



Imaging characteristics, and long-term outcomes of surgical management for pannus overgrowth after mechanical aortic valve replacement

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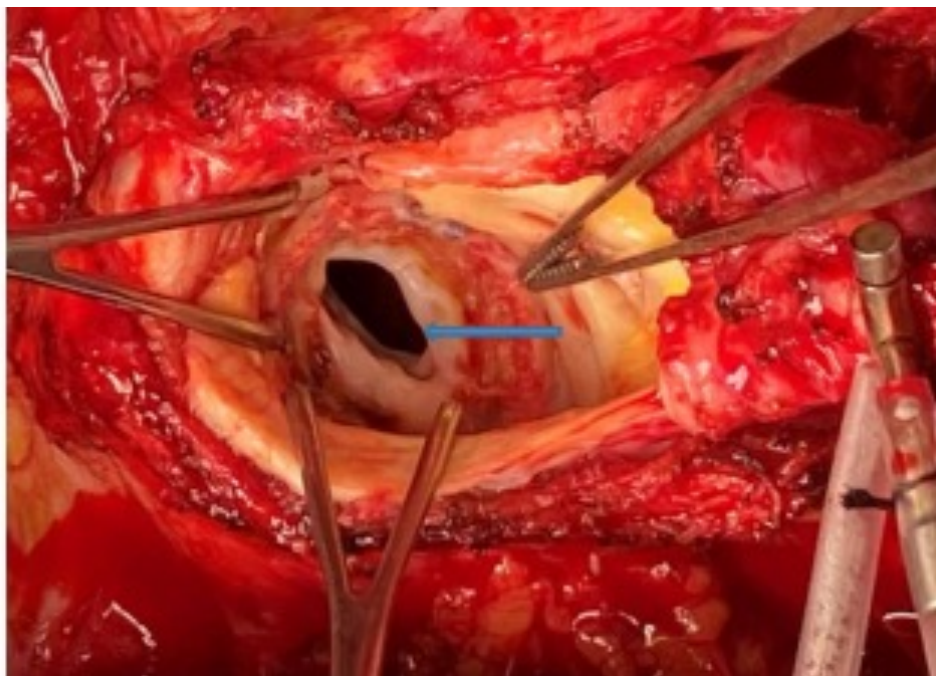
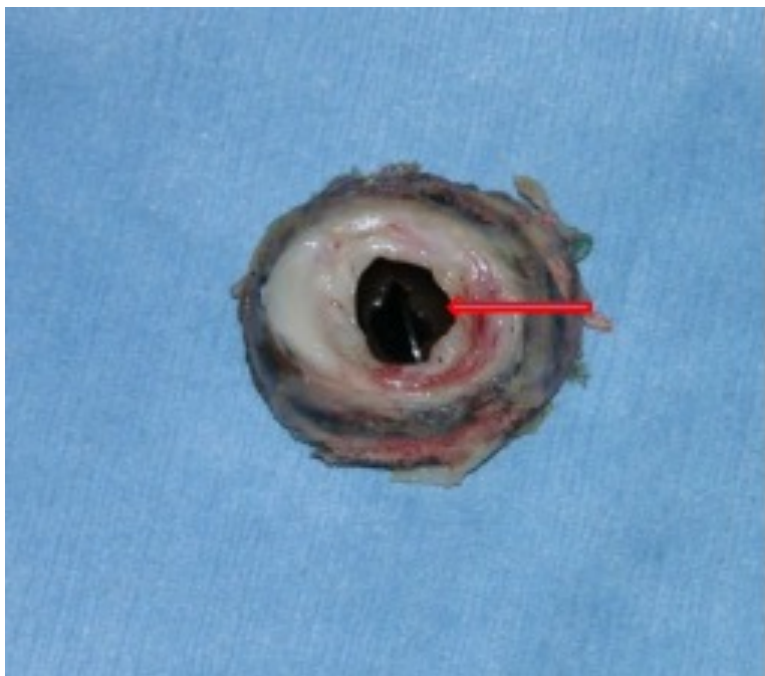
Background

