Actualités en cardiologie interventionnelle structurelle valvulaire

Dominique Himbert CHU Bichat Claude Bernard, APHP

Nice, 7 Décembre 2021





Conflits d'intérêt

- Proctor for Edwards Lifesciences
- Proctor for Abbott Vascular





Rationale for transcatheter valve interventions

- Demographic trends and increased burden of degenerative valve disease in elderly, high-risk patients
 - Less invasive than surgery
 - Avoids bypass
 - Shorter hospital stay, faster recovery
 - Decreases mortality and morbidity
- High level of scientific evidence comparison with surgery
 - ▶ TAVI+++
- Failure does not burn bridges to surgery
- Popularity, self referral+++

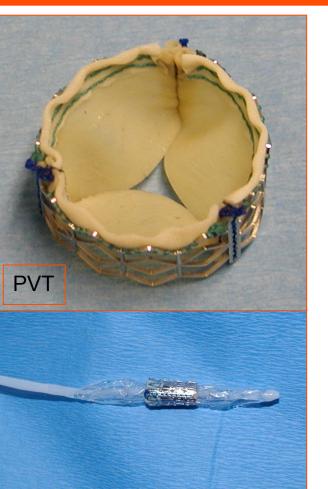




Percutaneous Transcatheter Implantation of an Aortic Valve Prosthesis for Calcific Aortic Stenosis

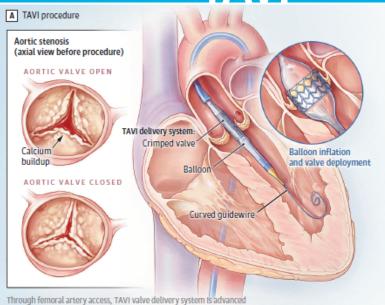
First Human Case Description

Alain Cribier, MD; Helene Eltchaninoff, MD; Assaf Bash, PhD; Nicolas Borenstein, MD; Christophe Tron, MD; Fabrice Bauer, MD; Genevieve Derumeaux, MD; Frederic Anselme, MD; François Laborde, MD; Martin B. Leon, MD 2002

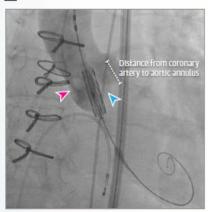




TAVI

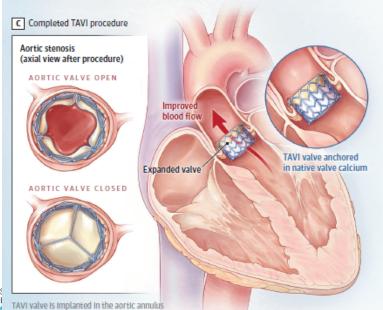


B Aortogram during TAVI deployment



Pigtail catheter (pink arrowhead) is in place to verify location of valve deployment relative to aortic annulus (blue arrowhead). Prior to deployment of TAVI valve, rapid ventricular pacing is used to transiently lower blood pressure.

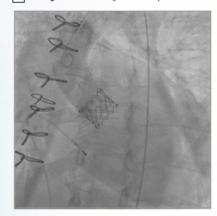
LKethu



across aortic valve in a retrograde fashion. Valve is deployed via balloon inflation.

using native aortic valve calcium as an anchor.

D Aortogram immediately after TAVI procedure



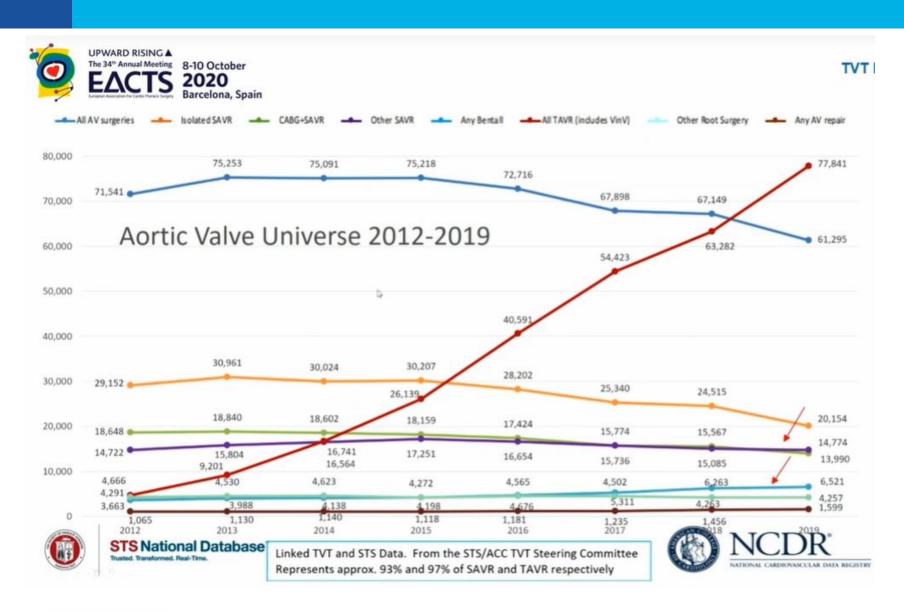
Aortography is performed to assess valvular or paravalvular aortic regurgitation.

Transthoracic echocardiography is also performed after implantation to verify correct aortic valve deployment and quantify valvular or paravalvular aortic regurgitation.

Davidson JAMA 2021

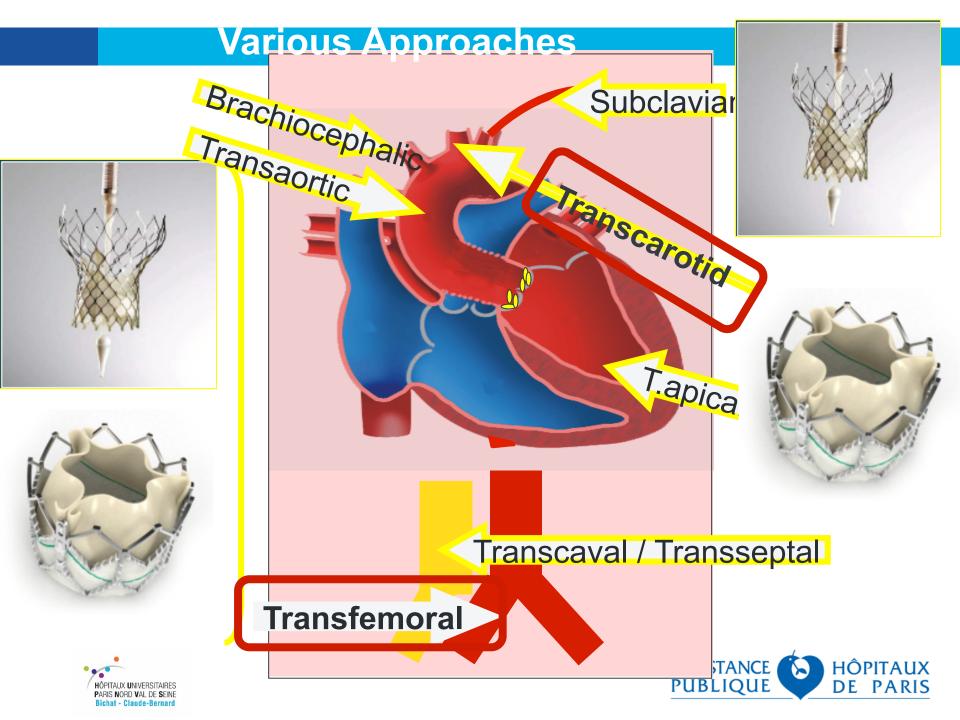




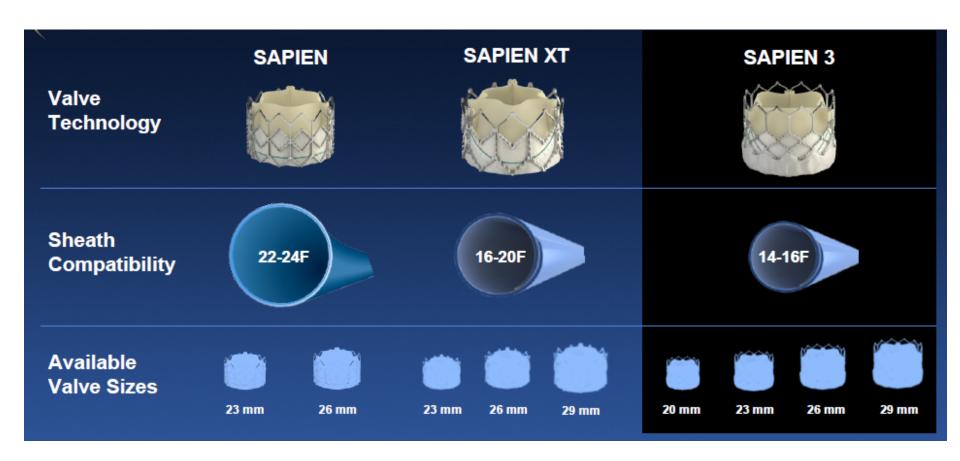








Technological improvements SAPIEN valve

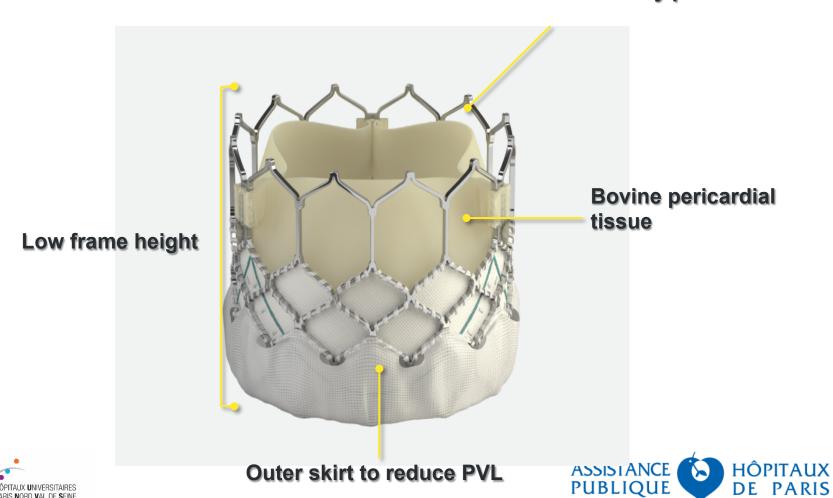






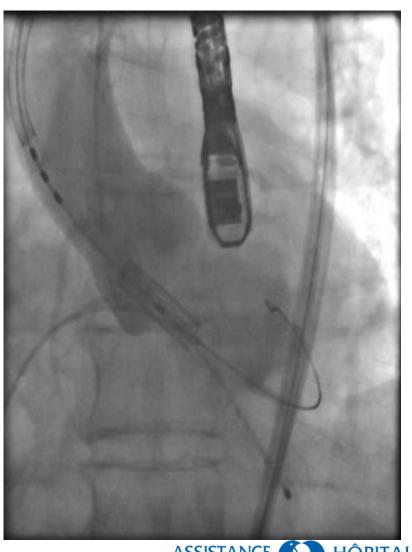
SAPIEN 3 Valve

Enhanced frame geometry for ultra-low delivery profile



Catheter SAPIEN 3





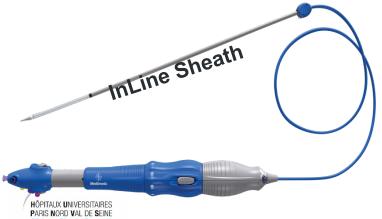




Medtronic Evolut R/Pro™







- Shortened self-expanding nitinol frame
- Porcine pericardium
- Supra-annular
- Extended skirt
- Partially repositionable
- 14F Enveo[™] delivery system
- Inline™ sheath



ACURATE

ACURATE neo™

Aortic Valve System

Stabilization Arches

Designed for axial selfalignment

Supra-Annular Valve

Porcine pericardium leaflets with BioFix™ anticalcification process

Upper Crown

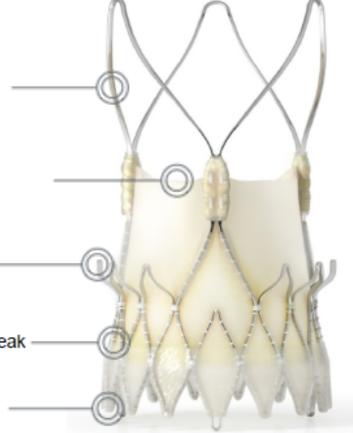
Minimal supra-annular anchoring

Anti-PVL Skirt

Sealing against paravalvular leak

Lower Crown

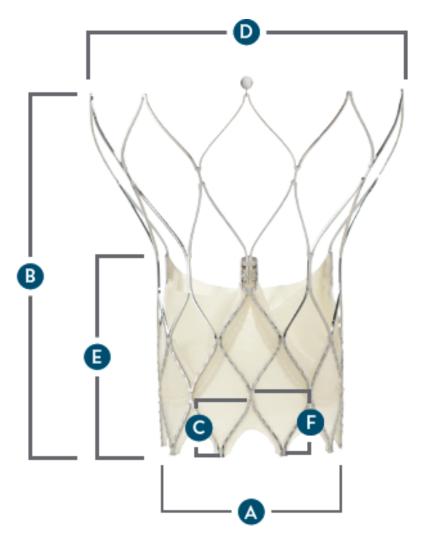
Minimal protrusion into LVOT







Portico



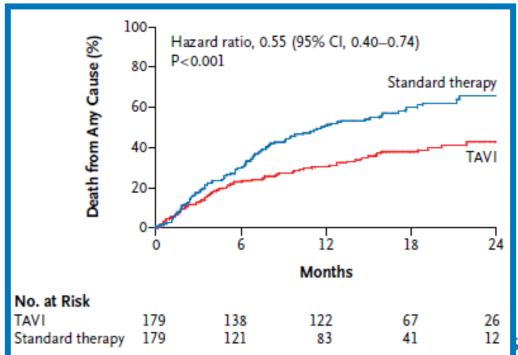




PARTNER Inoperable 2010

Transcatheter Aortic-Valve Implantation for Aortic Stenosis in Patients Who Cannot Undergo Surgery

