Update CardSurg

Awareness: The first step to change

YEARBOOK 2022

Update CardSurg Yearbook 2022

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"*Our future growth relies on competitiveness and innovation, skills and productivity... and these in turn rely on the education of our people.*"

-Julia Gillard

Our field is advancing daily and keeping up with the new research is one of our duties. The intention of this yearbook is to increase the academic awareness among cardiac surgeons and residents and also to improve our evidence– based practice.

In this yearbook, we have incorporated selected interesting articles related to cardiac surgery published in 2022 from issues of these journals and tried to summarize it for easy comprehension and a quick read.

For detailed reading please click on the title of that article.

I would really appreciate your feedback on my email: getcardiacsurgeon@gmail.com.

Feel free to share the newsletter on relevant platforms. *Please feel free to contact me if you would like to contribute to this academic endeavour.*

My colleagues have always been my inspiration. With warm regards to my teachers, seniors and friends.

Dr Manish K. Hinduja **Dr Chaitanya Chittimuri**

From the **Editor's Desk**

Like every medical practitioner, we as cardiac surgeons need to keep pace with the recent developments happening globally. With the upsurge in cardiovascular and thoracic diseases worldwide, patients are certainly going to get benefit from newer technologies & better perioperative management. In this yearbook, we have tried to summarize most of the interesting articles published globally. This yearbook shall also be useful to cardiac surgery residents who are interested in learning beyond basics by having an edge with updated current knowledge. We might have missed a good number of them too and we encourage readers to go through them as well. We are just providing the summaries of the research articles and we urge readers to go through the complete article for better analysis and understanding.

Update CardSurg can now also be accessed on **IACTS website.** Please click on the following link to access the new and previous issues of Update CardSurg. https://www.iacts.org/content/tips-tricks.

Happy Reading.

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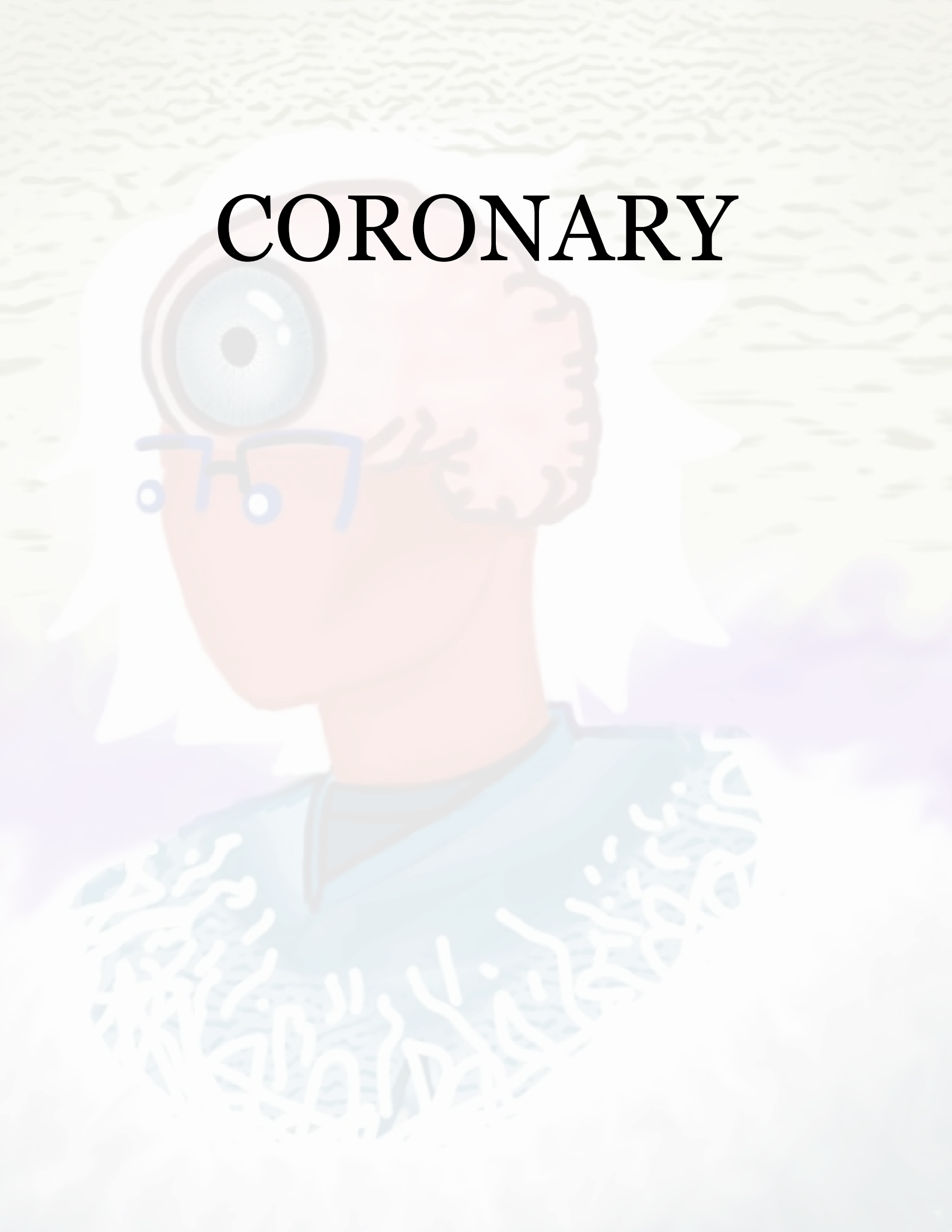
CORONARY



ADULT: CORONARY

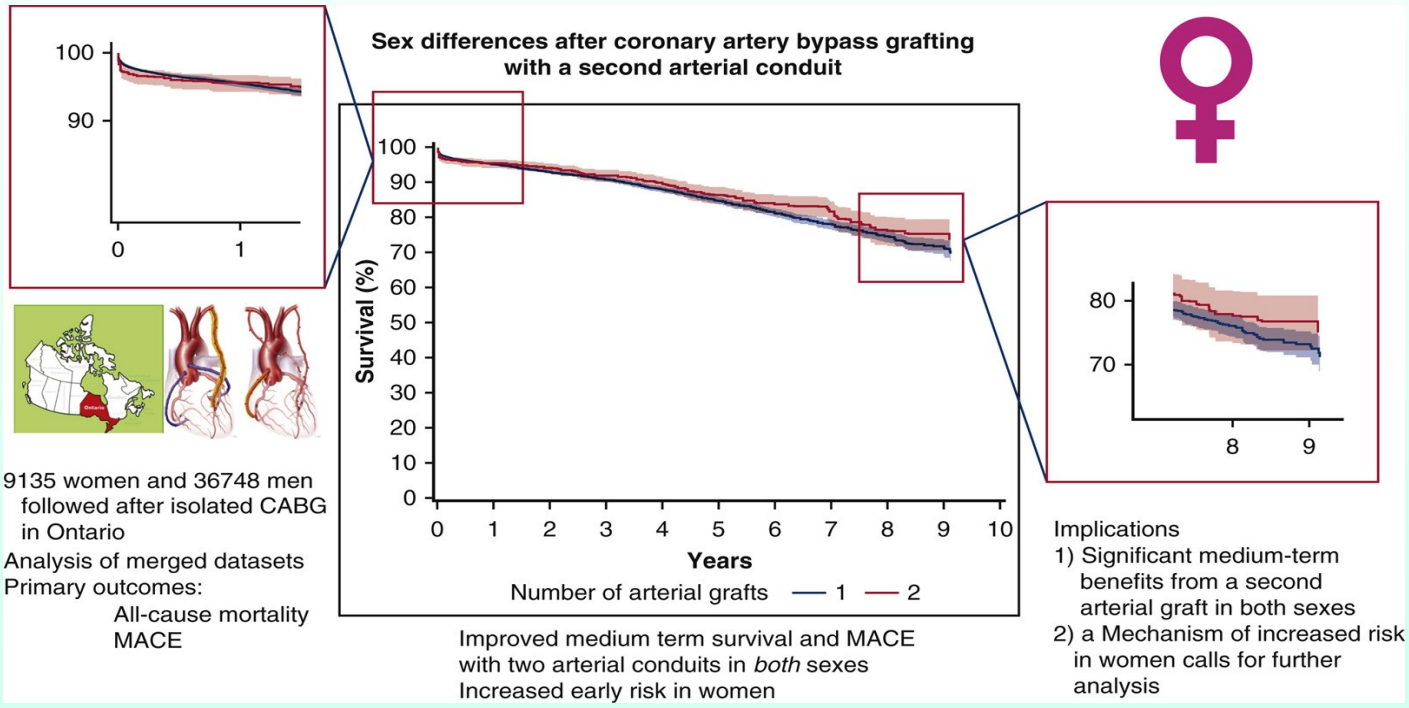
Sex differences after coronary artery bypass grafting with a second arterial conduit (JTCVS)

Rubens FD, Wells GA, Coutinho T, Eddeen AB, Sun LY. Sex differences after coronary artery bypass grafting with a second arterial conduit. J Thorac Cardiovasc Surg. 2022 Feb;163(2):686-695.e10. doi: 10.1016/j.jtcvs.2020.04.058. Epub 2020 Apr 23. PMID: 32493659.

Key points:

- It is a population-based, retrospective cohort study of all Ontarians who underwent primary isolated coronary artery bypass grafting with single arterial conduits (SAC) or double arterial conduits (DAC) between October 2008 and September 2017.
- Among women, a double arterial conduit was associated with an increased rate of 30-day death (hazard ratio, 1.48) and major adverse cardiac and cerebrovascular events (hazard ratio, 1.32) while there was no difference in mortality or major events in men comparing the two cohorts.
- The incremental improvement in 9-year survival was 4.0% in women with a double arterial conduit and 0.9% in men.

Comments:



A second arterial conduit has been proposed as a strategy to improve outcomes after coronary surgery. DAC in men was associated with improved medium-term survival, MACCE, repeat revascularization, MI, and HF at 1, 5, and 9 years compared with SAC. The observed lower risk of stroke may be due to the use of 2 pedicled internal thoracic arteries (with less aortic manipulation) in those treated with DAC. In contrast, DAC compared with SAC in women was associated with an increased risk of death and MACCE at 30 days, albeit a markedly lower risk of death and MACCE at 5 and 9 years. The incremental benefit of DAC on 9-year survival in women was 4% compared with 1.6% in men. It is possible that this was related to the fact that women undergoing CABG generally present at a later age with more comorbidities. Women also have higher rates of postoperative complications, such as new-onset dialysis and late cardiac readmission (including hospitalization for MI). LITA with SVG versus LITA and radial artery by Gaudino and colleagues demonstrated that there was an interaction between the female sex and the second arterial conduit, which was associated with a greater benefit in terms of major adverse cardiac events. The female sex was also found to be associated with a lower risk of radial artery graft occlusion.

Take Home Message: Double arterial conduit is associated with better medium-term survival and cardiovascular outcomes in both sexes. Double arterial conduits are associated with increased perioperative risk in women, but the medium-term benefit is greater than in men.

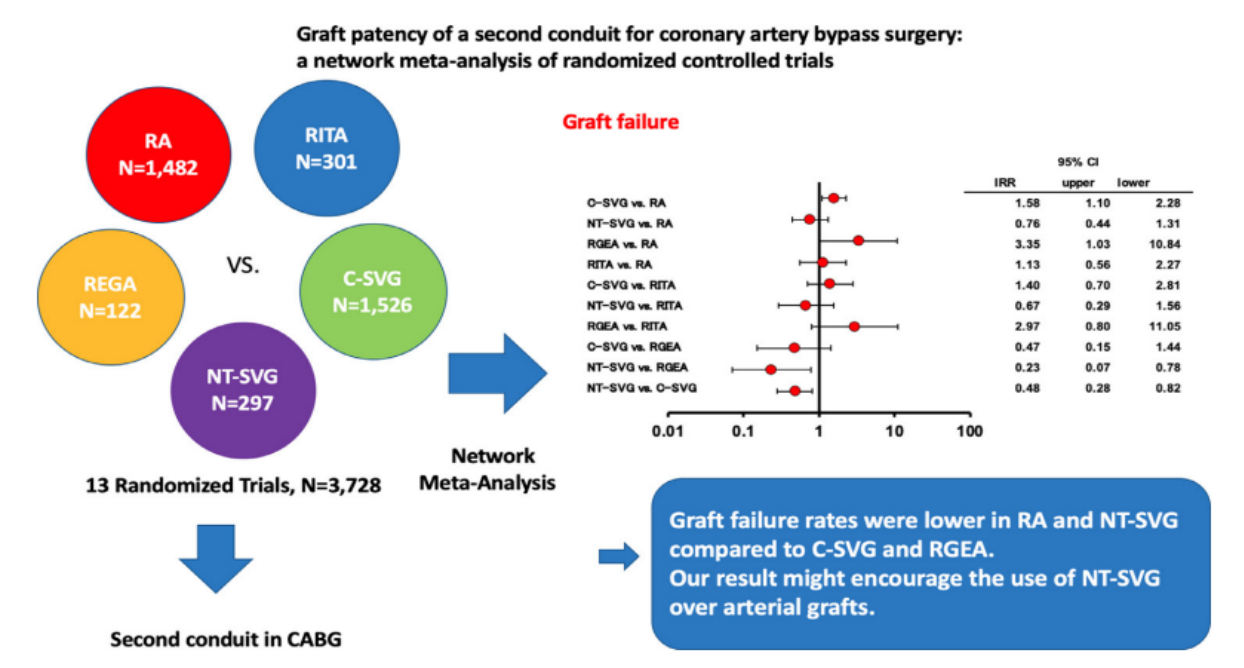
ADULT: CORONARY

Graft Patency of a Second Conduit for Coronary Artery Bypass Surgery: A Network Meta-Analysis of Randomized Controlled Trials (SEMTCVS)

Yokoyama Y, Takagi H, Kuno T. Graft Patency of a Second Conduit for Coronary Artery Bypass Surgery: A Network Meta-Analysis of Randomized Controlled Trials. Semin Thorac Cardiovasc Surg. 2022 Spring;34(1):102-109. doi: 10.1053/j.semtcvs.2021.02.002. Epub 2021 Feb 17. PMID: 33609673.

Key points:

- This is a network meta-analysis of RCTs to compare graft patency of the radial artery (RA), the right internal thoracic artery (RITA), the right gastroepiploic artery (RGEA), conventional saphenous vein (C-SVG), and no-touch saphenous vein (NT-SVG) as a second conduit in CABG.
- A total of 13 RCTs including 3728 patients and 2773 angiographic results were included. The graft failure rates were significantly lower in NT-SVG and RA compared to C-SVG and RGEA. There was no significant difference among the other comparisons.



Comments: The most recent society guidelines provide several relevant recommendations in this realm. The use of a second arterial conduit is a Class IIa recommendation in appropriate patients, a radial artery (RA) is a Class I recommendation compared to a conventional SVG, bilateral ITA graft is a Class IIa recommendation in patients not at high risk for sternal infection, and finally that a NoTouch SVG (NT-SVG) is preferred when open SVG harvesting is used. Yokoyama and colleagues used a network meta-analysis (NMA) of 13 RCTs involving a total of 3728 patients, of whom 2773 had angiographic assessment. A NMA, as opposed to the standard pair-wise meta-analysis, allows the investigators to incorporate direct and indirect comparisons to make inferences about the preferred second conduit. The authors concluded that the graft occlusion results for the RA and NT-SVG were statistically better than for conventional SVGs (or the gastroepiploic) while all other comparisons were not statistically different. According to the P-scores, the NT-SVG ranked highest. In the final RAPCO publication, graft occlusion was statistically and significantly lower in the RA compared to the right ITA and also in terms of survival. A caveat of RAPCO is that the right ITA was used as a free graft - it is uncertain whether the results should apply to in situ right ITA grafts. However, observational angiographic studies from the Melbourne group documented that late graft occlusion was similar between both free and in situ right ITAs and decreased compared to RA or conventional SVG conduits. Pertinent clinical data surrounding the right ITA is conflicting. However in the largest RCT to date to address this question, the intention to treat analysis of the Arterial Revascularization Trial (ART) did not identify any benefit of bilateral compared to single ITA grafting in terms of clinical outcomes out to 10 years,7 even though a more recent substudy did suggest a benefit in terms of event free survival restricted to patients 50-70 years of age.

Take Home Message: NT-SVG and RA have better graft patency compared to C-SVG and RGEA. Analysis results might encourage the use of NT-SVG over arterial grafts as the second graft.

ADULT: CORONARY

Does the Addition of a Gastroepiploic Artery to Bilateral Internal Thoracic Artery Improve Survival?

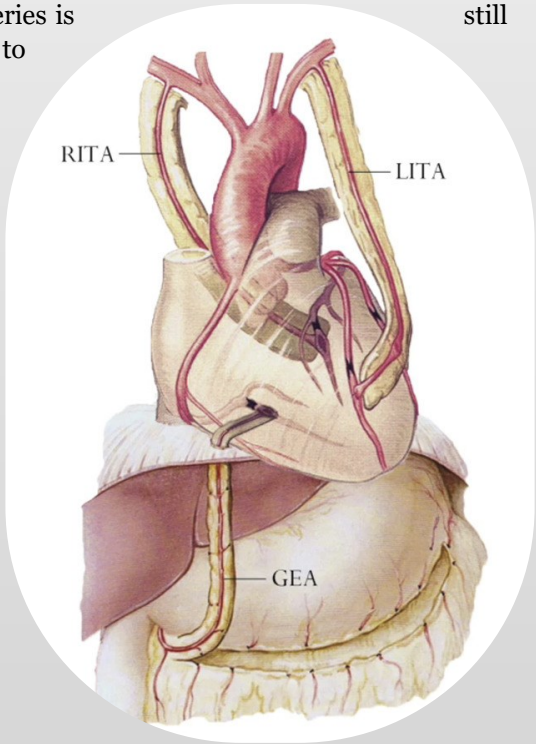
Jegaden OJL, Farhat F, Jegaden MPO, Hassan AO, Eker A, Lapeze J. Does the Addition of a Gastroepiploic Artery to Bilateral Internal Thoracic Artery Improve Survival? Semin Thorac Cardiovasc Surg. 2022 Spring;34(1):92-98. doi: 10.1053/j.semtcvs.2021.01.009. Epub 2021 Feb 16. PMID: 33600960.

Key points:

- This retrospective study compared long-term survival of patients undergoing left-sided BITA grafting in which the third conduit to the right coronary system (RCA) was either vein graft (SVG) or gastroepiploic artery (GEA).
- From 1989 to 2014, 1432 consecutive patients underwent left-sided revascularization with BITA associated with SVG (n = 599) or GEA (n = 833) to RCA. Propensity score was calculated by logistic regression model and patients were matched 1 to 1 leading to 2 groups of 320 matched patients.
- The 30-day mortality was 1.6% without influence of the graft configuration. Postoperative follow-up was 13.6 ± 6.6 years and was 94% complete. The significant difference in patients' survival observed at 20 years in favor of GEA in unmatched groups (48 ± 4% vs 33 ± 6%, P < 0.001) was not confirmed in matched groups (41 ± 7% vs 36 ± 7%, P = 0.112). In multivariable Cox model analysis, the conduit used to RCA did not influence the long-term survival in matched groups, like no other graft configuration or operative parameter.
- Only complete revascularization remained predictor of survival (P = 0.016), with age (P < 0.0001), diabetes status (P = 0.007), and left ventricle ejection fraction (P < 0.0001).

Comments:

The impact of a third conduit associated to bilateral internal thoracic arteries is still controversial. This study shows that the use of the gastroepiploic artery to bypass the right side has no impact on the long-term survival when compared to vein graft. Its added value could be limited on the occurrence of cardiac events and it remains an adjunct to more complete arterial revascularization. This paper shows that the GEA is safe and effective as a coronary graft. It also puts into question the degree of additional benefit of a third arterial graft, particularly when placed on the right side. The authors should be commended for an outstanding study on the long term outcomes of GEA grafting in addition to BITA. However, there are some inherent disadvantages of the GEA and larger trends in surgical training that will likely limit its use. First, there are some patient-related, relative contraindications to GEA use including obesity, history of abdominal surgery. Second, the GEA diameter, length and flow may be an issue - indeed in this study 58% of such grafts were abandoned completely. Third, the GEA cannot be accessed by interventional cardiologists in any subsequent procedure to address any downstream coronary lesion using percutaneous intervention. Finally, accessing the GEA necessitates entering into the abdominal cavity, which is time consuming, technically challenging and risks injury to an abdominal organ(s).



Take Home Message:

Long-term survival in patients undergoing BITA grafting is not affected by using GEA as third arterial conduit in alternative to SVG. Further studies are necessary to assess its impact on long-term cardiac events.

ADULT: CORONARY

Percutaneous coronary intervention versus coronary artery bypass graft for left main coronary artery disease: A meta-analysis (JTCVS)

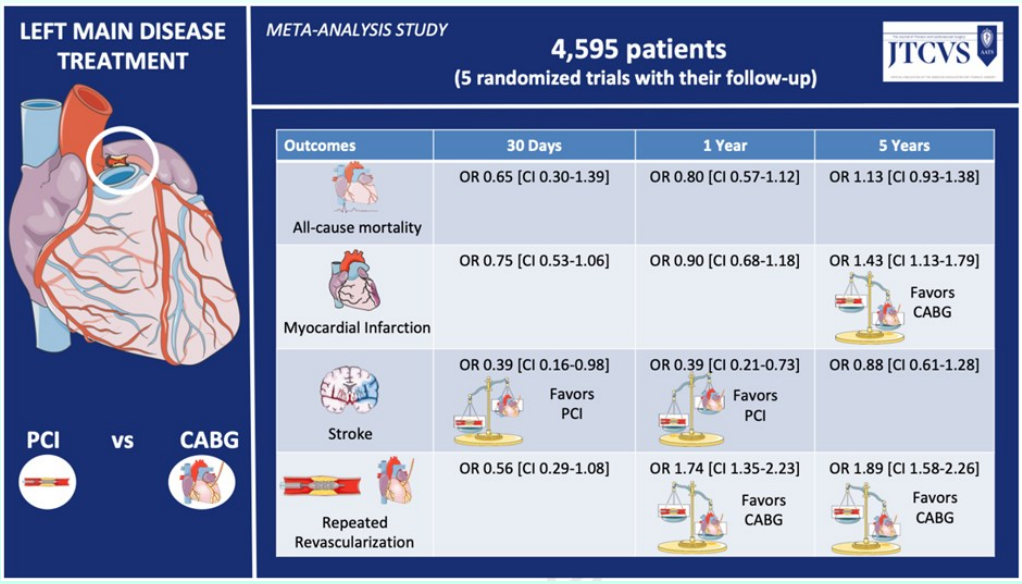
Gallo M, Blitzer D, Laforgia PL, Doulamis IP, Perrin N, Bortolussi G, Guariento A, Putzu A. Percutaneous coronary intervention versus coronary artery bypass graft for left main coronary artery disease: A meta-analysis. J Thorac Cardiovasc Surg. 2022 Jan;163(1):94-105.e15. doi: 10.1016/j.jtcvs.2020.04.010. Epub 2020 Apr 15. PMID: 32499076.

Key points:

- Online electronic databases were systematically reviewed until January 2020 for randomized trials comparing PCI with drug-eluting stents and CABG. 4,595 patients from 5 randomized trials with LM disease were included to summarize the current evidence.
- At 30 days and 1 year, PCI was associated with lower incidence of stroke, higher repeated revascularization, and similar odds of mortality and myocardial infarction compared to CABG. PCI was associated with lower periprocedural MI at 30-days, while at 5-years PCI was associated with higher non-periprocedural MI. At 5 years, PCI was associated with higher rates of MI and repeat revascularization. Mortality and stroke rate did not differ at 5 years follow-up.

Comments:

The optimal revascularization strategy for patients with left main disease requires an individualized approach, taking into account the 30-day and 1-year reduced risk of stroke after PCI treatment, and by considering the patient life expectancy with reduced myocardial infarction and repeated revascularization after CABG treatment at 5-year follow-up. . To date, 5 randomized trials and their follow-ups have compared PCI with DES and CABG in LM disease. Among these, the Coronary Artery Bypass Grafting versus Drug-Eluting Stent Percutaneous Coronary Angioplasty in the Treatment of Unprotected Left Main Stenosis (NOBLE) trial failed to demonstrate a noninferiority of PCI versus CABG in terms of a composite outcome of all-cause mortality, nonprocedural myocardial infarction (MI), any repeat coronary revascularization, and stroke after 5 years of follow-up. However, other studies have shown comparable outcomes after PCI and CABG. The most recent 10-year follow-up of the LM population of the Synergy between Percutaneous Coronary Intervention with Taxus and Cardiac Surgery (SYNTAX) trial showed no difference in mortality between PCI and CABG. Similarly, the 5-year follow-up of the Evaluation of the Xience Everolimus-Eluting Stent versus Coronary Artery Bypass Surgery for Effectiveness of Left Main Revascularization (EXCEL) trial did not show differences between PCI and CABG in terms of the composite end point of death, stroke, or MI at 5 years. Furthermore, a pooled analysis comprising 11,518 patients with multivessel disease, including 4478 patients with LM disease, showed no difference between PCI and CABG in terms of mortality. However there are limitations to this analysis like, the absence of individual patient data and detailed revascularization techniques in the original publications hindered the performance of an individual-patient meta-analysis. Other limitations common to all meta-analyses include the use of a summary treatment measure for 5-year outcomes that ignores the time-to-event nature of the data, censoring, and the lack of accounting for the competing risk of death. Some outcomes definitions of the included RCTs were similar but not equal.



Take Home Message: CABG surgery in left main disease was associated with a reduction in myocardial infarction, nonperiprocedural myocardial infarction, and need for repeated revascularization at 5- year follow-up, although it was associated with higher stroke to up 1 year.

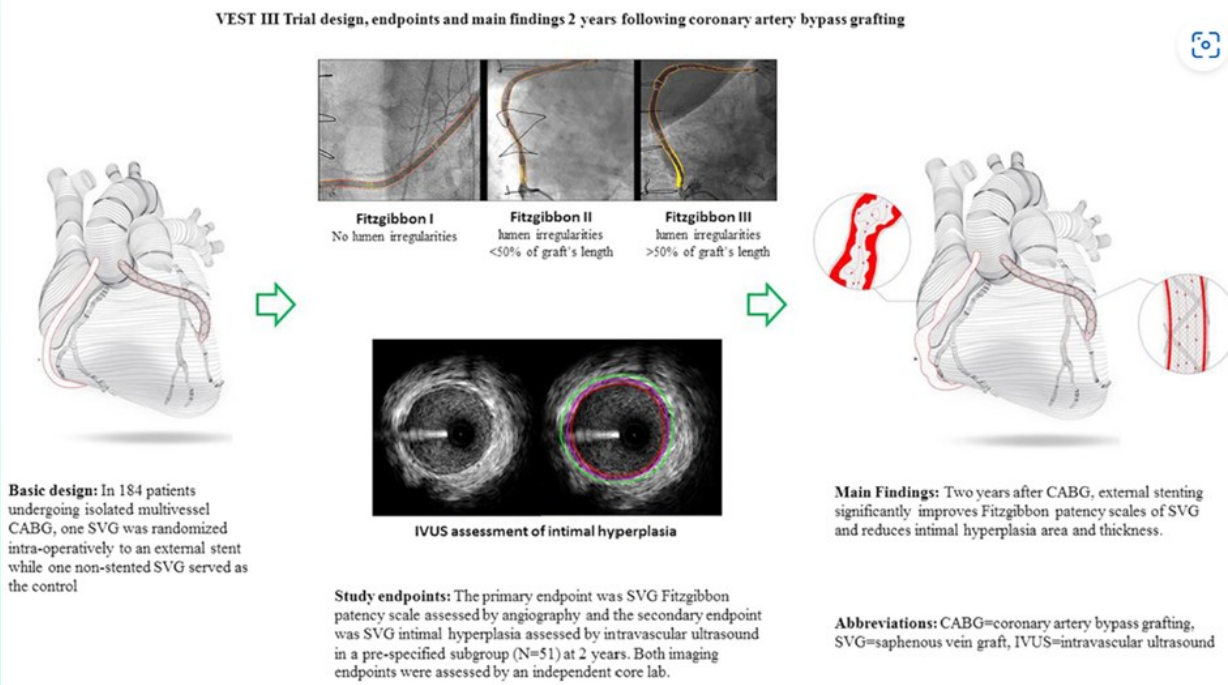
ADULT: CORONARY

External stenting and disease progression in saphenous vein grafts two years after coronary artery bypass grafting: A multicenter randomized trial (JTCVS)

Taggart DP, Gavrilov Y, Krasopoulos G, Rajakaruna C, Zacharias J, De Silva R, Channon KM, Gehrig T, Donovan TJ, Friedrich I; InVESTigators. External stenting and disease progression in saphenous vein grafts two years after coronary artery bypass grafting: A multicenter randomized trial. J Thorac Cardiovasc Surg. 2022 Nov;164(5):1532-1541.e2. doi: 10.1016/j.jtcvs.2021.03.120. Epub 2021 Apr 21. PMID: 34024615.

Key points:

- The effect of external stents on the progression of saphenous vein graft disease was studied in total of 184 patients undergoing isolated coronary artery bypass grafting, using an internal thoracic artery graft and at least 2 additional saphenous vein grafts, who were enrolled in 14 European centers.



- One saphenous vein graft was randomized to an external stent, and 1 nonstented saphenous vein graft served as the control. the saphenous vein graft Fitzgibbon patency scale by angiography, and the saphenous vein graft intimal hyperplasia by intravascular ultrasound were assessed at 2 years.
- The Fitzgibbon patency scale was significantly improved in stented versus nonstented saphenous vein grafts .The Overall patency rates were similar between stented and nonstented saphenous vein grafts . Externally stented saphenous vein grafts also showed significant reductions in mean intimal hyperplasia area and thickness.

Comments:

Despite the proposed benefits of multiple arterial grafts, autologous saphenous vein grafts (SVGs) are still the most frequently used (80%) bypass conduits in coronary artery bypass grafting (CABG). SVG failure may be classified into early and late phases. Early SVG failure is largely due to intraoperative technical issues, poor conduit quality or harvesting techniques, or inadequate runoff within the target vessel. Late SVG failure may due to intimal hyperplasia whereby smooth muscle cells proliferate and migrate to the dysfunctional intima.

Prior to this study, little data existed regarding the potential of external stents to mitigate long-term disease progression in saphenous vein grafts. All procedures in this study were performed with cardiopulmonary bypass. The SVG was threaded through the device before performance of the proximal anastomosis and manually expanded over the entire SVG. No further fixation of the device to the vein graft was performed. External stenting cannot mitigate many of the causes of early vein graft failure but is instead designed to minimize disease progression in the SVG over the longer term. Reinterventions were more frequently driven by ischemia in the nonstented territory, than in the stented territory.

This is the largest randomized clinical trial to evaluate the potential benefit of external stenting on SVG disease progression but, sample size remains relatively small (n = 184), and the currently reported duration of follow-up is limited.

Take Home Message: Two years after CABG, external stenting improves Fitzgibbon patency rates of vein grafts and significantly reduces diffuse intimal hyperplasia.

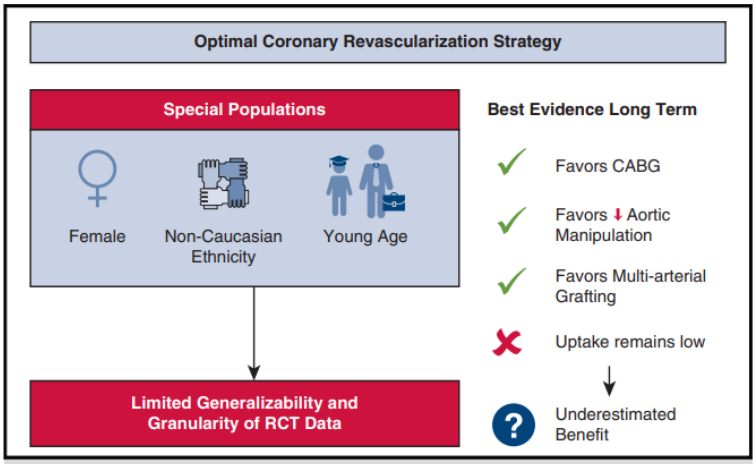
ADULT: CORONARY

Comparative effectiveness of revascularization strategies for early coronary artery disease: A multicenter analysis (JTCVS)

Robich MP, Leavitt BJ, Ryan TJ Jr, Westbrook BM, Malenka DJ, Gelb DJ, Ross CS, Wiseman A, Magnus P, Huang YL, DiScipio AW, Iribarne A; Northern New England Cardiovascular Disease Study Group. Comparative effectiveness of revascularization strategies for early coronary artery disease: A multicenter analysis. J Thorac Cardiovasc Surg. 2022 Feb;163(2):645-656.e2. doi: 10.1016/j.jtcvs.2020.03.164. Epub 2020 May 20. PMID: 32684394.

Key points:

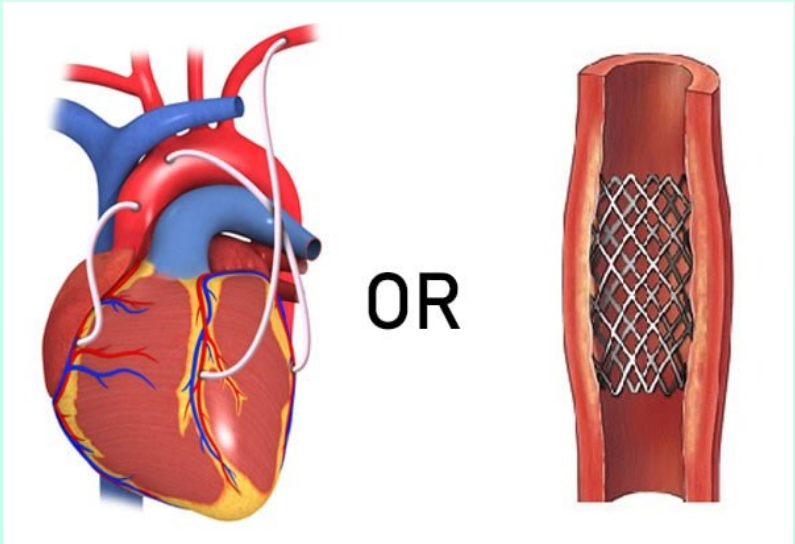
- All cardiac revascularization procedures from 2005-2015 among 7 medical centers obtained from registries of the Northern New England Cardiovascular Disease Study Group (NNECDSG) in < 60 years-old and ≥ 70% stenosis in ≥ 1 major coronary artery were studied to examine the comparative effectiveness of CABG versus PCI. 1,945 cardiac surgery and 2,938 percutaneous patients were analysed with primary endpoint being all-cause mortality and secondary endpoints being stroke, repeat revascularization, and 30-day mortality.
- Patients undergoing CABG had more comorbid conditions such as vascular disease, diabetes, chronic obstructive pulmonary disease, congestive heart failure. PCI patients were also younger, more likely to be female with 1-vessel disease , higher mean ejection fraction, and more urgent on presentation.
- There was no significant difference in 30-day mortality for multivessel disease patients. Patients undergoing surgery had a higher risk of stroke. Surgery was associated with superior 10-year survival compared to percutaneous (Hazard Ratio 0.71). Repeat procedures occurred in 13.4% of surgery and 36.4% of percutaneous patients with both groups having mostly percutaneous as their second operation.



Percutaneous coronary intervention vs coronary artery bypass grafting.

Comments:

Young patients are at risk for cardiovascular disease, and a 1.2% prevalence of coronary artery disease in patients less than 45 years of age . The ideal treatment strategy for young patients with significant coronary artery disease has been evolving. Traditionally patients < 60 years old have been underrepresented in randomized trials of CABG versus PCI. In <60 year olds, CABG was associated with higher freedom from all-cause mortality and repeat revascularization when compared to PCI but higher rates of stroke and acute kidney injury compared to PCI. In this age group with multi-vessel disease , CABG should be considered for . The long-term survival of patients undergoing CABG may be explained, in part, by the use of an arterial conduit for revascularization with added survival benefit of a second arterial conduit. The decision-making process for revascularization in young patients is complex. There is a trade-off between the short-term goals of returning to work and family and the long-term survival benefit of CABG but the associated time for recovery.