- PANNUS INGROWTH under aortic or mitral prosthesis: a reaction of the body to a foreign object, the mechanism of formation of which is still unclear. The incidence rate is quite low and varies widely according to the study population, about 0.5-4.5%*
- Pannus ≠ non-structural dysfunction @
- The nature of pannus is fibrous tissue, collagen increases in response to foreign objects. Pannus immunohistochemical examination revealed components such as myocardial fibroblasts, endothelial cells and macrophages **.
- The process of pannus formation often appears many years after surgery (from 5-15 years), and is only seen in a few individuals, not all valve replacement cases.

@Alkins CW, et al. Guidelines for reporting mortality and morbidity after cardiac valve interventions. *Euro J Cardiothorac Surg* 2008; 33: 523-528.

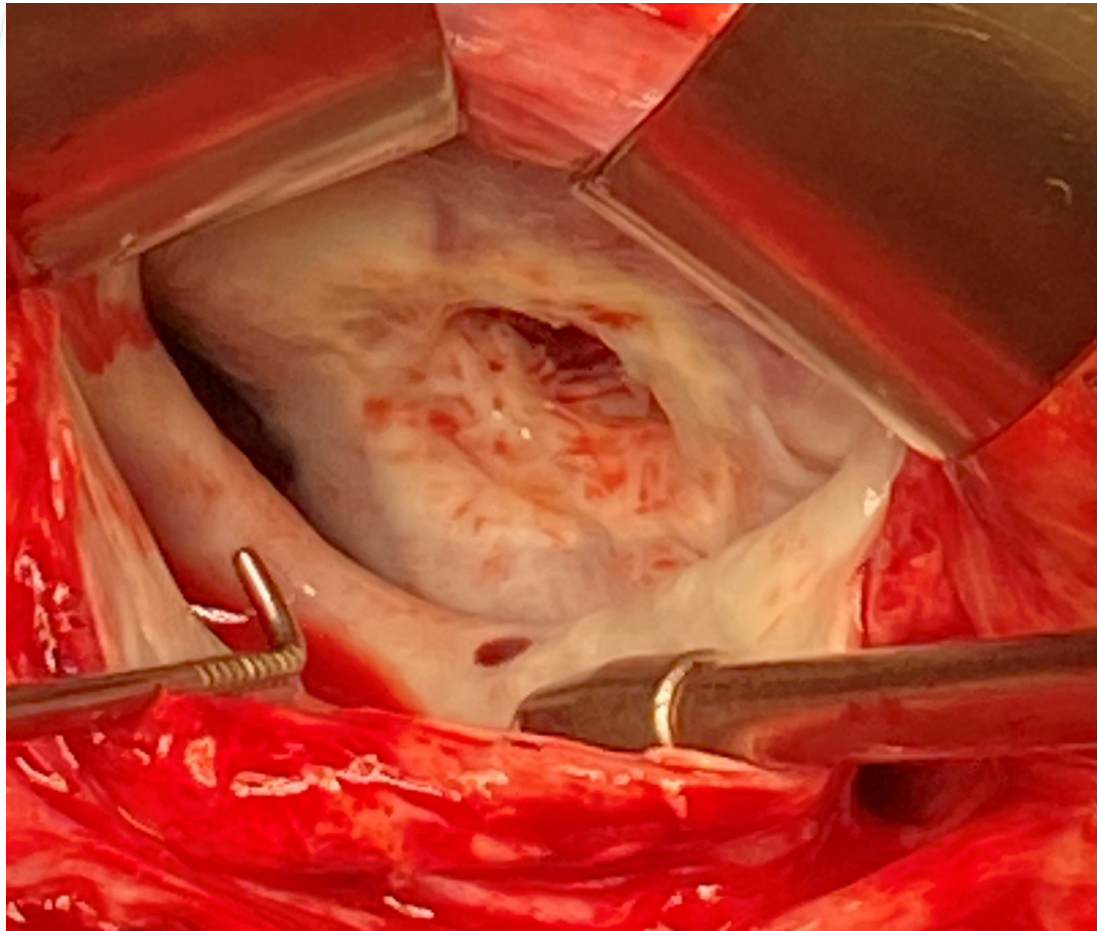
*Sakamoto Y, et al. Prevalence of pannus formation after aortic valve replacement: clinical aspects and surgical management. *J Artif Organs* 2006; 9:199-202.