Martin B. Leon, M.D., Craig R. Smith, M.D., Michael Mack, M.D., D. Craig Miller, M.D., Jeffrey W. Moses, M.D., Lars G. Svensson, M.D., Ph.D., E. Murat Tuzcu, M.D., John G. Webb, M.D., Gregory P. Fontana, M.D., Raj R. Makkar, M.D., David L. Brown, M.D., Peter C. Block, M.D., Robert A. Guyton, M.D., Augusto D. Pichard, M.D., Joseph E. Bavaria, M.D., Howard C. Herrmann, M.D., Pamela C. Douglas, M.D., John L. Petersen, M.D., Jodi J. Akin, M.S., William N. Anderson, Ph.D., Duolao Wang, Ph.D., and Stuart Pocock, Ph.D., for the PARTNER Trial Investigators*

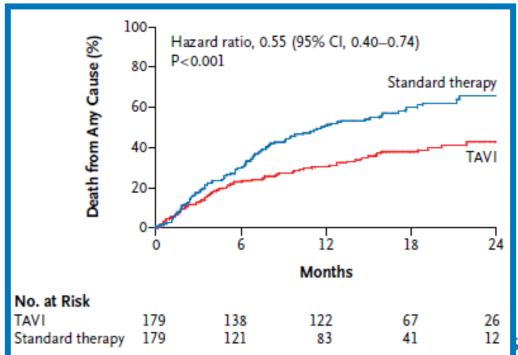




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PARTNER High risk 2011

The NEW ENGLAND JOURNAL of MEDICINE

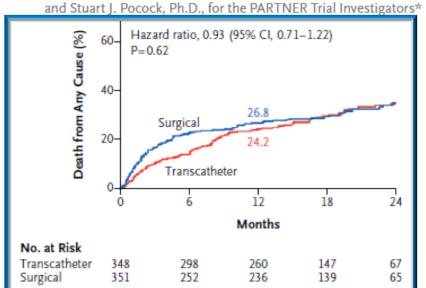
ESTABLISHED IN 1812

JUNE 9, 2011

VOL. 364 NO. 23

Transcatheter versus Surgical Aortic-Valve Replacement in High-Risk Patients

Craig R. Smith, M.D., Martin B. Leon, M.D., Michael J. Mack, M.D., D. Craig Miller, M.D., Jeffrey W. Moses, M.D., Lars G. Svensson, M.D., Ph.D., E. Murat Tuzcu, M.D., John G. Webb, M.D., Gregory P. Fontana, M.D., Raj R. Makkar, M.D., Mathew Williams, M.D., Todd Dewey, M.D., Samir Kapadia, M.D., Vasilis Babaliaros, M.D., Vinod H. Thourani, M.D., Paul Corso, M.D., Augusto D. Pichard, M.D., Joseph E. Bavaria, M.D., Howard C. Herrmann, M.D., Jodi J. Akin, M.S., William N. Anderson, Ph.D., Duolao Wang, Ph.D.,



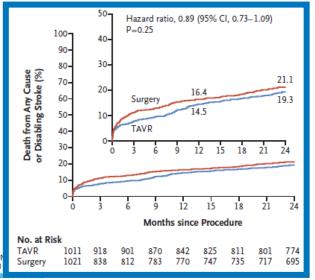


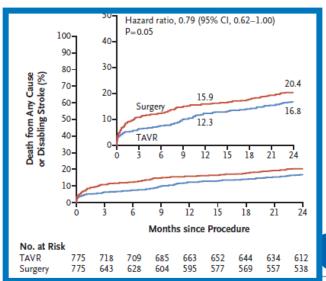


PARTNER 2 Intermediate risk 2016

Transcatheter or Surgical Aortic-Valve Replacement in Intermediate-Risk Patients

Martin B. Leon, M.D., Craig R. Smith, M.D., Michael J. Mack, M.D., Raj R. Makkar, M.D., Lars G. Svensson, M.D., Ph.D., Susheel K. Kodali, M.D., Vinod H. Thourani, M.D., E. Murat Tuzcu, M.D., D. Craig Miller, M.D., Howard C. Herrmann, M.D., Darshan Doshi, M.D., David J. Cohen, M.D., Augusto D. Pichard, M.D., Samir Kapadia, M.D., Todd Dewey, M.D., Vasilis Babaliaros, M.D., Wilson Y. Szeto, M.D., Mathew R. Williams, M.D., Dean Kereiakes, M.D., Alan Zajarias, M.D., Kevin L. Greason, M.D., Brian K. Whisenant, M.D., Robert W. Hodson, M.D., Jeffrey W. Moses, M.D., Alfredo Trento, M.D., David L. Brown, M.D., William F. Fearon, M.D., Philippe Pibarot, D.V.M., Ph.D., Rebecca T. Hahn, M.D., Wael A. Jaber, M.D., William N. Anderson, Ph.D., Maria C. Alu, M.M., and John G. Webb, M.D., for the PARTNER 2 Investigators*





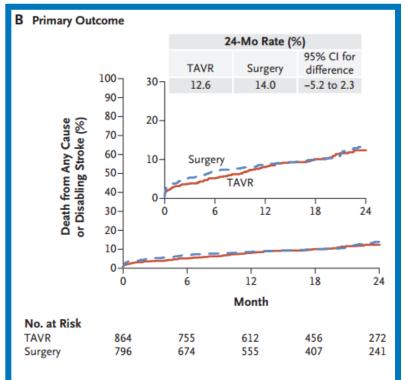




SURTAVI 2016

Surgical or Transcatheter Aortic-Valve Replacement in Intermediate-Risk Patients

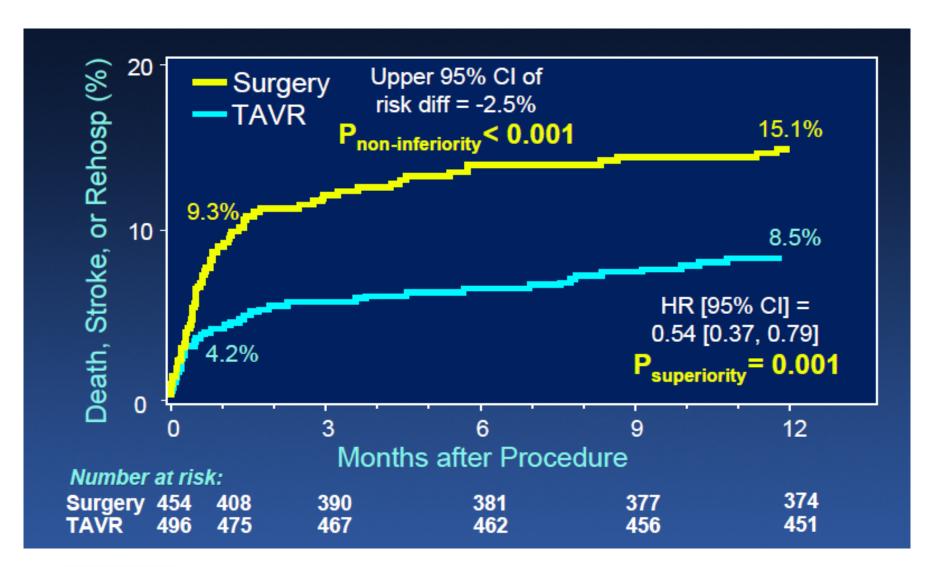
M.J. Reardon, N.M. Van Mieghem, J.J. Popma, N.S. Kleiman, L. Søndergaard, M. Mumtaz, D.H. Adams, G.M. Deeb, B. Maini, H. Gada, S. Chetcuti, T. Gleason, J. Heiser, R. Lange, W. Merhi, J.K. Oh, P.S. Olsen, N. Piazza, M. Williams, S. Windecker, S.J. Yakubov, E. Grube, R. Makkar, J.S. Lee, J. Conte, E. Vang, H. Nguyen, Y. Chang, A.S. Mugglin, P.W.J.C. Serruys, and A.P. Kappetein, for the SURTAVI Investigators*







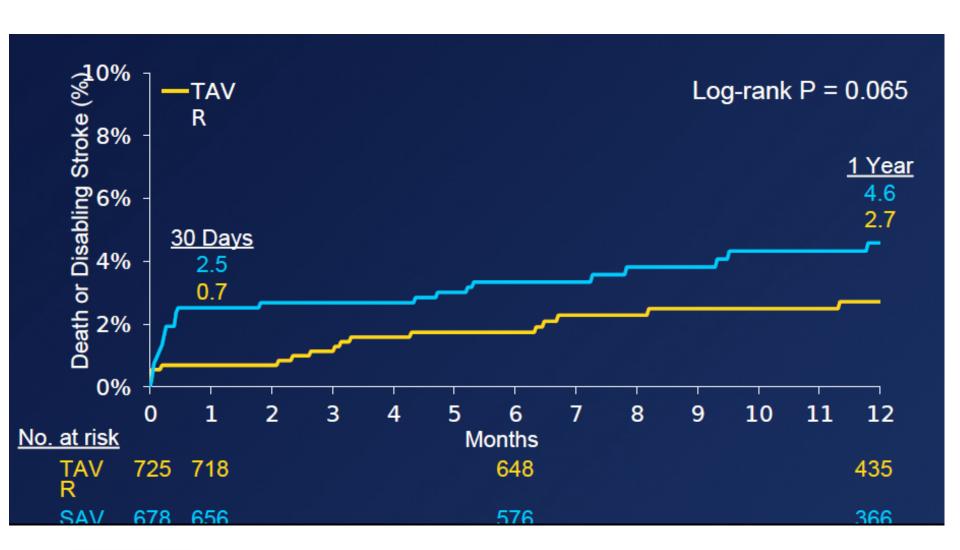
PARTNER 3 Low risk 2019







Evolut R Low risk 2019







Low risk Trials Clinical Implications

- Based upon these findings, TAVR, through 1-year, should be considered the preferred therapy in low surgical risk aortic stenosis patients!
- PARTNER randomized trials over the past 12 years, clearly indicate that the relative value of TAVR compared with surgery is independent of surgical risk profiles.
- The choice of TAVR vs. surgery in aortic stenosis patients should be a shared-decision making process, respecting patient preferences, understanding knowledge gaps (esp. in younger patients), and considering clinical and anatomic factors.





TAVI for everyone?

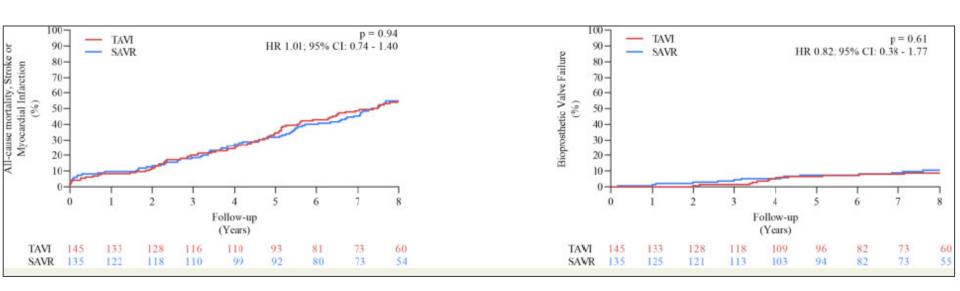




Notion Study 8-year follow-up

Death Stroke MI

Prosthesis failure



Jorgensen et al, Eur Heart J 2021; 2912-19

Longest follow-up in TAVI trials: 8 years

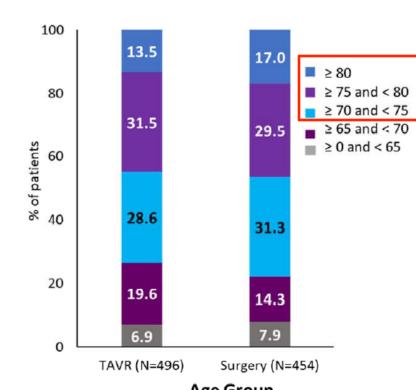




Exclusion Criteria from Low-Risk Trials

- Age <65 years*
- Bicuspid aortic valves
- Non suitable for TF TAVR
- **■** Multiple valve disease
- Other anatomical findings (~20% of patients screened by the Review Committee)
 - Calcification on the LVOT
 - Annulus size
 - **Others**

PARTNER 3



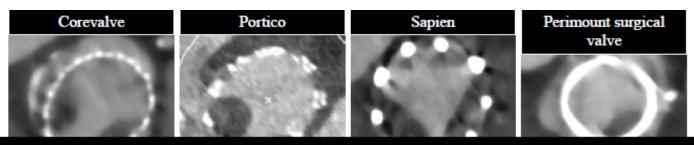
	Age Group	
74 [69, 78]	74 [70, 78]	
53 – 87	50 - 85	





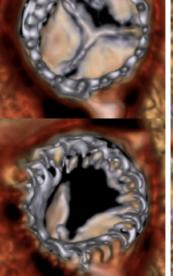
Valve thrombosis

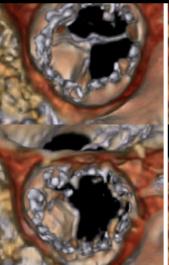
Which consequences on clinical outcomes and valve durability?



