Minimally Invasive Aortic Valve Replacement：Long-term Outcomes In 15-year Single Center Experience

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Background

・Since the 2000s, reports of minimally invasive aortic valve replacement (MIAVR) have gradually increased, however, data on the mid- to long-term outcomes of MIAVR performed via a right (antero-)lateral mini-thoracotomy remain limited.

・In recent years, the widespread use of three-dimensional endoscopy and robotic systems has facilitated the development of totally endoscopic MICS AVR.

Objective

・To evaluate the early postoperative outcomes and mid- to long-term outcomes of MIAVR performed via a right lateral thoracotomy and to assess the validity and feasibility of this surgical approach.

Patients

Study Period :

Between January 2011 and April 2026

＜**Patient Selection**＞

573 Cases undergoing MICS AVR

Exclude **39 cases** of parasternal approach

Exclude Concomitant Surgery with Aortic Replacement

Direct vision(Trans-Axillary:TAX)	**Totally Endoscopic(TE)**
170 cases	**359 cases**

＜**Endpoints**＞

・**Early Outcomes**

Perioperative Mortality

Major Adverse Cardiac Cerebrovascular Events(MACCE)

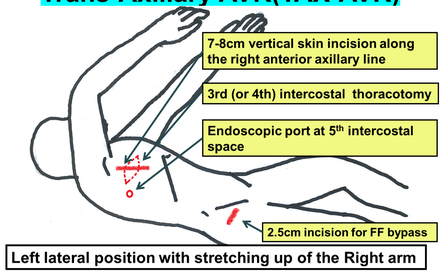
・**Mid- to Long-term Outcomes**

All Cause Mortality

Valve-related Events

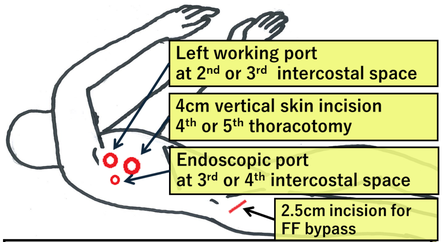
Methods

Trans-Axillary AVR(TAX-AVR)



Left lateral position with stretching up of the Right arm

Totally Endoscopic AVR(TE-AVR)



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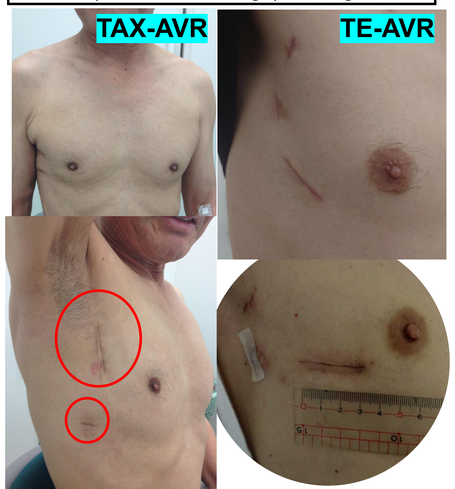


Results

＜Table 1-1. ＞ Preoperative Characteristics

Background factor	MICS AVR (n=529)	TAX-AVR (n=170)	TE-AVR (n=359)	p Value
Age(years)*	71.1±12.1	71.4±13.7	71.0±11.2	0.75
Male gender	255(48.2%)	64(37.7%)	191(53.2%)	0.001
Height(cm)*	157.1±10.2	155.3±9.8	157.9±10.3	0.005
Weight(kg)*	57.8±12.9	55.4±11.7	58.9±13.3	0.004
BMI*	23.3±4.0	22.9±3.7	23.5±4.1	0.09
BSA*	1.57±0.20	1.53±0.19	1.59±0.21	0.002
NYHA*	2.04±0.66	2.14±0.76	1.99±0.60	0.01
EF(%)*	64.0±11.8	65.8±9.4	63.1±12.6	0.01

