# Purse-string PV Box Isolation: A Less Invasive Modefied Maze Procedure for Non-mitral Atrial

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# NO CONFLICT OF INTEREST TO DECLARE

#### **Takahiro TAGUCHI**

# **Background 1**

It has been well described that maze procedure or its modification diminished several type of atrial fibrillation (AF) *combined with mitral valve disease* with high success rate.



Sueda. Ann Thorac Surg 1997; 63: 1070-1075. Isobe. J Thorac Cardiovasc Surg 1998; 116:220-227. Bando. J Thorac Cardiovasc Surg 2002; 124:575-583. Prasad. J Thorac Cardiovasc Surg 2003; 126: 1822-1828. Bando. J Thorac Cardiovasc Surg 2005; 129: 1032-1040. Doukas. JAMA 2005; 294: 2323–2329.

✓ SR restoration (>12 M. post-OP) = 70%
✓ Total n=49 (paroxysmal 0%, persistent/permanent 100%)
✓ Monopolar RF or Cryoablation

✓ <u>Need to open left atrium</u>

(T Sueda, K Imai. Ann Thorac Surg 2005;79:521–5)



# **Background 2**

- However, the efficacy of surgical AF procedure for non-mitral AF is still little known.
- Although all types of AF combined with aortic valve disease is also a good candidate for maze, <u>it seems to</u> <u>be too invasive</u> because of its left atrial incision.

'...Cardiac surgeons are facing 2 major dilemmas when operating on patients for AVR or CABG who present for surgery with AF. <u>The first</u> is related to patient selection and whether to intervene and

surgically ablate AF.

<u>The second</u> is what type of approach and lesion set should be applied....'

(Niv Ad, et al. J Thorac Cardiovasc Surg 2012;143:936-44)

# **Background 3**

- To lesser invasion, we have developed <u>a new less invasive</u> procedure, purse-string pulmonary vein box isolation (pPVBI) using clamp type radiofrequency device, for nonmitral AF to minimize the invasion for left atrium.
- It was a modification of pulmonary vein box isolation procedure (PVBI) which has been described before.

(T Sueda, K Imai. Ann Thorac Surg 2005;79:521–5)



- From 2008, we have employed pPVBI for a part of AF with aortic valve disease.





#### **Purse-strings PVBI**

#### Background 5 <u>RA ablation</u>

To some cases (for example concomitant TAP case), we added right atrial ablation.



# Purpose

The aim of this study is to clarify the clinical outcome of <u>pPVBI which is 'closed ' procedure</u> for AF combined with aortic valve disease, comparing with the left atrial 'open' procedure

# **Methods-Objective**

- 294 AF surgery cases that was performed in our department from 1996 to the end of 2013,
- <u>26 cases</u> who received <u>aortic valve procedure</u> <u>without mitral procedure</u> were extracted retrospectively.
- All patients were received continuous monitor ECG (in hospital) and Holter ECG of every 6 month (after discharge).

### **Methods-Objective**

#### Preoperative and intraoperative characteristics of the patient group

	<b>pPVBI (closed)</b> n=16	<b>PVBI (open)</b> n=10	P value
Preoperative characteristics			
Age	$71.5 \pm 9.5$	$71.7 \pm 7.9$	0.87
Femnale	6 (37%)	6 (60%)	0.26
AS	13 (82)	7 (70)	0.85
NYHA class 3 and 4	2 (12)	1 (10)	0.66
AF duration (months)	$38.1 \pm 73.0$	$44.0 \pm 62.2$	0.42
permanent/persistent AF	5 (31)	10 (100)	0.0023 *
EF (%)	$63.1 \pm 9.9$	$55.8 \pm 13.2$	0.23
LA diameter (mm)	$44.6 \pm 11.6$	$46.7 \pm 5.1$	0.35
CTR (%)	$56.3 \pm 5.4$	$59.3 \pm 5.7$	0.18
Intraoperative factors			
other cardiac surgery			
AV plasty	2 (13)	0	0.68
Bentall	1 (6)	0	0.81
ТАР	1 (6)	2 (20)	0.66
CABG	2 (13)	1 (10)	0.66
intraoperative ablation			
LA ithmus	0	2 (20)	0.27
RA ablation	7 (44)	5 (50)	0.93
ECC time (min)	$179.0 \pm 41.2$	$190.3 \pm 82.4$	0.21
AOC time (min)	$88.7 \pm 26.8$	$122.7 \pm 51.7$	0.0145 *
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#### **Result: Overall outcome**

#### Freedom from recurrent AF:

84.6% at discharge (approx. one month) 76.9% at latest follow up  $(23.0 \pm 24.1 \text{ M})$ 

- Among all, 22 patients (84.6%) at discharge and 20 patients (76.9%) at latest follow-up had sinus rhythm (SR) without any atrial arrhythmia.
- 2 operative death (< 30 days, cardiogenic) and 3 late death (1 cardiogenic and 2 non cardiogenic).

- Significant predicting factor of recurrent AF: longer duration of AF suffering (p=0.0356)

- All other preoperative and intraoperative characteristics were not significant. AF type (paroxysmal vs non-paroxysmal) 91% vs 66.7% (p=0.33)

### Result: 'open' vs 'closed' at each AF type

at latest follow up (without any atrial arrhythmia)



# **Summary & Study limitation 1**

- Normally, we don't need left atrial cut line for nonmitral organic heart disease, therefor, the strategy for non-MVD AF is controversial.
- In comparison with old fashioned maze procedure and it's modification (including our PVBI), pursestring PVBI can be a less invasive procedure for AF combined with aortic valve disease.
- The procedure without left atrial cut line might give good effect for postoperative atrial function following maze procedure.

# **Summary & Study limitation 2**

- Although purse-string PVBI clamps only one layer of atrium in contrast to PVI method that clamps two layers, RF clamping under beating heart might be not enough for complete electrical block line because of cooling effect of blood stream.
- Because the infallibleness of electrical block line must be a key for success of anti-AF procedure.

# **Summary & Study limitation 3**

- It is still unknown if less invasive procedure is enough for persistent/permanent AF. Our data suggest that old fashioned 'LA open' procedure might be effective for non-paroxysmal AF.
- We should carefully continue this method and need a strict follow-up data.
- Moreover, we should reveal more about postoperative cardiac function, especially in atrial kick, with further investigation.

# Conclusion

- Purse-string PVBI for AF can be a less invasive procedure for AF combined with aortic valve disease.
- Our operative result was satisfactory for paroxysmal AF patients, however, for the patients with persistent/permanent AF, it was not enough.
- For those patients, reliable RF block line under cardiac arrest with atriotomy for both atrium should be needed to achieve a cure of AF.