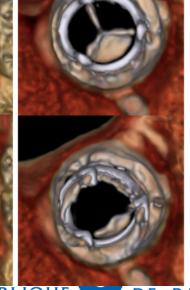
Prevelance was 13% in real life registries, 40% in a small IDE subset, overall 20% in 187 patients











Systole



Traitement antithrombotique post-TAVI

AOD

- ▶ GALILEO (Rivaroxaban): négative
- ▶ ATLANTIS (Apixaban): négative
- ▶ ENVISAGE TAVI AF (edoxaban vs AVK): non infériorité mais plus de saignements

Antiplaquettaires

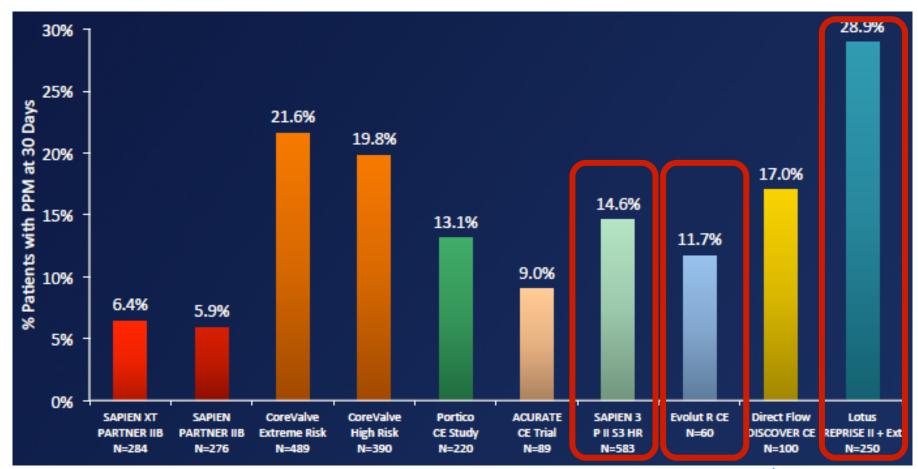
- ▶ POPULAR TAVI
 - AVK > AVK + Clopidogrel (moins de saignements)
 - ASA > ASA + Clopidogrel

2021	ESC
Guide	elines



Transcatheter aortic valve implantation		
OAC is recommended lifelong for TAVI patients who have other indications for OAC. ^{501 f}	1	В
Lifelong SAPT is recommended after TAVI in patients with no baseline indication for OAC. 495,496,521	1	Α
Routine use OAC is not recommended after TAVI in patients with no baseline indication for OAC. 497	Ш	В

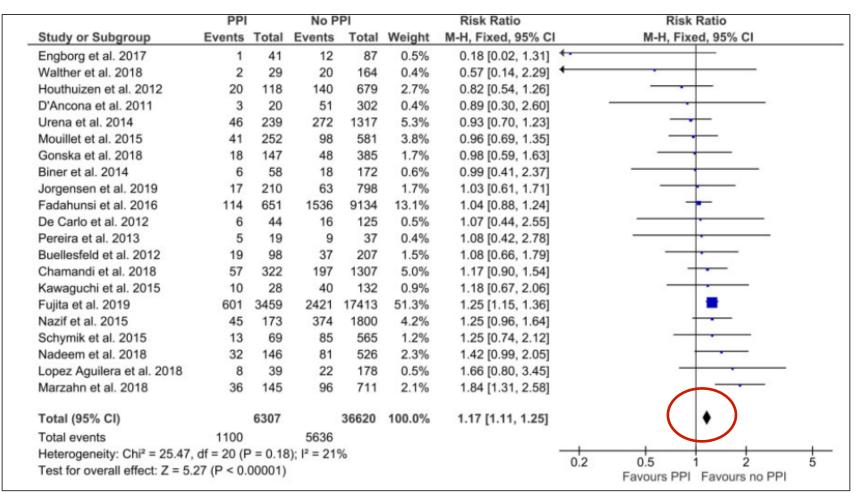
Post-TAVI Permanent Pace-Maker Implantation







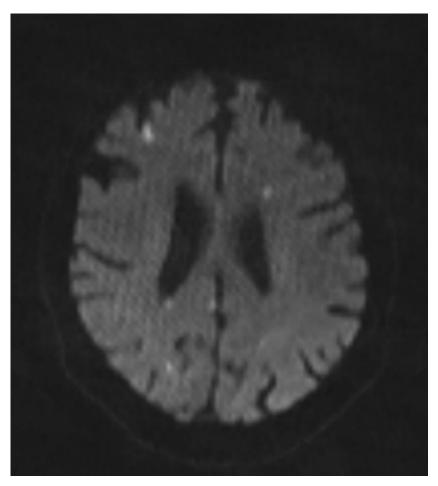
Metaanalysis PPM Implantation 1-year mortality





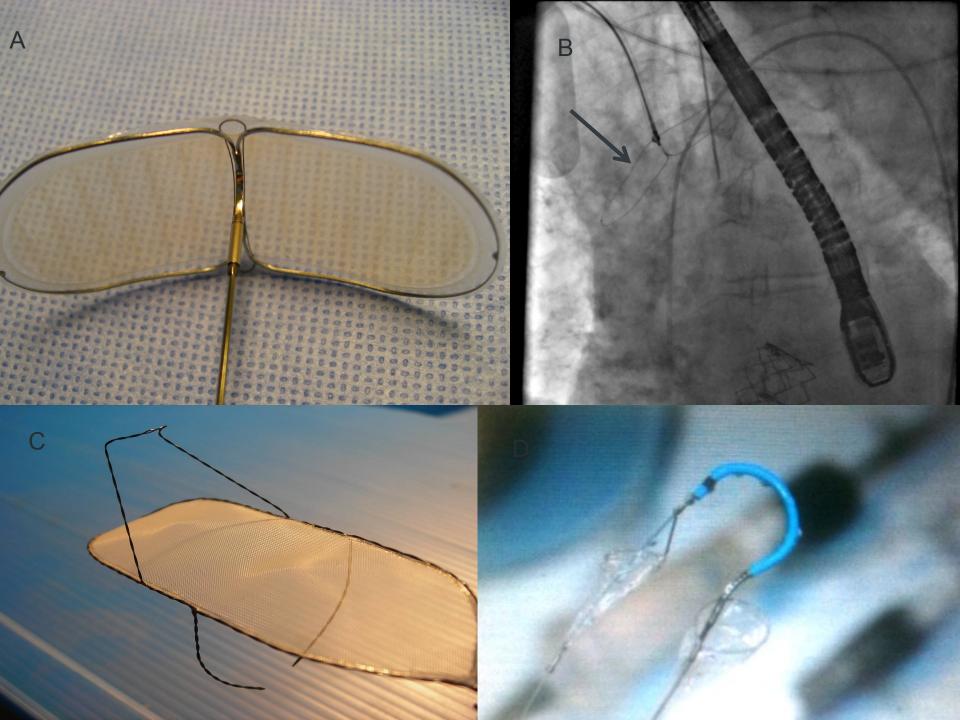


Post-TAVI Diffusion MRI









Recommandations 2021

Choix RVA chirurgical vs TAVI			
Classe	ACC/AHA	ESC/EACTS	
I	La chirurgie est recommandée chez les patients symptomatiques ou asymptomatiques ayant un RA sévère et une indication de RVA < 65 ans ou qui ont une espérance de vie > 20 ans	La chirurgie est recommandée chez les patients jeunes et à faible risque chirurgical (<75 ans et STS-PROM/ EuroSCORE II <4%) ou opérables et non éligibles au TAVI transfémoral	
I	Chez les patients symptomatiques ayant un RA sévère et âgés entre 65 et 80 ans, sans contre-indication anatomique à un TAVI transfémoral, un RVA chirurgical ou un TAVI transfémoral peuvent être recommandés après discussion commune de la balance entre la longévité attendue du patient et la durabilité de la valve	Le TAVI est recommandé chez les patients âgés (≥75 ans) ou à haut risque (STS-PROM /EuroSCORE II >8%) ou inopérables	
H (Le TAVI est recommandé de préférence à la chirurgie pour les patients symptomatiques ayant un RA sévère, > 80 ans ou plus jeunes mais avec une espérance de vie < 10 ans et sans contre-indication à un TAVI transfémoral	La chirurgie ou le TAVI sont recommandés chez les autres patients en fonction des caractéristiques individuelles cliniques, anatomiques et procédurales	

Remboursement du risque faible par l'Assurance Maladie

Patients avec sténose aortique native sévère symptomatique (SVAoi < 0,5 cm²/m²). L'indication doit être posée lors d'une réunion multidisciplinaire en prenant en compte les scores de risque et les comorbidités associées. Pour les patients opérables avec un score STS < 4%, l'indication est limitée aux patients de plus de 65 ans, avec un orifice tricuspide, ne pas avoir d'indication de chirurgie valvulaire mitrale ou coronaire (tronc commun et/ou SYNTAX > 32) associée et avec une anatomie favorable à la voie transfémorale.

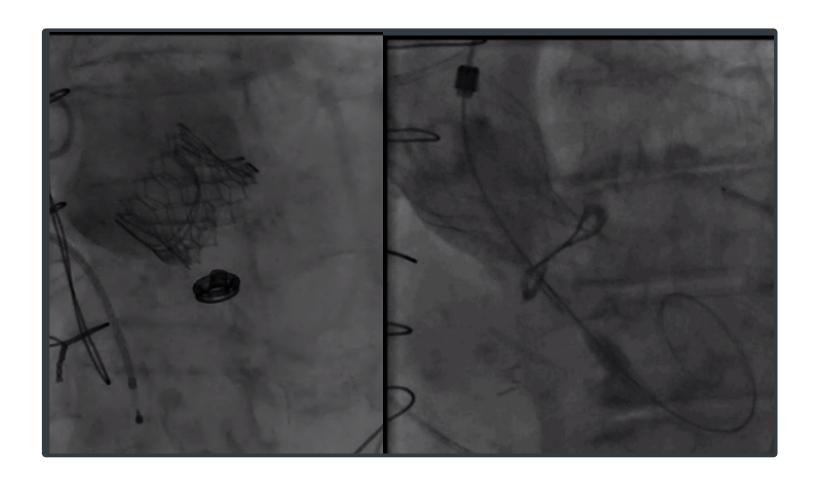
■ Références :

- ▶ 1. Journal officiel de la république Française, 30 juillet 2021, Texte 37 sur 121.
- 2.HAS, Avis de la Commisisson Nationale d'Evaluation des Dispositifs Médicaux et Technologies de Santé, Edwards SAPIEN 3 (système COMMANDER), 16 mars 2021
- ▶ 3.Mack MJ, Leon MB, Thourani VH, et al. Transcatheter aortic-valve replacement with a balloon-expandable valve in low-risk patients. N Engl J Med. 2019;380(18):1695-1705.
- ▶ 4.Leon MB et al. Transcatheter or Surgical Aortic-Valve Replacement in Patients at Low Surgical Risk. JACC 2021;77,9:1149-61.
- ▶ 5.HAS, Avis Economique, SAPIEN 3 Traitement de la sténose aortique sévère symptomatique en France chez les patients à faible risque chirurgical, mars 2021.





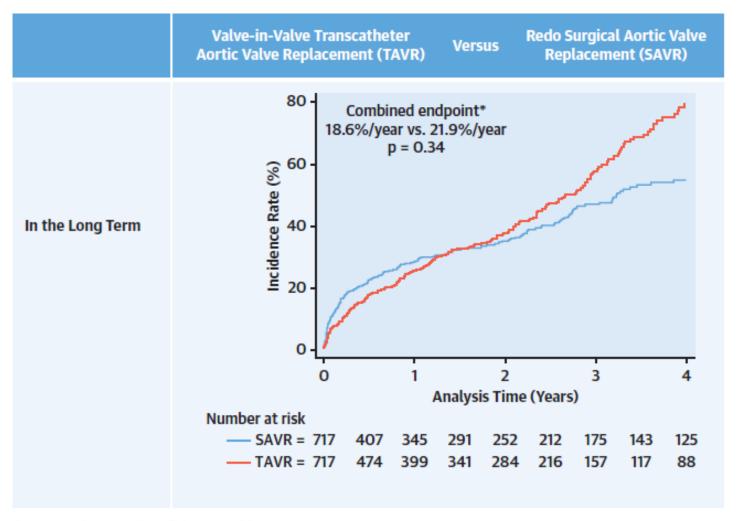
TAVI Valve-in-valve







Valve-in-valve TAVI vs Redo AVR



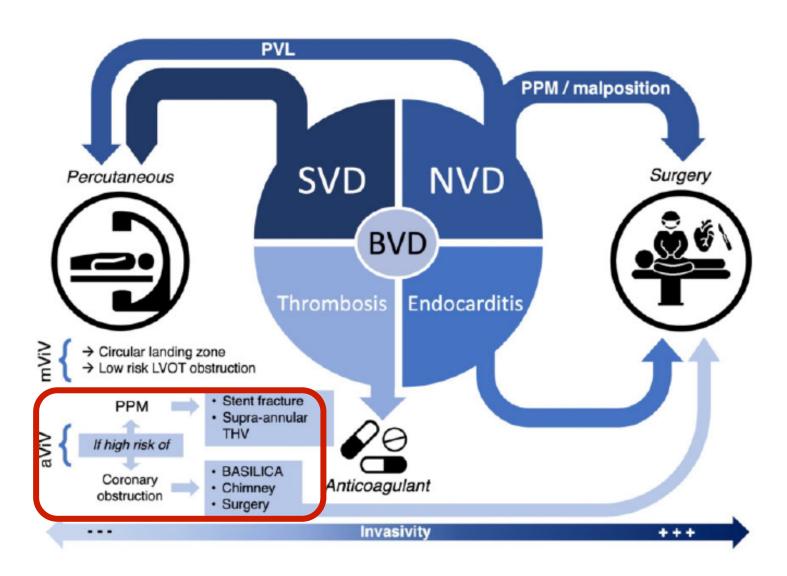
Deharo, P. et al. J Am Coll Cardiol. 2020;76(5):489-99.

CONCLUSIONS VIV TAVR was observed to be associated with better short-term outcomes than redo SAVR. Major cardiovascular outcomes were not different between the 2 treatments during long-term follow-up.