Take Home Message: Among patients aged less than 60 years with 2-vessel disease that includes the left anterior descending or 3-vessel coronary artery disease, surgery was associated with greater long-term survival and decreased risk of repeat revascularization.

ADULT: CORONARY

Short and long-term outcomes after off-pump coronary endarterectomy stratified by different target vessels (JCS)

Fang Y, Wei H, Wu Z, Song W, Liu C, Li H, Gu C. Short and long-term outcomes after off-pump coronary endarterectomy stratified by different target vessels. J Cardiothorac Surg. 2022 Dec 25;17(1):339. doi: 10.1186/s13019-022-02089-x. PMID: 36567322; PMCID: PMC9791732.

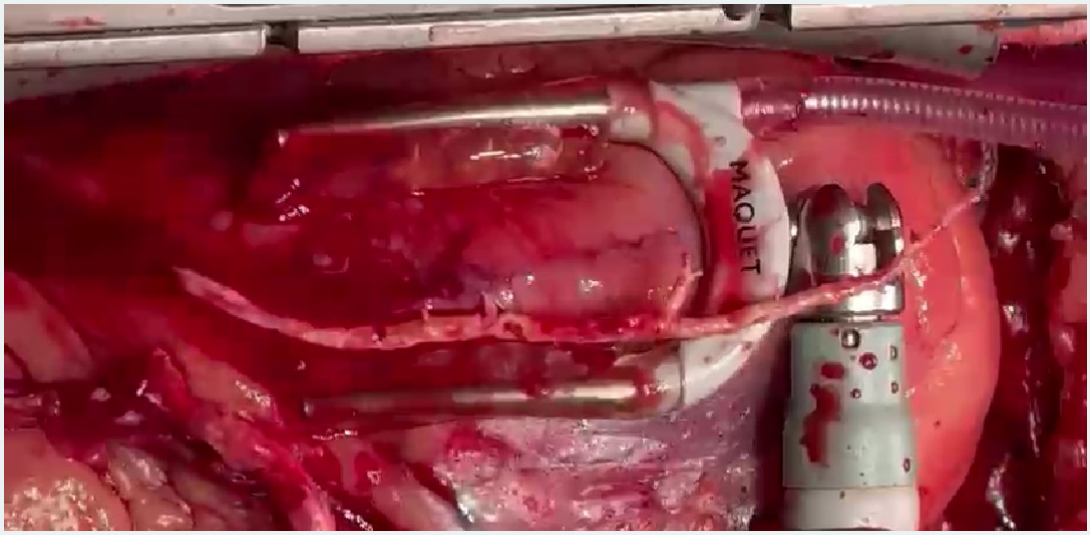
Key points:

- This retrospective study assessed the effect of the territory and number of coronary endarterectomy (CE) on short- and long-term outcomes of diffuse coronary artery disease (DCAD).
- From January 2012 to December 2014, 246 patients undergoing off-pump coronary artery bypass grafting (OPCABG) + CE were included. The patients were grouped by the territory and number of CE. 26.42% were in the left anterior descending branch (LAD) group (CE on LAD), 54.47% in the right coronary artery (RCA) group (CE on RCA), and 19.10% in the multi-vessels group. postoperative acute myocardial infarction (PMI) in the LAD group, RCA group, and multi-vessels group were 3.08%, 6.72%, and 14.89%, respectively. Multi-vessels , CE-plaque length ≥ 3 cm and type 2 diabetes mellitus (2DM) were independent risk factors of PMI. The long-term (mean 76 months) MACCE in the LAD group, RCA group, and multi-vessels group were 13.85%, 17.91%, and 10.64%, respectively.

Comments:

The efficacy of off-pump coronary endarterectomy (CE) has been proven in patients with diffuse coronary artery disease (DCAD). The CE was performed by as follow indications: (1) Coronary angiography indicating diffuse lesions with length > 2 cm, luminal diameter < 1 mm in the main coronary artery; (2) intraoperative inspection finding no suitable anastomotic location in the middle-distal of the coronary artery with a wide blood supply territory. The atherosclerotic plaque was removed using the closed-CE technique.

The postoperative antithrombotic strategy included (1) Unfractionated heparin to maintain ACT > 180 s from 3 h after surgery to extubation if bleeding < 300 ml in the first 3 h after surgery; (2) Low molecular heparin to bridge-therapy for 3 days after extubation; (3) Dual antiplatelet therapy at 6 –24 h after surgery and continuing for one year; (4) One antiplatelet continuing for life.



Acute thrombosis is the most common cause resulting in perioperative myocardial infarction (PMI) due to CE breaking the structural and functional integrity of coronary endothelium. CE mainly affects early outcomes due to the high risk of thrombosis while long-term outcomes were similar. regardless of the number and territory of CE, complete removing plaques at the distal of anastomosis site and complete revascularization were critical to maintain good run-off and improve long-term prognosis. The limitations of the study are 1) the retrospective nature-susceptible to inherent bias 2)Multi-vessels CE was an independent risk factor causing PMI.

Take Home Message: Multi-vessel CE and CE-plaque length ≥ 3 cm significantly increased risk of PMI after OPCABG + CE, but the territory and number of CE did not affect long-term MACCE.

ADULT: CORONARY

Coronary endarterectomy in coronary artery disease: Factors affecting graft patency and survival (ASCVTS)

Chow SC, Ho JY, Kwok MW, Fujikawa T, Lim K, Wan S, Wong RH. Coronary endarterectomy in coronary artery disease: Factors affecting graft patency and survival. Asian Cardiovasc Thorac Ann. 2022 Feb;30(2):147-155. doi: 10.1177/02184923211006851. Epub 2021 Apr 6. PMID: 33823658.

Key points: 81 consecutive patients who had coronary endarterectomy (CE) done between 2009 and 2019 in Hong Kong (36 patients with follow up coronary study) were evaluated.

- The 30-day and 1-year mortality was 2.5 and 6.2%, respectively. One-year MACCE rate was 11.1%. Periprocedural myocardial infarction rate was 7.4%. Failed grafts were defined as grafts that were occluded or with >70% stenosis on coronary angiogram. Three patients required repeat revascularization within a mean follow-up duration of 49.6 ± 36.5 months. Overall graft patency was 89.2% at 20.2 months and graft patency post-coronary endarterectomy was 85.4%. Arterial grafts showed 100% patency. Vein grafts to endarterectomized obtuse marginal branch had patency rates of 33.3%. Multiple endarterectomies were associated with worse one-year major adverse cardiac and cerebrovascular events.

Comments: CE was usually performed on arteries which were totally or sub totally occluded. Great care has to be taken to avoid unintentional plaque disruption at the far ends, and residual debris was flushed antegradely and retrogradely by cardioplegia.

An explanation for the higher rates of perioperative MI could be attributed to the endothelial damage caused by CE resulting in endothelial dysfunction and trauma, which promotes de novo thrombogenesis, resulting in elevated risks of MI. Given the nature of CE, a larger enzyme leak may not be surprising, and this may not necessarily translate to worse outcomes. A purely biochemical diagnosis of periprocedural MI after CE, overestimation of risks. While incomplete revascularization has been shown to impact prognosis, unsuccessful CE can result in significant periprocedural morbidities. Indiscriminate CE is not suggested on small, diffusedly diseased coronaries that supply small territories of myocardium in the absence of evidence of ongoing ischemia.

Take Home Message: Judicious use of coronary endarterectomy should be practiced to balance the need of completeness of revascularization against the risk of myocardial infarction as it does not increase early mortality .

Surgical management and long-term follow-up of aberrant right coronary arteries in adults (JCS)

Bartram J, Hussain A, Chaubey S, Mittal A, Khan H, Wendler O. Surgical management and long-term follow-up of aberrant right coronary arteries in adults. J Card Surg. 2022 Jun;37(6):1497-1502. doi: 10.1111/jocs.16461. Epub 2022 Mar 30. PMID: 35355326.

Key points:

- A single-center retrospective review of all patients who underwent surgery for aberrant right coronary arteries between 2005 and 2021 was conducted and in-hospital and long-term outcomes were analysed at our institution.
- A total of 10 patients (5 females, median age: 51 years, 36–62) were identified. They presented with symptoms of chest pain (n = 8), dyspnoea (n = 1) or following cardiac arrest (n = 1). In the majority the RCA originated from the left coronary sinus (n = 9). In one of those patients and one in whom the RCA originated directly from the left anterior descending artery CABG was performed. The other 8 patients were treated using transfer of the RCA ostium. All patients were discharged home (median hospital stay 5 days, range: 4–10). Four patients experienced post-op atrial fibrillation. No other complications were observed. At a median follow-up of 10 years and 9 months, 9 patients were alive and free from cardiac symptoms. One patient died 3 years post surgery due to liver failure, unrelated to cardiac disease.

Comments:

Anomalous origins of the right coronary artery (RCA) can cause ischaemia and sudden cardiac death, particularly if the RCA runs between the aorta and pulmonary artery. Conventional CABG can be affected by early graft failure due to collateral blood flow. This study present single institutional experience in managing patients with RCA anomalies.

Take Home Message: In patients with an aberrant RCA, transfer of the ostium into the right coronary sinus carries a low surgical risk. It overcomes early graft failure in these patients, who present with a dynamic impairment in RCA blood flow. However, if fixed proximal RCA flow-limiting pathology exists, conventional bypass surgery is feasible.

ADULT: CORONARY

Timing of Coronary Artery Bypass Grafting in Acute Coronary Syndrome: A National Analysis (ATS)

Hadaya J, Sanaiha Y, Tran Z, Downey P, Shemin RJ, Benharash P. Timing of Coronary Artery Bypass Grafting in Acute Coronary Syndrome: A National Analysis. Ann Thorac Surg. 2022 May;113(5):1482-1490. doi: 10.1016/j.athoracsur.2021.05.057. Epub 2021 Jun 12. PMID: 34126075.

Key points:

- Adults admitted for ACS in the 2009-2018 National Inpatient Sample were grouped by time from coronary angiography to CABG (Δt): 0, 1-3, 4-7, and >7 days. Timing and mortality of CABG for ACS was compared between high-performing hospitals (below the median risk adjusted mortality for all CABG and valve operations) and others. Of 444,065 patients, time to CABG was Δt=0 in 12.3%, Δt=1-3 in 57.3%, Δt=4-7 in 26.3%, and Δt>7 in 4.2%.
- Risk-adjusted mortality was greatest at Δt=0 (4.5%) and Δt>7 (4.0%), but similar for operations performed at Δt=1-3 (1.8%) and Δt=4-7 (2.1%). Compared to Δt=1-3, hospitalization costs were greater for Δt=4-7 followed by those for Δt>7.

Comments:

Despite several retrospective studies reporting improved outcomes with delayed revascularization in patients with non-ST-elevation (NSTEMI) and ST-elevation myocardial infarction (STEMI), the optimal timing of coronary artery bypass grafting (CABG) following initial angiography remains controversial. Percutaneous coronary intervention (PCI) has become routine in patients presenting with unstable symptoms and carries a low risk of mortality.Most contemporary guidelines recommend PCI in most scenarios excluding three-vessel disease or anatomically complex lesions, reducing the need for urgent CABGs. However, the desire to delay revascularization must be counterbalanced by the risk of re-infarction, infarct expansion and catastrophic complications such as ventricular rupture and death. The proportion of CABG performed for STEMI or UA decreased during the study period, but increased for NSTEMI. CABG for ACS on the same day as, or >7 days following coronary angiography was associated with the greatest odds of mortality and complications.

Take Home Message: Revascularization on day 1-3 and 4-7 led to comparable in-hospital mortality, with greater rates on day 0 and after day 7. Costs were greater for revascularization at day 4-7 compared to day 1-3. These findings support the reduction of time to revascularization to 1-3 days when deemed clinically appropriate and feasible.

MITRAL VALVE

ADULT: MITRAL VALVE

Treatment options for ischemic mitral regurgitation: A meta-analysis (JTCVS)

Nappi F, Antoniou GA, Nenna A, Michler R, Benedetto U, Avtaar Singh SS, Gambardella IC, Chello M. Treatment options for ischemic mitral regurgitation: A meta-analysis. J Thorac Cardiovasc Surg. 2022 Feb;163(2):607-622.e14. doi: 10.1016/j.jtcvs.2020.05.041. Epub 2020 May 27. PMID: 32713629.

Key points:

- From 1,846 titles of manuscripts, 26 pertinent studies were identified and 12 articles selected were included in this metanalysis.
- The MitraClip procedure did not confer a significant benefit in mortality and repeated hospitalization compared to medical therapy alone. In moderate ischemic mitral regurgitation (IMR), the adjunct of mitral procedure over CABG is not associated with clinical improvements. In Mitral valve (MV) replacement comparison to repair, hospital mortality was higher among patients undergoing replacement , but both reoperation and readmission rates were lower.

Comments:

The majority of patients with moderate-to-severe IMR in North America and Europe are mainly directed to the treatment of their underlying cardiomyopathy using guideline directed medical therapy (GDMT) and resynchronization (CRT). Resistance by the heart team to directly recommend a surgical procedure can be explained, at least in part, because a significant clinical benefit of mitral valve surgery has not been confirmed by rigorous randomized controlled trials (RCTs). The role of MV surgery as the first approach to improve clinical outcomes remains in evolution. In addition, patients with severe IMR and left ventricular systolic dysfunction with suitable coronary targets affected by high-grade proximal stenosis should receive CABG and a mitral valve procedure. In moderate IMR, the use of percutaneous therapy in patients with IMR who do not need coronary revascularization has shown benefit in the COAPT RCT and in contrast, no benefit in the MITRA-FR RCT.

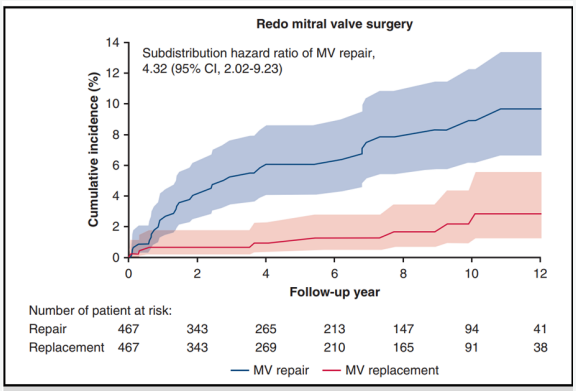
Take Home Message: MitraClip procedure is not associated with improved outcomes compared with medical therapy. MV replacement is associated with increased early mortality but reduced reoperation rate and readmission rate compared with MV repair using annuloplasty in moderate-to-severe IMR. Despite no significant benefit in isolated outcomes comparing annular and adjunct subvalvular procedures, the adjunct of subvalvular procedures reduces the risk of major postoperative adverse events.

Mitral valve repair versus replacement in patients with rheumatic heart disease (JTCVS)

Chen SW, Chen CY, Chien-Chia Wu V, Chou AH, Cheng YT, Chang SH, Chu PH. Mitral valve repair versus replacement in patients with rheumatic heart disease. J Thorac Cardiovasc Surg. 2022 Jul;164(1):57-67.e11. doi: 10.1016/j.jtcvs.2020.07.117. Epub 2020 Aug 29. PMID: 32994098.

Key points:

- Adult patients with rheumatic heart disease who underwent mitral valve repair or replacement surgery between 2000 and 2013 were identified from Taiwan's National Health Insurance Research Database. operation-related complications, all-cause mortality, and mitral valve reoperation rate were compared . Of 5086 patients with rheumatic heart disease, 489 (9.6%) and 4597 (90.4%) underwent mitral valve repair and mitral valve replacement, respectively.
- No difference in risk of in hospital mortality was observed between groups. The mitral valve repair group had comparable risks of all-cause mortality with the mitral valve replacement group (33.4% vs 32.5%; hazard ratio, 1.01;) during mean follow up period of 6 months. However, higher risks of mitral valve reoperation were observed in the mitral valve repair group. Previous percutaneous transvenous mitral commissurotomy was identified as a risk factor of mitral valve reoperation in the repair group.



Cumulative incidence of re-do MV surgery for patients with RHD receiving MV surgery.

Comments:

RHD decreased during the study period because of hygiene improvements in Taiwan. the MV repair group exhibited no benefits over the replacement group in all-cause mortality during the 14-year study period. Current guidelines recommend MV repair over MV replacement for degenerative MV disease. For patients with RHD, surgical management with MV repair is also currently preferred despite the lack of consensus among experts. The longterm outcomes in terms of redo MV surgery rate were higher in the MV repair group. Previous PTMC, stenosis type RHD, and operations involving tricuspid valve repair or replacement led to elevated risk of redo MV surgery in repair group. Durability is the major concern regarding MV repair in patients with RHD: Previous studies have demonstrated a higher reoperation rate after MV repair.

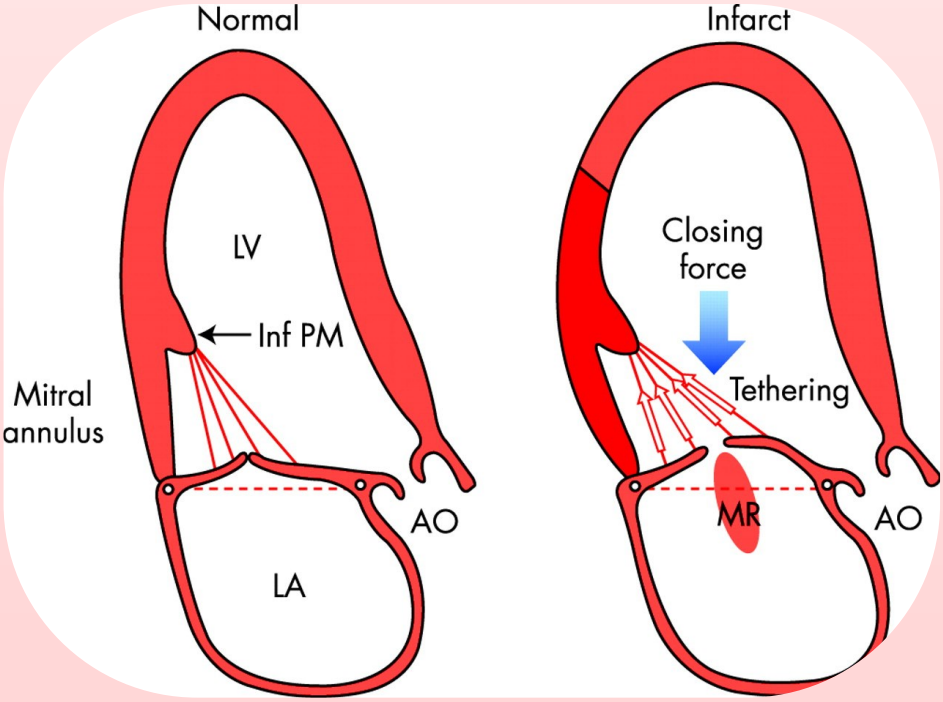
Take Home Message: MV repair for RHD offers no survival benefit and produces a higher risk of reoperation over MV replacement.

Mitral valve repair versus replacement in severe ischemic mitral regurgitation systematic review and meta-analysis (JCS)

Gamal MA, El-Fiky MM, Gamea MM, Ali I. Mitral valve repair versus replacement in severe ischemic mitral regurgitation systematic review and meta-analysis. J Card Surg. 2022 Jun;37(6):1591-1598. doi: 10.1111/jocs.16477. Epub 2022 Apr 2. PMID: 35366026.

Key points:

- The aim of the present meta-analysis is to compare the outcomes of mitral valve repair (RPR) versus replacement (RPL) regarding perioperative mortality, overall mortality, reoperation, recurrence of MR, and reverse remodeling after surgery.
- There was a trend towards better perioperative survival in the RPR arm. However, the difference fell short of statistical significance [odds ratio 95% p = 0.09]. Patients submitted to RPR experienced a significantly higher MR recurrence rate when compared with their counterparts submitted to RPL (p = 0.00001).



Comments:

Ischemic mitral regurgitation (IMR) is a serious consequence of coronary artery disease. The choice of the optimal surgical strategy remains debatable.

Take Home Message:

The lower perioperative mortality in RPR in comparison to RPL. On the other hand, RPL was associated with significantly lower recurrence rates.

ADULT: MITRAL VALVE

Outcomes of transapical mitral valve repair with neochordae implantation (JTCVS)

D'Onofrio A, Fiocco A, Nadali M, Mastro F, Aruta P, Lorenzoni G, Pittarello D, Gerosa G; Padova Neochord Working Group. Outcomes of transapical mitral valve repair with neochordae implantation. J Thorac Cardiovasc Surg. 2022 Apr 9:S0022-5223(22)00387-7. doi: 10.1016/j.jtcvs.2022.02.059. Epub ahead of print. PMID: 35624055.

Webcast: https://aats.blob.core.windows.net/media/Publications/AM21_A03%20-%20Transcatheter%20Mitral%20Valve%20Repair.mp4

Key points:

- This study evaluated clinical and echocardiographic 5-year outcomes of patients who underwent Transapical off-pump beating-heart neochord implantation (NC) from November 2013 to March 2016 .
- The 100 patients were classified into groups having favorable anatomy (FA) and unfavorable anatomy (UA) on the basis of the extent and severity of mitral valve disease (FA: 81%; UA: 19%). All patients underwent clinical and echocardiographic follow-up at 1, 3, 6, and 12 months, and annually thereafter. Median age was 66 years. Technical and procedural success were 98% and 94%, respectively. Thirty-day mortality was 2%. At 5 years, overall survival was 83% with no difference between FA and UA patients. Cumulative incidence of severe mitral regurgitation recurrence at 5 years was 14% in FA patients and 63% in UA patients, respectively.

Comments:

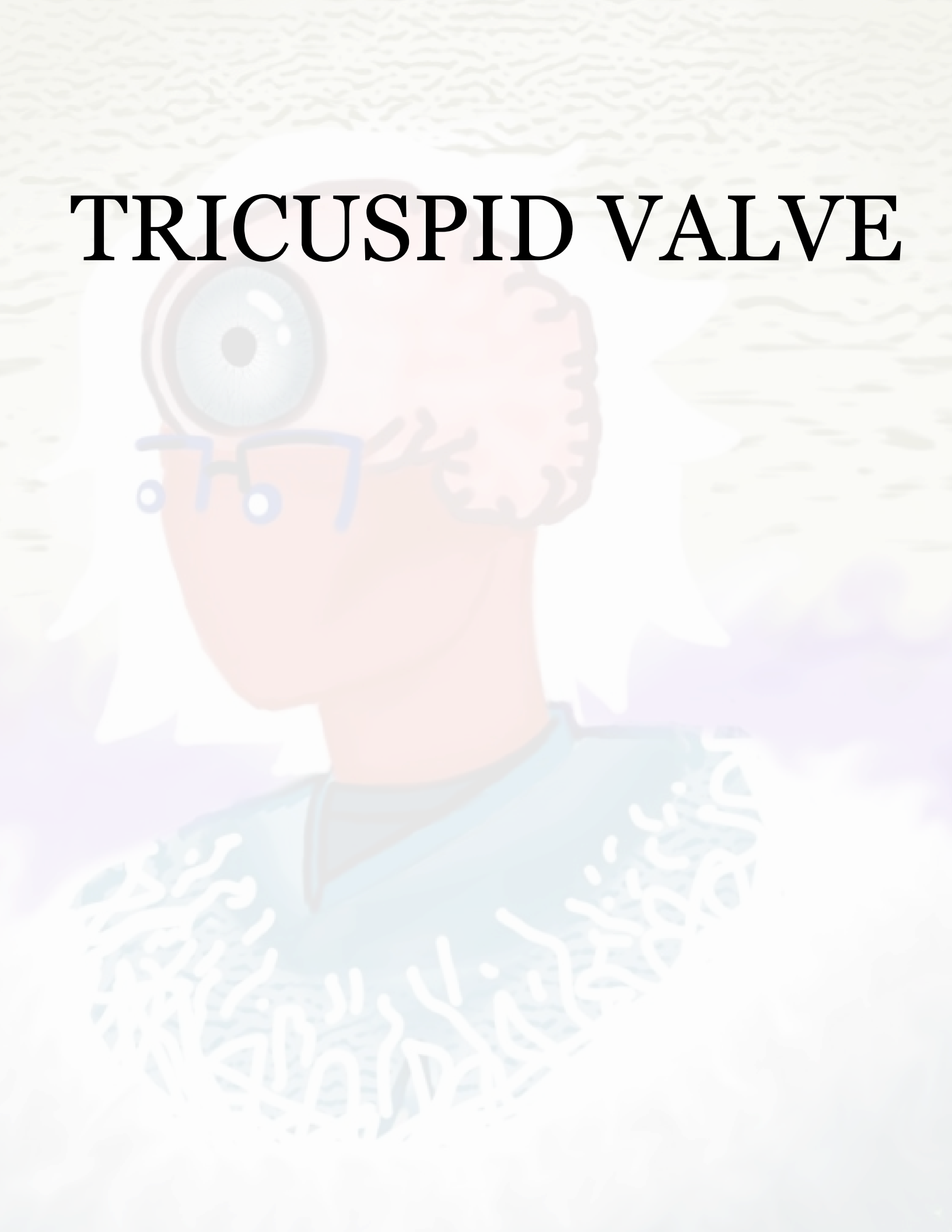
The procedure is performed in a standard operating room, using general anaesthesia, selective lung intubation, and real-time 2-dimensional/3D TEE guidance. Through a left anterolateral minithoracotomy in the fifth intercostal space, the LV apex is exposed. The ideal entry site is identified approximately 2 cm posterolateral from the real apex. After the insertion of the device in the left ventricle and with 3D real-time TEE guidance and 3D imaging assessment, the targeted scallop is grasped and then pierced at its edge, deploying a single pair of neochords. The device is subsequently retrieved from the ventricle and the chordal loop is exteriorized. A variable number of neochords are implanted on the basis of the extension of the prolapse/flail. The neochords are then tensioned using real-time TEE until an adequate coaptation of the leaflets is achieved. The chordal free ends are then secured to the LV wall on a polytetrafluoroethylene felt.

The leaflet-to-annulus index (LAI) consists of the ratio between the sum of anterior mitral leaflet and posterior mitral leaflet (PML) lengths divided by the antero-posterior diameter. Patients with LAI 1.2 were considered to have adequate leaflet tissue to allow for sufficient postoperative coaptation.

In patients with anterior or bileaflet prolapse/flail, paracommissural prolapse/flail, or any type of disease with the presence of significant leaflet/annular calcifications, NC is not considered due to unfavourable anatomy.

Take Home Message: Transapical off-pump beating heart NC might represent an acceptable option in patients with degenerative mitral valve disease and FA.

TRICUSPID VALVE



ADULT: TRICUSPID VALVE

Beating Versus Arrested Heart Isolated Tricuspid Valve Surgery: Long-term Outcomes (ATS)

Russo M, Di Mauro M, Saitto G, Lio A, Berretta P, Taramasso M, Scrofani R, Della Corte A, Sponga S, Greco E, Saccocci M, Calafiore A, Bianchi G, Leviner DB, Biondi A, Della Ratta E, Livi U, Sharoni E, Werner P, De Vincentiis C, Di Eusanio M, Kocher A, Antona C, Miraldi F, Troise G, Solinas M, Maisano F, Laufer G, Musumeci F, Andreas M. Beating Versus Arrested Heart Isolated Tricuspid Valve Surgery: Long-term Outcomes. Ann Thorac Surg. 2022 Feb;113(2):585-592. doi: 10.1016/j.athoracsur.2021.03.070. Epub 2021 Apr 5. PMID: 33831392.

Key points:

- The SUR-TRI (surgical tricuspid) study is a multi-center international retrospective study by the Department of Cardiac Surgery at the Medical University of Vienna involving 13 international cardiac surgery units with experience in valve surgery and tricuspid disease treatment , enrolling 406 adult patients who underwent isolated tricuspid valve procedures. Arrested heart (AH) and beating heart (BH) strategies were performed in 253 and 153 cases, respectively.
- The 30-day mortality rate was 6.2 vs 5.0% in the AH and BH groups, respectively . The rates of acute renal failure requiring replacement therapy and stroke were numerically higher in the AH group. The 6-year survival rate was 67±6 vs 78±5% in the AH and BH groups, respectively , while freedom from cardiac death was 75±5 vs 84±4% . The six-year composite cardiac endpoint of cardiac death and reoperation rate was 60±9 vs 86±5% comparing AH-TV replacement and BH-TV repair groups.

Comments: Isolated TV surgery is a rare procedure generally considered at high risk for perioperative mortality and poor long-term outcomes. It represents the therapy of choice for patients affected by severe regurgitation who are still symptomatic despite optimal medical therapy or showing progressive RV dilatation/dysfunction. Several factors, including etiology of tricuspid disease, right ventricular function, preoperative pulmonary hypertension and liver or renal disease play a distinct role in patient outcomes and the surgical approach. Patients affected by tricuspid disease who undergo surgical correction frequently present with reduced RV function, and published data support the negative effect of CPB on RVF in arrested heart surgery. No randomized clinical trial comparing beating heart and arrested heart strategies have been reported yet. Important limitation to the study was 25% patients lost to follow up.

Take Home Message: Patients undergoing beating heart valve tricuspid repair had the better long-term outcome and freedom from reoperation.

Durability of suture versus ring tricuspid annuloplasty: Looking at very long term (18 years) (ASCVTS)

Carino D, Zancanaro E, Sala A, Ruggeri S, Lapenna E, Forno BD, Verzini A, Schiavi D, Castiglioni A, Alfieri O, Bonis M. Durability of suture versus ring tricuspid annuloplasty: Looking at very long term (18 years). Asian Cardiovasc Thorac Ann. 2022 Mar;30(3):285-292. doi: 10.1177/02184923211019533. Epub 2021 May 20. PMID: 34011168.

Key points:

- All patients who underwent tricuspid valve repair between January 1998 and December 2004 in San Raffaele Scientific Institute, Milan, Italy were included in this study. Of one hundred forty-six patients were identified, 89 in the underwent suture annuloplasty and 57 underwent ring annuloplasty. Both isolated and combined with left-side valve surgery tricuspid valve repair were included. The decision to perform ring or suture annuloplasty (including De Vega and Kay procedure) was at the primary surgeon's discretion, as was the decision to implant a specific ring type. During the study period, in the ring annuloplasty group, two types of rings were employed: the rigid Carpentier-Edwards ring in the 95% and the flexible Tailor SJM band used in just three patients (5%).
- No difference in term of long-term survival and cardiac death was evident between the two groups. A significant higher rate of tricuspid regurgitation ≥2+ and ≥3+ recurrence was evident in the suture group during the whole follow-up ($p < 0.001$).

Comments:

Earlier reports advocated for a rather conservative TR management in patients undergoing left-sided heart valve surgery, but more recent guidelines advised for a more aggressive TR management, as accumulating evidence demon-

strates its adverse impact on long term morbidity and mortality. Several papers have been published analyzing the results of surgical tricuspid valve repair, but the length of the follow-up is usually limited to 10 to 12 years. This study has several key findings. First, no difference in the long-term survival was evident between patients who underwent tricuspid valve repair by means of ring implantation and suture technique. Second, the cumulative incidence function (CIF) for cardiac death in the overall population was low also at 18 years of follow-up with no difference between the two groups, endorsing the importance of tricuspid valve repair at the time of left-side valve surgery. Finally, but most importantly, the recurrence rate of TR ≥2+ and ≥ 3+ was significantly higher in the suture techniques group confirming the better result of ring annuloplasty also when the follow-up is extended up to 18 years.

Take Home Message: Ring annuloplasty should be considered the first option for tricuspid valve repair due to a better durability.

Midterm Results of Isolated Tricuspid Valve Replacement-Implications for Clinical Decision Making (ATS)

Leviner DB, Friedman T, Zafrir B, Arazi M, Weis A, Bolotin G, Sharoni E. Midterm Results of Isolated Tricuspid Valve Replacement-Implications for Clinical Decision Making. Ann Thorac Surg. 2022 Mar;113(3):793-799. doi: 10.1016/j.athoracsur.2021.03.104. Epub 2021 Apr 25. PMID: 33910052.

Key points:

- Outcomes of TVR with the aim of identifying variables that may influence morbidity and mortality of isolated TVR were compared to combined TVR and left sided valve surgery at two institutes (Carmel Medical Center and Rambam Health Care Campus , both located in Haifa, Israel) in 70 patients operated between the period of October 2007 and August 2018.
- TV replacement combined with left sided valvular surgery was performed in 37 patients (53%) and isolated TV replacement was performed in 33 patients (47%). Two thirds (61%) had a diagnosis of rheumatic heart disease and 8% (6/70) had previous infectious endocarditis. Atrial fibrillation was prevalent (86%, 06/70). Previous cardiac surgery was common (40 patients, 57%). Most patients had preserved left ventricular ejection fraction . The euroSCORE II results were higher in the concomitant valve group then in the isolated TVR group (8.25% vs 5.18%). Length of hospitalization , ICU stay, prevalence of all short-term in-hospital postoperative outcomes were similar between isolated and combined TV replacement surgery.
- Outcomes for isolated TV replacement are reported as much worse than isolated TV repair .The cumulative 5-year survival tended to be lower in patients with isolated TVR compared to combined surgery.

Comments:

Correction of left sided valvular disease does not always relieve tricuspid regurgitation and may even lead to progression of tricuspid valve disease.The association of postoperative outcomes with isolated compared to combined replacement was analyzed retrospectively with primary endpoint being long-term mortality.

Increasing severity of TR has been associated with worse survival. The correction of left sided valvular disease does not always relieve tricuspid regurgitation and may even lead to progression of tricuspid valve disease.The result of chronic severe TR is volume overload with progressive RV dilatation and ultimately RV failure. Surgery for primary tricuspid valve regurgitation should be performed in symptomatic patients and is recommended in asymptomatic patients that display right ventricular dysfunction.In secondary TR and annular dilatation, TV repair should be performed “liberally” in patients at the time of left-sided valve surgery, as this has been shown to reverse RV dysfunction with no increase in mortality.

Take Home Message: Isolated TVR did not increase morbidity and mortality when patients are referred for surgery early, including after previous sternotomy suggesting more aggressive approach towards patients requiring isolated replacement.