* = mean ± SD

＜Table 1-2. ＞ Preoperative Characteristics

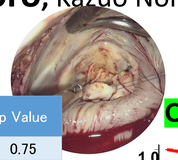
Background factor	MICS AVR (n=529)	TAX-AVR (n=170)	TE-AVR (n=359)	p Value
Hypertension	372(70.3%)	119(70.0%)	253(70.5%)	0.92
Diabetes mellitus	102(19.3%)	27(15.9%)	75(20.9%)	0.20
Hyperlipidemia	209(39.5%)	64(37.7%)	145(40.4%)	0.57
Renal failure	33(6.2%)	7(4.1%)	26(7.2%)	0.18
Smoking history	150(28.4%)	46(27.1%)	104(29.0%)	0.68
Cerebrovascular disease	27(5.1%)	14(8.2%)	13(3.6%)	0.03
Vascular disease	13(2.5%)	8(4.7%)	5(1.4%)	0.03
COPD	17(3.2%)	5(2.9%)	12(3.3%)	1.00
History of AF	84(15.9%)	25(14.7%)	59(16.4%)	0.70

＜Table 2-1. ＞ Early Clinical Outcomes

Clinical outcomes	MICS AVR (n=529)	TAX-AVR (n=170)	TE-AVR (n=359)	p Value
AS, n (%)	350(66.2%)	121(71.2%)	229(63.8%)	0.10
Annular Enlargement	20(3.8%)	7(4.1%)	13(3.6%)	0.81
Operation time(min)*	225±61	225±61	199±105	0.004
CPB time(min)*	136±36	143±41	138±96	0.46
Cross-clamp time(min)*	97±27	103±32	92±32	<0.001
Aortic valve size*	22.0±1.7	22.0±1.8	22.5±2.3	0.006
ICU Stay(days)*	1.4±1.1	1.4±1.1	1.6±1.5	0.08
Postop Hospital Stay(d)*	10.0±6.0	10.0±5.8	9.3±8.5	0.36
Blood transfusion(unit)*	2.9±4.3	2.6±4.1	3.0±6.0	0.34

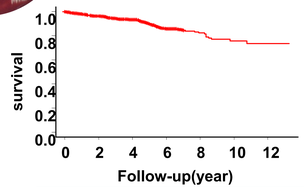
＜Table 2-2. ＞ Early Clinical Outcomes

Complications	MICS AVR (n=529)	TAX-AVR (n=170)	TE-AVR (n=359)	p Value
Hospital death	1(0.2%)	0(0.0%)	1(0.7%)	0.40
Cerebrovascular disease	7(1.3%)	3(1.8%)	4(1.1%)	1.0
Low output syndrome	3(0.6%)	0(0.0%)	3(0.8%)	0.28
Ⅲ degree AV block	4(0.8%)	2(1.2%)	2(0.6%)	0.65
Reoperation for bleeding	13(2.5%)	3(1.8%)	10(2.8%)	0.26
Reoperation for other reasons	1(0.2%)	1(0.6%)	0(0.0%)	0.40



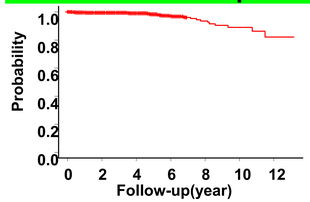
Results(Long-term)

Overall Survival



1 year	97.8%
3 year	94.1%
5 year	89.5%
8 year	82.3%
10 year	75.7%
12 year	73.5%

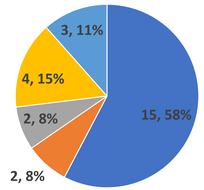
Freedom from Reoperation



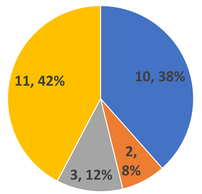
1 year	99.4%
3 year	99.4%
5 year	98.2%
8 year	93.5%
10 year	89.0%
12 year	82.1%

Mid- to Long-term	MICS AVR (n=529)
Reoperation	26(4.9%)
Age at the reoperation	27-87, (median 79)

Reason for Reoperation



Reoperative Procedure



■ SVD ■ SVD+Coronary ■ TAVI ■ Other Catheter Surgery
■ PVL ■ Other Valvular Disease ■ Redo MICS ■ Redo Sternotomy
■ Aortic Disease

Conclusion

・The early and mid- to long-term outcomes of **MICS AVR** performed **via a right anterolateral thoracotomy** were **excellent**.

・This approach may represent a **standard surgical option** for **isolated and concomitant** AVR **in experienced centers**.