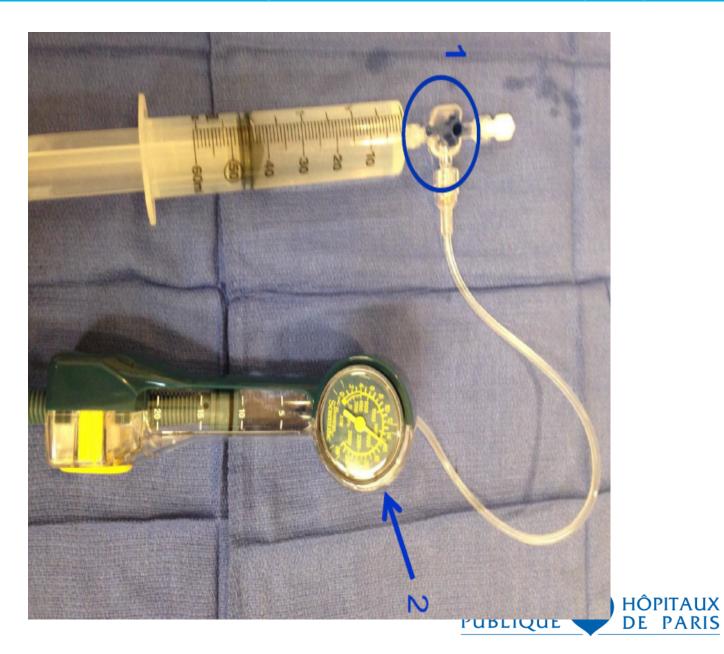
TAVI vs Redo SAVR for bioprosthetic valve deterioration







Prosthesis fracture – High pressure balloon / syringes





2021 Guidelines for Valve Heart Diseases

Bioprosthetic failure Reoperation is recommended in symptomatic patients with a significant increase in transprosthetic gradient (after exclusion of valve thrombosis) or severe regurgitation. Transcatheter, transfemoral valve-in-valve implantation in the aortic position should be considered by the Heart Team depending on Пa anatomic considerations, features of the prosthesis, and in patients who are at high operative risk or inoperable.529





Well begun is half done!

Initial choice of the adequate surgical bioprosthesis
 In the view of future valve-in-valve TAVI

Avoid prostheses

- At high risk of coronary occlusion (Mitroflow, Trifecta, St-Jude)
- Radiolucent or poorly visible (St Jude, Mosaic)
- Stentless prostheses

Privilegiate

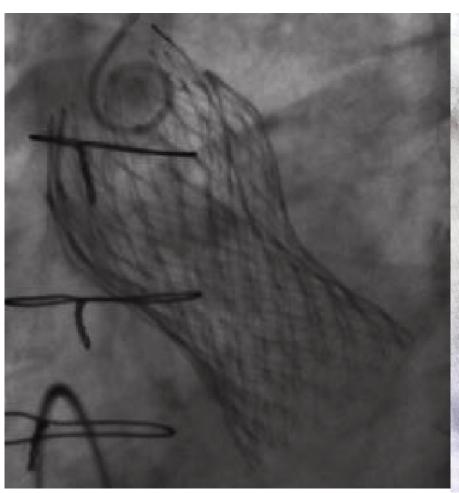
- Enterely radiopaque valves
- At low risk of coronary occlusion Perimount, Magna Ease...)
- Specially dedicated for future valve-in-valve TAVI:

Inspiris Resilia





Perspectives TAVI in TAVI







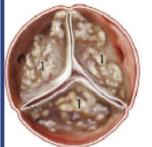


TAVI in pure AR Technical challenges

Morphological Features of Aortic Valve Stenosis or Regurgitation

Calcific Aortic Valve Stenosis

1- Nodular calcific deposits on aortic side





Aortic Valve Regurgitation

- 1- Minimal or absent cusp calcification
- 2- Dilated aortic root
- 3- Frequent coexistence of dilated ascending aorta





Technical Challenges of TAVR in Aortic Valve Regurgitation

Suboptimal Fluoroscopic Visualization of the Native Valve

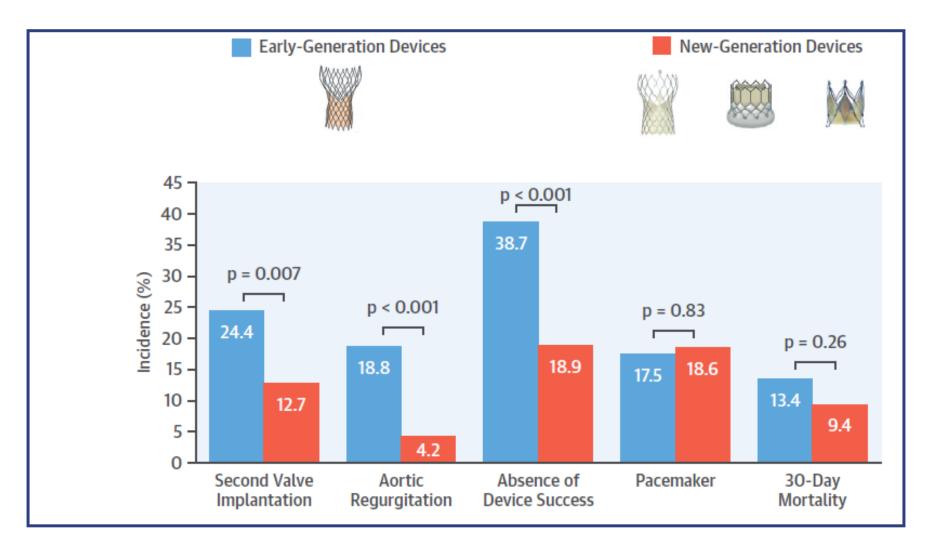
Insufficient Anchoring and Sealing of the Transcatheter Device

Risk of Misplacement and Migration of the Device Risk of Residual Valvular Regurgitation





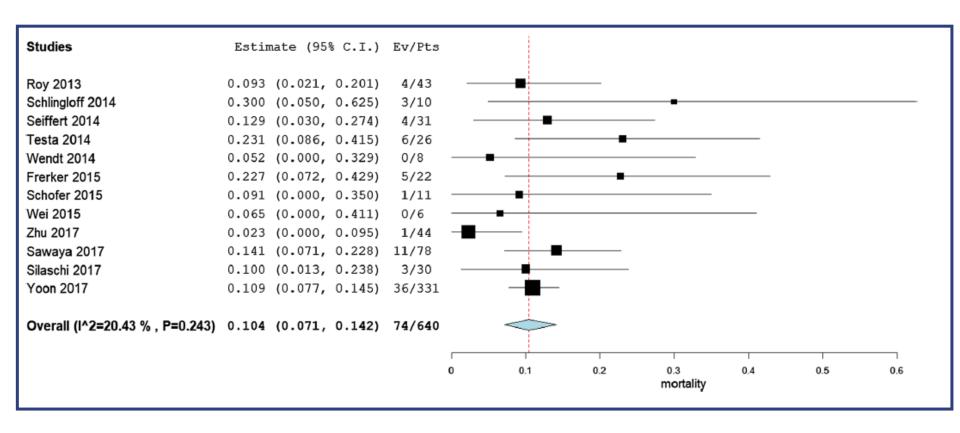
TAVI for AR: Outcomes according to devices







All-cause 30-day mortaliy in reported studies





Transcatheter Aortic Valve Implantation with the **SAPIEN 3**

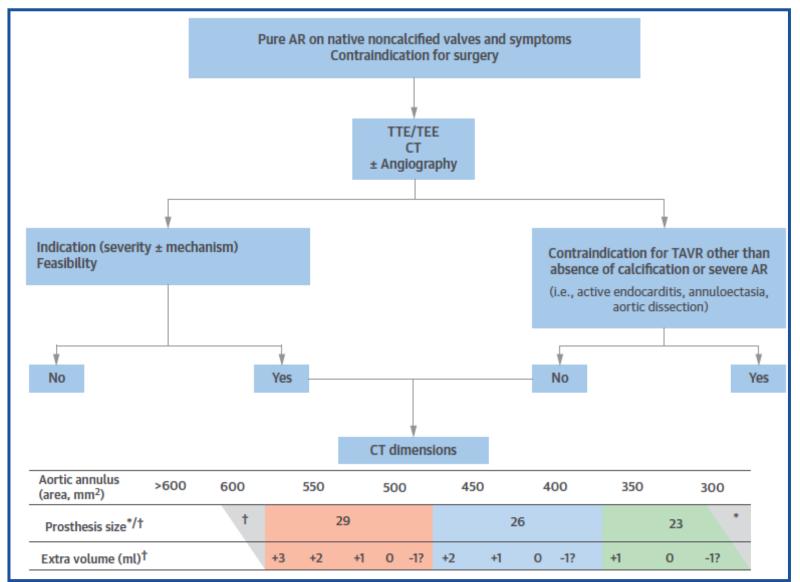
Transcatheter Heart Valve for Pure Aortic Regurgitation.

The S3AR Study





Algorithm for inclusion in S3 AR registry







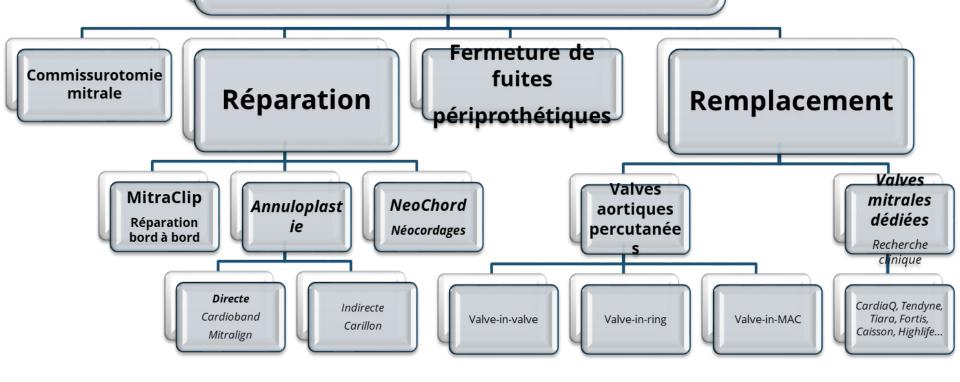
Conclusions

- □ Révolution thérapeutique à l'échelle mondiale, niveau de preuves élevé, plébiscité par les patients
- □ Explosion des indications à venir (démographie)
- Technologie rapidement évolutive
- □ Tendance à l'élargissement des indications vers le risque faible
- □ Certaines complications restent difficiles à prévenir: troubles conductifs...
- Durabilité à long terme encore incertaine
- « Niches » cliniques: « valve-in-valve », IA…





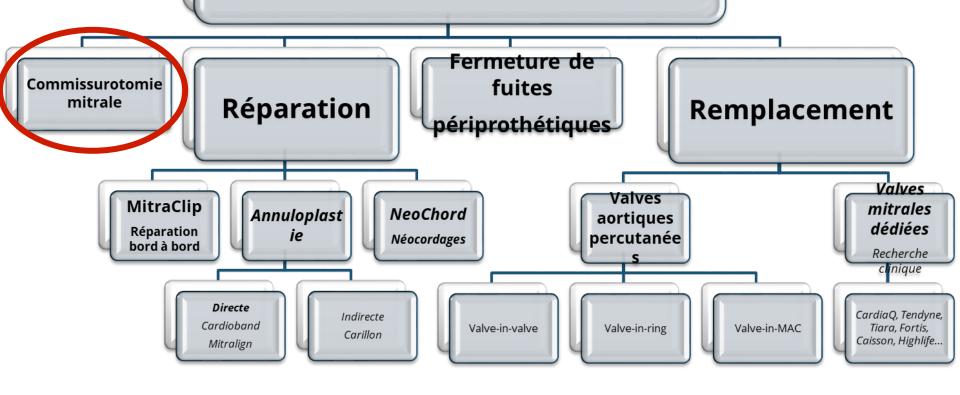
Procédures mitrales percutanées







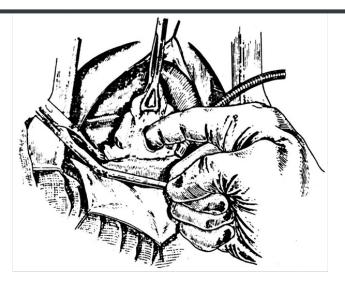
Procédures mitrales percutanées





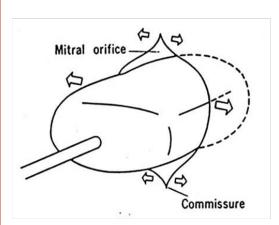


Percutaneous mitral commissurotomy





Closed-Heart Comm<u>issuratamy — Open-Heart </u>Commissurotomy



ercutantous mitral commissurotonny : K.Inoue 198





Ballon d'Inoue

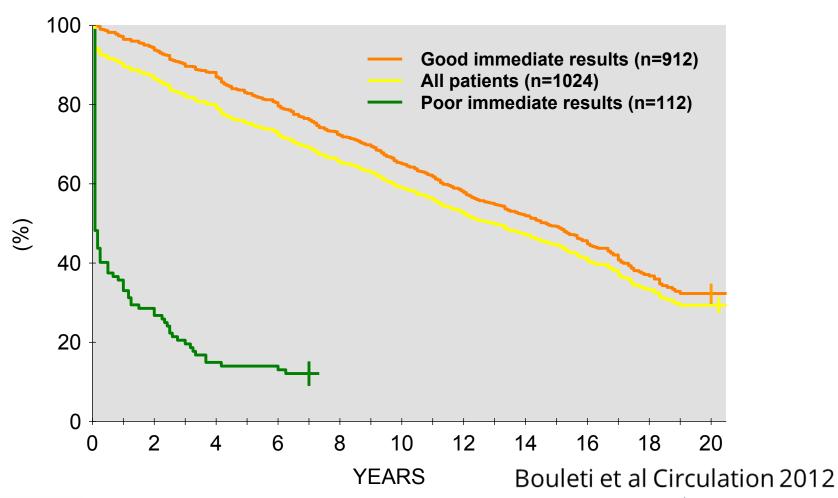






Percutaneous mitral commissurotomy

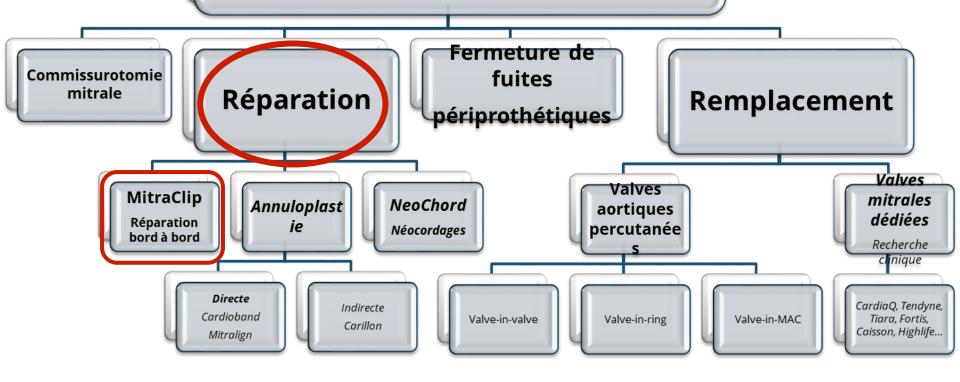
Survival without Surgery or Re-PMC, and in NYHA class I or II at 20 yrs