AORTIC VALVE

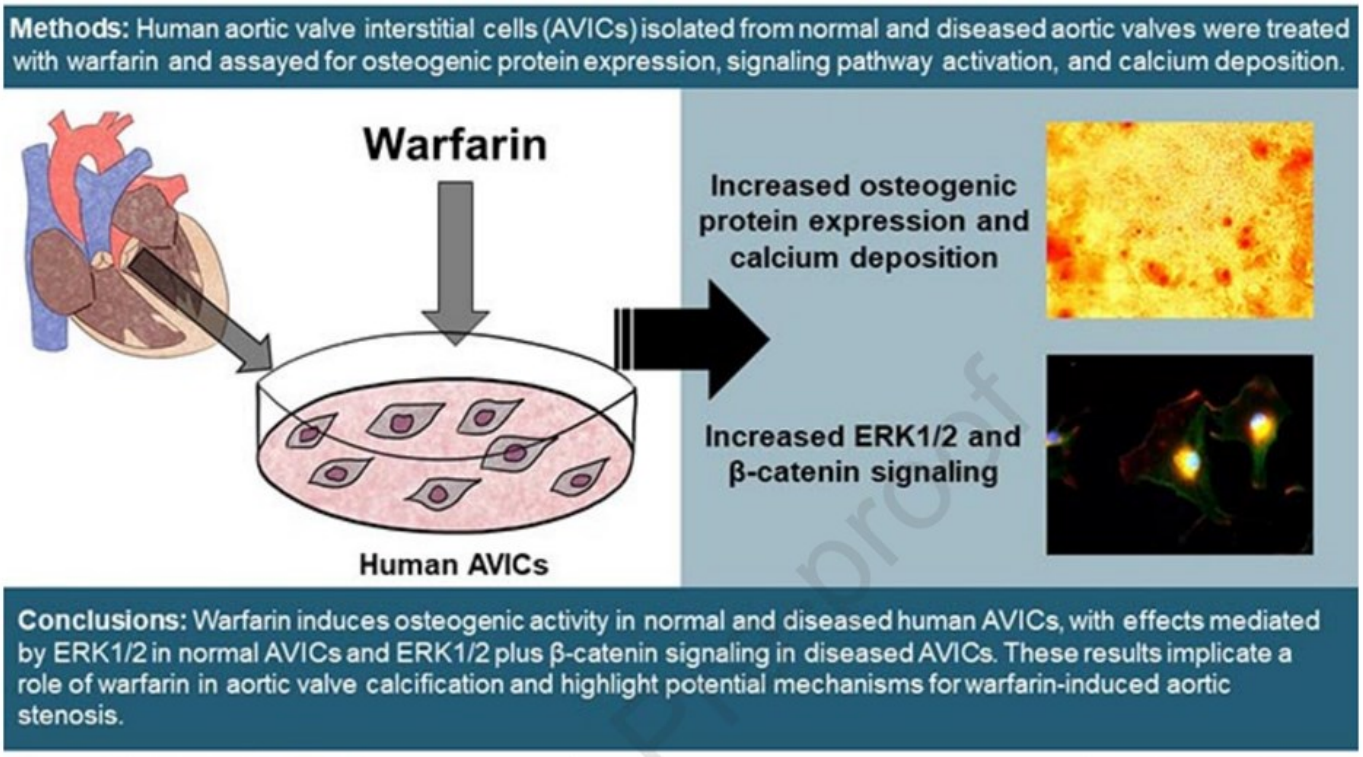
ADULT: AORTIC VALVE

Warfarin Induces Calcification of the Aortic Valve Through Extracellular Signal-regulated Kinase 1/2 and β-catenin Signaling (ATS)

Venardos N, Gergen AK, Jarrett M, Weyant MJ, Reece TB, Meng X, Fullerton DA. Warfarin Induces Calcification of the Aortic Valve Through Extracellular Signal-regulated Kinase 1/2 and β-catenin Signaling. Ann Thorac Surg. 2022 Mar;113(3):824-835. doi: 10.1016/j.athoracsur.2021.03.099. Epub 2021 Apr 23. PMID: 33901456.

Key points:

- Recent clinical evidence suggests an association between warfarin use and calcification of the aortic valve. Human aortic valve interstitial cells (AVICs) were isolated at the University of Colorado School of Medicine from normal aortic valves of patients undergoing cardiac transplantation while diseased AVICs were isolated from patients undergoing aortic valve replacement for aortic stenosis. Collagenase treatment removed endothelial cells from the surface of the valve leaflet. The supernatant was collected and the AVICs were treated with various anticoagulants and osteogenic protein expression was evaluated using immunoblotting. Warfarin was dissolved in sterile PBS with the assistance of heat and gentle agitation. In separate experiments, the concentration-response was studied over a range of warfarin concentrations ranging from 5μM to 20μM. The maximal response of AVICs to warfarin occurred at a concentration of 10μM, and so this concentration was chosen for this study. Phosphorylation of LRP6 and ERK1/2 was evaluated following treatment with warfarin.



Comments:

Warfarin, but not heparin or dabigatran, significantly increased Runx-2 and Osx expression in both normal and diseased human AVICs. Warfarin treatment for 48 hours induced increased expression of osteogenic proteins Runx-2 and Osx in both normal and diseased human AVICs. Upregulation of β-catenin protein expression and nuclear translocation occurred in diseased AVICs, but not normal AVICs after warfarin treatment. Warfarin induces phosphorylation of LRP6 in diseased AVICs only, and phosphorylation of ERK1/2 in both normal and diseased AVICs. LRP6 inhibition attenuated warfarin-induced Runx-2 expression in diseased AVICs. ERK1/2 inhibition attenuated warfarin-induced Runx-2 expression in both normal and diseased AVICs. Warfarin induces osteogenic activity in normal and diseased isolated human AVICs. This effect is mediated by ERK1/2 in both diseased and normal AVICs, but in diseased AVICs, β -catenin signalling also plays a role.

Take Home Message: Results implicate the role of warfarin in aortic valve calcification and highlight potential mechanisms for warfarin-induced aortic stenosis.

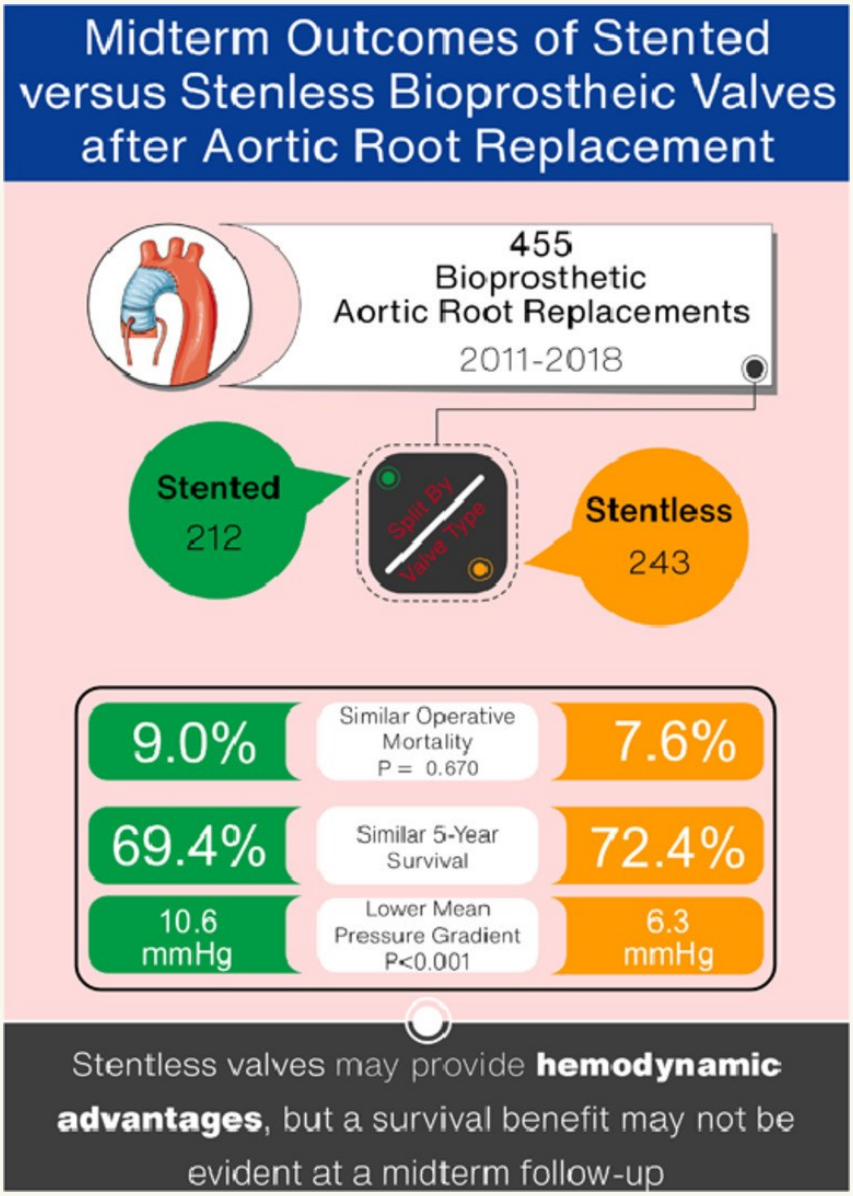
ADULT: AORTA

Midterm Outcomes of Stented Versus Stentless Bioprosthetic Valves After Aortic Root Replacement (SEMTCVS)

Brown JA, Serna-Gallegos D, Kilic A, Dai Y, Chu D, Navid F, Dunn-Lewis C, Sultan I. Midterm Outcomes of Stented Versus Stentless Bioprosthetic Valves After Aortic Root Replacement. Semin Thorac Cardiovasc Surg. 2022 Winter;34(4):1147-1155. doi: 10.1053/j.semtcvs.2021.09.003. Epub 2021 Sep 11. PMID: 34520838.

Key points:

- This was an propensity matched observational study of aortic root operations from 2010 to 2018. All patients with a complete aortic root replacement (ARR) for nonendocarditis reasons were included, while patients undergoing valve-sparing root replacements or primary aortic valve replacement or repair were excluded.
- A total of 455 patients underwent a complete ARR with a bioprosthetic valve implant for nonendocarditis reasons, of which 212 (46.6%) received a stented valve, while 243 (53.4%) received a stentless valve. After matching, postoperative outcomes were similar across each group (P > 0.05), including operative mortality and adverse neurologic events. Median follow-up for the entire cohort was 4.41 years (95% CI: 4.01, 4.95). At 1 year follow-up, aortic regurgitation ≥ 2+ and ejection fraction were similar across each group (P > 0.05); however, the stentless valve group had lower aortic valve velocity and transvalvular pressure gradient. Finally, reoperations and survival were similar for each group over the study's follow-up (P > 0.05).



Comments:

Compared to stented bioprosthetic valves, stentless valves may improve survival after aortic root replacement by optimizing hemodynamics. While patients received larger implants and had reduced pressure gradients at 1 year, stentless valves did not improve survival or reoperation rates at midterm. Despite hemodynamic benefits, the clinical impact of those benefits may not yet be evident in the midterm. Because of the limited follow-up, one cannot make any definitive conclusions about the long-term outcomes of stented versus stentless bioprosthesis. In addition, the majority of patients in this cohort had a large aortic annulus and, importantly, no data are presented on young patients with small roots. It is in this latter group of patients that a patient prosthesis mismatch may be of functional and prognostic significance over time.

Take Home Message: Despite reduced aortic valve pressure gradients, stentless valves did not improve midterm survival after aortic root replacement compared to stented bioprosthetic valve-graft conduits.

AORTA

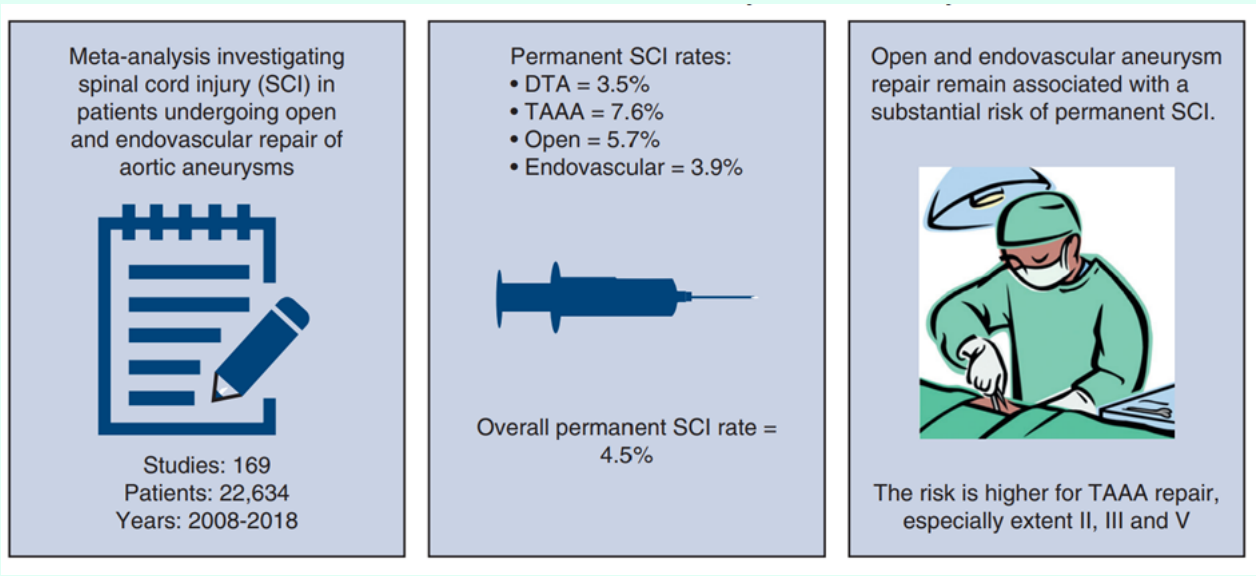
ADULT: AORTA

Spinal cord injury after open and endovascular repair of descending thoracic and thoracoabdominal aortic aneurysms: A meta-analysis (JTCVS)

Gaudino M, Khan FM, Rahouma M, Naik A, Hameed I, Spadaccio C, Robinson NB, Ruan Y, Demetres M, Oakley CT, Gambardella I, Iannacone EM, Lau C, Girardi LN. Spinal cord injury after open and endovascular repair of descending thoracic and thoracoabdominal aortic aneurysms: A meta-analysis. J Thorac Cardiovasc Surg. 2022 Feb;163(2):552-564. doi: 10.1016/j.jtcvs.2020.04.126. Epub 2020 May 13. PMID: 32561196.

Key points:

- Systematic literature search of studies from 2008 to 2018 on repair of descending thoracic aneurysm (DTA) and thoracoabdominal aortic aneurysm (TAAA) were pooled in this meta-analysis.
- One-hundred sixty-nine studies (22,634 patients) were included. The pooled rate of permanent spinal cord injury (SCI) was 4.5% ; 3.5% for DTA and 7.6% for TAAA repair , 5.7% for open repair and 3.9% for endovascular repair . Rates for Crawford extents I, II, III, IV, and V aneurysms were 4.0% , 15.0%, 7.0% , 2.0% , and 7.0% respectively .



Comments:

SCI is a serious complication of open repair of DTA and TAAA. The pathophysiology relates to aortic occlusion, intraoperative hypotension, embolism, or disruption of blood flow to the intercostal and lumbar arteries arising from the replaced aorta. Despite improvement in operative techniques and perioperative care, the reported incidence of permanent SCI remains variable across literature. The incidence of permanent SCI has not improved over the last 2 decades despite innovations in the field of thoracic aortic surgery. The pooled permanent SCI rate for TAAA repair was greater than that for DTA repair, regardless of operative technique (open vs endovascular). This is due to the increased amount of aorta replaced and technical complexity in TAAA repairs. The use of clamp-and-sew technique was associated with lower incidence of permanent SCI, likely due to the use of the technique for more limited aneurysm extents. Current US and European guidelines recommend CSF drain use in patients undergoing TAAA/DTA repair to prevent paraplegia. Although CSF drainage reduces incidence of paraplegia, the procedure is invasive and associated with its own complications. Compared with older studies, the use of imaging to establish size and placement of endografts has also improved in recent years. High surgeon volume has also been associated with significantly improved survival for open repair, but the improvement is modest for endovascular repair after reaching a relatively low threshold.

Take Home Message: Despite improvement, both open and endovascular aneurysm repair remain associated with a substantial risk of permanent SCI. The risk is greater for TAAA repair, especially extent II, III, and V.

ADULT: AORTA

Adjunctive endovascular balloon fracture fenestration for chronic aortic dissection (JTCVS)

Levack MM, Kindzelski BA, Miletic KG, Vargo PR, Bakaeen FG, Johnston DR, Rajeswaran J, Blackstone EH, Roselli EE. Adjunctive endovascular balloon fracture fenestration for chronic aortic dissection. J Thorac Cardiovasc Surg. 2022 Jul;164(1):2-10.e5. doi: 10.1016/j.jtcvs.2020.09.106. Epub 2020 Oct 7. PMID: 33220972.

Key points:

- The outcomes of adjunctive balloon fracture fenestration (BFF) during TEVAR in patients with chronic aortic dissection complicated by negative remodeling were assessed. From June 2013 to January 2016, 49 patients with chronic aortic dissection complicated by aneurysm due to negative remodeling underwent TEVAR with BFF. Contrast-enhanced computed tomography was performed before discharge, at 3 to 6 months, and annually.
- Intraoperatively, endovascular stent graft expansion was achieved in all patients. There was 1 hospital death due to visceral malperfusion. 3 patients had stroke, and 3 had acute renal failure. Survival at 1 year was 91%. Late reintervention for incomplete false lumen exclusion was required in 16 patients and freedom from reintervention was 75% at 1 year. Thirty-six patients (73.5%) had complete false lumen thrombosis through the treated segment. True lumen area increased following TEVAR with BFF and continued to incrementally expand with subsequent aortic remodeling at 1-year follow-up. Thirteen patients had positive remodeling, defined as thrombosis of false lumen, ≥10% decrease in aortic dimension, and ≥10% increase in true lumen diameter. Patients with positive remodeling had an average decrease of 11 mm in maximal aortic diameter at final follow-up.

Comments:

Thoracic endovascular aortic repair (TEVAR) has been increasingly used in patients with chronic type B aortic dissection. However, aortic remodeling in chronic type B aortic dissection has not been as positive compared with what is seen with aneurysmal disease or with acute type B aortic dissection. In this study investigators from Cleveland report their single-center experience using endovascular balloon fracture fenestration (BFF) to promote positive aortic remodeling during treatment of chronic type B aortic dissection. TEVAR endograft placement was followed by adjunctive BFF to achieve stent graft apposition to the adventitia of the thoracic aorta. The technique reported in this article is a slight variation from the original “Knickerbocker” technique described by Kolbel and colleagues in 2014. The current study details implant of commercially available endografts followed by balloon expansion of the device along the majority of aortic coverage versus the midsection alone, which represents the major difference from the original “Knickerbocker” procedure. The concept of these techniques centers on achieving obliteration of falselumen flow andtruelumen expansion, with the ultimate goal being positive aortic remodeling.

Take Home Message: BFF of chronic dissection membrane is a beneficial adjunct to TEVAR during short-term follow-up.

Delayed sternal closure for intractable bleeding after acute type A aortic dissection repair: outcomes and risk factors analyses

Lin CY, Wu MY, Tseng CN, Lee HF, Tsai FC. Delayed sternal closure for intractable bleeding after acute type A aortic dissection repair: outcomes and risk factors analyses. J Cardiothorac Surg. 2022 Aug 19;17(1):184. doi: 10.1186/s13019-022-01946-z. PMID: 35982501; PMCID: PMC9389841.

Key points:

- This retrospective study aimed to investigate the early and late outcomes and risk factors in patients who underwent delayed sternal closure (DSC) procedure during acute type A aortic dissection (ATAAD) repair surgery. 704 consecutive patients who underwent emergency ATAAD repair between January 2007 and September 2020 were dichotomized into the DSC (n = 109; 15.5%) and primary sternal closure (PSC) groups.
- The DSC group showed a higher rate of hemopericardium and preoperative malperfusion, higher blood transfusion volumes and rate of reexploration for bleeding after surgery. n-hospital mortality rates , 5-year survival rates , and freedom from reoperation were comparable between the DSC and PSC groups.

Comments:

Perioperative coagulopathy and intractable bleeding are severe complications in (ATAAD) repair surgery. The pathology and associated mechanisms were multifactorial, including the activation of the coagulation and fibrinolytic

systems for intravascular thrombosis in false lumen of the dissected aortic segment, which leads to reduction in clotting factors and dysfunction of platelet and intraoperative administration of heparin, prolonged CPB duration, and extensive tissue trauma for the complex aortic repair procedures .

Four criteria were defined as intractable perioperative bleeding and DSC was performed 1)bleeding exceeded 50 ml within 30 min; 2)administration of more than 8 units of red blood cells; 3)uncontrolled bleeding from the inaccessible bleeding sites; 4)presence of hemodynamic instability if sternal closure was attempted.

Managements such as restoration of body temperature, reversing metabolic imbalance, and aggressive blood transfusion would be mandatory after surgery for correction of coagulation deficiency. If acute renal failure develops after ATAAD surgery, the renal replacement therapy was promptly implemented to reduce the negative impact of fluid overload, metabolic acidosis, and electrolyte imbalance based on the Acute Kidney Injury Network criteria.

The saline-moistened sterile gauzes were used to extensively pressurize the uncontrollable bleeding sites. The pericardium and sternum were left open and the skin wound was covered with a plastic patch made by sterile intravenous fluid bag. Mediastinal reexploration was usually performed within 24–48 h at the operating room if the hemodynamics were stable and bleeding tendency improved. Sternal closure was performed with stainless steel wires if hemostasis has been well achieved. The application of mediastinal packing with DSC would be life-saving to minimize the bleeding tendency and temporarily maintain the hemodynamic stability. The limitations of this study are retrospective and non-randomized control model and potential bias that could influence the homogeneity of the DSC and PSC groups.

Take Home Message: Mediastinal packing with DSC is an efficient life-saving technique to stabilize patients who were complicated with intractable bleeding after undergoing ATAAD repair surgery.

New 3-zone hybrid graft: First-in-man experience in acute type I dissection (JTCVS)

Jakob H, Shehada SE, Dohle D, Wendt D, El Gabry M, Schlosser T, Tsagakis K. New 3-zone hybrid graft: First-in-man experience in acute type I dissection. J Thorac Cardiovasc Surg. 2022 Feb;163(2):568-574.e1. doi: 10.1016/j.jtcvs.2020.04.113. Epub 2020 May 6. PMID: 32653283.

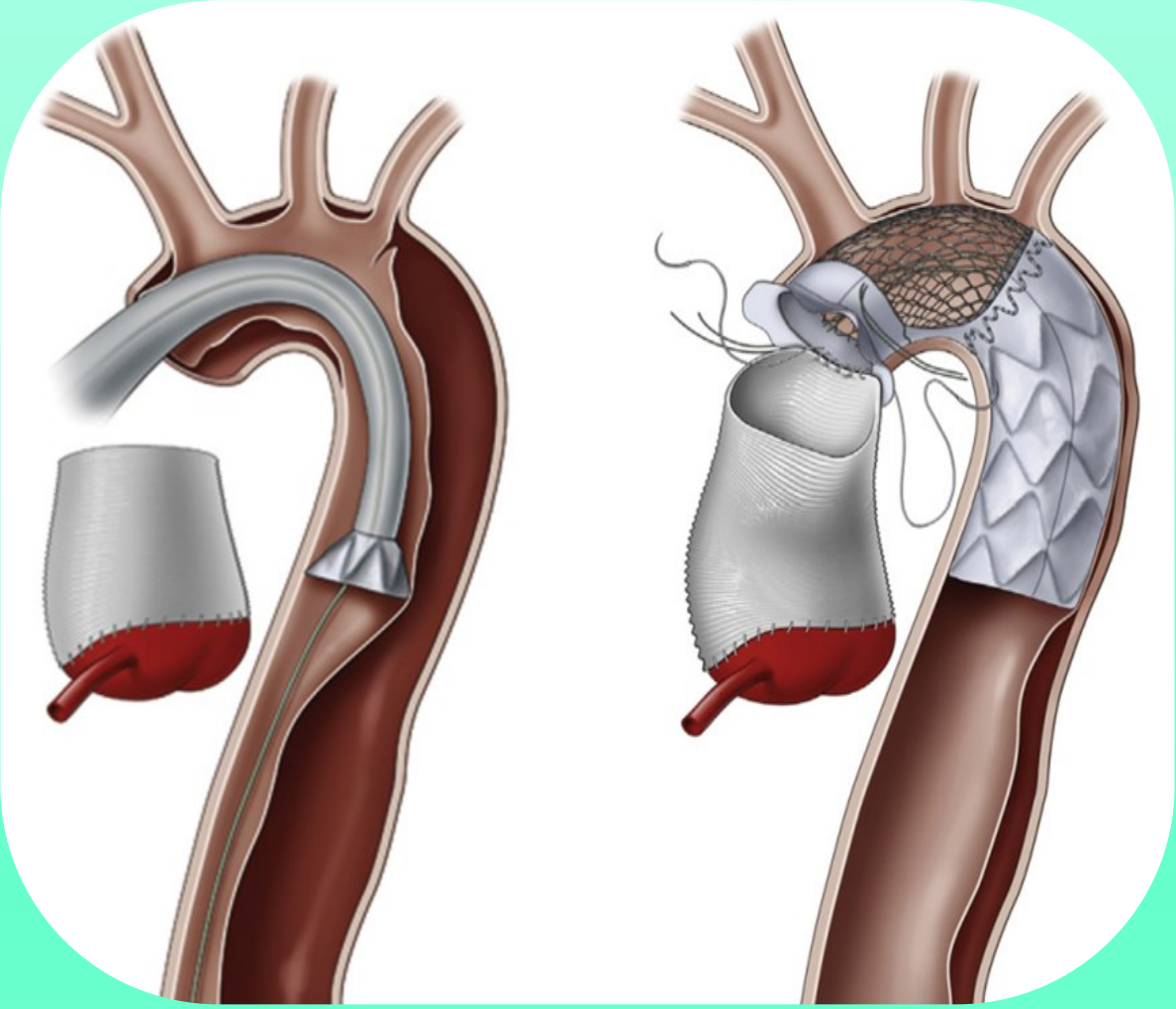
Key points:

- To combine the benefits of fast proximal repair with the frozen elephant trunk (FET) benefits, a 3-zone hybrid graft was developed consisting of an ascending polyester portion, an arch noncovered stent, and a descending stent graft. Mid-term results of this new technique were studied.
- 6 patients (age mean 69 years) with type I acute aortic dissection (AAD) in critical status were operated between July 2016 and April 2018 using this graft under distal hypothermic circulatory arrest and selective antegrade cerebral perfusion (SAC).
- The operative times for cardiopulmonary bypass, crossclamp, and selective antegrade cerebral perfusion were 178 +/- 39, 92 +/- 21, and 34 +/- 9 minutes, respectively. Operative mortality was 17%. No entry tear at the anastomotic site in the ascending aorta occurred postoperatively and during the follow-up. The false lumen along the aortic arch and the covered proximal descending aorta thrombosed completely in 2 of 5 and 3 of 5, respectively. In 3 patients, a residual false lumen (fed via communication to a patent false lumen of the supra-aortic arteries) perfusion in the arch was observed, staying stable over the post operative observation period.

Comments:

AAD type I is a surgical emergency with time-dependent evolving complications. In surgery of the type I very AAD operative mortality rate is beyond 20%. Mal-perfusion and circulatory collapse are negatively influencing results of emergency operations for type A AAD. FET in such situations does not worsen acute results and reduces long-term reintervention rates but requires in-depth experience with arch surgery.

The concept of combining fast ascending aortic–replacement techniques with the FET technology with the idea to save extracorporeal circulation time, having a haemostatic and easily accessible zone 0 suture line, benefits maintenance of arch and descending aorta true lumen stabilization. This was achieved through 3-zone hybrid graft technology suited consisting of a proximal polyester portion for zone 0 anastomosis with the distal ascending, a nitinol-braided, noncov



ered stent for arch coverage, and a distal covered z-shaped nitinol stent, all directly connected with each other, which usually referred to as **E-Novia stent graft**. Staged deployment of graft is possible starting with the release of the stent graft in the descending aorta, followed by release and positioning of the uncovered part within the arch. Nitinol mesh slightly overexpands the stent in relation to the stent graft diameter distally. Thus, passive fixation of both stent components is achieved by radial forces. Inside-out (stent graft–aortic wall) stay U-sutures were used to secure the fixation of the grafts with an additional polyester bridge at the concavity of the arch.

Take Home Message:

The 3-zone graft concept enables the extension of proximal aortic repair into the aortic arch and the descending aorta with a sole surgical anastomosis. This new device is designed to expand the true lumen in aortic arch und to exclude re-entries in the proximal descending aorta. Thus, extended arch repair in acute type I dissection can be performed as fast as a classic proximal aortic replacement.

MICS

ADULT: MICS

Continuous field flooding versus final one-shot CO_2 insufflation in minimally invasive mitral valve repair (JCS)

Nasso G, Condello I, Santarpino G, Di Bari N, Moscarelli M, Agrò FE, Lorusso R, Speziale G. Continuous field flooding versus final one-shot CO_2 insufflation in minimally invasive mitral valve repair. J Cardiothorac Surg. 2022 Nov 1;17(1):279. doi: 10.1186/s13019-022-02020-4. PMID: 36320080; PMCID: PMC9628269.

Key points:

- Retrospectively collected data of one hundred consecutive patients undergoing minimally invasive mitral valve repair (MIMVR) from January 2018 to November 2021 was analysed .
- Fifty patients were insufflated with continuous CO_2 1 min before opening the left atrium and ended after its closure, and fifty patients were insufflated with one shot CO_2 10 min before the start of left atrium closure.
- A significant difference was found in the median number of total micro-emboli recorded. In one-shot group from release of cross-clamp until 20 min after end of CPB. One patient in continuous CO2 group and 9 patients of one-shot O2 control group reported agitation at discontinuation of anaesthesia.

Comments:

Insufflation of carbon dioxide (CO_2) into the operative field to prevent cerebral or myocardial damage by air embolism is a well known strategy in open-heart surgery. The use of CO_2 in MICS is due to its high solubility and density in blood, allowing better tolerability of air embolism .

	Continuous CO_2 (n = 50)	One-shot CO_2 (n = 50)	*P*-value
Microemboli after CPB fell to zero (min)	9 ± 5	19 ± 3	0.01
Agitation at anesthesia discontinuation (no. of patients)	1	9	0.022
Mechanical ventilation (h)	14 ± 3	27 ± 4	0.016
ICU length of stay (h)	33 ± 4	42 ± 5	0.029

This study is the first one that tried to demonstrate a difference in the use of the CO_2 strategy trying to reduce the possible site effects of CO_2. Few authors, had demonstrated an impact on cardiac function due to less air bubbles in the heart when no CO2 was used.

The main limitation of this study is the quantitative assessment of gaseous micro-embolic activity with a correlation for the primary endpoint of the incidence of transient post-operative cognitive disorder (TPOCD) , MV duration and ICU length of stay, which should be further explored.

Take Home Message: Continuous field flooding insufflation of CO_2 in MIMVR is associated with a lower incidence of micro-emboli and of agitation at discontinuation of anesthesia, along with improved MV duration and ICU

Comparative efficacy of five surgical methods in the treatment of mitral regurgitation: A systematic review and network meta-analysis (JCS)

Huang W, Hou B, Li Q, Zhang Y, Wang L. Comparative efficacy of five surgical methods in the treatment of mitral regurgitation: A systematic review and network meta-analysis. J Card Surg. 2022 Jan;37(1):186-196. doi: 10.1111/jocs.16085. Epub 2021 Oct 17. PMID: 34662452.

Key points:

- The effectiveness of different surgical methods in the treatment of mitral regurgitation (MR) in adults were compared in this meta analysis. 31 studies ,12,998 patients, involving five surgical methods were included in the study. Surgical procedures including 3D endoscopic mitral valve surgery (3D-MVS), robot-assisted mitral valve surgery (R-MVS); totally thoracoscopic mitral valve surgery (T-MVS), small incision mitral valve surgery (M-MVS), and traditional thoracotomy mitral valve surgery (C-MVS) were compared.
- In terms of complications and MR, the 3D-MVS group had the lowest event rate. In terms of blood transfusion rate , T-MVS had the lowest event rate. In addition, with the exception of operation time and chest drainage, the R-MVS group has the best curative effect.

ADULT: MICS

Comments:

With the gradual aging of the global population, the number of MR patients has shown an upward trend year by year and the annual mortality rate was as high as 34%. Drug therapy can only improve the symptoms of the patient, but cannot prolong the survival time; the surgical operation includes mainly valve repair and valve replacement, which is considered to be the standard treatment for MR. Percutaneous intervention technology has become a supplementary treatment option for high-risk MR patients who cannot withstand the blow of surgery. After 30 years of development, minimally invasive cardiac surgery (MICS) technology reduces the trauma caused by the operation itself in the case of providing the same curative effect as the C-MVS operation. All these surgical procedures have their own advantages and disadvantages, and even C-MVS is still used as a routine operation method in some institutions restricted by endoscopic conditions due to its remarkable curative effect. the high surgical cost of minimally invasive surgery is lowered by the lower postoperative cost. The cost is offset, and the length of hospital stay is shortened by about 2 days. The minimally invasive surgery options can reduce trauma to a certain extent by comparing them with C-MVS. Saving blood products, reducing complications, and speeding up body recovery are beneficial to improve the quality of life of patients after surgery.

Take Home Message:

This minimally invasive surgery has their own advantages and disadvantages. Overall, 3D-MVS is most satisfactory.

Prophylactic Left Atrial Appendage Exclusion in Cardiac Surgery Patients With Elevated CHA_2DS_2-VASc Score: Results of the Randomized ATLAS Trial (Innovations)

Gerdisch MW, Garrett HE, Mumtaz MA, et al. Prophylactic Left Atrial Appendage Exclusion in Cardiac Surgery Patients With Elevated CHA2DS2-VASc Score: Results of the Randomized ATLAS Trial. Innovations. 2022;17(6):463-470. doi:10.1177/15569845221123796

Key points:

- ATLAS (NCT02701062) was a prospective, multicenter, feasibility trial. Patients age ≥18 years, undergoing structural heart procedure, with no preoperative AF, CHA_2DS_2-VASc ≥2, and HAS-BLED ≥2 were randomized 2:1 to LAAE or no LAAE. Patients who developed POAF and/or received LAAE were followed for 1 year. LAAE was evaluated with intraoperative transesophageal echocardiography.
- A total of 562 patients were randomized to LAAE (n = 376) or no LAAE (n = 186). Mean CHA_2DS_2-VASc (3.4 vs 3.4) and HAS-BLED (2.8 vs 2.9) scores were similar for LAAE and no LAAE groups. LAAE success (no flow nor residual stump >10 mm) was 99%. One LAAE-related serious adverse event (0.27%) occurred and was resolved without sequelae. There were 44.3% of patients who developed POAF. Through 1 year, 3.4% of LAAE patients and 5.6% of no LAAE patients had TE. OAC was used by 32.5% of POAF patients. Bleeding was higher with OAC than without (16.1% vs 5.4%, P = 0.008).

Comments:

Patients with elevated CHA_2DS_2-VASc scores are at high risk for atrial fibrillation (AF) and thromboembolic events (TE) after cardiac surgery. Left atrial appendage exclusion (LAAE) is a permanent, continuous approach to stroke prevention in AF, overcoming limitations of oral anticoagulation (OAC). Investigators report ATLAS trial results focused on LAAE technical success and perioperative safety and TE rates with and without LAAE in cardiac surgery patients who developed postoperative AF (POAF). Elevated CHA_2DS_2-VASc score and POAF increase AF recurrence and stroke risk. ATLAS demonstrated prophylactic LAAE was feasible with a low rate of safety events and resulted in a numerically lower thromboembolic rate in cardiac surgery patients who developed POAF.

Take Home Message:

ATLAS demonstrated a high rate of successful LAAE with low LAAE-related serious adverse events in cardiac surgery patients.

ADULT: MICS

A Novel Ring Knot Pusher With Closed Triangle Tip for Minimally Invasive Cardiac Surgery (Innovations)

Kishimoto N, Takahashi Y, Kawase T, Tsuda K, Morisaki A, Fujii H, Shibata T. A Novel Ring Knot Pusher With Closed Triangle Tip for Minimally Invasive Cardiac Surgery. Innovations (Phila). 2022 Jul-Aug;17(4):339-342. doi: 10.1177/15569845221109859. Epub 2022 Jul 11. PMID: 35816370.

Key points:

- Investigators have created a novel ring-type knot pusher with a closed triangle tip, wherein the thread is never detached from the knot pusher head during the ligation process. This knot pusher has a small head and is suitable for complex fields, such as the subvalvular apparatus of the mitral valve, allowing the surgeons to observe the knot itself. Considering that the thread passes through the inner corner of the triangle during the tying-down process without swinging inside the triangle, this knot pusher allows for a stable and secure ligation.