**Teshima H, et al. Obstruction of St Jude Medical valves in the aortic position: Histology and immunohistochemistry of pannus. *J Thorac Cardiovasc Surg* 2003;126: 401-7.



- Pannus overgrowth beneath the aortic prosthesis: a fibrotic ring create LVOT stenosis



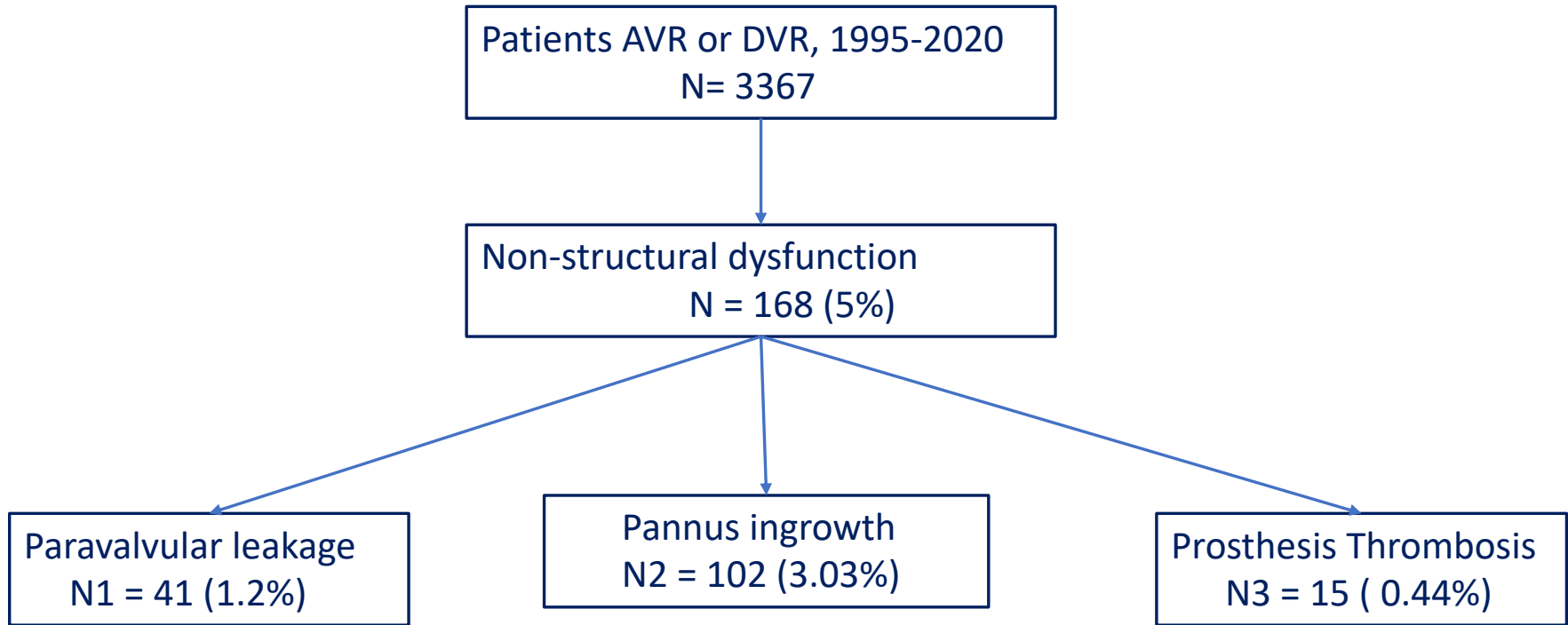




Pannus overgrowth in mitral valve and ring

Patients and Methodology

- Retrospective study, stage 1995 - 2020 at The Heart Institute of HCM city
- All kind of prosthesis: Allcarbon, Bicarbon, Saint Jude HP & ATS-Medtronic
- Inclusion of study: mechanical aortic prosthesis dysfunction due to pannus (intra-operative diagnosis)
- Exclusion of study: redo due to other causes such as paravalvular regurgitation, valve thrombosis or damage to the valve structure, biological aortic valve, aortic valve replacement accompanied by coronary artery disease surgery and congenital disease





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- Group 1 (pannus resection only) : 18