Procédures mitrales percutanées

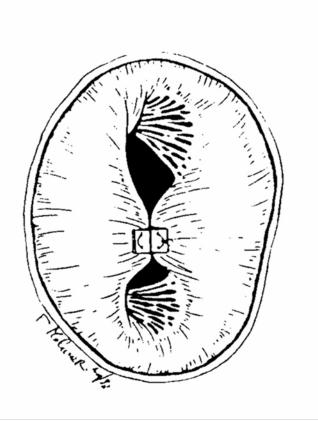


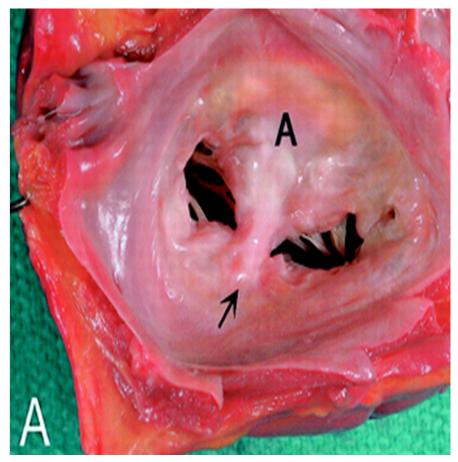




MitraClip

Réparation mitrale bord à bord (Alfieri)

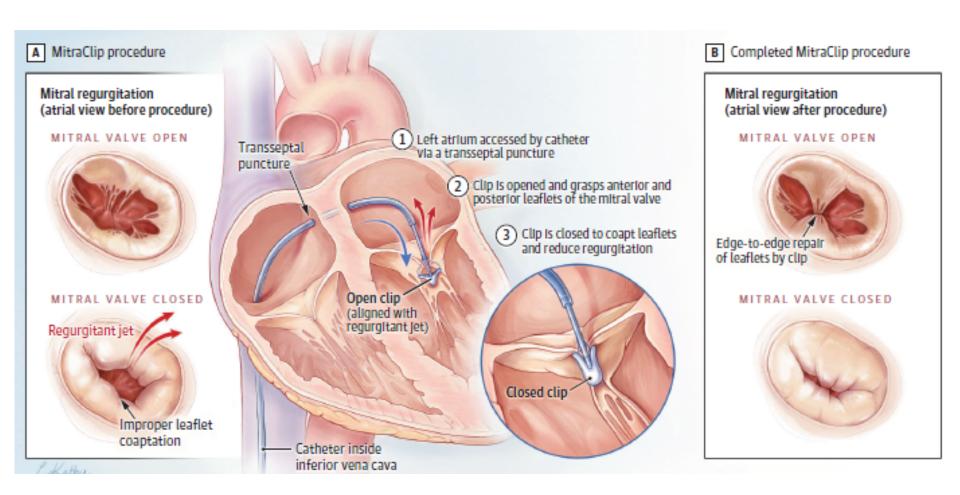








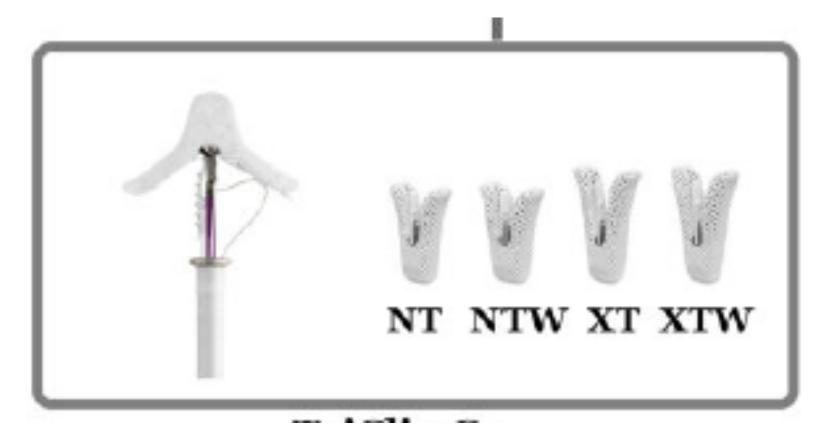
Mitraclip







MitraClip G4

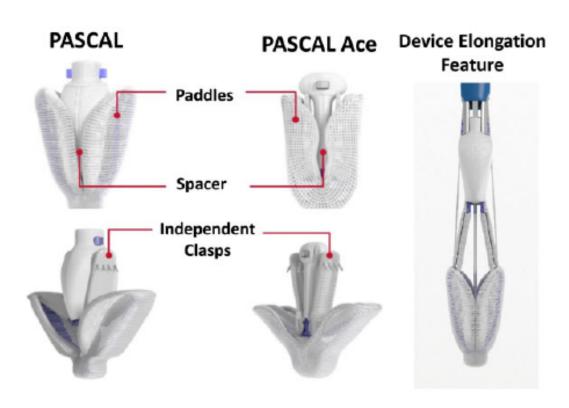


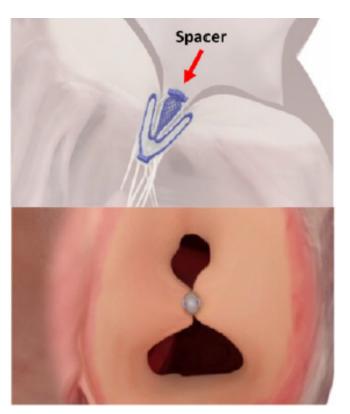
2 longueurs de bras2 largeurs de brasPossibilité de grasping indépendant





Système PASCAL









MitraClip IM initiale







MitraClip - Avant capture







MitraClip - Capture







MitraClip – IM résiduelle







MitraClip - Indications

IM primaire, dégénérative

- Contre-indication chirurgicale
 - Anatomie favorable: au mieux formes centrales (prolapsus de P2), mais de plus en plus de formes plus complexes (prolapsus étendus, médiaux ou latéraux...)

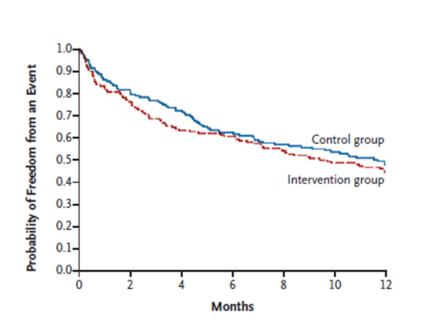
- Haut risque chirurgical
 - Randomisation contre chirurgie (PHRC Mitra-HR)
 - Inclusions difficiles +++

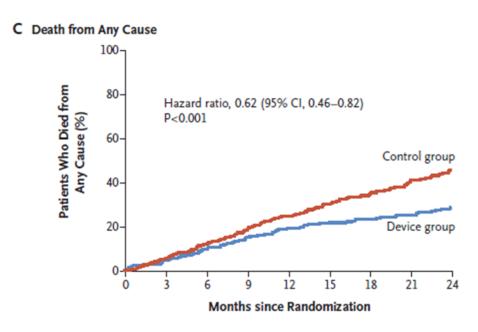




MitraClip - Indications

IM secondaire, fonctionnelle





Obadia et al NEJM 2018

Stone et al NEJM 2018

Remboursement du MitraClip dans l'IM secondaire

FEVG 20 à 50%, SOR > 30mm²





Recommandations 2021

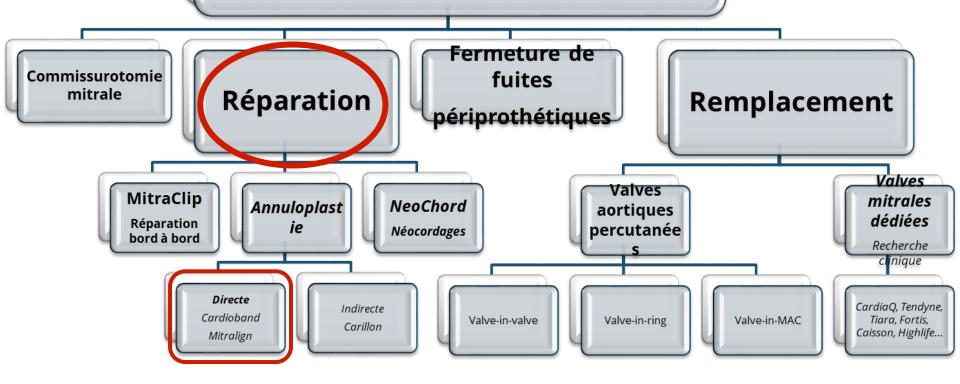
Interventions percutanées dans l'IM secondaire

Classe	ACC/AHA	ESC/EACTS	Classe
lla	Chez les patients avec FEVG <50% et en classes NYHA III/IV malgré un traitement médical optimal, le réparation bord-à-bord est raisonnable si l'anatomie est favorable à l'ETO, la FEVG comprise entre 20 et 50%, le DTSVG ≤70mm et la PAPS≤70mmHg	La réparation bord-à-bord peut être envisagée chez des patients symptomatiques sélectionnés, non éligibles pour la chirurgie et remplissant les critères suggérant une forte probabilité de répondre au traitement	lla
		Chez les patients symptomatiques à haut risque non éligibles pour la chirurgie et ne remplissant pas les critères de forte probabilité de réponse à la réparation bord-àbord, la Heart Team peut envisager celle-ci ou une autre intervention par cathéter dans certains cas sélectionnés, après discussion soigneuse d'une assistance ventriculaire ou d'une transplantation cardiaque	IIb