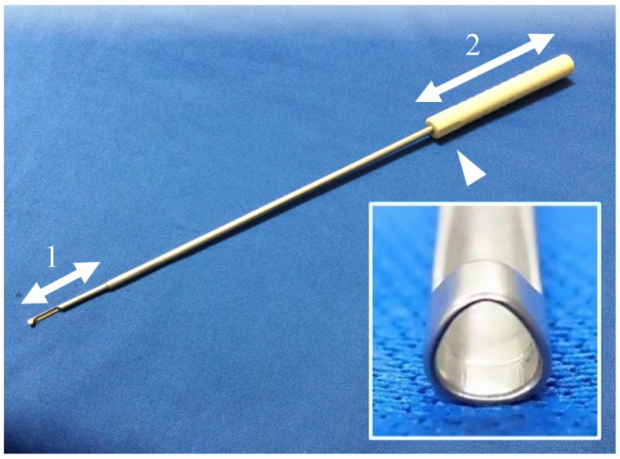


Fig. 1. Global image: arrow line 1 indicates the tip part, with an inner diameter of 3.5 mm. Arrow line 2 indicates the grip part. The dimple on the grip is located in the same direction as the top of the triangle (arrowhead).

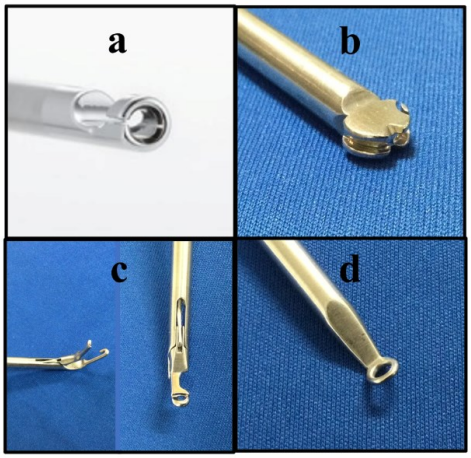


Fig. 2. The equipment for hooking the thread on the knot pusher head. (a) Adams-Yozu knot pusher (Albatec, Tokyo, Japan). (b) ValveGate Knot Pusher 34-7495 (Geister, Tuttlingen, Germany). (c) ValveGate Knot Pusher 38-7851 (Geister). (d) Ring-type knot pushers: ValveGate Knot Pusher with disc 34-7496 (Geister).

	Our ring-type knot pusher	Hook-type knot pusher	Cor-Knot
Ease of loading thread	Brief time	Shorter	Brief time
Come off the thread	Never happen	Possible	NA
Loose tying	Very unlikely	Unlikely	No
Pusher-subvalvular tissue interaction	Unlikely	Various (tip shape dependent)	NA
Adjustment for tying strength by surgeon	Possible	Possible	Impossible
Observation of ligation point	Excellent	Various (tip shape dependent)	Excellent
Location of use	Anywhere	Anywhere	Available for prosthetic valve (ring) fixation only
Available thread	Any thread	Any thread	Limited to polyester thread
Cost	Low	Low	Expensive

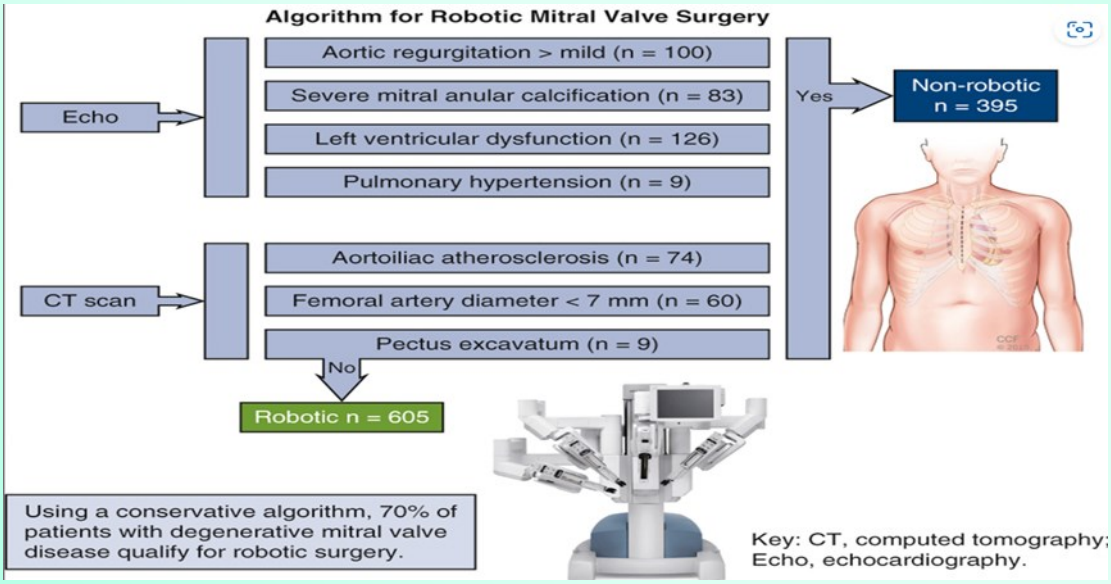
ADULT: MICS

A conservative screening algorithm to determine candidacy for robotic mitral valve surgery (JTCVS)

Chemtob RA, Wierup P, Mick SL, Javorski MJ, Burns DJP, Blackstone EH, Svensson LG, Gillinov AM; Cardiac Robotic Surgery Working Group at Cleveland Clinic. A conservative screening algorithm to determine candidacy for robotic mitral valve surgery. J Thorac Cardiovasc Surg. 2022 Oct;164 (4):1080-1087. doi: 10.1016/j.jtcvs.2020.12.036. Epub 2020 Dec 17. PMID: 33436297.

Key points:

- The outcomes of a conservative screening algorithm developed to select patients with degenerative mitral valve disease for robotic surgery were studied. From January 2014 to January 2019, a screening algorithm that included transthoracic echocardiography and computed tomography scanning was rigorously applied by 3 surgeons to assess candidacy of 1000 consecutive patients with isolated degenerative mitral valve disease (age 58 ± 11 years, 67% male) for robotic surgery.
- Among the 1000 screened patients, 605 patients were selected for robotic surgery. Common reasons for sternotomy (n = 395) were aortoiliac atherosclerosis (25%), femoral artery diameter <7 mm (20%), mitral annular calcification 21%), aortic regurgitation (26%), and reduced left ventricular function (n = 126/391, 32%).
- Compared with sternotomy, patients undergoing robotic surgery had less new-onset atrial fibrillation , fewer red blood cell transfusions , and shorter hospital stay . No hospital deaths occurred, and occurrence postoperative stroke occurrence in the robotic and sternotomy groups was similar.

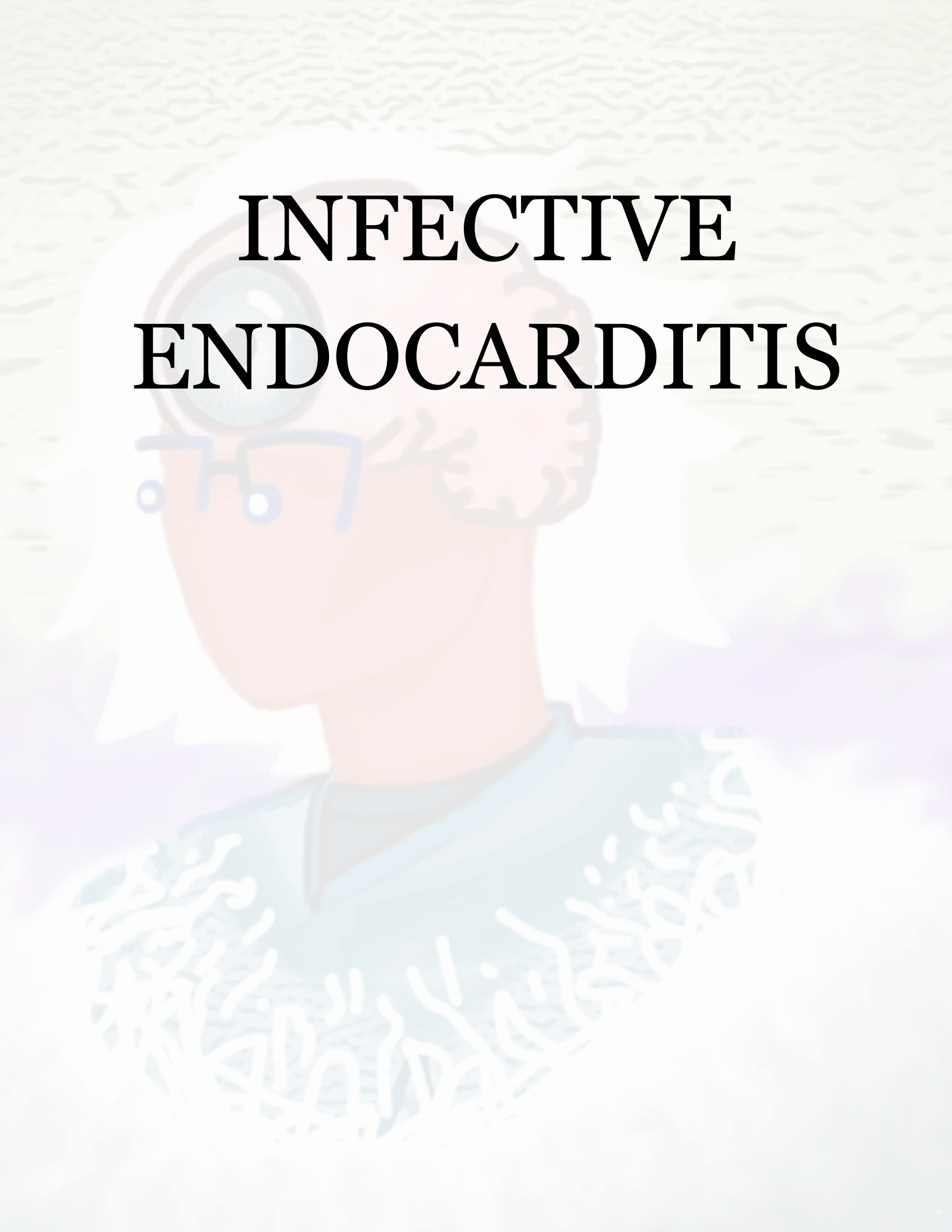


Comments:

Mitral valve repair is the procedure of choice to correct mitral regurgitation caused by degenerative mitral valve disease, due to its well-documented superiority over valve replacement. valve repair is feasible in more than 95% of such patients and is associated with better long-term survival, greater freedom from valve-related adverse events, and better preservation of left ventricular function. there has been increasing interest in applying less-invasive approaches. Some studies have documented an increased risk of stroke with less-invasive mitral valve surgery, whereas others reported operative mortality exceeding 1%. rigorous patient selection could maximize patient safety and this Patient selection for robotically assisted mitral valve repair was developed at Cleveland Clinic . It relies primarily on preoperative transthoracic echocardiography and computed tomographic (CT) scanning. The absolute contraindications to robotic mitral valve surgery include previous right thoracotomy, extensive calcification of the aortic root or ascending aorta, severe pulmonary dysfunction, severe liver dysfunction, and clinically important bleeding disorders. This is a single-center, nonrandomized study which is a limitation of the study.

Take Home Message: This conservative imaging-based screening algorithm for patients with isolated degenerative mitral valve disease can be validated as an approach to select patients for robotic mitral valve surgery.

INFECTIVE ENDOCARDITIS



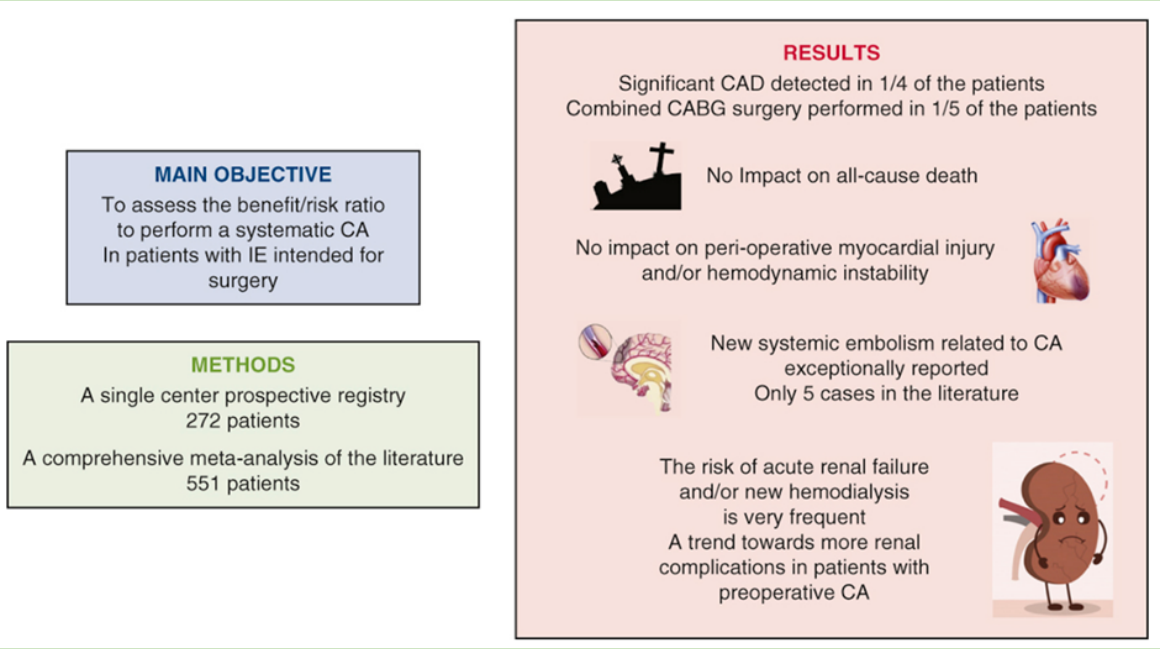
ADULT: INFECTIVE ENDOCARDITIS

Utility and safety of coronary angiography in patients with acute infective endocarditis who required surgery (JTCVS)

Spanneut TA, Paquet P, Bauters C, Modine T, Richardson M, Bonello L, Juthier F, Lemesle G. Utility and safety of coronary angiography in patients with acute infective endocarditis who required surgery. J Thorac Cardiovasc Surg. 2022 Sep;164(3):905-913.e19. doi: 10.1016/j.jtcvs.2020.08.117. Epub 2020 Oct 7. PMID: 33131891.

Key points:

- The benefit/risk ratio to perform a coronary angiography (CA) before surgery for infective endocarditis (IE) were analysed in this study with a single-center prospective registry including 272 patients with acute IE who underwent surgery and compared patients who underwent a pre-operative CA (n = 160) with those who did not (n = 112). A meta-analysis of 3 observational studies was also conducted and included 551 patients: 342 who underwent a CA and 209 who did not.



- In the registry, combined CABG was performed in 17% of the patients with preoperative CA. At 2 years, the rate of the primary composite end point (all-cause death, new systemic embolism, stroke, new hemodialysis) was similar in the CA (38%) and no-CA (37%) groups. only 2 episodes of systemic embolism after CA and only one possibly related to a vegetation dislodgement were noted.
- In the meta-analysis, combined CABG was performed in 18% of the patients with preoperative CA. All-cause death was similar in both groups. Only 5 cases of systemic embolism possibly related to a vegetation dislodgement were reported.

Comments:

This study showcased the largest prospective registry in the field. Benefit/risk ratio to perform a preoperative CA in patients with IE intended for surgery were well addressed. Preoperative CA is currently recommended by guidelines in patients with acute IE at high cardiovascular risk; the level of evidence is, however, very low.

The patients who require emergent surgery for IE are often unstable (heart failure, hemodynamic instability) and prevalence of significant underlying CAD may be much lower in acute IE. The risk of vegetation dislodgement in case of aortic vegetation looks overall overestimated by physicians when by contrast the risk of new hemodialysis looks underestimated. The risk of renal complications should be highlighted in future guidelines. The postoperative acute renal failure and/or now hemodialysis was frequent and we observed a trend for more acute renal failure and/or new hemodialysis in patients who underwent preoperative CA. Because of the fear of systemic embolism, guidelines and it is suggested to consider a coroscanner as an alternative technique in this context, especially for patients with aortic valve location so as to avoid the risk of vegetation dislodgement.

The decision to perform or not a preoperative CA was based on physician's decision and not randomly allocated. This forms major limitation of the study. longer than 2 year follow-up may be needed to show a potential benefit of combined CABG surgery

Take Home Message: This study implicates that performing a preoperative CA in this context is not associated with improved prognosis.

HOCM

ADULT: HOCM

Anomalous papillary muscles-Implications in the surgical treatment of hypertrophic obstructive cardiomyopathy (JTCVS)

Lentz Carvalho J, Schaff HV, Morris CS, Nishimura RA, Ommen SR, Maleszewski JJ, Dearani JA. Anomalous papillary muscles-Implications in the surgical treatment of hypertrophic obstructive cardiomyopathy. J Thorac Cardiovasc Surg. 2022 Jan;163(1):83-89.e1. doi: 10.1016/j.jtcvs.2020.04.007. Epub 2020 Apr 15. PMID: 32414597.

Key points:

- 73 patients operated from January 1961 to April 2018, for obstructive hypertrophic cardiomyopathy with an anomalous papillary muscle were identified.
- Anomalous papillary muscles inserting directly into the body of the anterior mitral valve leaflet were classified as type I, those with both direct insertion into the body of the leaflet and attachment to the free edge of the anterior leaflet were categorized as type II, and anomalous papillary muscles inserting into the free edge of the anterior leaflet were grouped as type III. The anomalous papillary muscle was detected on preoperative transthoracic echocardiography in 11% of patients and by intraoperative transesophageal echocardiography in 27.4% of patients. No anomalous papillary muscles were identified on cardiac magnetic resonance imaging.
- The anomalous papillary muscle was classified as type I in 31.5% of patients, type II in 35.6%, and type III in 32.9%. Only type I and type II anomalous papillary muscles contributed to left ventricular outflow tract obstruction. All patients underwent septal myectomy with or without associated excision of the anomalous papillary muscle. Excision of the papillary muscles was more common in patients with type I and II (76.4% and 80.8%, respectively) when compared with type III (4.2%).
- Transient atrial fibrillation occurred in 35.6% of patients. A left bundle branch block (LBBB) was seen on postoperative electrocardiograms in 30.1% of patients, and one patient with pre-existing right bundle branch block required a permanent transvenous pacemaker for complete heart block postoperatively.

Comments:

Papillary muscle abnormalities are important findings in patients with obstructive hypertrophic cardiomyopathy but are not identified preoperatively in the majority of patients. The aberrant muscle have contributed to obstruction by pulling the anterior MV leaflet into the outflow tract. The difficulty in imaging by echocardiography may be explained by the fact that anomalous papillary muscles usually insert near the commissures. During septal myectomy, the anomalous PM should be excised from its attachment to the body of the anterior leaflet in order to relieve outflow tract obstruction I type I and type II. PM may attach directly to the free edge of the anterior MV leaflet (type III) and rarely hinders forward blood flow unless there is associated midventricular obstruction and will not require any procedure in addition to septal myectomy. This anomalous papillary muscle subtype should not be excised as doing so may produce an unsupported leaflet segment and associated MR. Careful surgical inspection at the time of transaortic septal myectomy is critically important to identify anomalous papillary muscles and their anatomic subtypes.

Take Home Message: The optimum approach to adequate gradient relief and preservation of mitral valve function involves a transaortic extended septal myectomy associated with the resection of the anomalous papillary muscles in patients with type I and II anatomy.

HEART FAILURE SURGERY

HEART FAILURE

Systemic ventricular assist device support of the Fontan circulation yields promising outcomes: An analysis of The Society of Thoracic Surgeons Pedimacs and Intermacs Databases (JTCVS)

Bedzra EKS, Adachi I, Peng DM, Amdani S, Jacobs JP, Koehl D, Cedars A, Morales DL; Society of Thoracic Surgeons Fontan VAD Group. Systemic ventricular assist device support of the Fontan circulation yields promising outcomes: An analysis of The Society of Thoracic Surgeons Pedimacs and Intermacs Databases. J Thorac Cardiovasc Surg. 2022 Aug;164(2):353-364. doi: 10.1016/j.jtcvs.2021.11.054. Epub 2021 Nov 27. PMID: 35016782.

Key points:

- This is the largest reported analysis of systemic VAD support of Fontan patients so far. A retrospective analysis of patients with a Fontan circulation who underwent VAD implant in the Society of Thoracic Surgeons Pedimacs and Intermacs Databases from September 19, 2012, to December 31, 2019 was done.
- 55 Fontan patients who had undergone VAD implant with a median age at implantation of 10.2 years and weight, 26.8 kg were identified . More VADs were implanted in 2018-2019 than in 2012-2017. The later era had higher pre-VAD glomerular filtration rate . Kaplan-Meier survival on device was 76% at 6 months with no difference by era. Kaplan-Meier survival on device was 76% at 6 months with no difference by era. Five patients were supported for >1 year with no added mortality; the longest support time was 4 years, 7 months. Adverse event rates included pump thrombosis incidence of 4% , stroke 5.5% , gastrointestinal bleeding of 7% , and nongastrointestinal bleeding of 9% .

Comments:

This study appears to provide additional support for systemic VAD support in patients with Fontan circulation with systemic systolic and possibly diastolic ventricular dysfunction. The complication and adverse events profiles are not trivial, and timing of placement seems imperative, although the optimal window remains unclear. Even the present study has very limited follow-up data at 3 months, including data for end-organ function. Whilewe collectively hope an existing mechanical support platform could reverse the late adverse consequences of the Fontan circulation, it is still difficult to discern truth from hype in this very challenging clinical context.

Take Home Message: VAD support of the Fontan circulation is becoming more frequent. VAD usage in this growing population can yield promising outcomes.

Autologous bone marrow stem cell transplantation for patients undergoing coronary artery bypass grafting: a meta-analysis of 22 randomized controlled trials (JCS)

Song J, He K, Hou J. Autologous bone marrow stem cell transplantation for patients undergoing coronary artery bypass grafting: a meta-analysis of 22 randomized controlled trials. J Cardiothorac Surg. 2022 Jun 25;17(1):167. doi: 10.1186/s13019-022-01838-2. PMID: 35752847; PMCID: PMC9233763.

Key points:

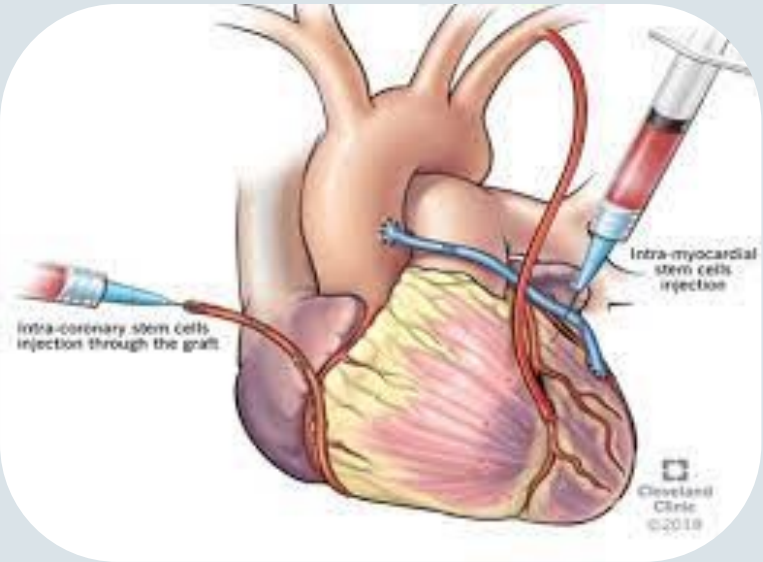
- This updated meta-analysis of randomized controlled trials was to evaluate the efficacy, safety and feasibility of coronary artery bypass grafting (CABG) and bone marrow stem cell (BMSC) transplantation. 22 studies with 820 patients were included sourced from the PubMed, Embase, and Cochrane literature databases.
- 432 patients received BMSC transplantation with CABG and 388 patients received isolated CABG. Compared with the CABG group, the BMSC transplantation group exhibited an improvement in the left ventricular (LV) ejection fraction.
- The change of LVEF from baseline to follow-up in the BMSC group increased by 3.87% .

Comments:

Myocardial ischemia often results in irreversible loss of viable myocardium and replacement by noncontractile scar tissue, leading to the impairment of left ventricular and cardiac dysfunction. The aim of bone marrow stem cells (BMSCs) therapy is to repair damaged myocardium, prevent ventricular remodelling, and improve overall cardiac function. Bone marrow cells are the first choice for bypass combined stem cell transplantation because they are autologous and readily available. The choice of method of assessing the EF influenced the determined effectiveness of CABG combined with BMSC transplantation in IHD patients. subgroup analysis of echocardiographic tests demonstrated higher values

STEM CELL TRANSPLANTATION

compared to SPECT and MRI. Use of Bone marrow mononuclear cells (BMMNCs) or BMCs may lead to a more pronounced improvement in LVEF compared to CD133 + or CD34 + cells. BMMNCs can express a large number of cytokines, prevent cardiomyocyte apoptosis, promote angiogenesis, and recruit endogenous stem cells for cell regeneration and fusion. The hypothesis is that in a cardiac arrest, capillaries dilate and blood vessel permeability increases, so transplanted cells attached to the blood vessel wall migrate easily to the myocardium while other studies believe that intramuscular injection was the most effective method because cells are more reliably located in the heart by direct visualization and delivery to the target site. More high-quality research is needed to determine which approach is better.



The intervention time may play a key role in the outcome. Transplantation during off-pump CABG could reduce ischemia and reperfusion injury and restore vascular supply, thereby increasing stem cell survival.

The limitations of the study are that there is significant heterogeneity in the present meta-analysis and follow-up work in most studies is relatively short.

Take Home Message:

Autologous BMSC transplantation for patients undergoing CABG appears to be associated with an improvement in LV function compared with CABG alone.

CARDIOLOGY

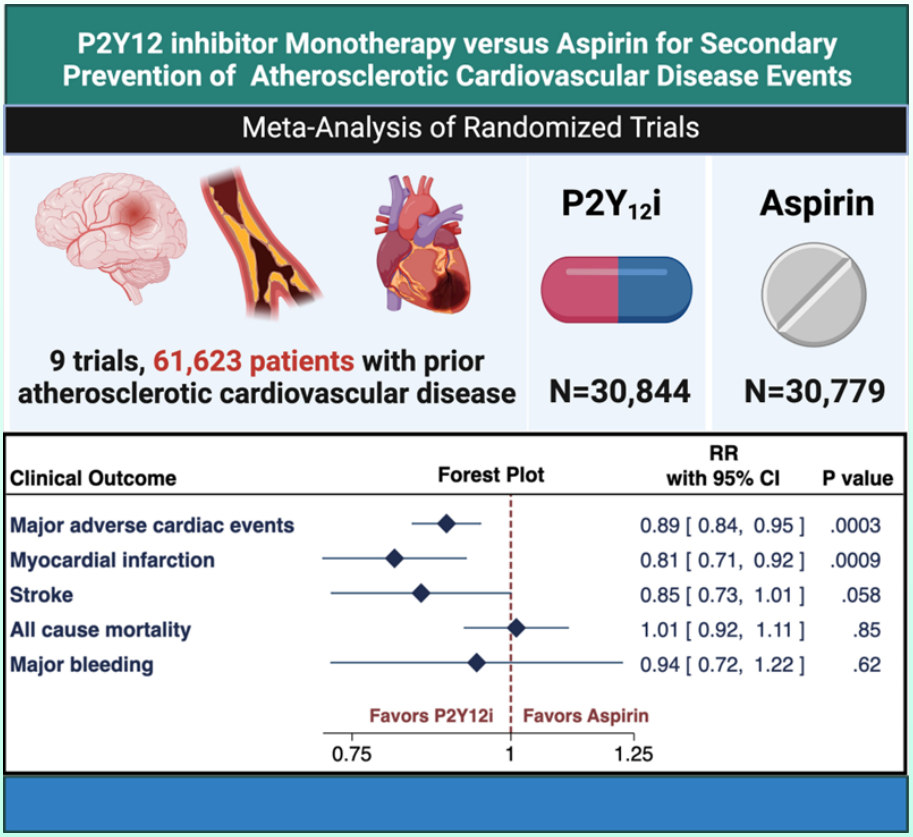
ADULT: CARDIOLOGY

$P2Y_{12}$ inhibitor versus aspirin monotherapy for secondary prevention of cardiovascular events: meta-analysis of randomized trials (EHJ open)

Aggarwal D, Bhatia K, Chunawala ZS, Furtado RHM, Mukherjee D, Dixon SR, Jain V, Arora S, Zelniker TA, Navarese EP, Mishkel GJ, Lee CJ, Banerjee S, Bangalore S, Levisay JP, Bhatt DL, Ricciardi MJ, Qamar A. $P2Y_{12}$ inhibitor versus aspirin monotherapy for secondary prevention of cardiovascular events: meta-analysis of randomized trials. Eur Heart J Open. 2022 Mar 21;2(2):oeac019. doi: 10.1093/ehjopen/oeac019. PMID: 35919116; PMCID: PMC9242055.

Key points:

- Clopidogrel Superior to 'Divine' Aspirin Monotherapy in Secondary Prevention
- P2Y12 inhibitors reduced the risk of MI by 19%, and researchers say it's time to move beyond aspirin for long-term use.



Comments:

A meta-analysis of 9 randomized trials (61 623 patients) was conducted to compare $P2Y_{12}$ inhibitor monotherapy versus aspirin monotherapy for secondary prevention of cardiovascular events in patients with established atherosclerotic cardiovascular disease (coronary, cerebrovascular, or peripheral artery disease). The included studies had follow-up periods between 3 and 36 months. Monotherapy with $P2Y_{12}$ inhibitors (clopidogrel or ticagrelor) significantly reduced the risk of MACE by 11% (0.89, 95% CI 0.84–0.95, I^2 = 0%) and MI by 19% (0.81, 95% CI 0.71–0.92, I^2 = 0%) compared with aspirin monotherapy. There was no significant difference in the risk of stroke, all-cause mortality, or major bleeding. Subgroup analysis revealed that the reduction in MACE with $P2Y_{12}$ inhibitors was driven by a reduction in recurrence of the qualifying event.

Dose-Response to Sacubitril/Valsartanin Patients With Heart Failure andReduced Ejection Fraction (JACC)

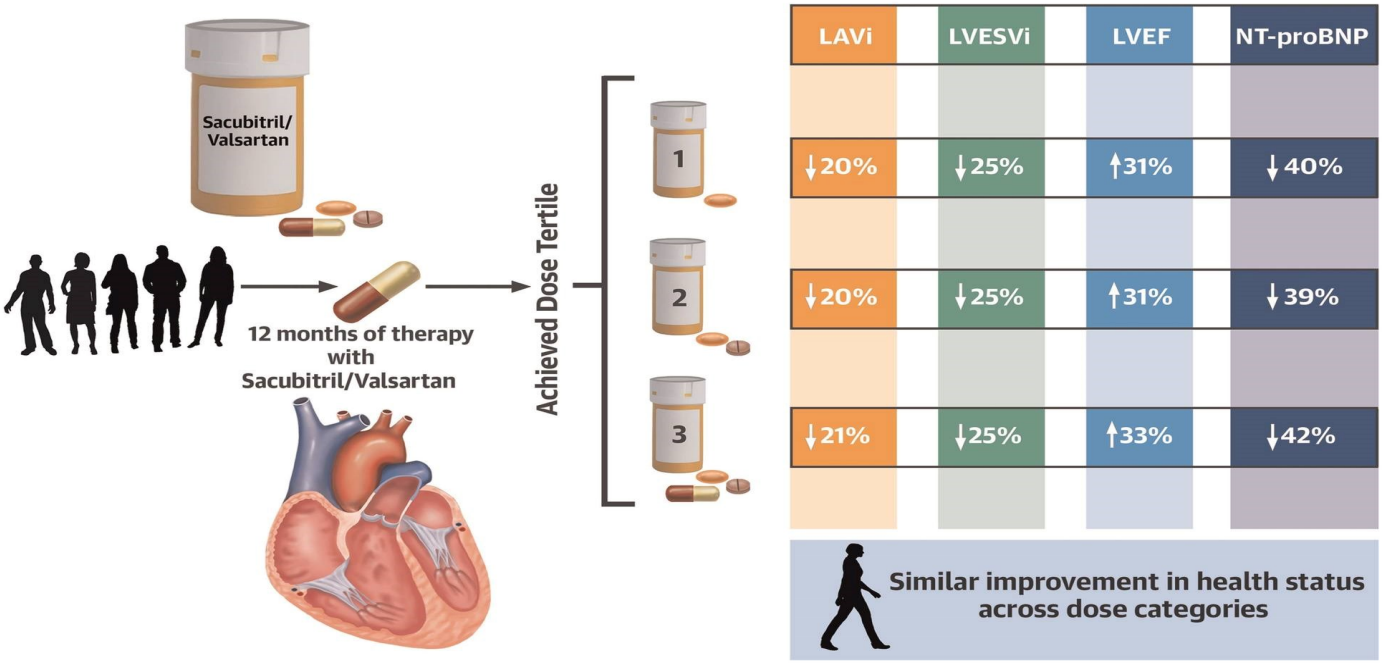
Mohebi R, Liu Y, Piña IL, Prescott MF, Butler J, Felker GM, Ward JH, Solomon SD, Januzzi JL Jr. Dose-Response to Sacubitril/Valsartan in Patients With Heart Failure and Reduced Ejection Fraction. J Am Coll Cardiol. 2022 Oct 18;80(16):1529-1541. doi: 10.1016/j.jacc.2022.08.737. PMID: 36229089.

Key points:

Regardless of achieved dose, sacubitril/valsartan reduced cardiac biomarkers, improved health status, and significantly reversed cardiac remodeling processes in patients with heart failure with reduced ejection fraction.

ADULT: CARDIOLOGY

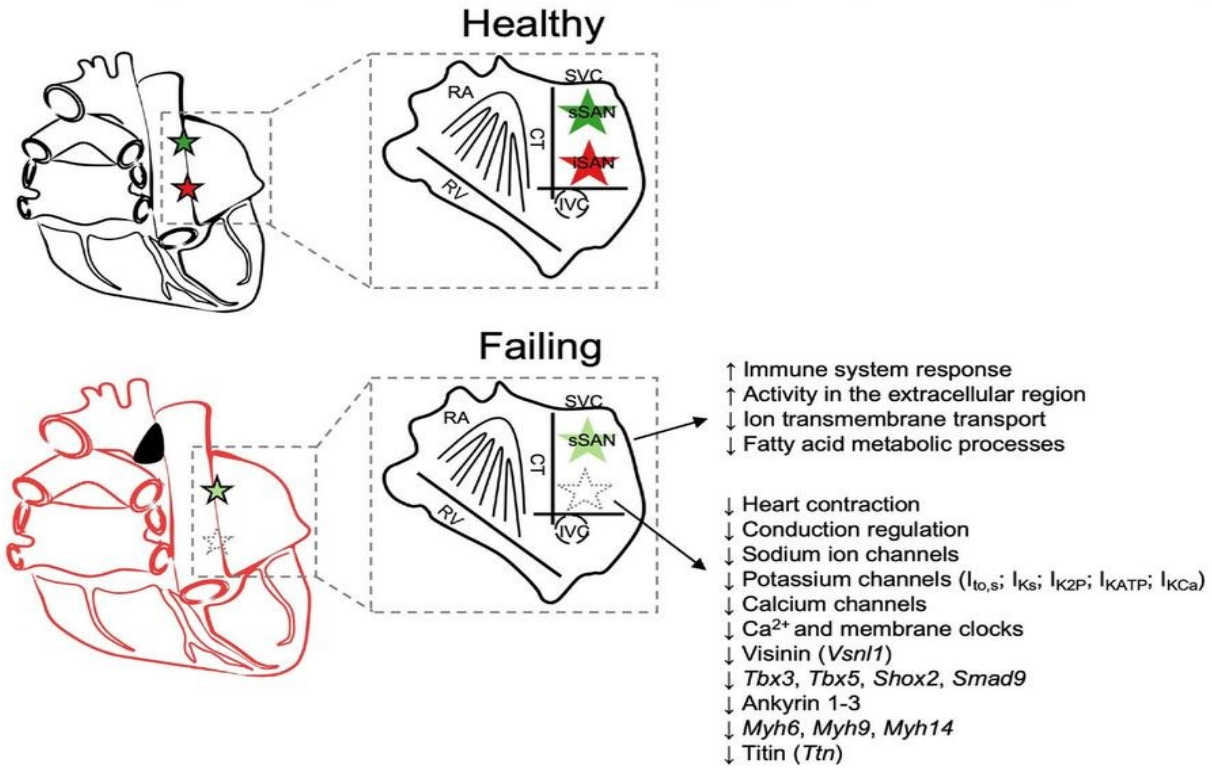
CENTRAL ILLUSTRATION: Improvements in Cardiac Function Across Sacubitril/Valsartan Dose Categories



Mohebi R, et al. J Am Coll Cardiol. 2022;80(16):1529–1541.

