presence of pleural adhesions, the patient was considered eligible for a beating-heart epicardial ablation of the pulmonary veins with epidural anesthesia and spontaneous ventilation. After a catheter was inserted at the level of T1–T2 and advanced into the epidural space, a bolus of 2% lidocaine (3 mL), 0.475% naropine (14 mL) plus sufentanil (25 μg) was administered. Following median sternotomy and pericardial opening, a careful dissection between the right superior pulmonary vein and the superior vena cava was carried out first; then, the pericardial reflection between the right inferior pulmonary vein and the inferior vena cava was opened. The Flex 10 microwave ablation probe (Figure 1) (Guidant, Fresno, CA, USA) was positioned in a standard loop fashion around the four pulmonary veins in order to obtain a "box" lesion set (Figure 2), as previously described [Bisleri 2005]. The correct positioning of the Flex 10 was carefully assessed, especially with respect to its orientation (by visualizing the black markers of the probe)

Received February 13, 2005; received in revised form March 25, 2005; accepted March 28, 2005.

Address correspondence and reprint requests to: Gianluigi Bisleri, MD, UDA Cardiochirurgia – Spedali Civili, P.le Spedali Civili, 1 25123 Brescia Italy; 39-030-3996401; fax: 39-030-3996096 (e-mail: gianluigi_bisleri@katamail.com).

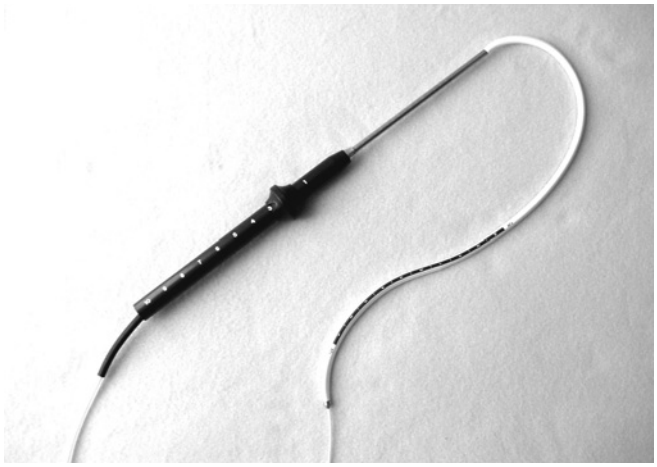

Figure 1. The Flex 10 Microwave Ablation Probe is shown: the probe has an unilateral energy delivery opposite to the black markers. The position of the microwave antenna into the flexible sheath is regulated through the sliding ring in the handle.

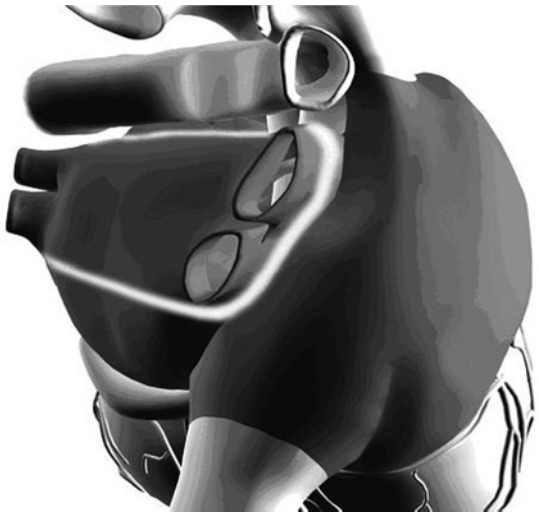

Figure 2. The "box lesion" set around the four pulmonary veins is depicted.

and its position behind the left atrial appendage, in order to avoid any damage to the circumflex artery.

The ablation was carried out using a microwave power at 65 watts and performing segmental ablations of 90 seconds each. The left atrial appendage was not excluded.

The patient was conscious and spontaneously breathing throughout the duration of the procedure and went back directly to the ward, without any postoperative stay in the intensive care unit. Postoperative analgesia was maintained by continuous infusion of 0.2% naropine (50 mL) and sufentanil (50 μg) at 3 mL/h . In the early postoperative period, the patients first received intravenous amiodarone (900 mg on the 1st , 600 mg on the 2nd, 300 mg on the 3rd postoperative day, respectively), followed by an oral intake of amiodarone of 400 mg q.d. for 1 week and then tapered to 200 mg q.d.

The postoperative course was uneventful: the patient was mobilized the day after the procedure and the chest drainage was removed on the same day. The patient was discharged home on postoperative day 5 with oral intake of amiodarone and warfarin.

At 6 months follow-up, the patient was in stable sinus rhythm, without any palpitation or electrocardiographic evidence (Holter monitoring) of recurrent atrial fibrillation: amiodarone administration was, therefore, withdrawn and since no evidence of recurrences was observed, warfarin was also withdrawn at 9 months follow-up.

DISCUSSION

Despite the tremendous efficacy of the Cox "Maze" procedure [Cox 1989], its diffusion has been mainly hampered by the technical complexity and the surgical invasiveness, making this operation unlikely to be adopted by the majority of cardiac surgeons. The introduction of innovative energy sources significantly expanded the application of the modified Maze operation even thoracoscopically [Argenziano 2003, Saltman 2003]. However, the latter technical advance requires the absence of pleural adhesions or plaques. Since our patient was suffering from lone atrial fibrillation in presence of fibrothorax and impaired lung function, a thoracoscopic epicardial ablation was not feasible and we therefore planned to perform a beating-heart ablation procedure on the awake patient through a standard sternotomy. While spontaneously breathing, the patients' pulmonary function remained unpaired and the maintenance of the epidural catheter during the first 24 postoperative hours allowed an adequate pain control in the early recovery phase.