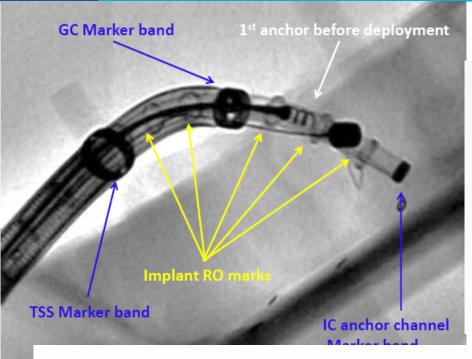
Procédures mitrales percutanées

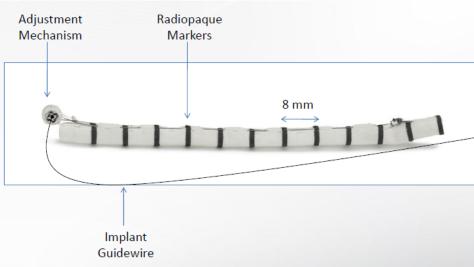






Cardioband

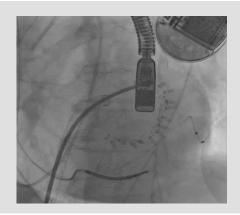


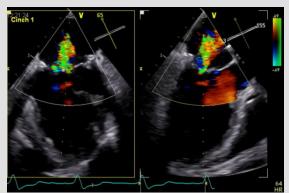




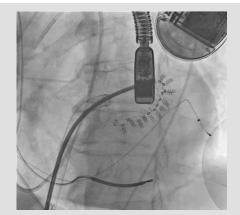
Cardioband

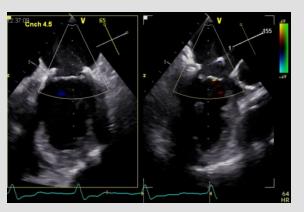
Baseline





Final Size Post Adjustment





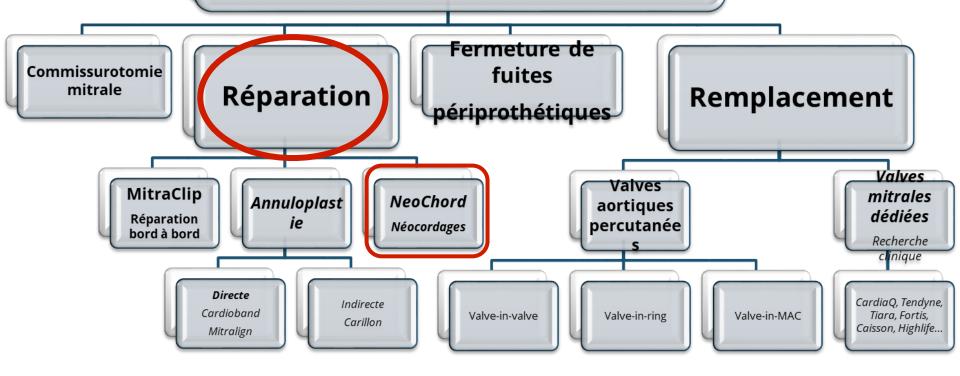




Cardioband



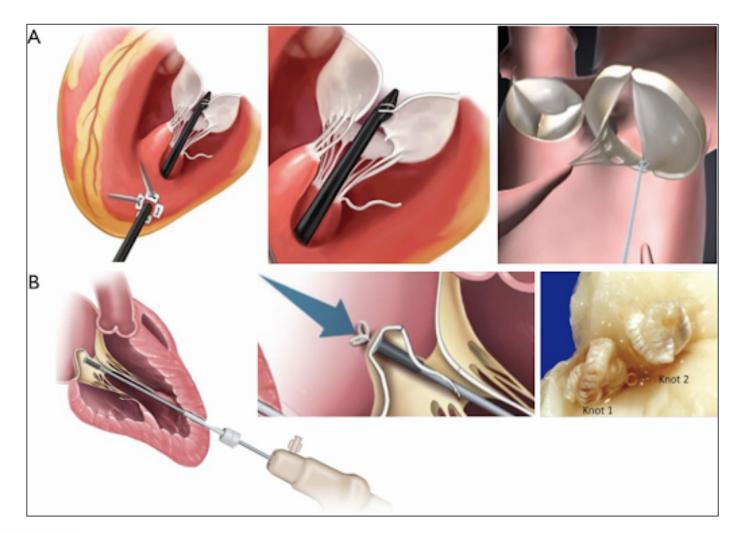
Procédures mitrales percutanées







Néocordages percutanés – IM dégénérative







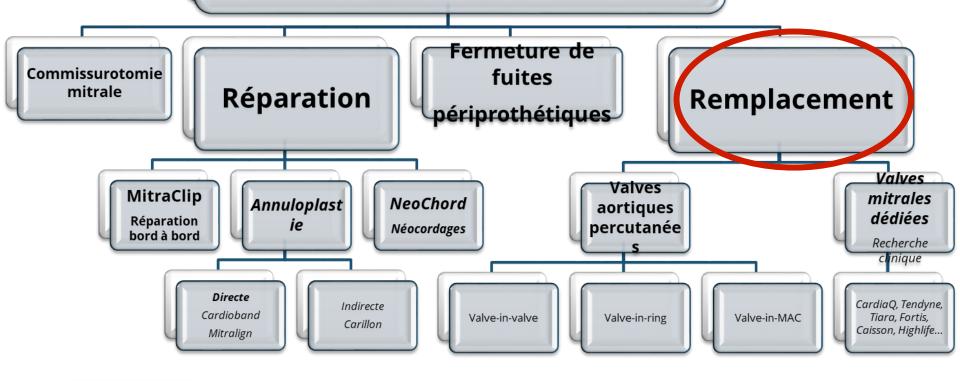
Système Neochord







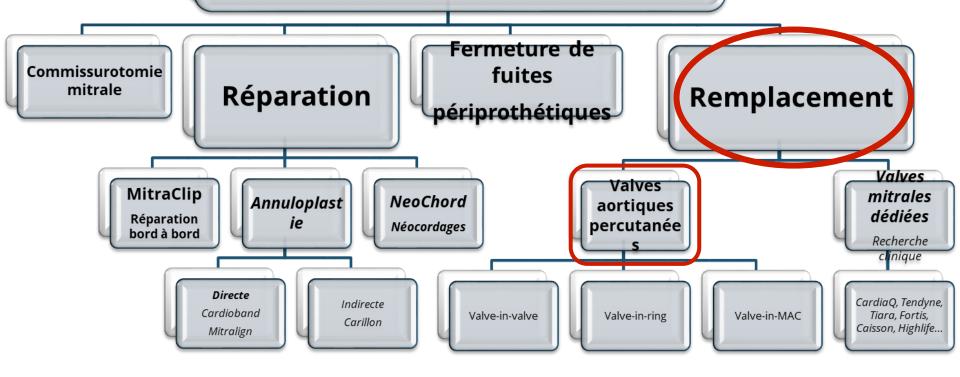
Procédures mitrales percutanées







Procédures mitrales percutanées





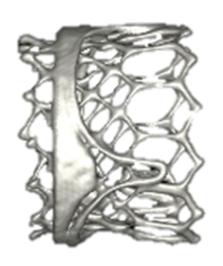


Transcatheter Mitral Valve Implantation -TMVI

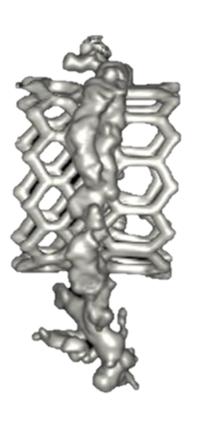
Valve-in-Valve



Valve-in-MAC











TMVI Valve in Valve – Déploiement prothèse



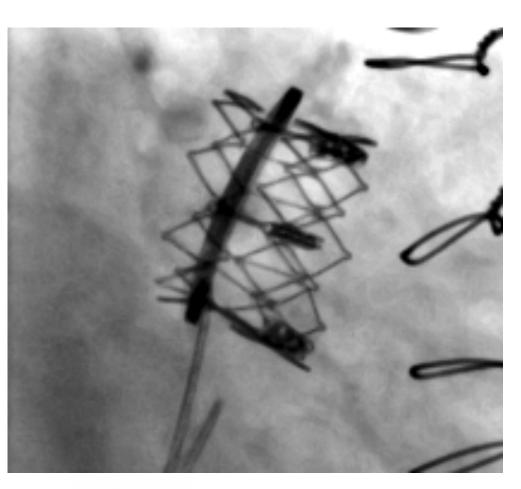


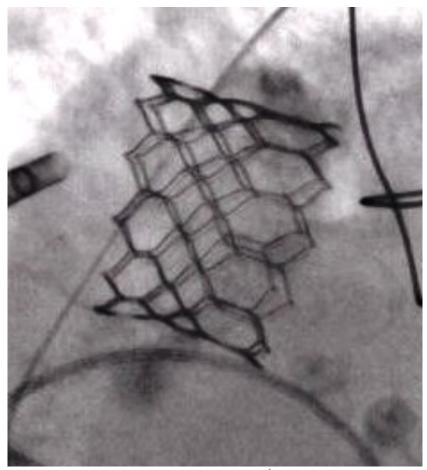


TMVI

Valve in ring

Valve in MAC









2021 ESC Guidelines on valve heart diseases

Bioprosthetic failure		
Reoperation is recommended in symptomatic patients with a significant increase in transprosthetic gradient (after exclusion of valve thrombosis) or severe regurgitation.	1	С
Transcatheter, transfemoral valve-in-valve implantation in the aortic position should be considered by the Heart Team depending on anatomic considerations, features of the prosthesis, and in patients who are at high operative risk or inoperable. 529	lla	В
Transcatheter valve-in-valve implantation in the mitral and tricuspid position may be considered in selected patients at high risk for surgical reintervention. 382,531,532	ШЬ	В
Reoperation should be considered in asympto- matic patients with significant prosthetic dys- function if reoperation is low risk.	lla	С





Challenges of TMVI

Risk of futility

THV thrombosis

TMVI

Risk of complications
(Access, LVOT obstruction and valve embolization)

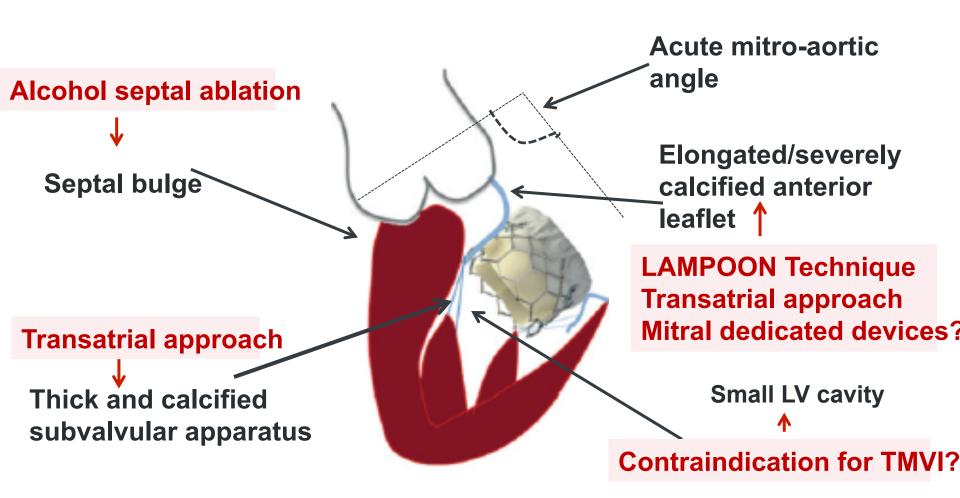
Durability of THV

Risk of suboptimal results (PVL and high gradients)





LVOT Obstruction

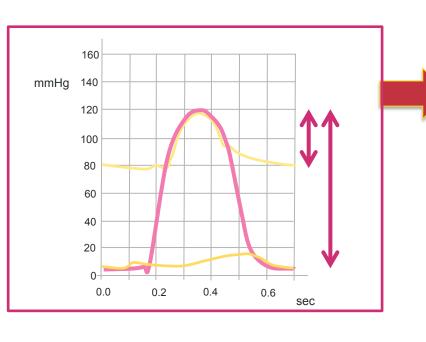




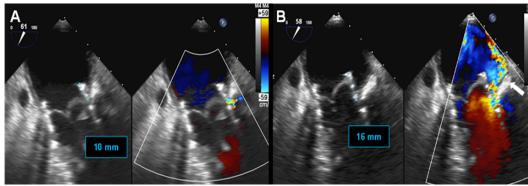


Risk of valve embolization

Anchoring is based on radial force



- Acute valve embolization
- Slight late valve displacement→ PVL



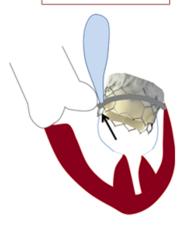
Urena et al. JACC CV Int 2017 Nguyen et al. JACC CV Int 2016



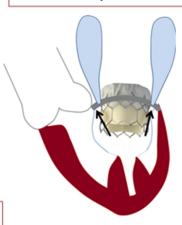


Risk of suboptimal results-Paravalvular Leaks

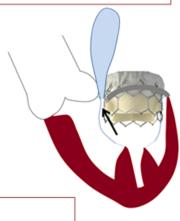




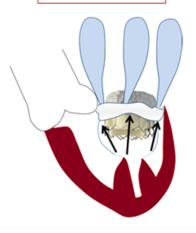
Underexpansion



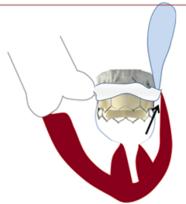
Ring dehiscence



Undersized



Irregularities (MAC,open rings...)







Paravalvular leaks - Treatment

Malposition of THV



TMVI in TMVI

Underexpansion

Undersizing



Postdilation

 Dehiscence of bioprosthesis or ring



Surgery?

Irregularities

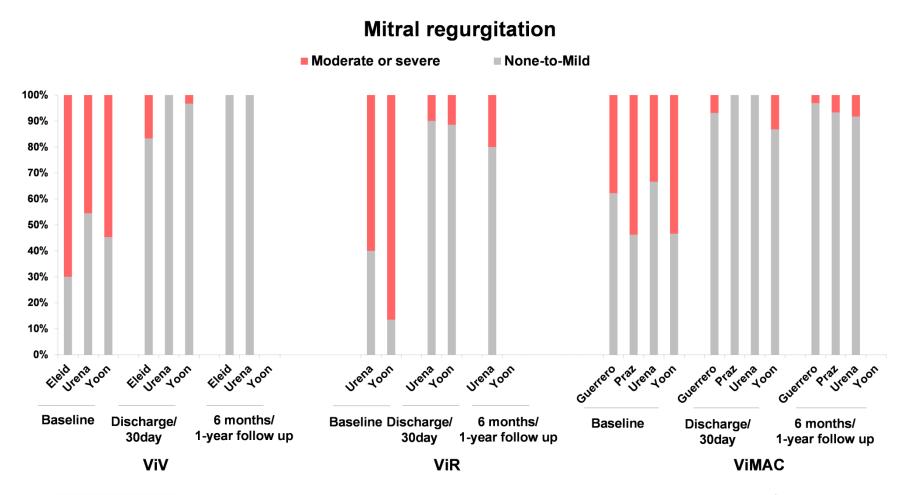


Percutaneous closure of PVL





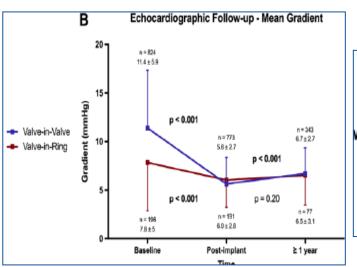
Mitral regurgitation

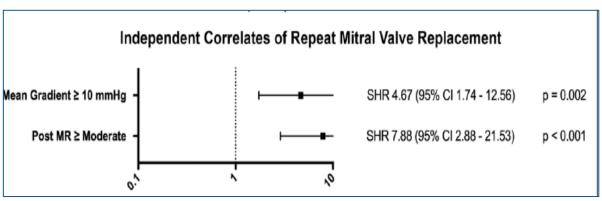






High gradients VIVID Mitral Registry

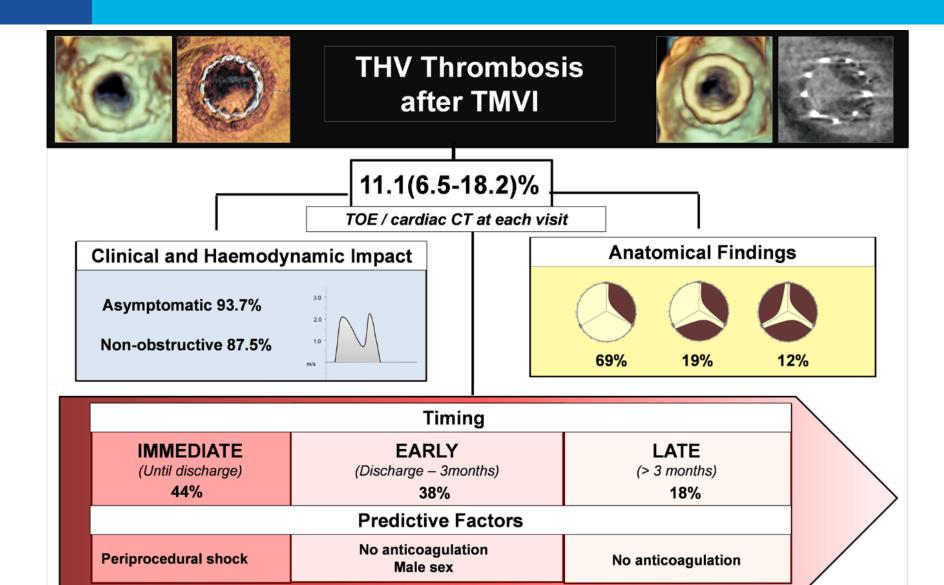




	Total (n=1079)	Mitral valve-in- ring (n=222)	Mitral valve-in- valve (n=857)	P value
Mean gradient ≥5 mmHg	61.4%	67.5%	59.9%	0.05
Mean gradient ≥10 mmHg	8.9%	12.0%	8.2%	0.09