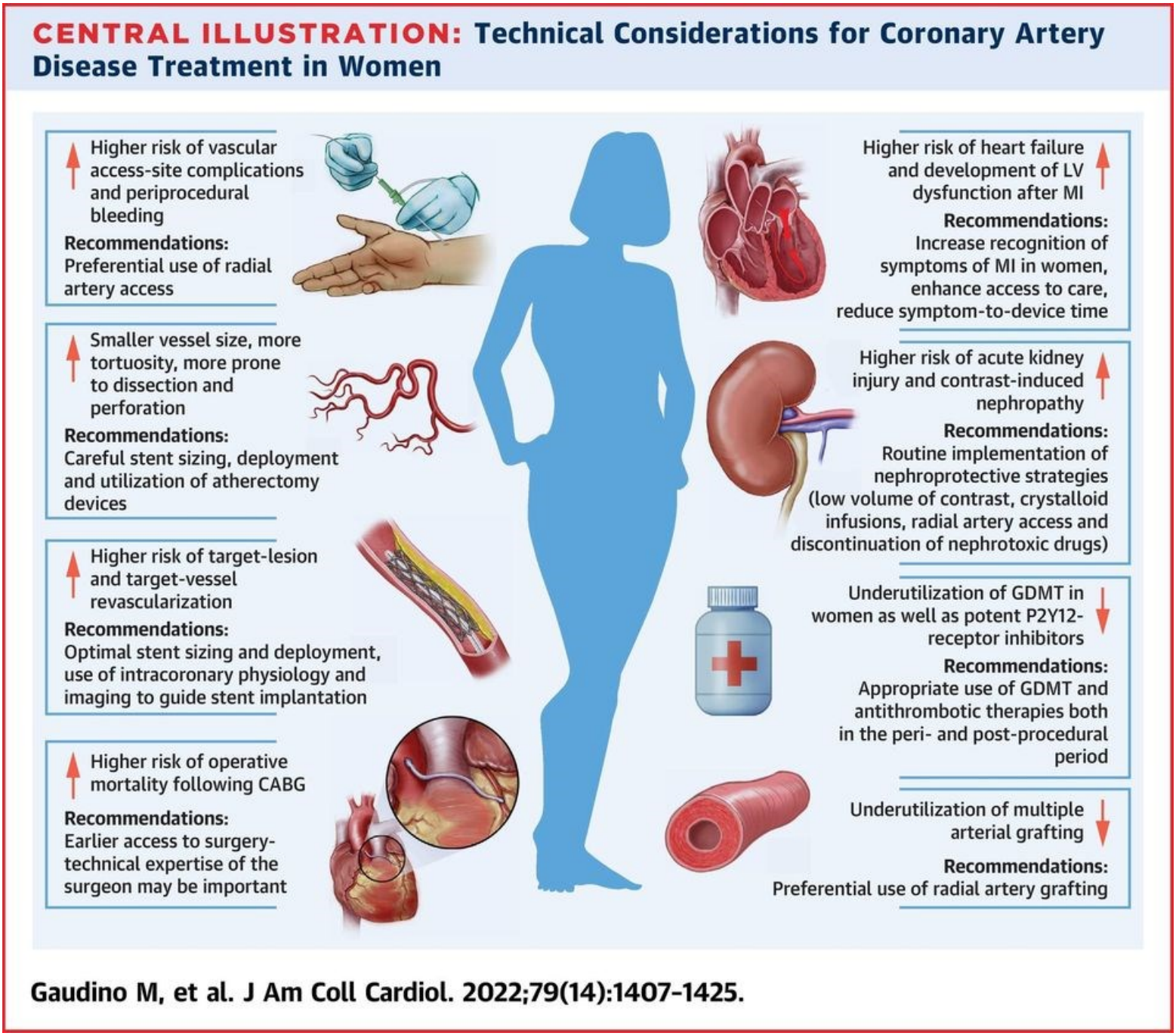
Did you know that the mammalian heart has superior and inferior sinoatrial nodes (SAN)? During heart failure the inferior SAN is *silenced*.

CENTRAL ILLUSTRATION: Heart Failure Results in Loss of Automaticity in 1 Pacemaker Region



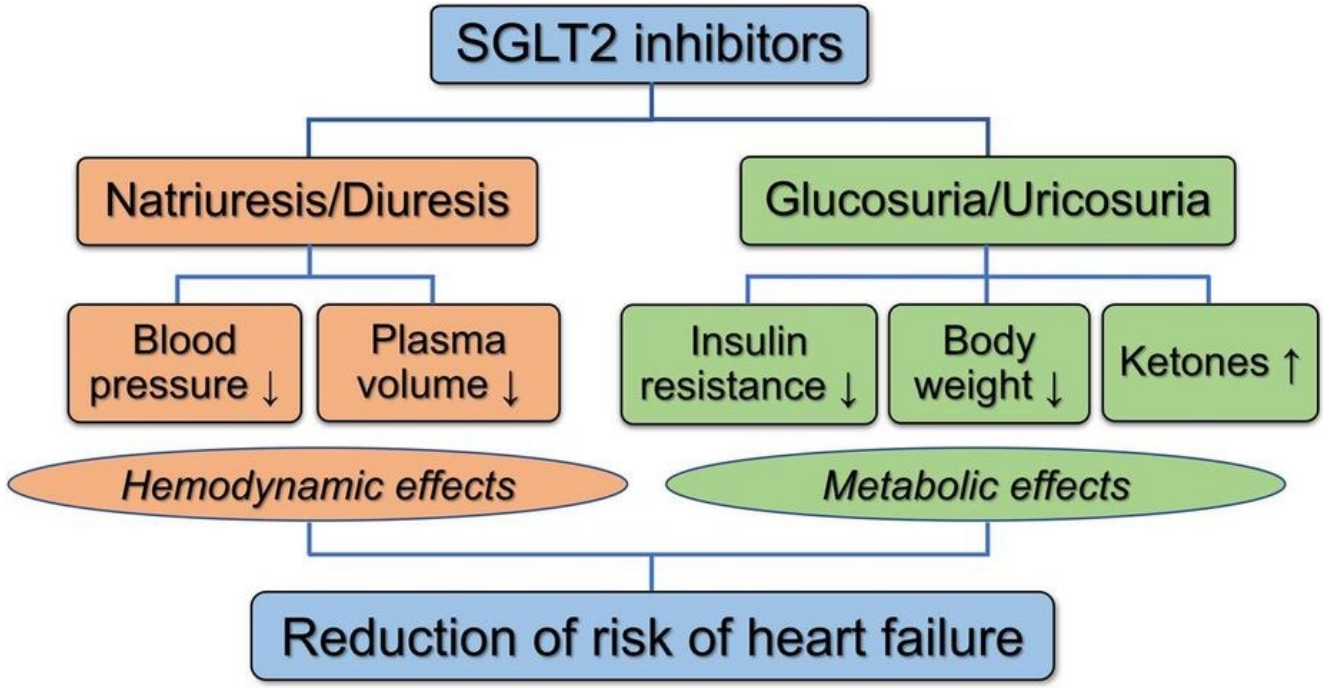
Gams A, et al. J Am Coll Cardiol EP. 2022;8(11):1341–1353.

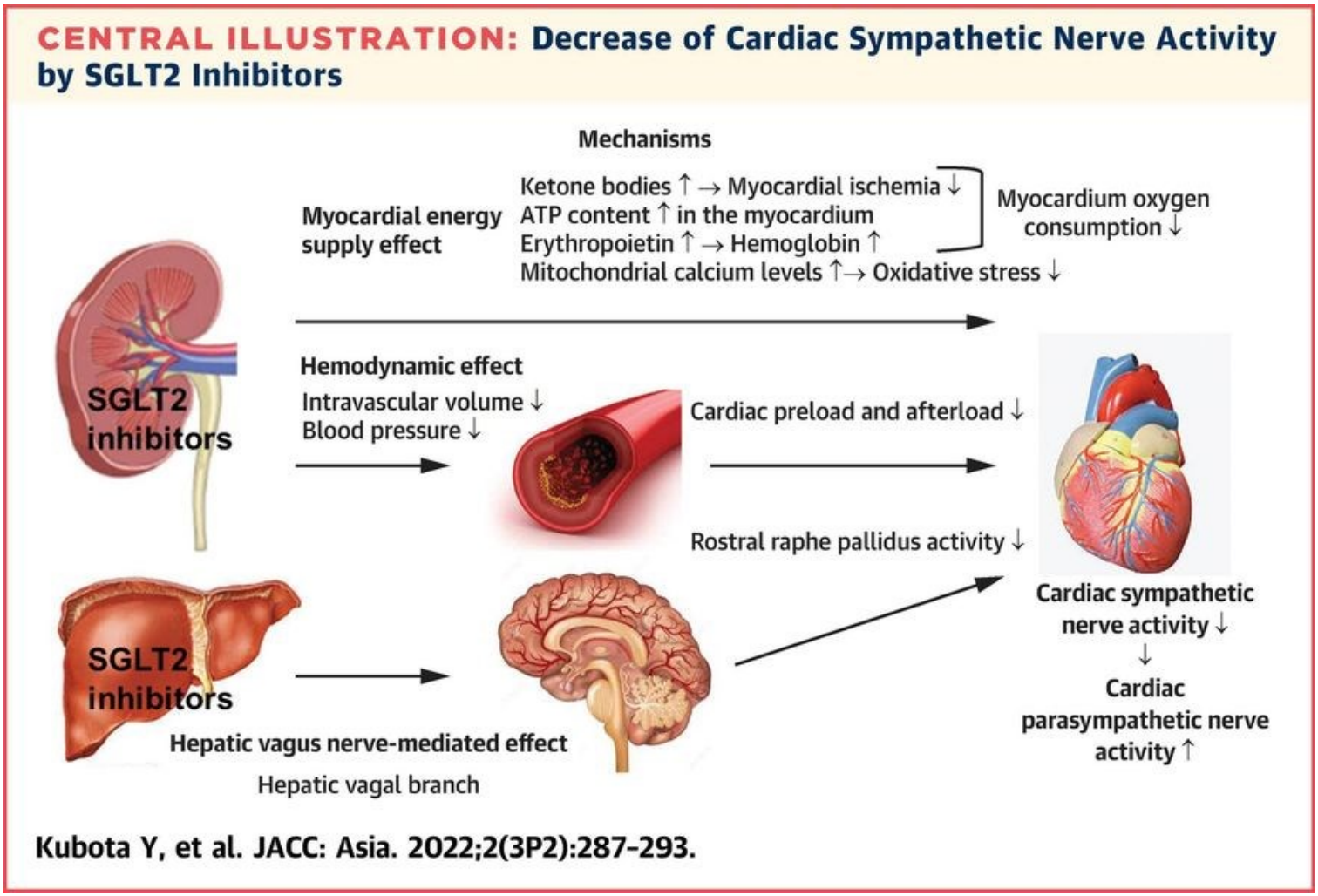
Technical considerations for Coronary artery disease in Women (JACC)



Gaudino M, et al. J Am Coll Cardiol. 2022;79(14):1407-1425.

Clinical Benefits of Sodium–GlucoseCotransporter 2 Inhibitors and theMechanisms Underlying TheirCardiovascular Effects (JACC Asia)



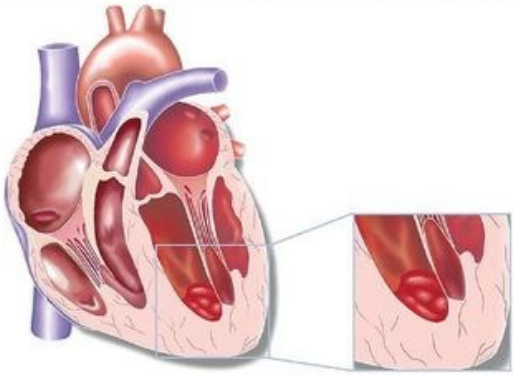


Prophylactic Rivaroxiban therapy for Left ventricular Thrombus after anterior ST– segment elevation myocardial infarction (JACC Intv•)

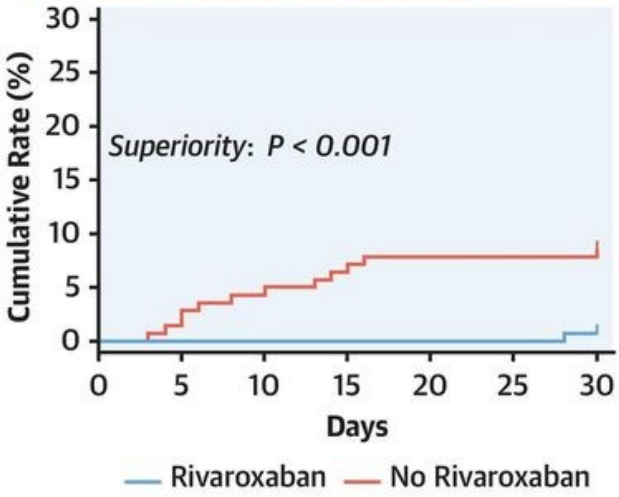
CENTRAL ILLUSTRATION: Prophylactic Rivaroxaban Therapy for Left Ventricular Thrombus After Anterior ST-Segment Elevation Myocardial Infarction

Randomized Trial of DAPT Plus Rivaroxaban Versus DAPT Alone Following Anterior STEMI, N = 279

Rivaroxaban Group	Dual Antiplatelet Therapy Group
Rivaroxaban 2.5 mg twice daily for 30 days + DAPT n = 139	DAPT alone n = 140



Primary Outcome Left Ventricular Thrombus Formation Within 30 Days



Clinical Outcomes Within 30 Days

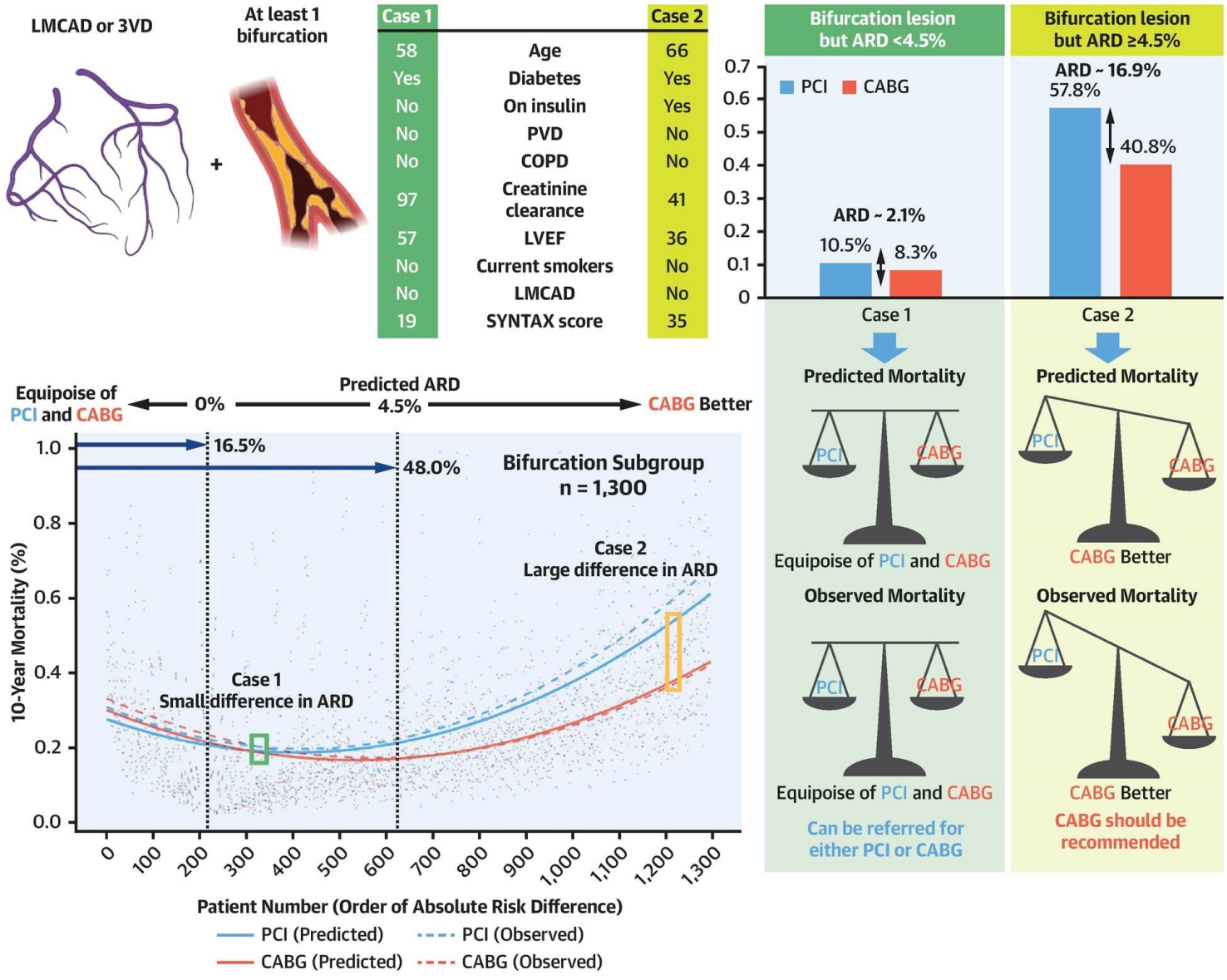
	HR (95% CI)	*P* Value
Primary Outcomes		
ITT	0.080 (0.010-0.618)	0.015
PP	0.082 (0.011-0.630)	0.016
Net Adverse Clinical Events		
ITT	0.368 (0.170-0.795)	0.011
PP	0.373 (0.172-0.805)	0.012
Bleeding Events	2.017 (0.369-11.012)	0.418

Zhang Z, et al. J Am Coll Cardiol Intv. 2022;15(8):861-872.

Predicted and Observed Mortality at 10 Years in Patients With Bifurcation Lesions in the SYNTAX Trial (JACC Interventions)

Ninomiya K, Serruys PW, Garg S, Gao C, Masuda S, Lunardi M, Lassen JF, Banning AP, Colombo A, Burzotta F, Morice MC, Mack MJ, Holmes DR, Davierwala PM, Thuijs DJFM, van Klaveren D, Onuma Y; SYNTAX Extended Survival Investigators. Predicted and Observed Mortality at 10 Years in Patients With Bifurcation Lesions in the SYNTAX Trial. JACC Cardiovasc Interv. 2022 Jun 27;15(12):1231-1242. doi: 10.1016/j.jcin.2022.04.025. Epub 2022 May 17. PMID: 35595676.

CENTRAL ILLUSTRATION: Treatment Recommendation According to the Predicted Absolute Risk Difference for 10-Year Mortality in Patients With Bifurcation Lesions



Ninomiya K, et al. J Am Coll Cardiol Intv. 2022;15(12):1231-1242.

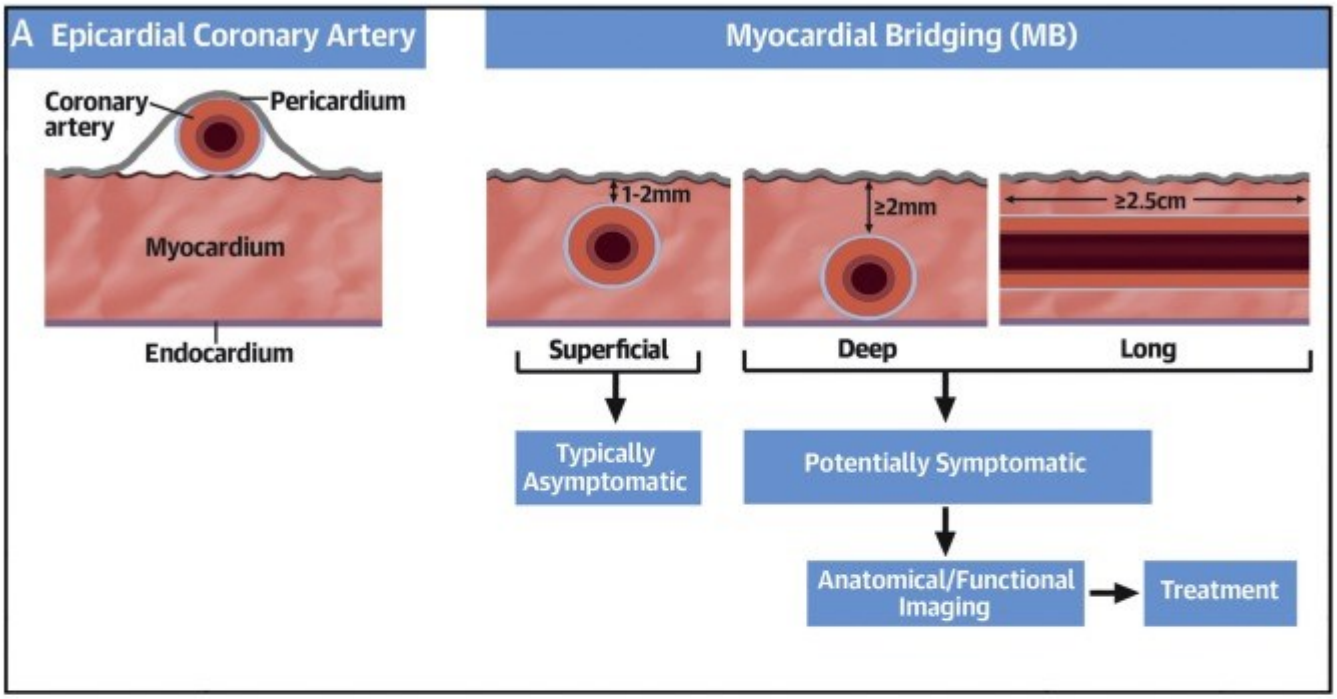
Do bifurcation lesions do better with coronary artery bypass grafting (CABG) than percutaneous coronary intervention (PCI)?

Among patients treated with PCI in the SYNTAXES trial, those with >1 bifurcation lesion had a higher 10-year mortality compared with those without bifurcation lesions. Among patients who underwent CABG, there was no difference in mortality between those with and without bifurcation lesions.

Myocardial Bridging: Diagnosis, Functional Assessment, and Management: *JACC* State-of-the-Art Review (JACC)

Sternheim D, Power DA, Samtani R, Kini A, Fuster V, Sharma S. Myocardial Bridging: Diagnosis, Functional Assessment, and Management: JACC State-of-the-Art Review. J Am Coll Cardiol. 2021 Nov 30;78(22):2196-2212. doi: 10.1016/j.jacc.2021.09.859. PMID: 34823663.

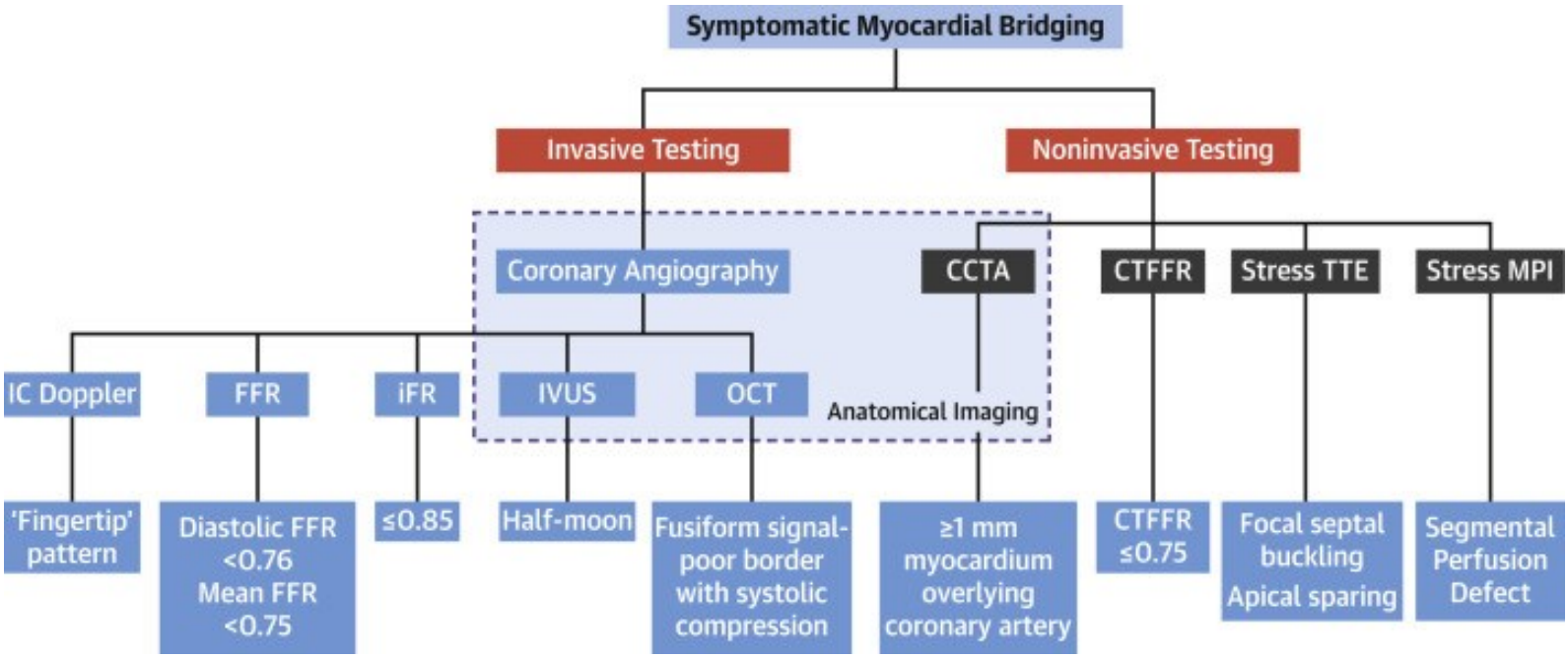
CENTRAL ILLUSTRATION: Anatomic Properties of Myocardial Bridging and Overview of Treatment Modalities

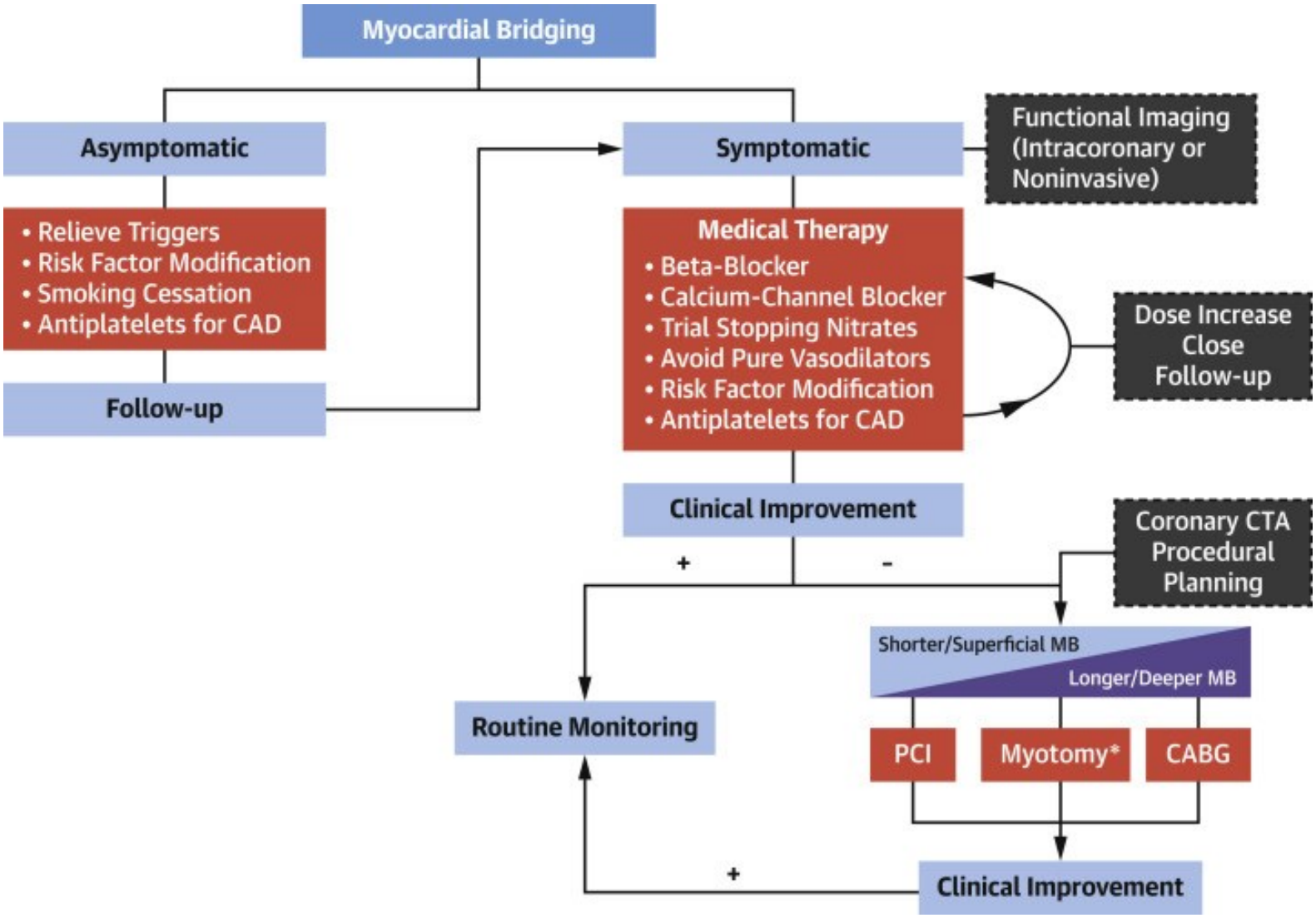


B Treatment Modalities

	Medical Therapy	Percutaneous Coronary Intervention	Coronary Artery Bypass Surgery	Surgical Myotomy
				
Treatment Goal	• Decrease HR • RF modification	• Reinforce the intramural coronary artery	• Bypass the compressed arterial segment	• Remove the overlying MB
Clinical Issues	• First line treatment • Trial nitrate cessation • Avoid pure vasodilators	• High radial strength, second generation DES recommended • Intravascular imaging critical to avoid over or under expansion • Avoid bioresorbable stents	• Suitable for long or very deep MB • Saphenous grafts may be preferred to arterial grafts due to potentially lower rates of graft failure	• Consider as first line surgical treatment at experienced myotomy centers • Technically challenging

Sternheim, D. et al. J Am Coll Cardiol. 2021;78(22):2196-2212.


Symptomatic Myocardial Bridging
Invasive Testing
Noninvasive Testing
Coronary Angiography
CCTA
CTFFR
Stress TTE
Stress MPI
IC Doppler
FFR
iFR
IVUS
OCT
Anatomical Imaging
'Fingertip' pattern
Diastolic FFR <0.76 Mean FFR <0.75
≤0.85
Half-moon
Fusiform signal-poor border with systolic compression
≥1 mm myocardium overlying coronary artery
CTFFR ≤0.75
Focal septal buckling Apical sparing
Segmental Perfusion Defect


Myocardial Bridging
Asymptomatic
Symptomatic
Functional Imaging (Intracoronary or Noninvasive)
• Relieve Triggers
• Risk Factor Modification
• Smoking Cessation
• Antiplatelets for CAD
Follow-up
Medical Therapy
• Beta-Blocker
• Calcium-Channel Blocker
• Trial Stopping Nitrates
• Avoid Pure Vasodilators
• Risk Factor Modification
• Antiplatelets for CAD
Dose Increase Close Follow-up
Clinical Improvement
+
-
Coronary CTA Procedural Planning
Shorter/Superficial MB
Longer/Deeper MB
Routine Monitoring
PCI
Myotomy*
CABG
+
Clinical Improvement

ADVOR trial

#ESCCongress

Acetazolamide in acute heart failure

Conclusion

Acetazolamide added to intravenous loop diuretics decreases congestion within 3 days in patients with acute decompensated heart failure (HF).

Impact on clinical practice

Acetazolamide is easy to use, safe, effective, off-patent and cheap. It is therefore expected that the results will lead to a paradigm shift in the treatment of acute decompensated HF.

Study objectives

The ADVOR trial examined whether the addition of acetazolamide to intravenous loop diuretics improves decongestion in patients with acute decompensated HF.

Who and what?

Population

- Adults hospitalised with acute decompensated HF
- ≥1 clinical sign of volume overload (i.e. ascites, pleural effusion, or oedema)
- Elevated natriuretic peptide levels
- Taking oral diuretics for ≥1 month

519 patients randomised

Acetazolamide
500 mg once daily

Placebo

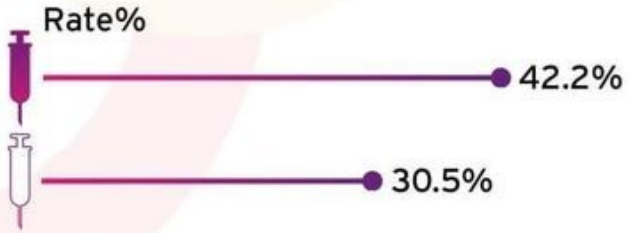
Administered as a bolus upon randomisation and during the next 2 days or until successful decongestion

At randomisation

- Oral loop diuretics were stopped
- All patients received high-dose intravenous loop diuretics

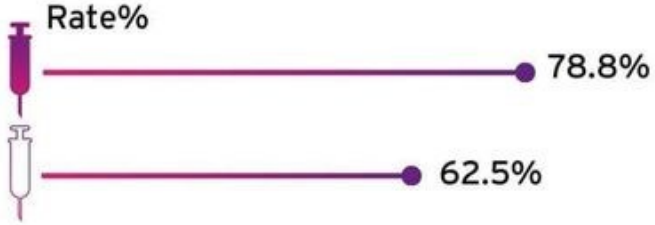
Primary outcome

Successful decongestion, defined as no clinical signs of fluid overload (other than trace oedema) within 3 days of randomisation without needing escalation of decongestive therapy



Relative Risk 1.46
95% CI 1.17–1.82; p=0.0009

Successful decongestion in patients alive at discharge



Relative Risk 1.27
95% CI 1.13–1.43; p=0.0001

ESC

TIME trial

#ESCCongress

The treatment in morning versus evening study

Conclusion

Protection against heart attack, stroke and vascular death is not affected by whether antihypertensive medications are taken in the morning or evening.

Impact on clinical practice

People with high blood pressure should take their regular antihypertensive medications at a time of day that is convenient for them and minimises any undesirable effects.

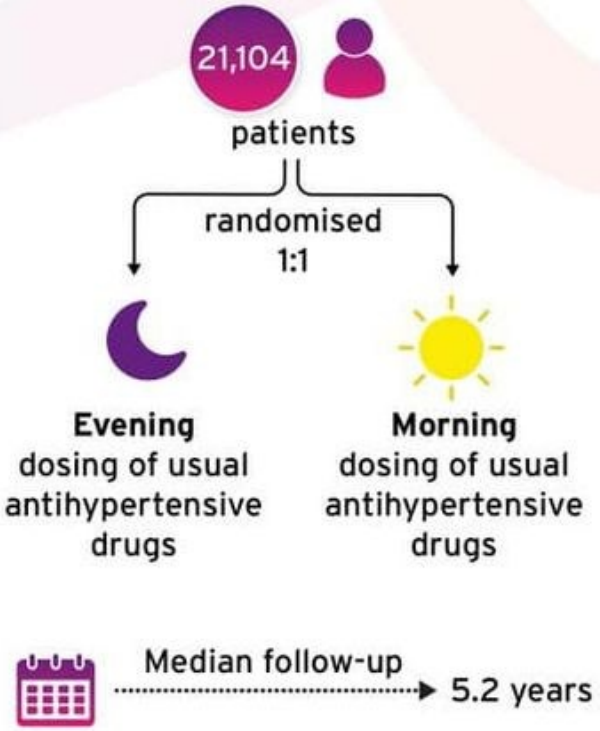
Study objectives

The TIME trial tested whether evening dosing of antihypertensive medication improved major cardiovascular outcomes compared with morning dosing.