Despite the patient being on permanent atrial fibrillation, we used a simple left-sided lesion set. In fact, an increasing evidence demonstrates that not all the lesions of original Maze procedure may be necessary for the successful treatment of atrial fibrillation, even if permanent [Cox 2003]. Different surgical experiences suggest that a strategy, mainly focused on the isolation of the pulmonary veins, either surgical [Kalil 2002] or ablative [Knaut 2004, Maessen 2002, Todd 2003] is effective in restoring the sinus rhythm in the majority of patients. A similar success rate has been reported by several electrophysiological experiences [Kottakamp 2004, Pappone 2000], mainly targeting the pulmonary veins isolation plus a few additional lines (as the connection between the right and left pulmonary veins and lesion to the mitral annulus).

Additionally, Lammers and colleagues experimentally demonstrated that the right atrium *per se* is more likely to be unable to sustain atrial fibrillation unless a considerable enlargement occurs [Lammers 1990]. Therefore, the essential left atrial lesions could be reduced only to the pulmonary veins encircling the lesion and the one across the mitral isthmus, which could not be performed in an epicardial approach with a microwave energy source as in the present case.

Finally, despite removal of the LAA being commonly advocated in the original Maze procedure, it may result in undesirable physiological sequelae (as reduced atrial compliance and capacity for atrial natriuretic factor secretion in

response to pressure and volume overload) [Al-Saady 1999, Stollberger 2003]. Moreover, a growing evidence from electrophysiological clinical experiences is the incidence of thromboembolic events that can be neglected despite the LAA not being excluded [Pappone 2003, Wong 2004]. As a consequence, we adopted a policy of LAA exclusion only in selected cases at higher risk, as in the presence of previous history of cerebrovascular accidents, severe left atrial enlargement, left ventricular dysfunction, coagulative disorders, and high levels of hematocrit.

Despite a wider experience being required for its validation, we believe that beating-heart epicardial pulmonary veins isolation on the awake patient can be safely performed whenever a closed-chest approach for surgical treatment of lone atrial fibrillation is not feasible due to the presence of pleural or pericardial adhesions. This technique may represent a tremendous advancement in the field of arrhythmia surgery by offering an innovative less invasive approach, both on the surgical and the anesthesiological side.

REFERENCES

Al-Saady NM, Obel OA, Camm AJ. 1999. Left atrial appendage: structure, function, and role in thromboembolism. Heart 82:547-55.

Argenziano M, Williams MR. 2003. Robotic atrial septal defect repair and endoscopic treatment of atrial fibrillation. Semin Thorac Cardiovasc Surg 15(2):130-40.

Aybek T, Kessler P, Dogan S, et al. 2003. Awake coronary artery bypass grafting: utopia or reality? Ann Thorac Surg 75:1165-70.

Bisleri G, Manzato A, Argenziano M, Vigilance DW, Muneretto C. 2005. Thoracoscopic epicardial pulmonary vein ablation for lone paroxysmal atrial fibrillation. Europace 7:145-8.

Cox JL. 2003. Atrial fibrillation II: Rationale for surgical treatment. J Thorac Cardiovasc Surg 126:1693-9.

Cox JL, Schuessler RB, Cain ME, et al. 1989. Surgery for atrial fibrillation. Semin Thorac Cardiovasc Surg 1:67-73.

Kalil RAK, Lima GG, Leiria TLL, et al. 2002. Simple surgical isolation of pulmonary veins for treating secondary atrial fibrillation in mitral valve disease. Ann Thorac Surg 73:1169-73.

Karagoz HY, Kurtoglu M, Bakkaloglu B, Sonmez B, Cetintas T, Bayazit K. 2003. Coronary artery bypass grafting in the awake patient: three years' experience in 137 patients. J Thorac Cardiovasc Surg125:1401-4.

Kottkamp H, Tanner H, Kobza R, et al. 2004. Time courses and quantitative analysis of atrial fibrillation episode number and duration after circular plus linear left atrial lesions. J Am Coll Cardiol 44:869 -77.

Knaut M, Tugtekin SM, Matschke K. 2004. Pulmonary vein isolation by microwave energy ablation in patients with permanent atrial fibrillation. J Card Surg 19:211-5.

Lammers WJ, Schalij MJ, Kirchhof CJ, Allessie MA. 1990. Quantification of spatial inhomogeneity in conduction and initiation of reentrant atrial arrhythmias. Am J Physiol 259:H1254-63.

Maessen JG, Nijs JF, Smeets JL, Vainer J, Mochtar B. 2002. Beating-heart surgical treatment of atrial fibrillation with microwave ablation. Ann Thorac Surg 74:S1307-11.

Pappone C, Rosanio S, Augello G, et al. 2003. Mortality, morbidity, and quality of life after circumferential pulmonary vein ablation for atrial fibrillation. J Am Coll Cardiol; 42:185-97.

Pappone C, Rosanio S, Oreto G, et al. 2000. Circumferential radiofrequency ablation of pulmonary vein ostia: a new anatomic approach for curing atrial fibrillation. Circulation 102(21):2619-28.

Saltman AE, Rosenthal LS, Francalancia NA, Lahey SJ. 2003. A completely endoscopic approach to microwave ablation for atrial fibrillation. Heart Surg Forum 6(3):38-41.

Stollberger C, Schneider B, Finsterer J. 2003. Elimination of the left atrial appendage to prevent stroke or embolism? Chest 124:2356-62.

Todd DM, Skanes AC, Guiraudon G, et al. 2003. Role of the posterior left atrium and pulmonary veins in human lone atrial fibrillation. Circulation.108:3108-14.

Wong T, Markides V, Peters NS, Davies DW. 2004. Percutaneous pulmonary vein cryoablation to treat atrial fibrillation. J Interv Card Electrophysiol 11:117-26.