Futility- Independent predictors of Mortality

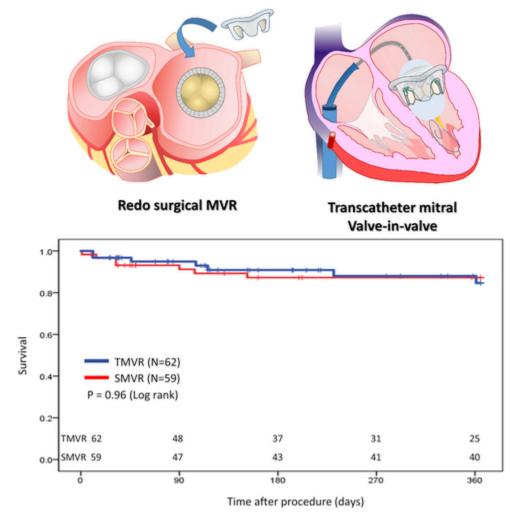
- MAC (+++)
- Tricuspid regurgitation >2
- EuroSCORE II or STS score
- Chronic pulmonary disease
- Residual post-TMVI MR ≥3
- ViR versus VIV TMVR





TMVI vs Redo Surgery

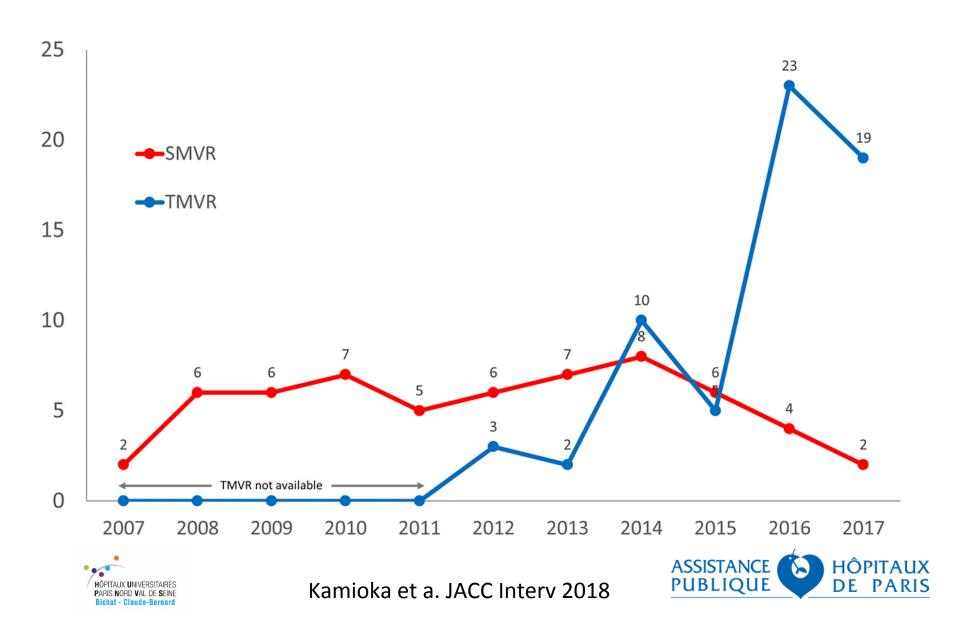
TABLE 1 Baseline Characteristic	cs		
	SMVR (n – 59)	TMVR (n – 62)	p Value
Age, yrs	$\textbf{63.7} \pm \textbf{14.9}$	$\textbf{74.9} \pm \textbf{9.4}$	<0.00
Male	23 (39.0)	24 (38.7)	0.98
Hypertension	47 (79.7)	53 (85.5)	0.40
Dyslipidemia	38 (64.4)	50 (80.6)	0.05
Diabetes mellitus	7 (11.9)	15 (24.2)	0.08
Serum creatinine, mg/dl	$\textbf{1.5} \pm \textbf{1.4}$	$\textbf{1.5} \pm \textbf{1.5}$	0.19
Dialysis	5 (8.5)	4 (6.5)	0.74
Lung disease, ≥moderate	8 (13.6)	21 (33.9)	0.01
Liver disease	8 (13.6)	4 (6.5)	0.19
History of healed endocarditis	16 (27.1)	5 (8.1)	0.01
Cerebrovascular disease	17 (28.8)	22 (35.5)	0.43
Peripheral vascular disease	2 (3.4)	4 (6.5)	0.68
Coronary artery disease	18 (30.5)	33 (53.2)	0.01
History of myocardial infarction	12 (20.3)	14 (22.6)	0.76
History of PCI	5 (8.5)	12 (19.4)	0.09
History of surgical procedure			
Coronary artery bypass grafting	15 (25.4)	29 (46.8)	0.02
Aortic valve replacement	4 (6.8)	16 (25.8)	0.01
Atrial fibrillation	16 (27.1)	47 (75.8)	<0.00
History of pacing device implantation	7 (11.9)	17 (27.4)	0.03
History of heart failure	54 (91.5)	60 (96.8)	0.27
NYHA functional class IV	19 (32.2)	19 (30.7)	0.85
STS PROM. % Bichat - Claude-Bernard	8.7 ± 10.1	$\textbf{12.7} \pm \textbf{8.0}$	<0.00



Kamioka et al. JACC Interv 2018



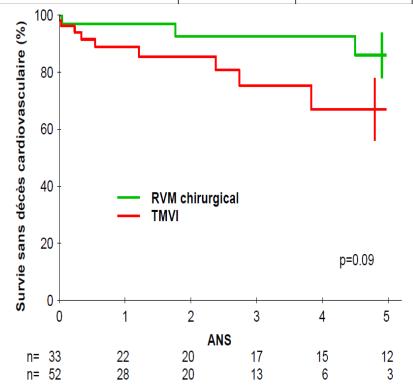
TMVI vs Redo Surgery



Bichat TMVI vs RVM redux

	Tous (n = 85)	RVM (n = 33)	TMVI (n = 52)	p
Sexe féminin	59 (69.4)	21 (66.7)	38 (73.1)	0.36
Âge (ans)	58.4 ± 19.5	51.0 ± 14.8	63.1 ± 20.7	0.002
EuroSCORE I (%)	19.1 ± 16.4	10.5 ± 6.5	24.8 ± 18.5	<0.0001
EuroSCORE II (%)	10.0 ± 10.1	6.2 ± 3.3	12.5 ± 12.2	0.001
IMC (kg/m²)	24.5 ± 4.5	24.6 ± 4.6	24.5 ± 4.6	0.93
Surface corporelle (m²)	1.8 ± 0.9	1.8 ± 0.2	1.7 ± 0.2	0.14