Who and what?

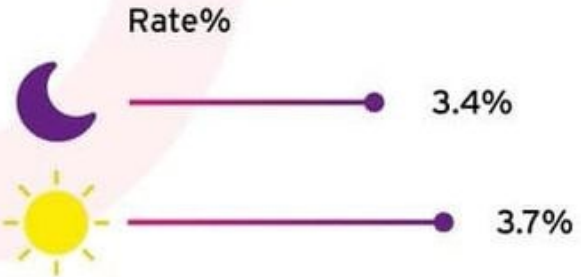
Population

Adults taking at least one antihypertensive medication and with a valid email address were recruited by advertising in the community, from primary and secondary care, and from databases of consented patients in the UK.



Composite primary outcome

Hospitalisation for nonfatal myocardial infarction or nonfatal stroke, or vascular death, in the intention-to-treat population.



Unadjusted hazard ratio 0.95
95% CI 0.83-1.10
p=0.53

- The results did not vary in pre-specified subgroup analyses.
- Taking medication in the evening was not harmful.

ESC

SECURE trial

#ESCCongress

A polypill strategy in secondary prevention

Conclusion

A pill containing aspirin and medications to lower lipids and blood pressure more effectively prevents further adverse CV events after a myocardial infarction (MI) compared with taking the drugs separately.

Impact on clinical practice

A polypill could become an integral part of strategies to prevent CV events in post-MI patients.

Study objectives

SECURE was the first randomised trial to study the impact of a polypill on recurrent CV events in post-MI patients. The study enrolled patients within 6 months of having an MI.

What and who?

The polypill contained:

- Aspirin (100mg)
- ACE inhibitor ramipril (2.5, 5 or 10 mg)
- Atorvastatin (20 or 40 mg)

2,499 post-MI patients

randomised

Polypill

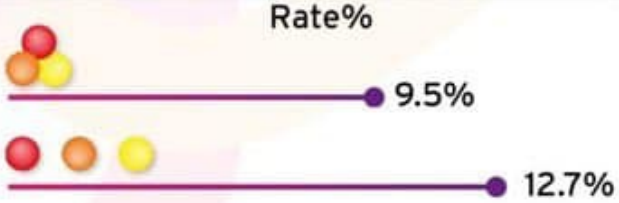
Usual care

(at the discretion of the treating physician)

Median follow-up ····▸ 3 years

Primary endpoint

Composite of death from CV causes, nonfatal MI, stroke, or urgent revascularisation



Hazard ratio 0.76
95% CI 0.60–0.96
p<0.001 for non-inferiority
p=0.02 for superiority

Key secondary endpoint

Composite of CV death, nonfatal MI, or stroke

Hazard ratio 0.70
95% CI 0.54–0.90
p=0.005

ESC

INVICTUS trial

#ESCCongress

Rivaroxaban versus VKA for rheumatic atrial fibrillation

Conclusion

The largest trial in patients with rheumatic heart disease has found that in those with atrial fibrillation, vitamin K antagonists (VKA) reduce CV events and mortality, without increasing major bleeding, compared to rivaroxaban.

Impact on clinical practice

Adjusted dose VKA should remain the standard of care for patients with rheumatic heart disease and atrial fibrillation.

Study objectives

The INVICTUS trial compared the direct oral anticoagulant (DOAC) rivaroxaban to VKA in patients with echocardiographically documented rheumatic heart disease, atrial fibrillation and an elevated risk of stroke.

Where?

24 countries in Africa, Asia and South America

138 sites

Who and what?

4,565 patients

randomised

Rivaroxaban 20 mg once daily

Adjusted dose VKA

Median follow-up ····▶ 3.1 years

Primary efficacy outcome

Composite of stroke, systemic embolism, myocardial infarction, or death from vascular or unknown causes

Rate per year %

8.26%

6.46%

Restricted mean survival time (RMST) for the primary outcome:

RMST difference -75 days
95% CI -117 to -34
p<0.001

1,576 days vs 1,652 days

Primary safety outcome

No significant difference between groups

Rate per year %

0.67%

0.83%

International Society on Thrombosis and Haemostasis (ISTH) major bleeding

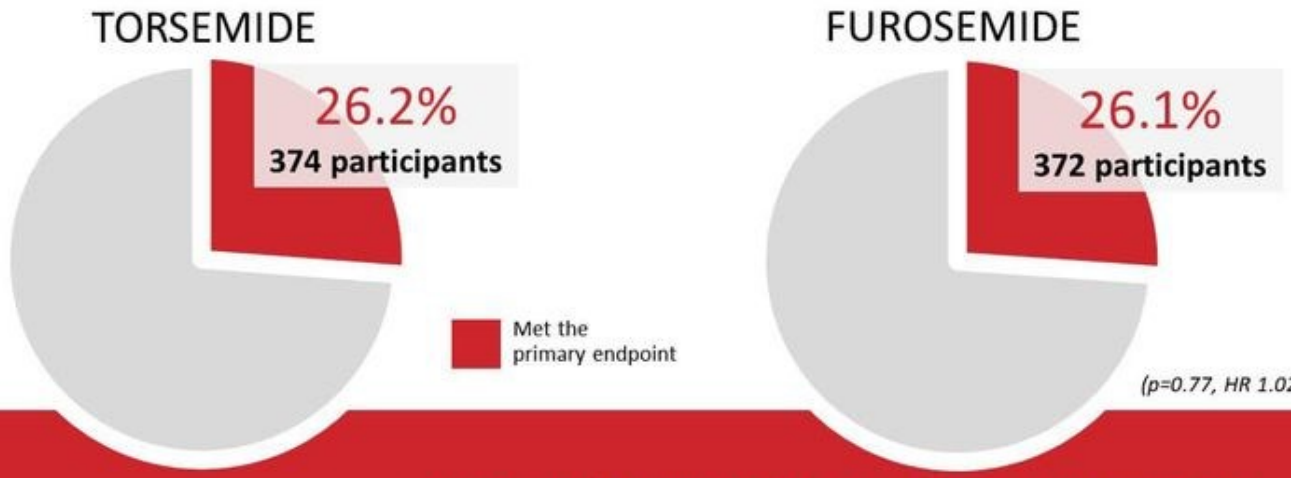
ESC

Scientific Sessions

TRANSFORM-HF

PURPOSE:	To compare the treatment strategy of torsemide vs. furosemide on long-term clinical outcomes among patients hospitalized with HF.
TRIAL DESIGN:	Open-label, pragmatic design in 61 centers in the US of 2859 patients with HF randomized 1:1 to loop diuretic strategy of torsemide or furosemide with median follow up 17.4 months.
PRIMARY END POINT:	All-cause mortality.
SECONDARY END POINTS:	All-cause mortality or all-cause hospitalization and total hospitalizations assessed over 12 months.

RESULTS:



KEY TAKEAWAYS:

A strategy of torsemide did not reduce all-cause mortality compared with furosemide in patients discharged after heart failure hospitalization.

The Year in Valvular Heart disease: ten papers that could become game changers

Lp(a) associated with AS occurrence but not AS progression

RCT: No effect of Vitamin K on AS progression

Aortic stenosis

RCT

Early SAVR intervention was associated with better outcome than watchful waiting

RCT

TAVI was non-inferior to SAVR in elderly patients with severe AS and moderately increased operative risk

RCT

Sentinel cerebral protection device did not reduce the rate of stroke during transfemoral TAVI

RCT: During MV surgery, combined TV repair was associated with lower rate of reoperation for TR, TR progression, or death at the expense of higher pacemaker rate

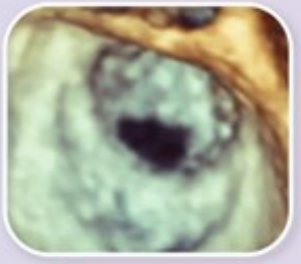
Mitral regurgitation

Tricuspid regurgitation

In elderly patients with severe degenerative MR at increased surgical risk, TEER was superior to conservative management

TRI-SCORE accurately predicted in-hospital mortality rate after isolated tricuspid valve surgery

RCT: VKA was associated with lower event rates than rivaroxaban in patients with rheumatic heart disease in AF



Rheumatic heart disease

Mechanical valve thrombosis

Ultraslow infusion of low-dose thrombolytic therapy was associated with high success rate and low complication rate in obstructive mechanical valve thrombosis

The Year in Acute Cardiovascular Care and Ischaemic Heart Disease: ten papers that could become game changers

A paradigm shift is needed to embrace personalised medicine as a research focus in acute cardiovascular care

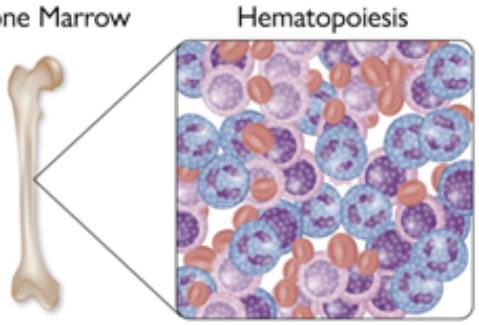
CCTA is a suitable alternative to invasive coronary arteriography for management of patients with stable angina

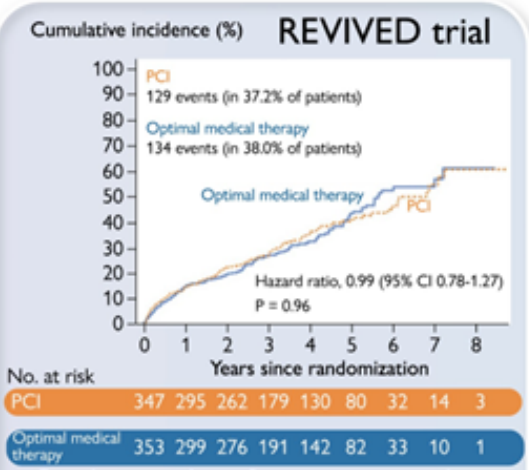
Effective randomization and blinding is needed in clinical studies involving critically ill patients

Clinical trial

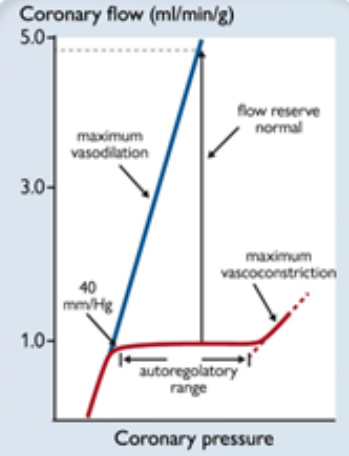
Improved monitoring of anticoagulation combining APTT and anti-Xa factor measurement should guide treatment of cardiogenic shock

Clonal haematopoiesis of indeterminate potential (CHIP) may play a role in risk stratification of cardiogenic shock patients





Similar results of treatment with PCI+OMT and OMT alone in patient with obstructive CAD and reduced ejection fraction



Coronary flow reserve is a reliable marker of all-cause mortality in ischaemic heart disease patients

Compared with SYNTAX I, SYNTAX II trial showed a lower incidence of cardiovascular and cerebral events at 5-year follow-up

SYNTAX II trial

FAME 3 showed that FFR-guided PCI was not non-inferior to CABG for treatment of multivessel disease

FAME 3 trial

CENTRAL ILLUSTRATION: 2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease

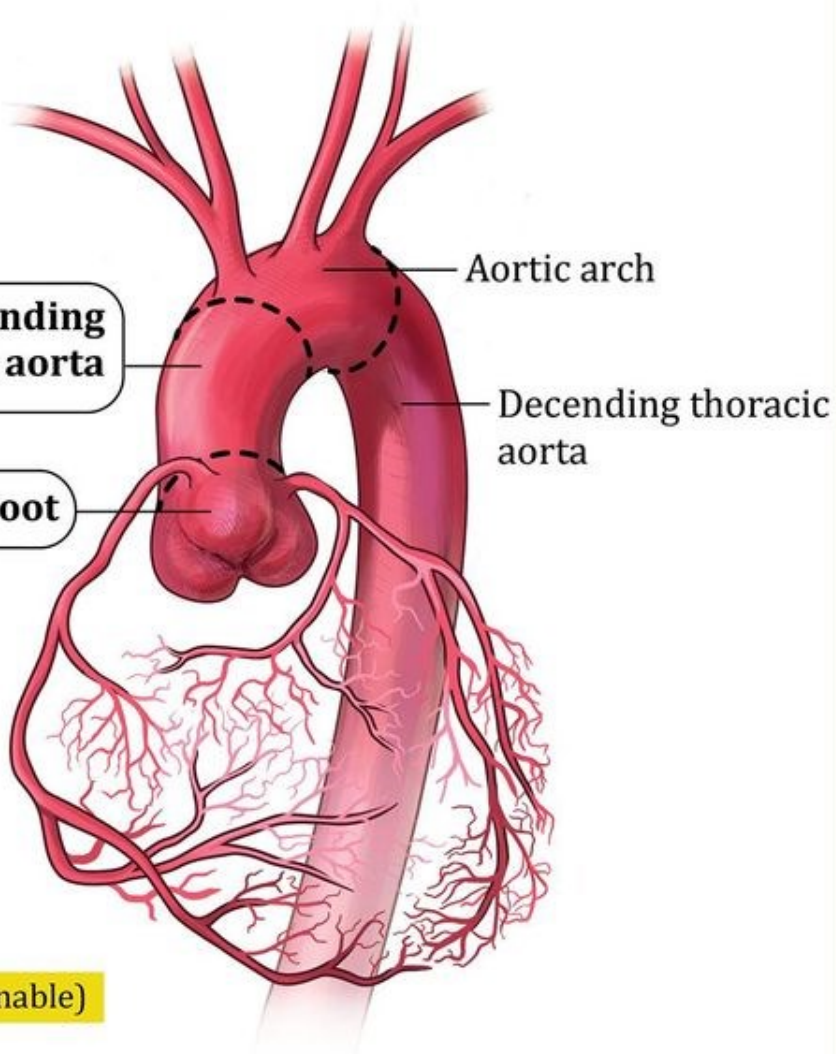
Surgical intervention thresholds for aortic root & ascending aorta in patients with...

Sporadic and BAV aneurysms*:

5.5 cm (COR 1)
5.0 cm by experienced surgeons in a Multidisciplinary Aortic Team (COR 2a)

Marfan syndrome#:

5.0 cm (COR 1)
≥4.5 cm in those with an increased risk of aortic dissection when performed by experienced surgeons in a Multidisciplinary Aortic Team (COR 2a)



COR 1 (Is recommended) COR 2a (Is reasonable)

**Surgical thresholds may be adjusted based on patient genetics, rapid aortic growth rate, cross-sectional aortic area/height ratio ≥10 cm²/m, aortic size index of ≥3.08 cm/m², or aortic height index of ≥3.21 cm/m.*

#For more on rapid aortic growth rate and patients with nonsyndromic heritable thoracic aortic aneurysms or with genetic aortopathies other than Marfan syndrome (e.g., Loeys-Dietz syndrome), please see the 2022 ACC/AHA Guideline for the Diagnosis & Management of Aortic Disease.

Erwin JP 3rd, et al. J Am Coll Cardiol. 10.1016/j.jacc.2022.10.001

PROMINENT: Pemafibrate to Reduce Cardiovascular Outcomes by Reducing Triglycerides in Patients with Diabetes

Purpose: To evaluate if lowering triglyceride levels and improving other lipid levels with pemafibrate would reduce the elevated risk of CVD in patients with type 2 diabetes who were on statins.

Trial Design: Multinational, double blind RCT (N=10,497). All patients (with type 2 diabetes, mild to moderate hypertriglyceridemia, and with HDL ≤ 40 mg/dl) received standard of care management of CV risk factors, including treatment with high-intensity statins. In addition, patients received either pemafibrate (0.2mg twice daily) or placebo.

Primary Endpoints: Composite of nonfatal MI, ischemic stroke, coronary revascularization, or CV death.

Key Takeaways for the Clinician:

- In patients with diabetes, mild to moderate hypertriglyceridemia and low levels of HDL, lowering triglycerides with pemafibrate did not lower rates of cardiovascular disease.
- The study results calls into question whether TG lowering should be used at all in patients with diabetes who are already on statins.

	Placebo (N= 5257)	Pemafibrate (N= 5240)	HR (95%CI)	P value
Primary Composite Endpoint	560	572	1.03 (0.91-1.15)	0.67
Components				
Nonfatal MI	178	205	1.16 (0.95-1.42)	-
Nonfatal Ischemic Stroke	104	95	0.92 (0.69-1.21)	-
Coronary revascularization	344	334	0.98 (0.84-1.13)	-
Death from CV causes	133	133	1.00 (0.79-1.28)	-

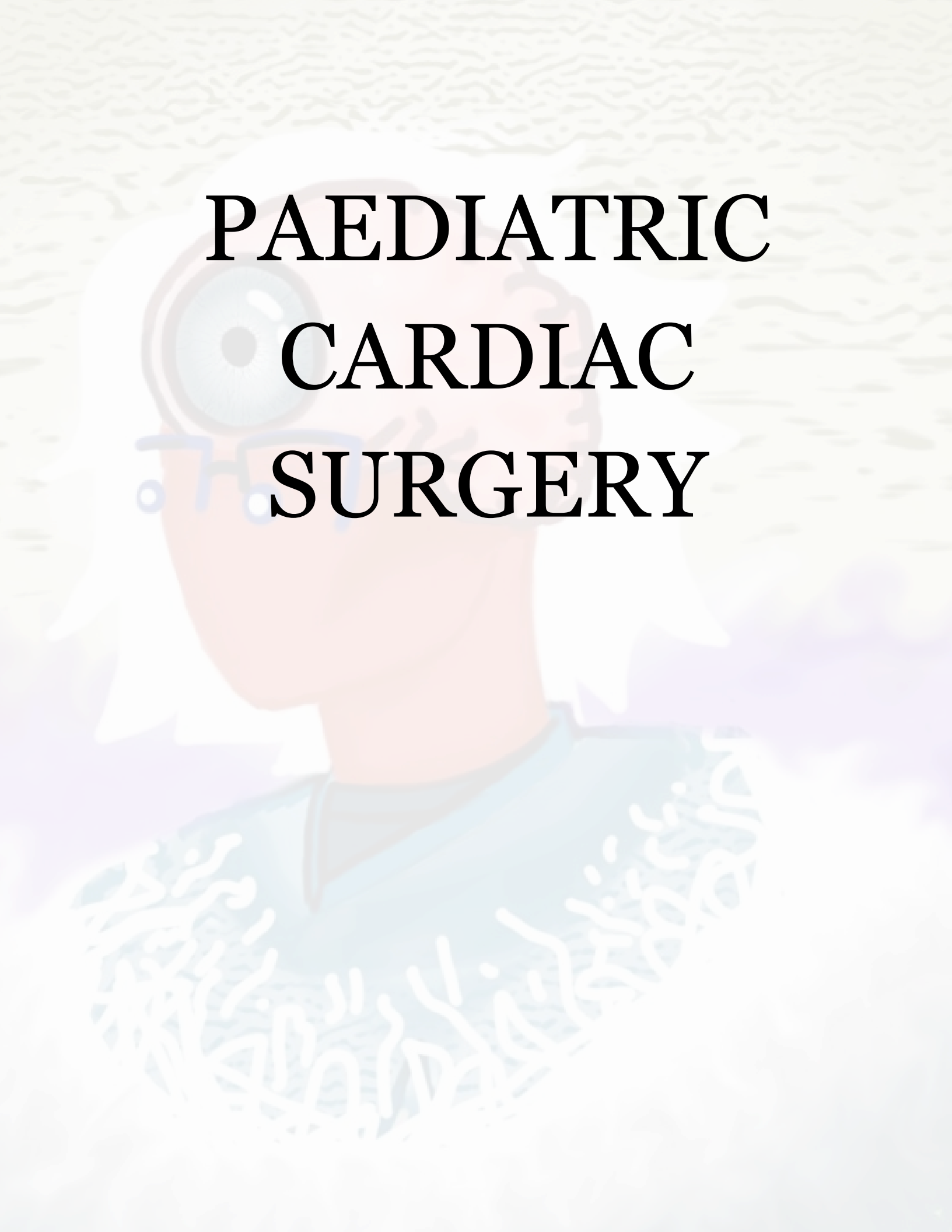
Results:

- Although levels of TG, VLDL cholesterol, Apo C-III and remnant cholesterol were 26-28% lower in the pemafibrate group, the incidence of CV events was not lower compared to the placebo group.
- The overall incidence of serious adverse events did not differ significantly between the groups, but pemafibrate was associated with a higher incidence of adverse renal events and VTE and lower incidence of NAFLD.

Results reflect the data available at the time of presentation.

Presented by: **Aruna D Pradhan,** BRIGHAM AND WOMENS HOSPITAL, Boston, MA;

PAEDIATRIC CARDIAC SURGERY



PEDIATRICS: MISCELLANEOUS

Propranolol treatment for chylothorax after congenital cardiac surgery (JTCVS)

Carda R, Chrisomalis-Dring S, Crook S, Shawber CJ, Wu JK, Chai PJ. Propanolol treatment for chylothorax after congenital cardiac surgery. J thorac Cardiovasc Surg. 2022 May;163(5):1630-1641.e2.doi:10.1016/j.jtcvs.2021.09.007.Epub 2021 Sep 14.PMID:34583843

Key points:

- Post operative chylothorax causes significant morbidity to the patient of cavopulmonary connections, systemic pulmonary shunts and Fontan surgeries. This study was conducted in 50 post operative pediatric patients of high-output chylous effusion. Investigators have defined the "Proponolol response" as 80% reduction or more drainage reduction in 9 days or less (responders). When responders were compared with controls and non-responders, there was significantly fewer days of chest tube requirement, infection, thrombus and shorter hospitalization. All patients had low serum albumin levels, but for non-responders, albumin levels were very low.

Comments:

Chylothorax after congenital cardiac surgery continues to be a significant complication affecting infants and children, resulting in increased morbidity and mortality. A recent study found that by lymphangiography, only 8% of patients with postoperative chylothorax had a traumatic etiology; the remainder had anatomic or physiologic flow anomaly of the pulmonary lymphatics. Clearly defined lymphatic anatomic aberrations have been reported in 40% to 60% of patients, as well as abnormalities in children with single ventricle anatomy, including congestion of the central lymphatic system, dilation of thoracic duct, lymphangiectasia, lymphatic collateralization, and tissue oedema. Furthermore, patients who have undergone the Fontan have been found to have 17% lower lymphatic pumping pressure and impaired pumping capacity compared with healthy controls. Postoperative chylothorax may be a clinical manifestation of an intrinsically abnormal lymphatic system. Although authors provide a summary of scientific investigation into proposed mechanisms, they acknowledge that the mechanism by which propranolol reduces chylous drainage is unknown. This is a limited study from a single institution comprising prospective and retrospective data. Although all patients in the propranolol-treated and control groups had congenital heart disease and postoperative highoutput chylothorax, the groups themselves were not matched by age and diagnosis because of the limited population of patients with these clinical issues. Patients did not receive propranolol on the same postoperative day because of time to consensus with multiple teams of providers for an off-label use of a drug.

Take Home Message: Patients with high-output chylous effusion have significant morbidity. Propranolol reduces morbidity, required chest tube days, and length of hospitalization in patients with response.

Minimal Right Vertical Infra-axillary Incision for Repair of Congenital Heart Defects (ATS)

An K, Li S, Yan J, Wang X, Hua Z. Minimal Right Vertical Infra-axillary Incision for Repair of Congenital Heart Defects. Ann Thorac Surg. 2022 Mar;113(3):896-902. doi: 10.1016/j.athoracsur.2021.01.052. Epub 2021 Feb 13. PMID: 33592183.

Key points:

- This is a review of consecutive patients using minimal right vertical infra-axillary incision (RVIAI) for congenital heart defects between 2015 to 2019 by a single surgeon. 1672 patients were included and the minimal RVIAI was utilized for 13 primary procedures.
- The length of incision ranged from 2.0 to 4.0 cm in all patients. Median age was 2.3 years (range, 0.2-6.0 years) and median weight was 12.5 kg (range, 5.0-34.0 kg). There was no in-hospital death or conversion to median sternotomy. Five patients (0.3%) underwent early reoperations (three had postoperative bleeding, one had coarctation of ascending aorta due to cannulation, and one had major residual shunt). Other postoperative complications included trivial residual shunt in 16 patients (1.0%), pleural effusion in 3 patients (0.2%), and wound infection in 4 patients (0.2%). There were no late deaths or late reoperations. During the follow-up period, no surgery-related thoracic deformity or breast asymmetry were noted. One patient had mild scoliosis.

Comments:

To reduce invasiveness and achieve cosmetic results, several alternative surgical incisions have been proposed and applied, such as lower mini-sternotomy, anterolateral incision, posterolateral incision , right horizontal infra-axillary inci-

sion , and RVIAI. RVIAI preserves the breast tissue and pectoral muscle, and avoids potential deformities such as scoliosis. For RVIAI, in the left lateral position with the right side elevated about 75°, and the right arm was wrapped and elevated over the head to expose the axillary region and balloon was placed between the right arm and the head to avoid overspreading of the right arm. Incision was from the second to fourth ribs along the right midaxillary line. Only serratus anterior and intercostal muscles are only muscular structures to be tackled in this area. Surgical route was generally through the fourth intercostal space and for smaller children fifth ICS is preferred. Cannulation of the ascending aorta and both vena cava was performed in a routine fashion. A 0.5 cm vertical incision (2nd incision) was made in the seventh intercostal space along the midaxillary line, which would be the chest tube incision later. The inferior vena cava (IVC) was cannulated with a straight cannula through 2nd incision.

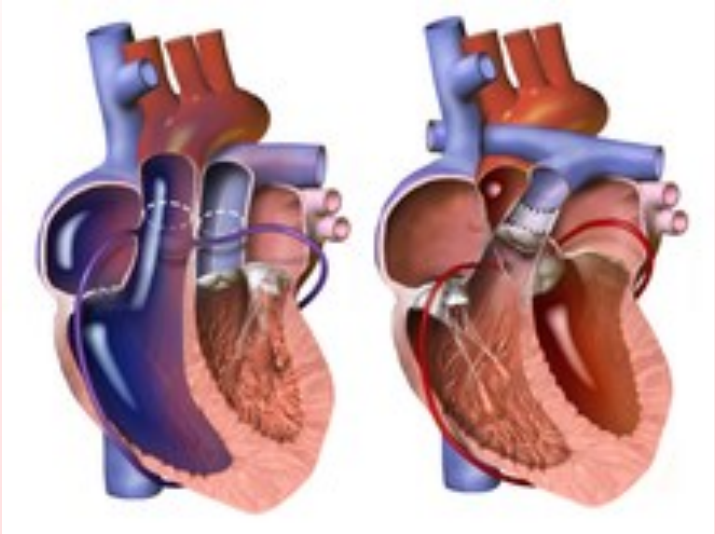
Take Home Message: Minimal RVIAI can be safely performed for a wide range of congenital heart defects is a good alternative to median sternotomy, especially for very young female patients with excellent cosmetic results.

Long-term outcomes of the arterial switch operation (JTCVS)

Fricke TA, Buratto E, Weintraub RG, Bullock A, Wheaton G, Grigg L, Disney P, d'Udekem Y, Brizard CP, Konstantinov IE. Long-term outcomes of the arterial switch operation. J Thorac Cardiovasc Surg. 2022 Jan;163(1):212-219. doi: 10.1016/j.jtcvs.2021.01.134. Epub 2021 Feb 11. PMID: 33715839.

Key points:

- Patients who underwent an arterial switch operation (ASO) between 1983 and 2015 were identified from the hospital database and retrospectively reviewed using hospital records.
- The data was collected from a single centre with reasonable number of subjects (n=844). There was very low early death rate of 3.3%. More than 25 years follow up is available for 95 patients (13%). Overall survival was 95% (95% CI 94-97%) at 10 and 25 years after ASO. Freedom from overall reintervention was 77%, freedom from reoperation on the neoaortic root or neoaortic valve was 92% and freedom from coronary reoperation was 99% which is phenomenal to note. Normal systolic function was noted in 595(98%) patients. Only six patients (6.3%) had least moderate neoaortic valve regurgitation and eight patients had undergone neoaortic valve replacement after 25 years of follow up. Arrhythmia was noted in very less number of patients of 0.9% (7/774).



Comments:

After ASO, reinterventions are common for neo aortic regurgitation and neo pulmonary stenosis, which needs continuous surveillance. There was a significant difference in reintervention and reoperation between patients with TGA-IVS and TGA-VSD. This difference is explained by the patients with TGA-VSD undergoing reintervention for a broader scope of problems as well as more reintervention for pulmonary stenosis. Branch PA stenosis was the most common cause of both reoperation and catheter reintervention. The etiology of branch PA stenosis has been hypothesized to be caused by the stretched course of the arteries over a dilated neoaortic root. reoperation on the neoaortic root or valve occurred uncommonly. Reoperation on the coronary arteries remained a rare. Qualitative assessment of LV function was normal in 98% of patients with follow-up .

Take Home Message: Arterial switch surgery is one of the triumph in the history of congenital cardiac surgery with excellent surgical cure if performed in right time. This surgery also requires meticulous surgical technique being anastomosis of tiny coronaries which also determine the long-term survival.

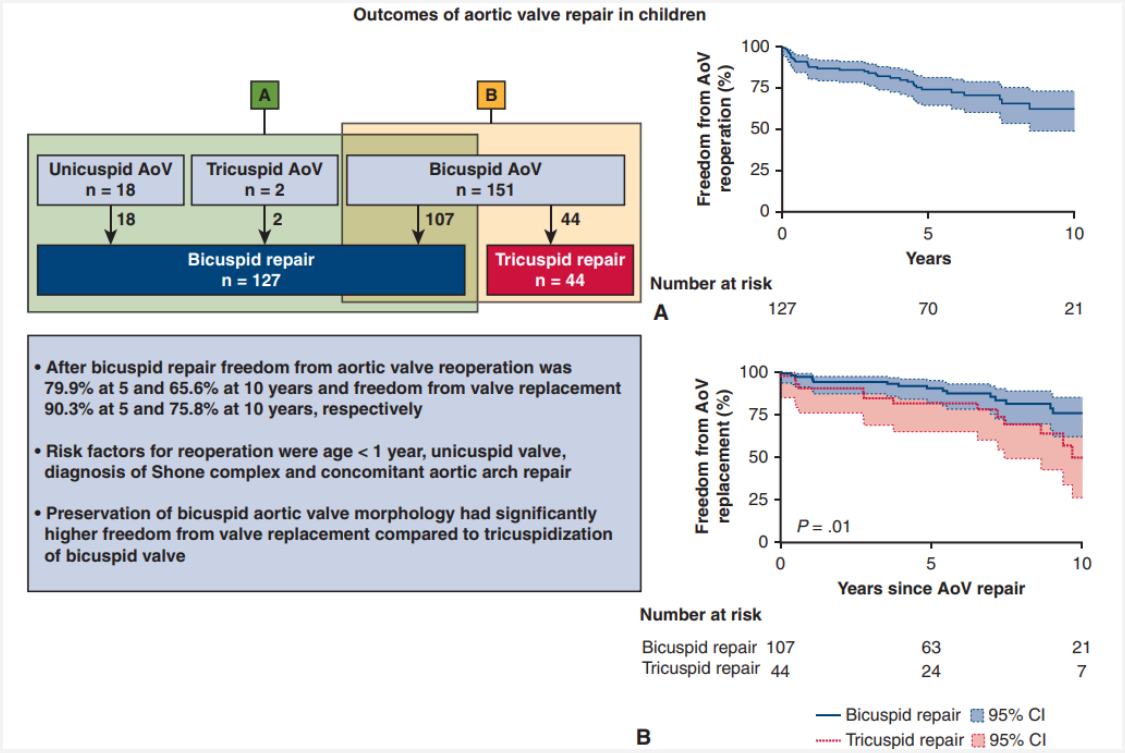
PEDIATRIC: AORTIC VALVE

Outcomes of aortic valve repair in children resulting in bicuspid anatomy: Is there a need for tricuspidization? (JTCVS)

Schulz A, Buratto E, Wallace FRO, Fulkoski N, Weintraub RG, Brizard CP, Konstantinov IE. Outcomes of aortic valve repair in children resulting in bicuspid anatomy: Is there a need for tricuspidization? J Thorac Cardiovasc Surg. 2022 Jul; 164 (1) : 186-196.e2. doi:10.1016/j.jtcvs.2022.01.022.Epub 2022 Jan 26. PMID: 35227498.

Key points:

- This single institute retrospective study assess the long-term results of aortic valve repair in terms of creation/ preservation of bicuspid aortic valve anatomy or tri cuspidization of bicuspid valves between 1980 and 2016 in 127 patients with median age of 0.73 years (interquartile range, 0.1-8.9) and median weight of 8.15 kg at the time of surgery.



- Repair was done without a patch in nearly half of the patients. Survival at 10 years was 94.8% and freedom from replacement was 65.6%. with excellent outcome. Re-repair was done in nearly half patients (22/41). Risk factors for reoperation were age less than 1 year, unicuspid valve, and the presence of Shone complex and concomitant aortic arch repair.
- They were compared with a separate cohort of 44 patients who underwent tricuspidization of bicuspid aortic valve during the same period. There was no difference in survival or freedom from aortic valve reoperation. However, freedom from aortic valve replacement was lower after tricuspidization with 49.7% versus 75.8% after 10 years (P = .0118).

Comments:

Treatment of congenital aortic valve (AoV) disease in childhood remains an ongoing challenge. Repair techniques range from simple commissurotomies and leaflet thinning to more complex repairs that allow to change the valve morphology by neocommissure creation, cusp augmentation, or cusp replacement. Simple repairs and the avoidance of patch material are usually associated with superior long-term freedom from reintervention. However, it is unknown what long-term outcome can be expected when the AoV is left in bicuspid anatomy after the repair.

Bicuspid repair involved commissurotomy of fused commissures and debridement of nodular dysplasia and fibrotic tissue, including resection of the raphe if it caused restriction of the cusp motion. Autologous pericardial patch, treated for 4 minutes in 0.625% glutaraldehyde or CardioCel patch augmentation was used for creation of neo-commissures and cusp extension as previously described. Tricuspidization was performed to convert a bicuspid valve into tricuspid anatomy. The raphe was incised with subsequent patch augmentation for neo-commissure creation and possible cusp extension as previously described by our group.

Take Home Message: Aortic valve repair can be done in children with minimum complications, reoperations and freedom from replacements. When feasible, preservation of bicuspid aortic valve morphology seems superior compared with tricuspidization of bicuspid valves.

PEDIATRIC: MITRAL VALVE

Isolated Congenital Mitral Regurgitation Repair in Children: Long-term Outcomes of Artificial Rings (ATS)

Van DH, Pham NHM, Nguyen VMT, Nguyen PV, Phan PK, Van CNM, Vuong NL. Isolated Congenital Mitral Regurgitation Repair in Children: Long-term Outcomes of Artificial Rings. Ann Thorac Surg. 2022 Feb;113(2):638-645. doi: 10.1016/j.athoracsur.2021.01.024. Epub 2021 Jan 29. PMID: 33524352.