 - Group 2 (pannus resection and new valve replace) : 54
 - Group 3 (pannus resection and new valve replace with annulus enlargement) : 30



Demographic pre-operation

Characteristics	N (%)
Female	71 (69.6)
Mean age	48.5 ±11.8 (17-72)
Mean BSA	1.55 ± 0.13 (1.2-1.8)
Blood group	
AB	6 (5.9)
A	24 (23,5)
B	32 (31,2)
O	40 (39,2)
Underlying disease: Sys. hypertensive	26 (25,5)
Diabetes melitus	14 (13,7)
Lipid disorder	15 (14,7)
Chronic renal dis.	7 (8)
Tabagism	16 (15)
Etiology: rheumatic aortic disease	72 (70,6)
bicuspid calcification	11 (10,8)
others	19 (18,6)
Previous op. DVR	66 (65)
NYHA I	02 (1,9)
II	69 (67,6)
III	24 (23,5)
IV	7 (6,8)



Pre-op Image Diagnosis Data

Echocardiography data	parameter
LVEF (%)	64.5 ± 9.2
LVEDd (mm)	46.24 ± 6.01
Peak Velocity (m/s)	4.6 ± 0.67
SPAP (mmHg)	46.1 ± 14.7
TransAoVal <i>max</i> gradient (mmHg)	82.3 ± 17.8
TransAoVal <i>mean</i> gradient (mmHg)	40.7 ± 9.5
Aortic Regurgitation ≥ 2/4	15
Pannus Image (+)	92 (90.2%)

Valvular Fluoroscopy (+) : 85 (90%)

MSCT (+) : 38 (37%)