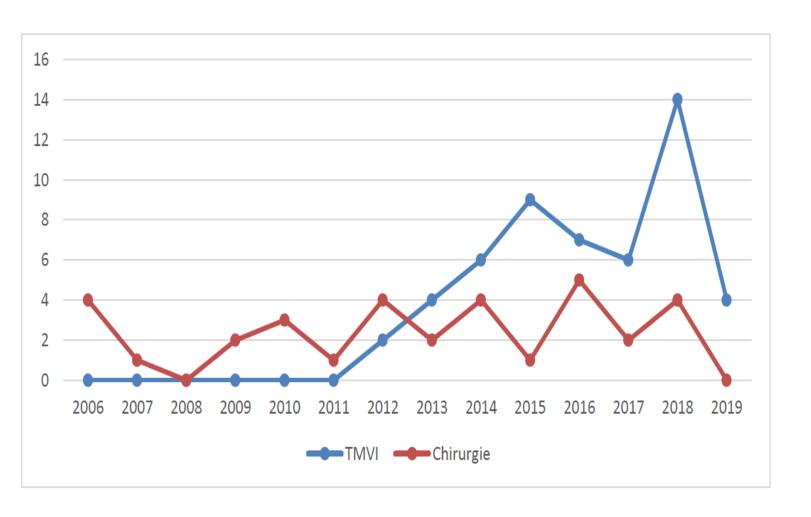
Thèse Fuchs A 2019 Non publiée







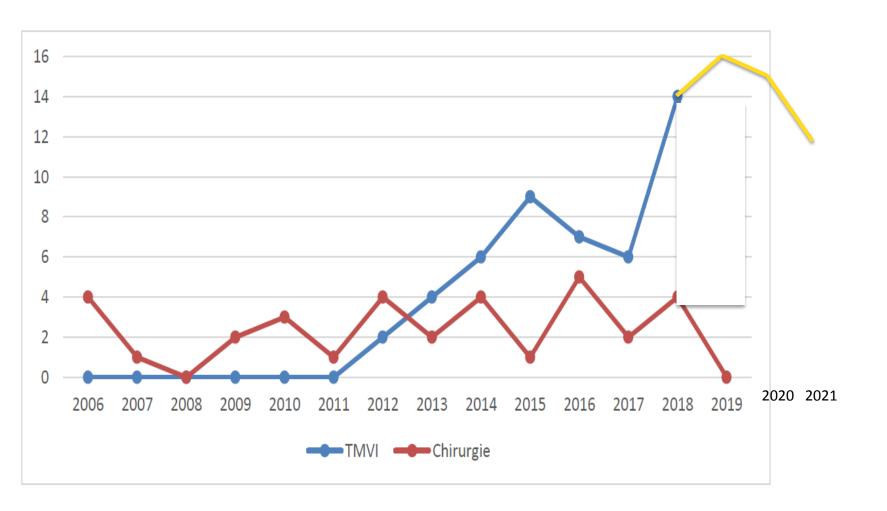
Bichat: ViV TMVI vs chirurgie redux







Bichat: ViV TMVI vs chirurgie redux

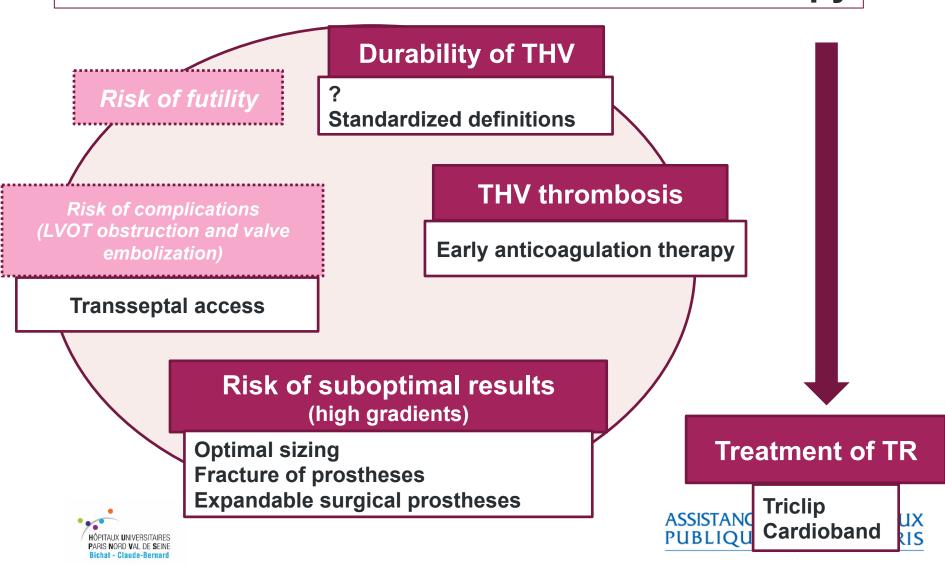




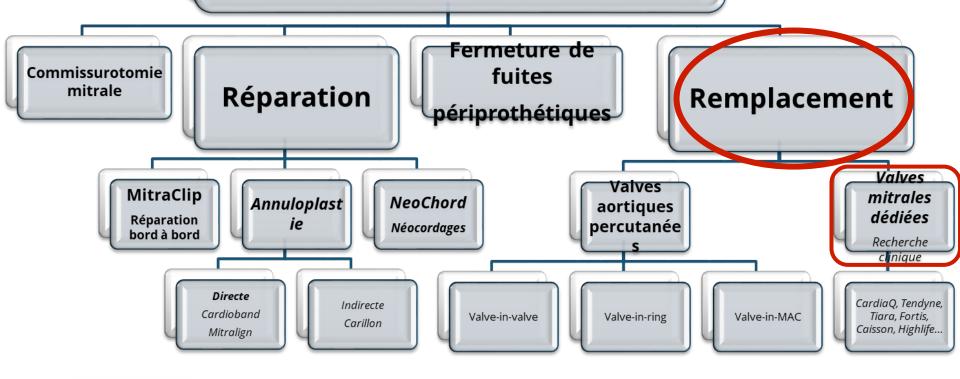


Perspectives-VIV TMVI

VIV-TMVI will become the 1st choice therapy



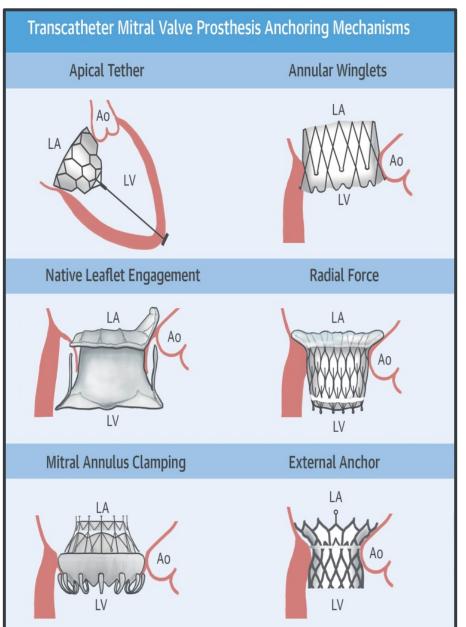
Procédures mitrales percutanées







TMVI - Valves natives non calcifiées

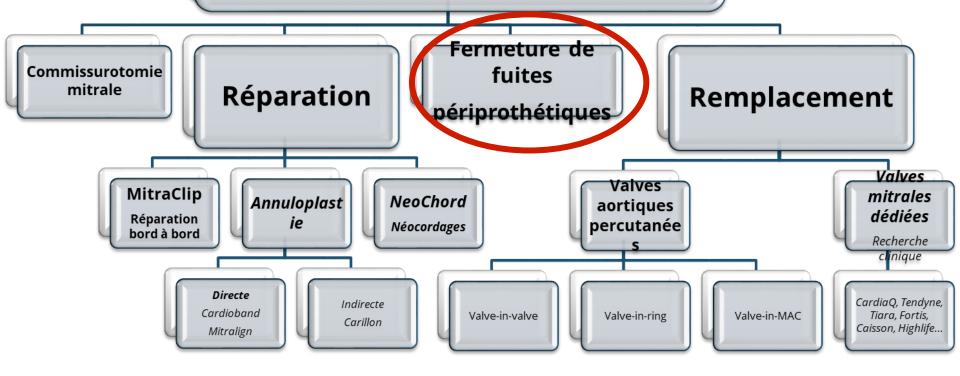


Regueiro et al. JACC 2017





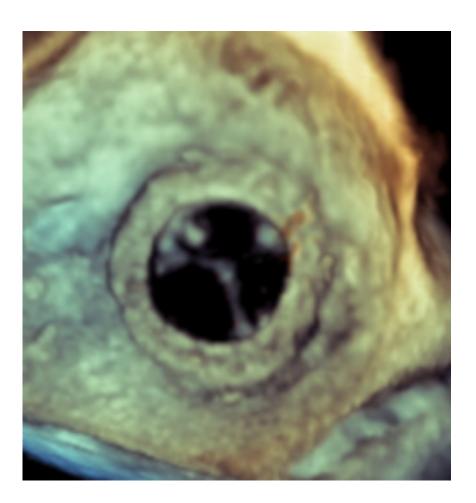
Procédures mitrales percutanées

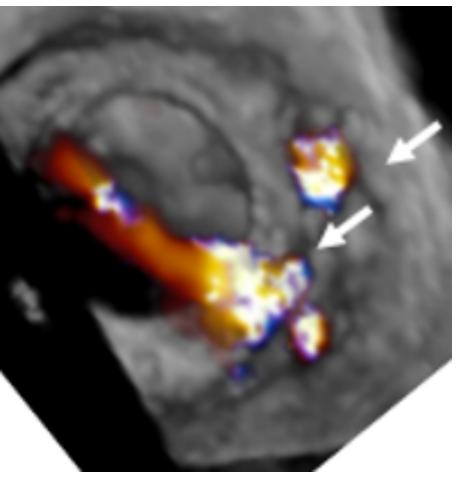






FPFP - ETO -3D + couleur

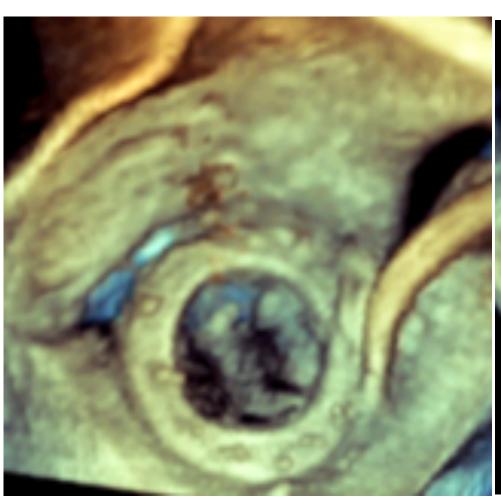


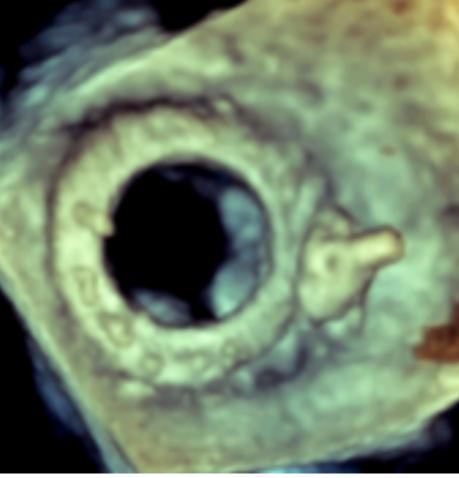






FPFP – Un plug

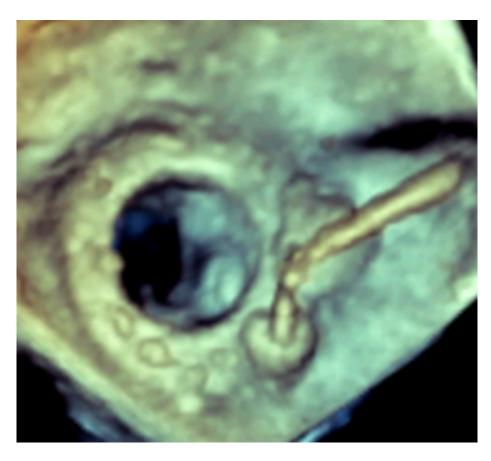


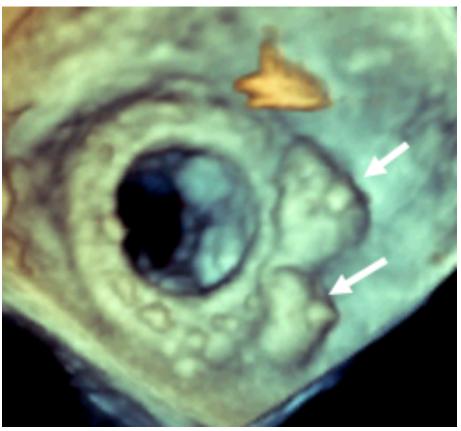






FPFP – 2 plugs









FPFP

AVP III

VSD Occluder

Occlutech











Conclusions

- Fin du commencement
- Essor plus lent que le TAVI, plus complexe
 - candidats plus divers et techniques multiples,
 - courbe d'apprentissage plus longue (voie transseptale)
- MitraClip largement utilisé en France, Europe, Etats-Unis
- TMVI Valve-in-valve très sûr et performant, sous-utilisé
- Prochaine étape décisive: prothèses mitrales percutanées dédiées





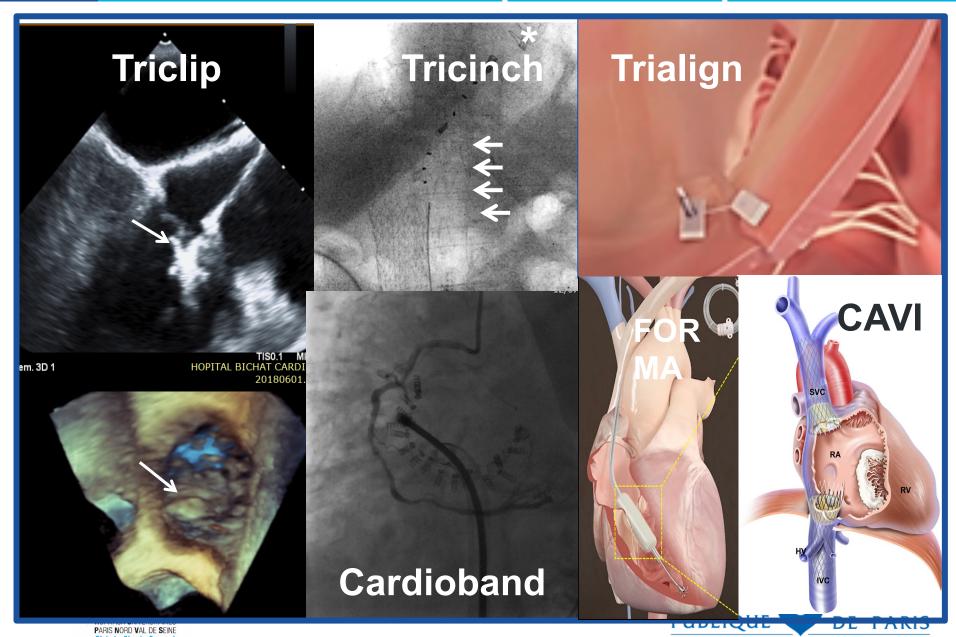
Tricuspid percutaneous repair – Edge to edge

Trial	TriClip System
TRILUMINATE Pivotal	The primary objective of this trial is to demonstrate the safety and effectiveness of the TriClip device in improving clinical outcomes in symptomatic patients with severe tricuspid regurgitation, who are at intermediate or greater estimated risk for mortality or morbidity with tricuspid valve surgery. This randomized controlled trial will compare TriClip to medical therapy.
bright	An observational single-arm, multicenter, real-world study evaluating severe tricuspid regurgitation in
TRI-FR	Evaluation of tricuspid valve percutaneous repair system compared to conventional pharmacological treatment in the treatment of severe secondary tricuspid disorders in patients unsuitable for surgical isolated correction of tricuspid regurgitation.
	PASCAL System
CLASP TR EFS	Early feasibility study of the PASCAL system for tricuspid valve repair in patients with tricuspid insufficiency. Enrollment is currently limited to patients in the United States.
CLASP II TR	Prospective, multicenter, randomized, controlled pivotal trial to evaluate the safety and effectiveness of transcatheter tricuspid valve repair with the PASCAL System and OMT compared to OMT alone in patients with tricuspid regurgitation.
TriCLASP	European prospective, multicenter post-market study of transcatheter repair of tricuspid regurgitation





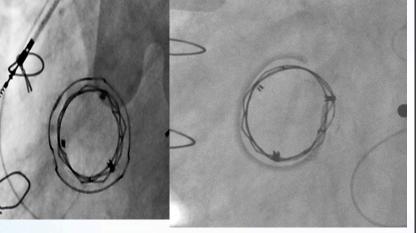
Percutaneous Tricuspid Valve Repair

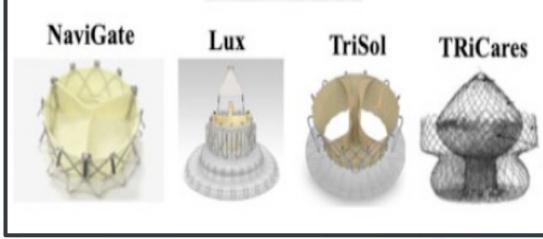


Percutaneous Tricuspid valve Replacement

Current Pratice

Research

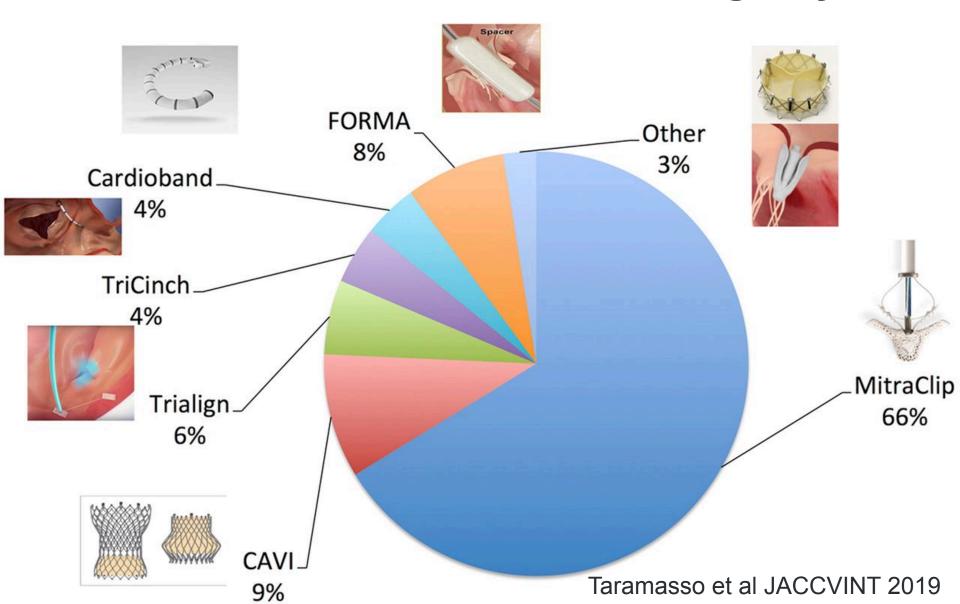








Interventions tricuspides percutanées International TriValve Registry



Interventions tricuspides percutanées

Questions

- Population très hétérogène: IT isolée / cardiopathie gauche associée?
- Comment et quand sélectionner les patients?
- Quels critères utiliser? Cliniques?
 Echographiques?
- Comment évaluer les résultats?





Conclusions

- TAVI: Changement de paradigme
 - Avant: Chirurgie si possible, TAVI si nécessaire
 - Maintenant: TAVI si possible, chirurgie si nécessaire

- Interventions mitrales percutanées
 - La fin du commencement

- Interventions tricuspides percutanées
 - Ce n'est plus la valve oubliée
 - Mais beaucoup de chemin à faire encore

Merci!