Key points:

- This study compared long-term results of annuloplasty with and without rings for isolated congenital mitral regurgitation (ICMR) in < 18 years old undergoing repair for ICMR from December 1993 to September 2019 at the Heart Institution of Ho Chi Minh City, Vietnam.
- Techniques of annuloplasty depended on individual lesions of the mitral valve (MV). The Patients were divided into 3 groups: group A (43 cases) with ‡26-mm ring, group B (35 cases) with <26-mm ring, and group C (34 cases) with a band. Surgeries were delayed as long as possible for neonates and infants with severe MR until at least 6 months of age, unless they had severe symptoms or pulmonary arterial hypertension. In cases of moderate to severe MR with anteroposterior annulus diameter of >30% of normal value or pulmonary artery pressure increasing to >70% of normal value, Surgery was done earlier. In severe dilatation of the annulus investigators used a Carpentier-Edwards ring (Classic or Physio II; Edwards Lifesciences, Irvine, CA) with the maximum size that could be inserted. For small annulus we used a posterior annuloplasty with a continuous or interrupted autologous pericardial band.
- Group A were older than the others. The MV lesions were complicated, but annular dilatation existed in 91% of cases. Three patients died, and there were 25 reoperations during a median follow-up period of 11 years. Groups B and C had higher rates of reoperation than group A (hazard ratios, 5.35 and 3.61 respectively). Most reoperations in group B (13/14 cases) were due to stenosis, whereas 6 of 7 reoperations in group C were due to recurrent regurgitation.

Comments:

ICMR is rare account for 0.4% of all congenital heart diseases. Among those mitral regurgitation (MR) accounts for 72% of cases, mitral stenosis (MS) is reported in 13%, and 15% containing both stenosis and regurgitation. Treatment for congenital MR but is usually complex because patients are too young. Operation should be ideally delayed for the growth and maturity of the MV's annulus and tissue. Valve replacement is not favoured in young children and MV reconstruction is a better choice of intervention. Most ICMR cases have annular dilatation that can be treated by inserting a ring to repair the lesion. It is not always possible to insert an artificial ring in young children because the MV and the orifice are too small. There are no commercially available rings of small size (<24mm) and Inserting a small ring may lead to functional MS when patients grow up. In MR cases the functions of the ring are reshaping the MV's annulus, increasing the height of coaptation, and preventing reoperation for a long time. Annular dilatation was confirmed when the annulus/ anterior leaflet ratio was >1.3.

A variety of techniques are used for MV annuloplasty without a ring, such as Kay-Wooler's technique, interrupted strip, plication of the annulus, De technique, and Paneth-Hetzer's annuloplasty. Another choice is an absorbable or biodegradable ring. For a small annulus, surgeons have to choose between a band (with a risk of recurrent MR) and a ring (with a risk of MS). The best choice would be a nonsmall ring; however in young children with a small annulus both bands and small rings have pros and cons.

Take Home Message: MV reconstruction for ICMR in children had good long-term survival. Annuloplasty with ‡26-mm ring had the lowest risk of reoperation.

PEDIATRICS: TRICUSPID ATRESIA

Factors associated with mortality or transplantation versus Fontan completion after cavopulmonary shunt for patients with tricuspid atresia (JTCVS)

Callahan CP, Jegatheeswaran A, Barron DJ, Husain SA, Eghtesady P, Welke KF, Caldarone CA, Overman DM, Kirklin JK, Jacobs ML, Lambart LM, DeCampli WM, McCrindle BW; Congenital Heart Surgeons' Society Tricuspid Atresia Working Group. Factors associated with mortality or transplantation versus Fontan completion after cavopulmonary shunt for patients with tricuspid atresis. J Thorac Cardiovasc Surg. 2022 Feb; 163(2):399-409.e6.doi:10.1016/j.jtcvs.2021.04.061.Epub 2021 Apr 30. PMID:34045062

Key points:

- Tricuspid atresia (TA) is one of the favorable hypoplastic right heart (single ventricle) physiology for Fontan pathway. However there are some limitations in ascending the Fontan pathway, and some children may land up in heart transplantation or succumb to death.
- In this study, 417 infants of younger than 3 months of age with tricuspid atresia were enrolled between January 1999 to February 2020 from 40 Centers. Cavo pulmonary shunt (CPS) was performed in 382 patients with TA, amongst them 5% died or underwent transplantation; and rest of the children were transitioned to Fontan surgery after 5years of CPS. Pre-natal diagnosis, pulmonary artery band, moderate to severe mitral valve regurgitation, concomitant mitral valve repair and post operative superior vena cava interventions were associated with poor outcome of death or transplantation.

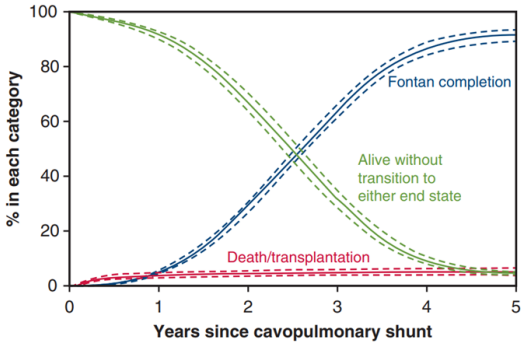
Comments:

Outcomes after the CPS in patients with TA are good, with transplantation-free survival. Fontan interstage period is notable, especially in a group of patients whose anatomy and physiology are felt to be "ideal" for the single ventricle pathway. Preoperative moderate or worse MR and the need for concomitant MV intervention at the time of CPS were both associated with an increased risk of death or transplantation without Fontan completion. CPS physiology should offload the MV to a degree due to the volume unloading of the left ventricle and, therefore, improve some of the regurgitation but, CPS alone does not adequately improve the moderate or greater MR. Interval transcatheter SVC interventions and the need for CPS takedown with the addition of a BT shunt to be associated with increased risk of death or transplantation. Postoperative hypoxia and/or pulmonary hypertension were the main reasons for CPS takedown and a new BT shunt noted in patients' records. Concomitant PA banding at the time of CPS was negatively associated with Fontan completion, was found to be an independent factor associated with death or transplantation in the CPS–Fontan interstage period. Additional pulmonary blood flow had no adverse effect on CPS physiology; these patients had greater oxygen saturations but also more perioperative complications. A potential adverse effect of competing pulmonary blood flow in the CPS circulation is greater CPS pathway pressures, resulting in suboptimal protection of the pulmonary arterial bed, with concomitant chronic elevation in pulmonary vascular resistance. Greater preoperative oxygen saturation was also associated with decreased time-related transition to Fontan. A hemi -Fontan cavopulmonary connection and placement of a PA band at the time of previous palliative BT shunt placement were associated with increased transition to Fontan. Owing to the deleterious effects on anterograde flow, pulmonary artery band is associated with poor outcome. As well, pre operative mitral regurgitation falls in high-risk group.

What factors are associated with CPS-Fontan interstage death/transplantation vs. Fontan completion in tricuspid atresia?

Methods: n = 382/417 CPS patients enrolled in CHSS prospective TA cohort
- Competing risks
- Parametric multiphase hazard analysis

Factors associated with death/transplantation (n = 18)
≥ moderate mitral regurgitation, concomitant mitral valve repair, concomitant PA band, interval SVC intervention, CPS takedown
Factors associated with Fontan completion (n = 310)
Increased completion: HemiFontan, Prior PA band w/ BT shunt
Decreased completion: concomitant PA band, prenatal diagnosis of TA, higher preCPS O2 saturation, interval procedures



Implications: Antegrade pulmonary blood flow in CPS in TA needs further study to identify patients who may benefit from it and patients it may harm.

Key: CPS = cavopulmonary shunt, CHSS = Congenital Heart Surgeons' Society, TA = tricuspid atresia, PA = pulmonary artery, SVC = superior vena cava, BT = Blalock-Taussig, O2 = oxygen

Take Home Message: Selection of the patient, and suitable management strategy is important for the better outcome for the patients with tricuspid atresia.

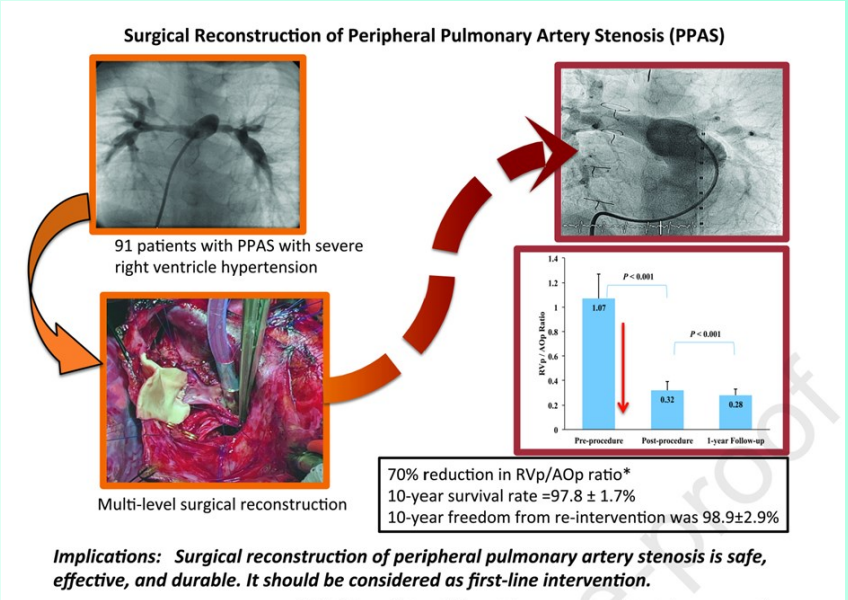
PEDIATRICS: PPAS

Late outcomes of surgical reconstruction of peripheral pulmonary arteries (JTCVS)

Al-Khaldi A, Abuzaid AD, Tamimi O, Alsahari A, Alotay A, Momenah T, Alfonso JJ. Late outcomes of surgical reconstruction of peripheral pulmonary arteries. J Thorac Cardiovasc Surg. 2022 Apr; 163(4):1448-1457.e6. doi:10.1016/j.jtcvs.2021.07.057.epub 2021 Sep 9.PMID:34649717

Key points:

- This retrospective study was conducted in 91 patients with median age of 26 months who underwent peripheral pulmonary artery reconstruction from March 2008 to July 2020 in patients with biventricular anatomy.
- Surgical approach was either single-stage repair through sternotomy or two stage repair through sternotomy/left thoracotomy. Nearly 60% of children are syndromic etiology in the study and three fourths of the children underwent single stage repair. There was 70% reduction in the right ventricle to aorta pressure ratio immediately after surgery. When the patients were followed for 68 months, there was no late mortality after discharge. There were no early or late reinterventions on pulmonary arteries.



Comments:

PA stenosis extending to the lobar or segmental branches is not uncommon finding in many patients at most large volume congenital heart centers. Unfortunately, most congenital heart surgeons and congenital cardiac groups tend to avoid surgically addressing peripheral pulmonary artery stenosis (PPAS) due to the incorrect perception that these vessels are not accessible, difficult to handle, or associated with a very high rate of recurrence. PPAS patients are either turned down or managed in the catheterization laboratories using either balloon dilation or stent implantation. Unfortunately, the outcomes of catheter-based interventions for PA stenosis in general, and in PPAS in particular, are suboptimal.

The most commonly used definition for a successful outcome with PA catheter interventions is a more than 50% increase in pre-procedure diameter and/or > 20% decrease in subpulmonic ventricular pressure. Even with this definition, which is debatably imperfect outcome by surgical standards.

Surgical modifications to facilitate the procedure include better utilization of traction sutures to improve exposure, more reliance on geometrical reconstruction (such as longitudinal V plasty) instead of simple patching to repair segmental arteries, insistence on repairing every stenotic segment possible (complete repair), utilization of two-stage approach with left thoracotomy as the second stage in selected cases with extensive stenoses in the distal segments of left lower lobe, and early placement on ECMO support for patients with severe pulmonary reperfusion injury to avoid aggressive mechanical ventilation with a possible lung tissue injury (barotrauma).

Many surgical series of PPAS reconstruction from showed excellent early and late outcomes with low operative mortality , complete relief of multi-level branch PA stenosis, clinically significant reduction in RVp/AOp ratio ,very low PA reintervention rate , and no late mortalities .The adoption of the surgical approach to PPAS has been slow and limited for various reasons.

The most noteworthy to mention include being technically demanding requiring extensive training and a long-learning curve, being lengthy procedures with extended operating room hours, lack of proper incentives and inadequate reimbursements in many health care systems, and competitive interests in advancing catheter-based PA interventions.

Long-term outcomes of surgical reconstruction of peripheral pulmonary arteries are satisfactory in various pathologies with low mortality.

Take Home Message: In this Dissection trial, the Valiant Captivia thoracic stent graft effectively treated acute complicated type B aortic dissections with positive aortic remodeling and patient outcomes through 5 years.

PEDIATRICS: MISCELLANEOUS

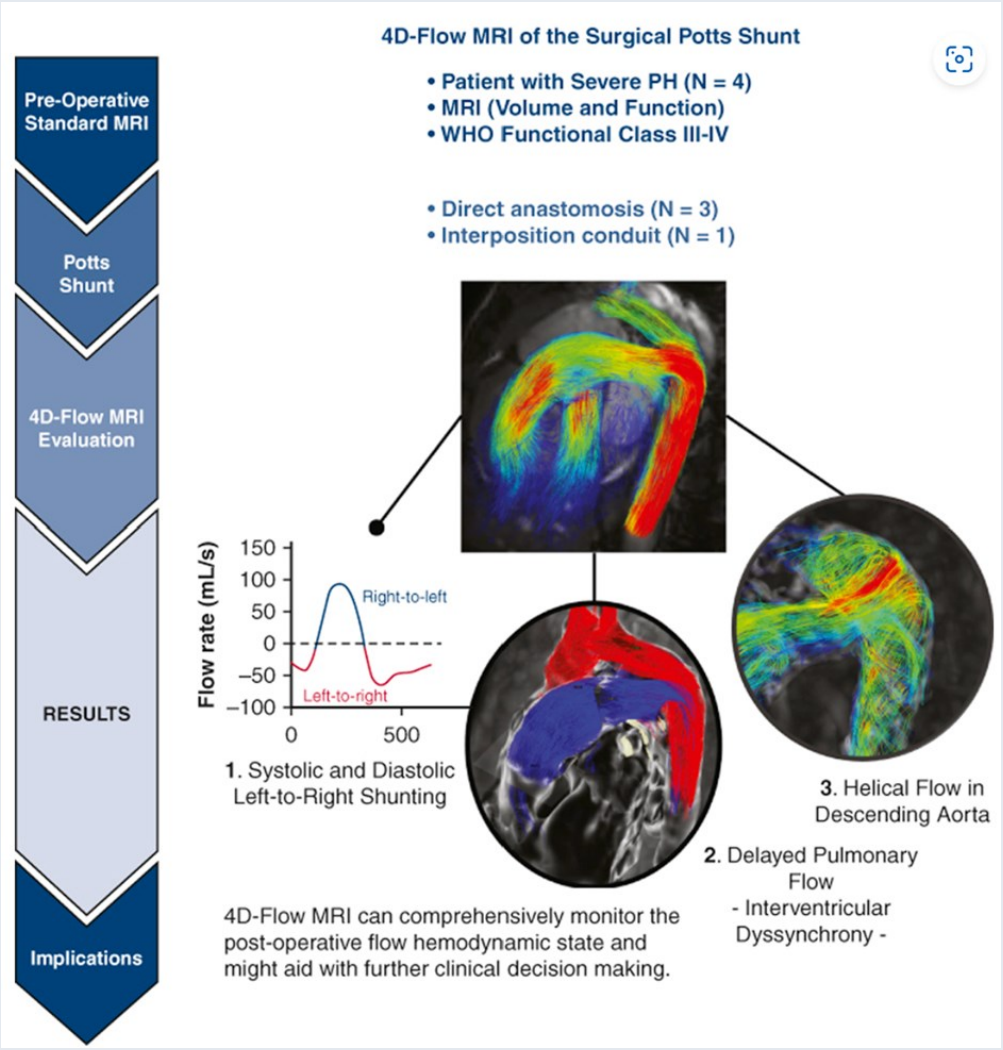
Monitoring and evaluation of the surgical Potts shunt physiology using 4-dimensional flow magnetic resonance imaging (JTCVS)

Schäfer M, Frank BS, Grady RM, Eghtesady P, Mitchell MB, Jaggers J, Ivy DD. Monitoring and evaluation of the surgical Potts shunt physiology using 4-dimensional flow magnetic resonance imaging. J Thorac Cardiovasc Surg. 2022 Aug;164(2):331-341. doi: 10.1016/j.jtcvs.2021.11.025. Epub 2021 Nov 16. PMID: 34872760.

Key points:

- 2-center study, 4 patients—Seen in the Pulmonary Hypertension Clinic at Children's Hospital Colorado and underwent surgical reverse Potts shunt at Washington University School of Medicine.
- Serially followed using comprehensive imaging including cardiac MRI and 4D-flow MRI to analyze 1) quantitate the flow through the anastomosis, (2) correlate the shunting pattern with phases of cardiac cycle and PH comorbidities, and (3) describe chronologic changes in shunting pattern.

- Pulmonary pressure offload was evident in all patients, as shown by positive systolic right-to-left flow across the Potts shunt. All patients experienced some degree of the flow reversal, which occurs primarily in diastole (when central aortic pressure exceeds pulmonary diastolic pressures). Interventricular dyssynchrony further contributed to flow reversal across the Potts shunt.



Comments:

The reversed Potts shunt (connecting the left pulmonary artery to the descending aorta) is an increasingly applied mode of surgical palliation of severe pulmonary hypertension (PH) or as an alternative to atrial septostomy with the main goal to reduce the right ventricular (RV) afterload by systolic pressure off-loading. However, the long-term flow hemodynamic effect of the Potts shunt physiology and desirable long-term hemodynamic end points are not defined. A side effect of the Potts shunt is flow reversal leading to left-to-right shunt and pulmonary volume overload, exacerbated by pulmonary valve insufficiency, a common complication of severe RV dilation.

The non-invasive 4D-flow MRI provides arguably the most accurate flow hemodynamic evaluation in complex congenital heart disease associated with shunting physiology. Limitations associated with study are that only 4 patients who are primarily followed and surgically palliated at 2 different institutions. In addition, placement of valved conduits might limit the accurate 4D-flow MRI evaluation at the location of anastomosis.

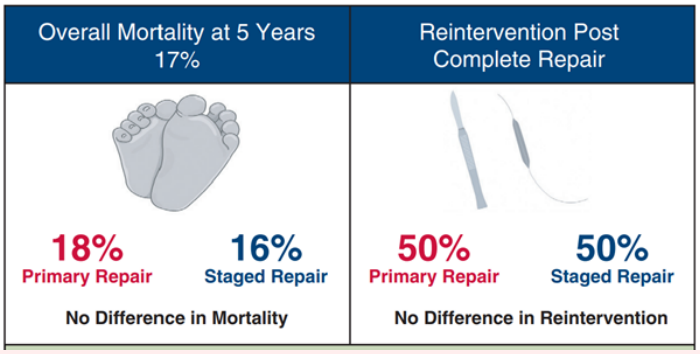
Take Home Message: Valved conduit may decrease the left to right shunting and improve overall cardiac output.

PEDIATRIC: TOF

Comparison of management strategies for neonates with symptomatic tetralogy of Fallot and weight <2.5 kg (JTCVS)

Qureshi AM, Caldarone CA, Romano JC, Chai PJ, Mascio CE, Glatz AC, Petit CJ, McCracken CE, Kelleman MS, Nicholson GT, Meadows JJ, Zampi JD, Shahanavaz S, Law MA, Batlivala SP, Goldstein BH; Congenital Cardiac Research Collaborative Investigators. Comparison of management strategies for neonates with symptomatic tetralogy of Fallot and weight <2.5 kg. J Thorac Cardiovasc Surg. 2022 Jan;163(1):192-207.e3. doi: 10.1016/j.jtcvs.2021.01.100. Epub 2021 Feb 3. PMID: 33726912.

Key points:



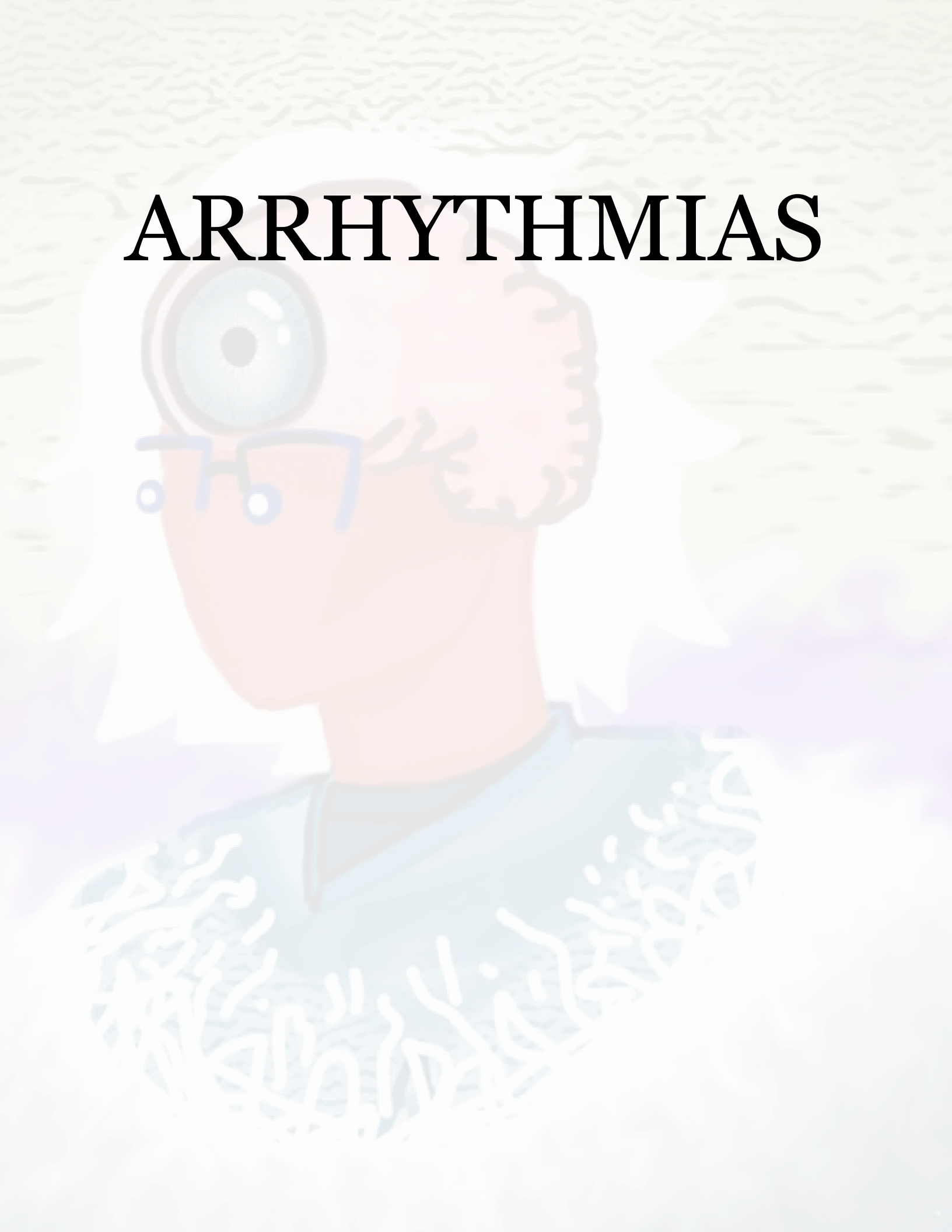
- The strategies for management of neonates <2.5kg with TOF and symptomatic cyanosis who underwent staged repair (SR) (initial palliation followed by later complete repair) or primary repair (PR) between 2005 and 2017 were reviewed from the Congenital Cardiac Research Collaborative. TOF with nonconfluent branch pulmonary arteries, TOF with atrioventricular canal, and TOF with absent pulmonary valve syndrome were excluded. 76 SR (initial palliation: 53 surgical and 23 transcatheter) and 44 PR patients were included.
- The observed risk of overall mortality and adjusted hazard of mortality was similar between SR and PR groups. Reintervention in the first 18 months was common in both groups. Procedural complications and neonatal morbidity burden were overall lower in the SR group. Cumulative secondary outcome burdens (component and cumulative hospital and intensive care unit lengths of stay, durations of ventilation, inotrope use, cardiopulmonary bypass time, procedural complications, and reintervention) largely favoured the PR group.

Comments:

Neonates with a procedural weight <2.5KG constitute a uniquely high-risk group due to smaller size, less overall patient reserve, other comorbidities that frequently accompany a low-birth weight babies. Delaying surgical treatment in these patients may not be of any added benefit. Neonatal morbidities largely favor the SR group. Although hospital and ICU LOS were not different between groups as they had been higher compared to larger neonates possibly due to comorbidities those are highly prevalent in low-weight population,. Smaller anatomic structures at this weight result in high reintervention rates in both groups, regardless of treatment strategy.

Take Home Message: In neonates weighing <2.5 kg with TOF , mortality and reintervention burden was high with both treatment strategies. Complications and neonatal morbidities were lower in the SR group, whereas cumulative morbidity burden favoured the PR group, highlighting potential advantages to each strategy.

ARRHYTHMIAS



ADULT: ARRHYTHMIA

New Oral Anticoagulants Versus Warfarin in Atrial Fibrillation After Early Postoperative Period in Patients With Bioprosthetic Aortic Valve

Mannacio VA, Mannacio L, Antignano A, Mauro C, Mastroroberto P, Musumeci F, Zebele C, Iannelli G. New Oral Anticoagulants Versus Warfarin in Atrial Fibrillation After Early Postoperative Period in Patients With Bioprosthetic Aortic Valve. Ann Thorac Surg. 2022 Jan;113(1):75-82. doi: 10.1016/j.athoracsur.2021.03.016. Epub 2021 Mar 18. PMID: 33744222.

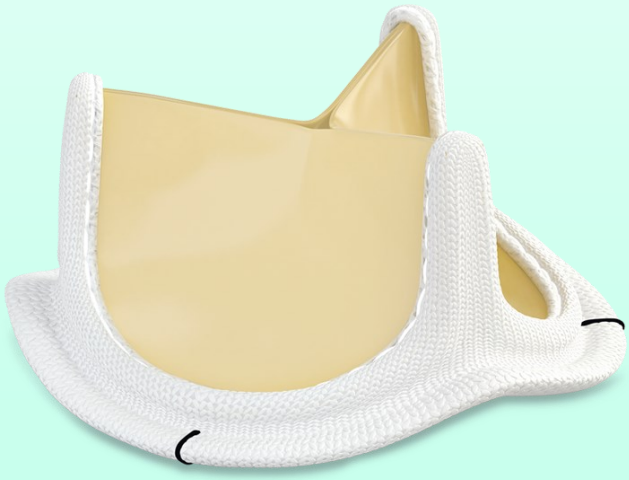
Key points:

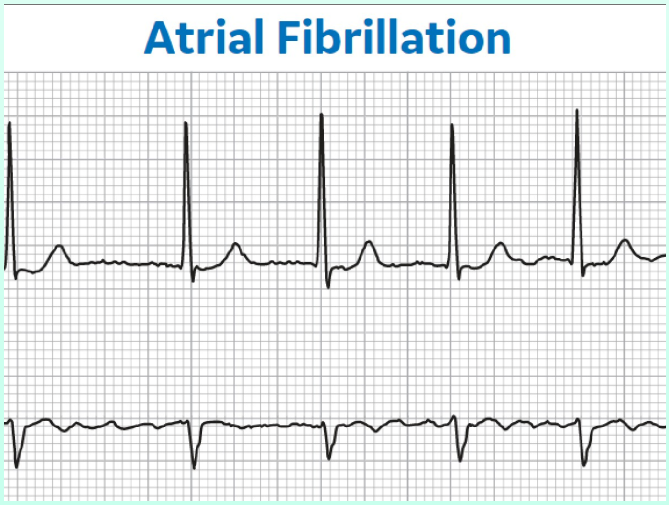
- 1032 patients with Afib after 3 months of AVR from the databases of 5 centers {340 patients were given novel nonvitamin K antagonist oral anticoagulants (NOACs) & 692 prescribed warfarin} were studied. Propensity matched study.
- NOACs used in the patients were dabigatran (150 mg twice daily), rivaroxaban (20 mg daily), apixaban (5 mg twice daily), or edoxaban (60 mg daily). Aspirin was withdrawn in all patients who started NOACs or Vitamin K antagonist (VKAs) therapy for AF occurrence. Ischemic/embolic events and major bleeding rates were compared.
- The NOACs vs warfarin embolic/ischemic rate was 13.5% (46 of 340) vs 22.7% (157 of 692), respectively, (P < .001), and the incidence rate was 3.7% vs 6.9% patients/year, respectively (log-rank test P = .009). The major bleeding rate was 7.3% (25 of 340) vs 13% (90 of 692) (P = .007), and the incidence rate was 2% vs 4% patients/year (log-rank test P = .002.) After propensity score matching, the NOACs vs warfarin embolic/ischemic rate was 13.1% (42 of 321) vs 21.8% (70 of 321) (HR, 0.6; 95% CI, 0.4-0.9; P = .02), and the incidence rate was 4.1% vs 6.7% patients/year (log rank test P = .01). The major bleeding rate was 7.8% (25 of /321) vs 13.7% (44 of 321) (HR, 0.5; 95% CI, 0.31-0.86; P = .01), and the incidence rate was 2.4% vs 4.2% patients/year (log-rank P = .01).

Comments:

Compared with VKAs, NOACs promised a number of hypothetical advantages, consisting of rapid onset of action, shorter half-life, more predictable therapeutic effect, no need for routine monitoring except for periodic assessment of renal function, no need for frequent dose adjustment, fewer potential drug-drug interactions, and no restriction on dietary consumption of food containing vitamin K. Lower adherence is usually related to the higher drug cost or to regular coagulation checks not being necessary, which in warfarin patients provides a constant feedback on medication intake.

Bleeding risk at the time of AVR was higher in patients from the NOACs group, whereas thrombotic risk was higher in patients from the warfarin group. NOACs therapy was significantly associated with an 0.8-fold reduced risk of ischemic/ embolic events compared with warfarin (P = 0.002).





Take Home Message: NOACs use in patients who developed AF after bioprosthetic AVR was more effective in prevention of thromboembolism and safe in reduction of major bleeding events compared with warfarin. n long term, rigid ring annuloplasty is associated with less tricuspid regurgitation recurrence than De Vega annuloplasty in functional tricuspid regurgitation.

ADULT: ARRHYTHMIA

Concomitant Cox-Maze IV and Septal Myectomy in Patients With Hypertrophic Obstructive Cardiomyopathy

Bakir NH, MacGregor RM, Khiabani AJ, Musharbash FN, Schill MR, Sinn LA, Schuessler RB, Melby SJ, Gleva MJ, Damiano RJ Jr. Concomitant Cox-Maze IV and Septal Myectomy in Patients With Hypertrophic Obstructive Cardiomyopathy. Ann Thorac Surg. 2022 Jan;113(1):109-117. doi: 10.1016/j.athoracsur.2020.12.090. Epub 2021 Mar 1. PMID: 33662312; PMCID: PMC9536242.

Key points:

- Between 2005 and 2019, 347 patients who underwent septal myectomy at a single institution (Washington University School of Medicine, Barnes-Jewish Hospital, St Louis, MO) were retrospectively reviewed. For patients with hypertrophic obstructive cardiomyopathy (HOCM) and atrial fibrillation who underwent a concomitant Cox-Maze IV procedure (CMP-IV), freedom from atrial tachyarrhythmias (ATAs) on or off antiarrhythmic drugs (AADs) was evaluated annually.
- A total of 42 patients underwent concomitant septal myectomy and CMP-IV procedures. The majority of patients, 69% (29 of 42), had paroxysmal atrial fibrillation with a 2.5-year median duration. Operative mortality was 7% (3 of 42). NYHA functional class was reduced after surgery ($P < .01$). Rates of freedom from recurrent ATAs at 1- and 5-year intervals were 93% (27 of 29) and 100% (14 of 14), respectively. Rates of freedom from ATAs and AADs were 83% (24 of 29) and 100% (14 of 14) at the same time points, respectively.
- Increased left atrial diameter predicted first ATA recurrence ($P < .01$). Cerebrovascular accident risk was lower in patients with atrial fibrillation who underwent concomitant CMP-IV and septal myectomy relative to myectomy only ($P = .02$).

Comments: HOCM is the most common inherited cardiomyopathy, with an estimated prevalence of 1 in 500 in the general population. AF is the most common sustained arrhythmia in patients with HOCM; it affects approximately 22% of patients and is associated with significantly increased morbidity and mortality. Several variables, such as AF duration, left atrial size, and degree of mitral regurgitation, could be valuable predictors . CMP-IV concomitant with septal myectomy had promising late rhythm outcomes, particularly when compared with catheter ablation in patients with HOCM. Recurrence rate likely reflects that the patients did not undergo a complete Cox-Maze procedure.

Take Home Message: Late freedom from ATAs on or off AADs was excellent after Cox-Maze IV and septal myectomy.

The long-term outcomes and durability of the Cox-Maze IV procedure for atrial fibrillation (JTCVS)

Khiabani AJ, MacGregor RM, Bakir NH, Manghelli JL, Sinn LA, Maniar HS, Moon MR, Schuessler RB, Melby SJ, Damiano RJ Jr. The long-term outcomes and durability of the Cox-Maze IV procedure for atrial fibrillation. J Thorac Cardiovasc Surg. 2022 Feb;163(2):629-641.e7. doi: 10.1016/j.jtcvs.2020.04.100. Epub 2020 May 5. PMID: 32563577.

Key points:

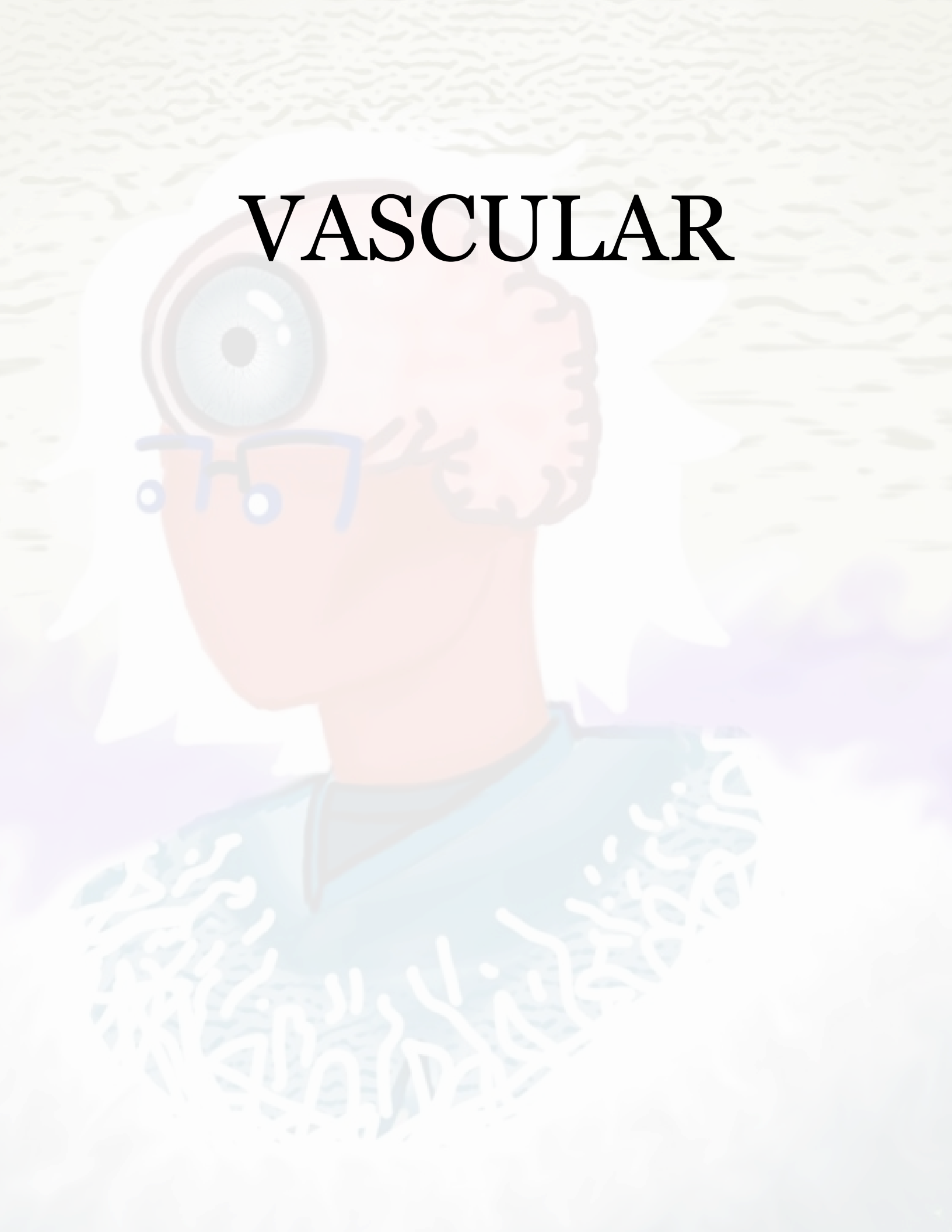
- Long-term outcomes following the Cox-Maze IV procedure (CMP-IV) were studied in 853 patients who were operated between May 2003 and March 2018.Follow-up visits occurred at 3, 6, and 12 months and annually thereafter. Preoperative and perioperative variables were retrospectively evaluated and compared.
- Freedom from Atrial Tachy-arrythmias (ATA) was 92% (552/598), 84% (213/253), and 77% (67/87) at 1, 5, and 10 years, respectively. Incidence of first ATA recurrence was 11%, 23%, and 35% at 1, 5, and 10 years, respectively.