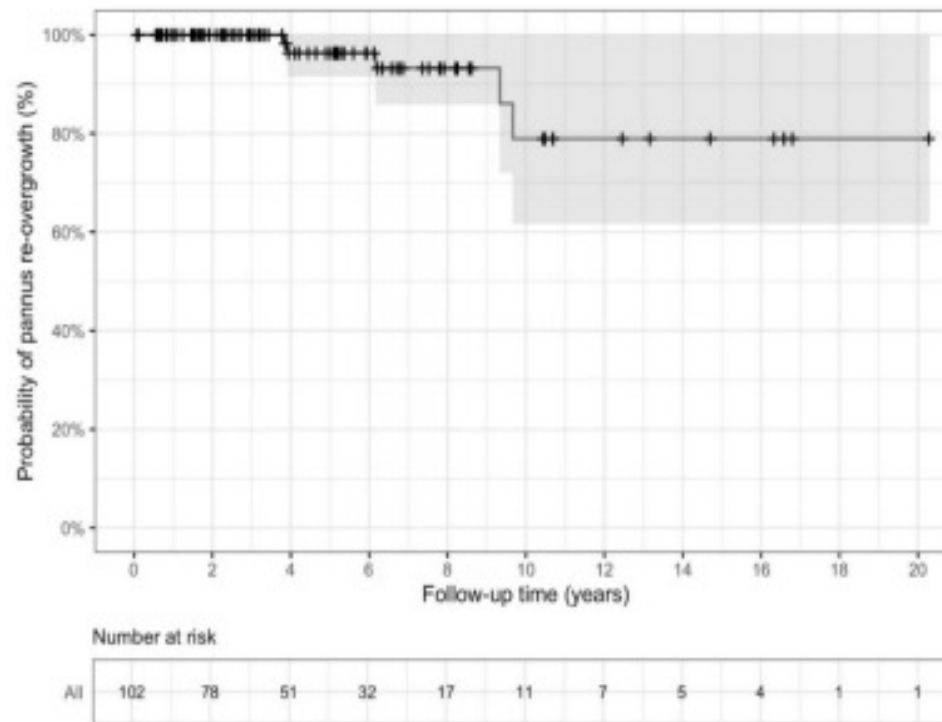
Operative characteristics

	Group 1 (18)	Group 2 (54)	Group 3 (30)	P
Type of valve: monodisc	2	7	13	< 0,01
bileaflet	16	47	17	< 0,01
Tissue valve (2 nd op)	0	21	7	
Size of valve of 1 st op (mm)	20,56 ± 1,6	19,8 ± 1,25	19,6 ± 1,5	0,045
Size of valve of 2 nd op (mm)	<u>20,56 ± 1,6*</u>	<u>20,7 ± 1,2</u>	<u>21,9 ± 1,5</u>	< 0,01
Interval between two op.	119,5 ± 76	147,5 ± 53,8	140 ± 60,2	0,035
Recurrent pannus	5/18(27,7%)	0	0	
Mean time of recurrent pannus (months)	89,4	--	--	

Follow-up

- Mean time of FU (counted from the 2nd surgery): 55.3 months (57-80). [2 lost FU]
- 5 case pannus recur (all belongs group 1)
[size van of the first op: 17mm: 1pt, 19mm: 2 pts and 21mm: 2 pts]
- 3/5 pannus recur: 2nd redo for new AVR and annulus enlargement . Mean time of pannus recur : 89.4 months (40-116)






Hình 4: Tỷ lệ tích lũy không bị pannus tái phát sau 20 năm theo dõi

5, 10 and 20 years freedom from pannus recurrent (Kaplan-Meier): 96%, 79% and 79%





Gradient trans-aorta max and mean (mmHg)

- Before 2nd operation: 82.3 ± 17.8 40.7 ± 9.5 ($P < 0.001$)

- At the last FU : 24 ± 8.5 11.7 ± 4.3 ($P < 0.001$)

Peak Velocity trans-aorte before op : 4 ± 07 m/s

post-op : 2.24 ± 06 m/s ($P < 0.001$)


- No late death
- Only one case CVA related to anti VitK (alive)



Uni and Multi-variable analysis

Characteristics	Frequency	OR (P)
Gender: Female	3.63	2.1 (P= 0.002)
Male	2.2	
Previous DVR	9.1	3.98 (P < 0.001)
AVR only	1.36	
RHD	70.6	1.4 (P =0.56)
Non-RHD	29.4	





Authors	% pannus	Female (%)	Mean age (ys)	RHD (%)	Previous DVR (%)	Monodisc Valve (%)	Mean valve size (mm)	Time of diagnosis (y)
Sakamoto	1.8	100				65 BS		
Ellensen	2.3	66.6	43.5			100 MH	23	11.1
Park	1.96	82	58.7		88.2	33	20.1	13.4
Rizolli	1.79					63		13
Oh				78.8	72.7			16.7
Our study	3.03	74	45.5	70.6	65	21.6 AC	20	12.2





Conclusion

- Female sex and previous DVR are two risks of existence pannus after mechanical AVR
- Multimodality image diagnosis such as TTE,TEE associated with fluoroscopy or MSCT is necessary.
- Long-term results of surgical treatment for pannus is good
- ***To prevent of pannus recur, radical resection of pannus and replace a new valve instead of only tran-valvular resection of pannus***



THANK YOU FOR YOUR ATTENTION