Comments:

Surgical ablation is indicated both in patients with AF undergoing concomitant cardiac surgery and in those who have not responded to medical and/or catheter-based ablation therapy. Most effective surgical option is CMP-III, with excellent long-term success rates. But, its adoption was limited due to its technical complexity, an increase in cardiopulmonary bypass time, and its morbidity. Damiano and colleagues introduced the CMP-IV uses bipolar radiofrequency and cryoablation devices to replace most of the surgical incisions which form a “box lesion,” to completely isolate the entire posterior left atrium. This allowed for the development of minimally invasive approaches and more widespread adoption. This CMP-IV has proven to be as effective as its predecessor CMP-IV in restoring sinus rhythm while reducing operative morbidity and mortality

Take Home Message: The CMP-IV had an excellent long-term efficacy and results at maintaining sinus rhythm compared to those reported for catheter ablation and other forms of surgical ablation.

VASCULAR



ADULT: VASCULAR

Early and midterm patency of arteriovenous fistula for hemodialysis access using different techniques and their advantages and disadvantages (IJTCVS)

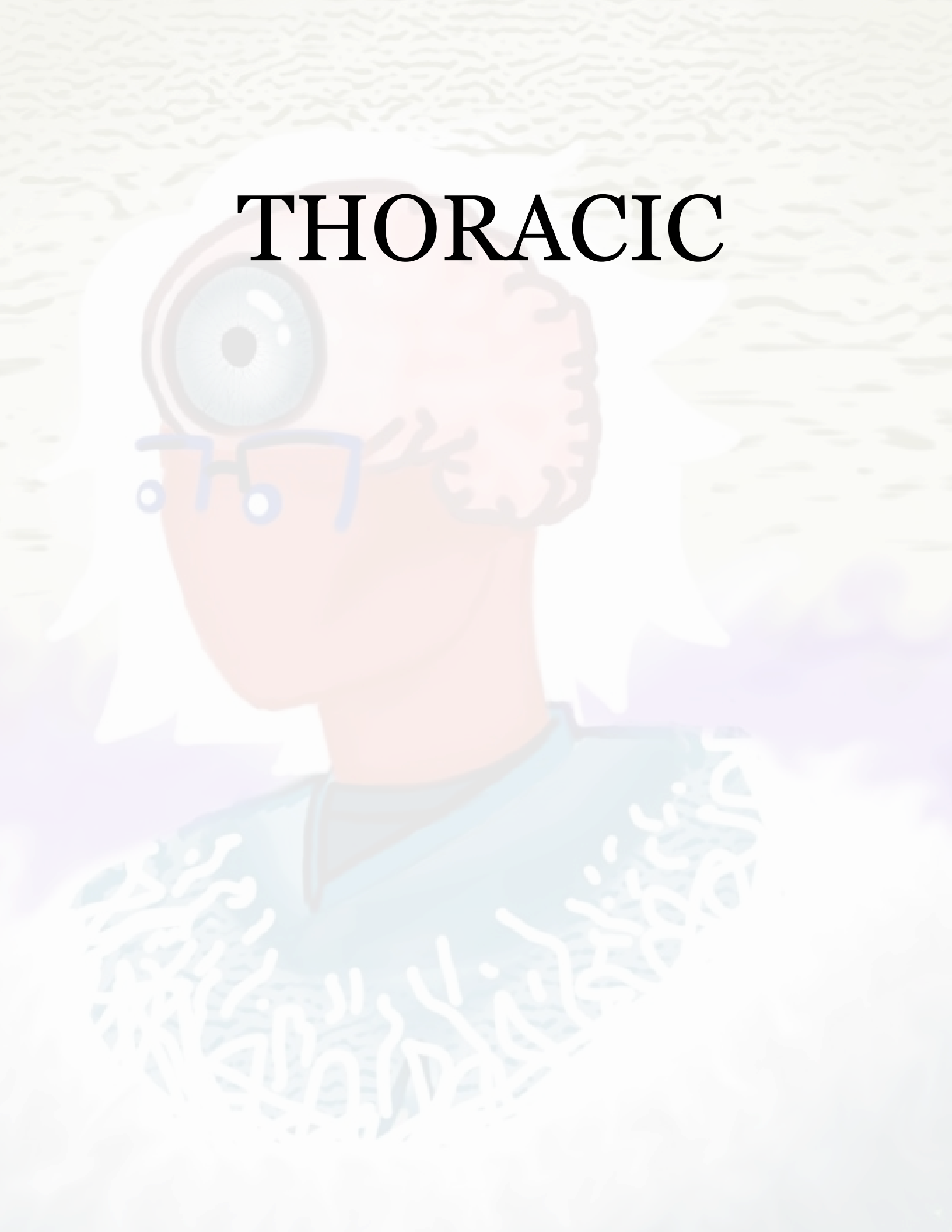
Goyal, V.D., Pahare, A., Sharma, S. *et al.* Early and midterm patency of arteriovenous fistula for hemodialysis access using different techniques and their advantages and disadvantages. *Indian J Thorac Cardiovasc Surg* **38**, 481–486 (2022). https://doi.org/10.1007/s12055-022-01390-7

Key points:

- This descriptive retrospective study was done to observe the different techniques of arteriovenous fistula creation for advantages and disadvantages, complications, and early and midterm patency.
- 53 AV fistulas were created from September 2018 to August 2020 using four different techniques. Radio-cephalic arteriovenous fistula was usually the first option. Other techniques like brachio-cephalic arteriovenous fistula, radio-basilic arteriovenous fistula, and brachio-basilic arteriovenous fistula were used when the radio-cephalic fistula had thrombosed or could not be constructed due to small-sized cephalic vein in the forearm.
- The majority of patients (41 (77.35%)) underwent radio-cephalic fistula creation. Early patency was 38 (92.7%) in the radio-cephalic technique whereas it was 12 (100%) in the radio-basilic, brachio-cephalic, and brachio-basilic techniques combined. The midterm patency was 32 (78%) in the radio-cephalic technique, 5 (83%) in the brachio-cephalic technique, 3 (75%) in the radio-basilic technique, and 1 (50%) in the brachio-basilic technique.

Take Home Message: Radio-basilic and brachio-cephalic are alternative techniques for fistula creation after radio-cephalic depending upon the size of the basilic vein in the forearm or cephalic vein in the cubital fossa or arm. The radio-basilic technique may have advantages over the brachio-cephalic technique which need to be further evaluated. Proximal fistulas like brachio-basilic and brachio-cephalic are more commonly associated with limb edema.

THORACIC



ADULT: THORACIC

Non–small cell lung cancer in never- and ever-smokers: Is it the same disease? (JTCVS)

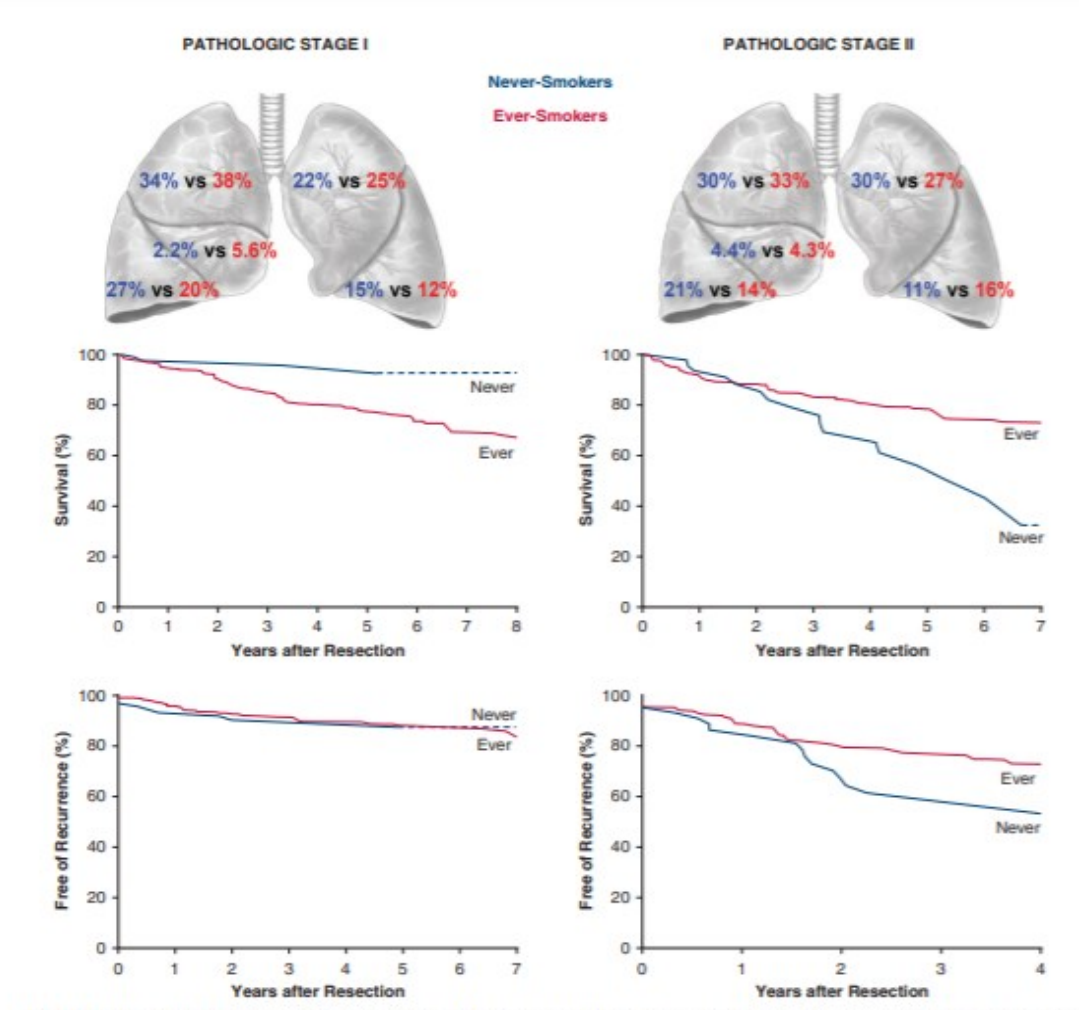
Tang A, Ahmad U, Toth AJ, Bourdakos N, Raja S, Raymond DP, Blackstone EH, Murthy SC. Non-small cell lung cancer in never- and ever-smokers: Is it the same disease? J Thorac Cardiovasc Surg. 2021 Jun;161(6):1903-1917.e9. doi: 10.1016/j.jtcvs.2020.03.175.

Key points:

- A matched study of 2 cohorts (172 never-smokers and 1376 ever-smokers with non-small cell lung cancer (NSCLC) who underwent pulmonary resection) from January 2006 to July 2016. Overall survival and cancer recurrence were compared by pathological stage.
- In never-smokers, the prevalence of NSCLC was more frequent in women than in men (63% [n = 109] vs 45% [n = 63]). Compared with ever-smokers, never-smokers had less upper-lobe disease (53% [n = 91] vs 62% [n = 855]) and more adenocarcinoma (88% [n = 151] vs 62% [n = 845]). Postoperative complications were similar. Never-smokers had a lower prevalence of non–lung cancer deaths than ever-smokers (13% vs 23% at 5 years; P = .006). Among matched pairs, never-smokers had better overall survival at 5 years in pathological stage I (96% vs 78%), but worse survival in stage II (54% vs 78%). Tumour size, N category, and histopathological cell type were more important drivers of mortality and cancer recurrence in never-smokers than in ever-smokers.

Comments:

The proportion of never-smokers with NSCLC is rising; moreover, NSCLC in never-smokers may represent a distinct clinical entity Survival and cancer recurrence differences, particularly related to tumour size, between never-smokers and ever-smokers with non–small cell lung cancer suggest unique tumour or host behaviours. However there are few limitations of the study: Never-smokers were identified by self-report; thus, we depended on patients being truthful and remembering any smoking. Never-smokers were more likely to receive induction therapy, reflecting institutional bias in selecting patients with higher performance status for induction therapy.



Take Home Message: Matched never-smokers have better or equivalent outcomes than ever-smokers in pathological stage I cancer, but are less likely to survive and to be cured of cancer as tumor burden increases. These findings suggest that there might be unique tumour or host behaviours differentially impacting survival of never- and ever-smoking patients with NSCLC.

ADULT: THORACIC

Lobar size reduction in lung transplantation: A propensity score study (JTCVS)

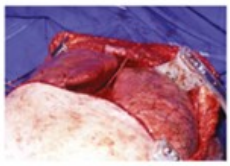
Schiavon M, Mendogni P, Faccioli E, Lorenzoni G, Mazzucco A, Nosotti M, Rea F; Lung Transplantation Working Group. Lobar size reduction in lung transplantation: A propensity score study. J Thorac Cardiovasc Surg. 2022 Jul;164(1):289-296.e2. doi: 10.1016/j.jtcvs.2021.07.023. Epub 2021 Jul 21. PMID: 34353616.

Key points:

- This retrospective study was performed on 608 consecutive lung transplantations at 2 centres between January 2005 and August 2019 (559 standard lung transplantations [standard transplantation] and 49 with lobar reduction [lung transplantation group]) with aim to assess early and long-term outcomes associated with lobar reduction in lung transplantation.
- In terms of early outcomes, the lung transplantation group showed a higher percentage of severe primary graft dysfunction at 0 hours and reported longer intensive care unit stay than the standard transplantation group. No other differences in terms of morbidity, mortality, mechanical ventilation time, hospital stay, and anastomotic complications were observed. Although the lung transplantation group showed worse long-term pulmonary function, the 2 populations had comparable survival outcomes.

Lobar size reduction in lung transplantation: a propensity score study

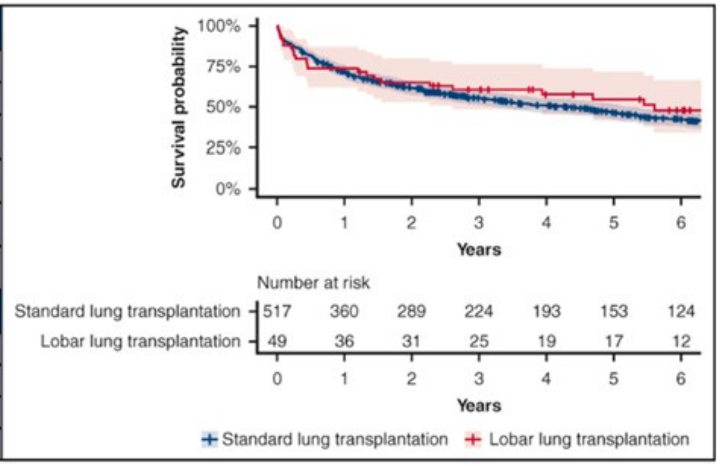
571 lung transplant from 2005 - 2019 Thoracic Surgery Unit of Padova and Milan



Weighted regression approach to account for potential confounding factors

559 standard procedures compared to 49 lobar transplantations

Outcome	Group Standard Lung Transplant	Group Lobar Lung Transplant	OR	Lower 95% CI	Upper 95% CI
30-day mortality	9%	8%	1.06	0.36	3.12
In-hospital mortality	13%	16%	1.47	0.65	3.32
De novo post-operative ECMO	7%	0%	0.62	0.28	1.40
Early anastomotic complications	2.1%	4%	1.65	0.36	7.63
Late anastomotic complications	3.4%	6%	2.82	0.75	10.60
Severe PGD 3 T72 Hrs	12%	23%	2.09	0.98	4.42
	Group Standard Lung Transplant	**Group Lobar Lung Transplant**	**β estimate**	**Lower 95% CI**	**Upper 95% CI**
MV time (hours)	37 (IQR24-96)	44 (IQR 24-83)	28.22	−68.12	124.56
ICU stay (days)	6 (IQR 4-12)	9 (IQR 5-24)	4.73	−1.43	10.89
Hospital stay (days)	29 (IQR 21-40)	30 (IQR 24-48)	4.32	−3.10	11.75
Best post-operative FEV1%	84 (IQR 67-100)	78 (IQR 64-90)	−7.64	−14.28	−1.01



ECMO, extracorporeal membrane oxygenator; PGD, primary graft dysfunction; MV, mechanical ventilation; ICU, Intensive Care Unit OR, odds ratio

Comments:

The shortage of donors is a major limitation for lung transplantation surgeries. For small-sized recipients of lung transplantation, the time span for organ reception from standard donors is generally longer than for normal-sized patients. Lobar LT represents an effective strategy to reduce wait-list time and mortality of small-sized patients. Size matching was assessed according to the visual comparison of donor's and recipient's chest x-rays, donor to recipient predicted total lung capacity (TLC), and heights ratio.

Limited nonanatomic or sublobar graft resections are successfully used in cases of small size discrepancy between donor and recipient; however, in cases of greater mismatch, lobar reduction often is the surgical technique of choice. The choice of which lobe to resect is based on technical factors, related to lung size mismatch and thoracic cage volume and conformation. A second team can carry out the lobectomies at the back-table safe procedures, and this does not significantly prolong the cold ischemic time and also reduce the time of surgery. The limitations of the study are smaller sample size and non inclusionof pre transplantation computer tomograph.

Take Home Message: The lobar reduction showed early and long-term results comparable to those after standard lung transplantation.

ADULT: THORACIC

Long-term outcomes of living-donor lobar lung transplantation (JTCVS)

Sugimoto S, Date H, Miyoshi K, Otani S, Ishihara M, Yamane M, Toyooka S. Long-term outcomes of living-donor lobar lung transplantation. J Thorac Cardiovasc Surg. 2022 Aug;164(2):440-448. doi: 10.1016/j.jtcvs.2021.08.090. Epub 2021 Nov 19. PMID: 34895720.

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Key points:

- Long-term outcomes of 30 patients (bilateral Living-donor lobar lung transplantation LDLLT, 29 patients; single LDLLT, 1 pediatric patient) who received living-donor lobar lung transplantation (LDLLT) more than 16 years previously were examined retrospectively .The patients underwent the procedure between October 1998 and April 2004.
- At a median follow-up of 205 months, 22 patients were alive and 8 were dead. The causes of death were infection (n = 3), malignancy (n = 2), acute rejection (n = 2), and chronic lung allograft dysfunction (CLAD; n = 1). Two patients underwent bilateral cadaveric lung re-transplantations. Malignancy occurred in 7 patients. The 5-, 10-, and 15-year overall survival rates were 96.7%, 86.7%, and 73.3%, respectively. The long-term survival was excellent after LDLLT (73.3% at 15 years) in the present study. Interestingly, even after the onset of CLAD, the 5-year survival rate of the CLAD patients was 66.9%.

Comments:

LDLLT is an established life-saving therapy for end-stage lung diseases. Although LDLLT enables an intermediate survival similar to cadaveric lung transplantation, the long-term outcome which was largely unknown was dealth with by this study.

The postoperative management of the recipients, including the immunosuppressive therapy (calcineurin inhibitors including tacrolimus or cyclosporine, mycophenolate mofetil, or azathioprine, and a corticosteroid) and prescribed prophylactic therapies against fungal and viral infections. Acute rejection was diagnosed on the basis of the clinical and radiographic findings without transbronchial biopsy to avoid unexpected intragraft bleeding. Pulmonary function testing was performed at 3, 6, and 12 months and every year thereafter. CLAD was defined as an irreversible decline in the forced expiratory volume in 1 second (FEV_1) to <80% of the baseline value. CLAD developed predominantly in a unilateral lung even over a long-term clinical course after LDLLT, because the lobar lungs from 2 different donors had different immunological characteristics. In patients who develop unilateral chronic lung allograft dysfunction (CLAD), the functioning contralateral graft might contribute to the favorable outcome after LDLLT.

The limitations of the study are 1) the number of patients who underwent LDLLT was relatively small,2) the phenotypes of CLAD after LDLLT were not examined 3), this was a retrospective, observational study conducted at a single institution.

Take Home Message: In patients with unilateral CLAD, the functioning contralateral graft might contribute to a favourable long-term outcome.

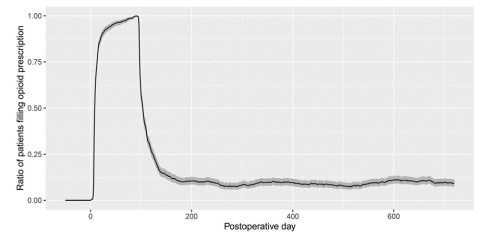
PERIOPERATIVE CARE

ADULT: PERIOPERATIVE CARE

The Incidence of New Persistent Opioid Use Following Cardiac Surgery via Sternotomy (ATS)

Ingason AB, Geirsson A, Gudbjartsson T, Muehlschlegel JD, Sigurdsson MI. The Incidence of New Persistent Opioid Use Following Cardiac Surgery via Sternotomy. Ann Thorac Surg. 2022 Jan;113(1):33-40. doi: 10.1016/j.athoracsur.2021.04.030. Epub 2021 Apr 27. PMID: 33930358.

Key points:



- 925 opioid-naive patients who underwent heart surgery by sternotomy from 2005 to 2018 in Landspitali University Hospital, Iceland were included in the study. No formal inpatient postoperative pain regimen protocol was followed during the study period, but in general, patients received scheduled acetaminophen, scheduled opioid (tramadol and oxycodone), and an opioid as needed (morphine, ketobemidone, or oxycodone).
- Naivety was defined as not filling an opioid prescription within 6 months before surgery. The primary outcome , persistent opioid use was defined as filling at least 1 opioid prescription during the first 90 days after surgery and another 90 to 180 days after the operation.
- 46% of patients filled an opioid prescription after discharge. 4.6% developed new persistent opioid use. When only patients who filled an opioid prescription after surgery were included, 10.1% developed new persistent opioid use.
- COPD, preoperative use of NSAIDs, gabapentinoids, and nitrates were associated with increased risk for new persistent opioid use. New persistent opioid use did not have higher rates of readmission nor all-cause mortality.

Comments:

Opioids are effective analgesics for acute pain and thus are widely used after surgery, including cardiac surgery. Side effects of opioid use include constipation, nausea, respiratory depression, and opioid-induced hyperalgesia, decreased rate of wound healing, a paradoxical increase in pain associated with opioid use. Tolerance develops with chronic use of opioids, in which higher doses are needed to acquire the same analgesic effects. Although multimodal opioid-free analgesia has been described,the perioperative management of patients undergoing open heart surgery almost invariably includes opioids. The incidence of chronic pain is described in up to 40% of patients after sternotomy. preoperative prescriptions of NSAIDs,Nitrates and neuropathic medications were both associated with new persistent opioid use. Acetaminophen is a relatively safe medication with few contraindications or adverse effects with reduced incidence of delirium after cardiac surgery , but linked to higher rates of myocardial infarction, stroke, and cardiovascular mortality. Other analgesic modalities, such as serratus anterior plane, paravertebral and pectoralis block, and epidural anesthesia can be used as alternatives. Nonpharmacologic modalities such as expedited removal of chest tubes and early ambulation can potentially reduce pain and use of opioids immediately after surgery.

Take Home Message: The rate of new persistent opioid use after cardiac surgery was 4.6%. Future steps should identify strategies to minimize the development of new persistent opioid use, identify patients at risk for developing postoperative persistent opioid use, and provide support for postoperative opioid tapering.

Impact of Sacubitril/Valsartan Compared With Ramipril on Cardiac Structure and Function After Acute Myocardial Infarction: The PARADISE-MI Echocardiographic Substudy (Circulation)

Shah AM, Claggett B, Prasad N, Li G, Volquez M, Jering K, Cikes M, Kovacs A, Mullens W, Nicolau JC, Køber L, van der Meer P, Jhund PS, Ibram G, Lefkowitz M, Zhou Y, Solomon SD, Pfeffer MA. Impact of Sacubitril/Valsartan Compared With Ramipril on Cardiac Structure and Function After Acute Myocardial Infarction: The PARADISE-MI Echocardiographic Substudy. Circulation. 2022 Oct 4;146(14):1067-1081. doi: 10.1161/CIRCULATIONAHA.122.059210. Epub 2022 Sep 9. PMID: 36082663; PMCID: PMC9529950.

Key points:

- In a prespecified substudy, 544 PARADISE-MI participants were enrolled in the Echo Study to undergo protocol echocardiography at randomization and after 8 months. Patients were randomized within 0.5 to 7 days of presentation with their index AMI to receive a target dose of sacubitril/valsartan 200 mg or ramipril 5 mg twice daily.
- Mean age was 64±12 years; 26% were women; mean LVEF was 42±12%; and LAV was 49±17 mL. Of 544 enrolled patients, 457 (84%) had a follow-up echo at 8 months (228 taking sacubitril/valsartan, 229 taking ramipril). There

was no significant difference in change in LVEF (P=0.79) or LAV (P =0.62) by treatment group. Patients randomized to sacubitril/valsartan demonstrated less increase in LV end-diastolic volume (P=0.025) and greater decline in LV mass index (P=0.037), increase in tissue Doppler e'_{lat} (P=0.005), decrease in E/e'_{lat} (P=0.045), and decrease in tricuspid regurgitation peak velocity (P=0.024) than patients randomized to ramipril. These differences remained significant after adjustment for differences in baseline characteristics.

Comments: Angiotensin-converting enzyme inhibitors attenuate left ventricular (LV) enlargement after acute myocardial infarction (AMI). Preclinical data suggest similar benefits with combined angiotensin receptor neprilysin inhibition, but human data are conflicting. The PARADISE-MI Echo Study (Prospective ARNI Versus ACE Inhibitor Trial to Determine Superiority in Reducing Heart Failure Events After Myocardial Infarction) tested the effect of sacubitril/valsartan compared with ramipril on LV function and adverse remodeling after high risk-AMI.

Take Home Message: Treatment with sacubitril/valsartan compared with ramipril after AMI did not result in changes in LVEF or LAV at 8 months. Patients randomized to sacubitril/valsartan had less LV enlargement and greater improvement in filling pressure. Measures of LV size, systolic function, and diastolic properties were predictive of cardiovascular death and incident heart failure after AMI in this contemporary, well-treated cohort.

The association of hyperhomocysteinemia with acute post-operative complications following coronary artery bypass grafting (ASCVTS)

Panicker BT, Veerapudran S, Damodaran D, Thomas R, Krishnan JT. The association of hyperhomocysteinemia with acute post-operative complications following coronary artery bypass grafting. Asian Cardiovascular and Thoracic Annals. 2023;0(0). doi:10.1177/02184923231156731

Key points:

- This cross-sectional study aimed to determine if hyperhomocysteinemia was associated with post-operative complications in patients < 50 years who underwent off-pump coronary artery bypass graft for coronary artery disease.
- The mean homocysteine levels among the study participants who had post-operative complications were significantly higher than those without post-operative complications (17.37 mmol/L vs. 12.84 mmol/L). On multivariate analysis, hyperhomocysteinemia, diabetes mellitus, and higher body mass index (> 25) were significant predictors of adverse events during the post-operative period.

Comments:

Hyperhomocysteinemia is associated with an increased risk for cardiovascular diseases. The influence of hyperhomocysteinemia on post-operative events, after coronary artery bypass surgery graft, is less studied.

Take Home Message: Hyperhomocysteinemia was a significant predictor of immediate post-operative adverse events after coronary artery bypass surgery graft

ADULT: PERIOPERATIVE CARE

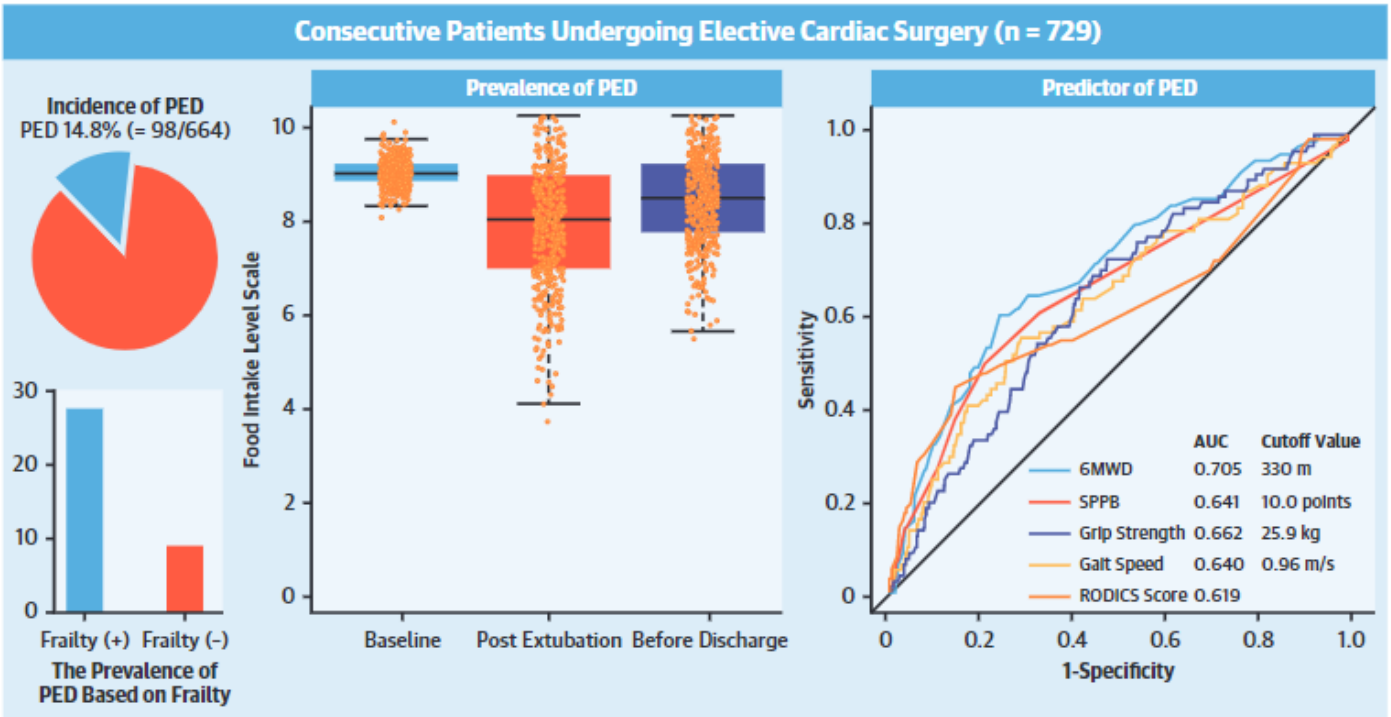
Impact of Frailty on PostoperativeDysphagia in Patients UndergoingElective Cardiovascular Surgery (JACC Asia)

Ogawa M, Satomi-Kobayashi S, Yoshida N, Komaki K, Izawa KP, Hamaguchi M, Inoue T, Sakai Y, Hirata KI, Okada K. Impact of Frailty on Postoperative Dysphagia in Patients Undergoing Elective Cardiovascular Surgery. JACC Asia. 2022 Feb 1;2(1):104-113. doi: 10.1016/j.jacasi.2021.10.011. PMID: 36340251; PMCID: PMC9627818.

Key points:

- This single-center retrospective cohort study included 644 consecutive patients who underwent elective cardiovascular surgery between May 1, 2014, and December 31, 2020; they were assigned to the post extubation dysphagia (PED) or non-PED group based on postoperative swallowing status, and postoperative complications were investigated.
- Frailty status and physical functions, including walking speed, grip strength, Short Physical Performance Battery, and 6-minute walking distance, were preoperatively assessed; the frailty-status cutoff for predicting PED was determined from the receiver-operating characteristic curve.
- In this study cohort (mean age 67.7 years), the overall PED prevalence was 14.8%; preoperative frailty had a significantly higher prevalence in the PED group (50.0%) than in the non-PED group (20.3%; $P < 0.001$). PED correlated with a higher incidence of postoperative pneumonia and prolonged intensive care unit or hospital stay ($P < 0.05$ for all). After adjustment for confounders, multiple regression analysis revealed that preoperative frailty was independently associated with PED ($P < 0.001$).

CENTRAL ILLUSTRATION **Prevalence and Predictors of Postextubation Dysphagia**



Ogawa, M. et al. JACC: Asia. 2022;2(1):104-113.

(Left) Incidence of postextubation dysphagia (PED) was 14.8%, which was significantly higher in the frail group than that in the nonfrail group. **(Middle)** Longitudinal changes in the preoperative and postoperative PED are shown. Before discharge, 5.8% of patients still had PED. **(Right)** In receiver-operating characteristic curves to predict the incidence of PED, 6-minute walking distance (6MWD) was the most predictable parameter among physical functions. AUC = area under the curve; RODICS = Risk of Dysphagia in Cardiac Surgery; SPPB = Short Physical Performance Battery.

Comments: Preoperative frailty was independently associated with PED. The 6-minute walking distance was the most powerful predictor of PED.

ADULT: PERIOPERATIVE CARE

Ticagrelor or Aspirin After Coronary Artery Bypass in Patients With Chronic Kidney Disease (ATS)

Sandner SE, Schunkert H, Kastrati A, Milojevic M, Böning A, Zimpfer D, Zellmer S, Wiedemann D, Laufer G, von Scheidt M; TiCAB Investigators. Ticagrelor or Aspirin After Coronary Artery Bypass in Patients With Chronic Kidney Disease. Ann Thorac Surg. 2022 Feb;113(2):554-562. doi: 10.1016/j.athoracsur.2021.03.061. Epub 2021 Apr 2. PMID: 33819474.

Key points:

- The optimal antiplatelet therapy for patients with chronic kidney disease (CKD) undergoing coronary artery bypass grafting (CABG) remains unknown. This is post hoc analysis of Ticagrelor in Coronary Artery Bypass (TiCAB) trial, to evaluate the efficacy and safety of ticagrelor versus aspirin in patients with or without CKD. TiCAB was a multi-center, double-blinded, placebo-controlled randomized trial that enrolled patients with stable coronary artery disease or ACS undergoing CABG for TVD and/or LM stenosis, or two-vessel disease with impaired LV function. Randomized patients received either aspirin 100 mg and placebo ticagrelor or placebo aspirin and ticagrelor 90 mg within the first 24 hours after CABG.
- Of 1,859 patients undergoing CABG in the TiCAB trial, CKD was present in 276 patients (15.0%). Patients with CKD versus those without CKD had higher 1-year rates of MACCE (13.0% vs. 8.3%) and major bleeding (5.6% vs. 3.1%). The 1-year rate of MACCE was increased with ticagrelor versus aspirin in patients with CKD (18.2% vs. 8.9%), but not in patients without CKD (8.5% vs. 8.1). There was no difference in the 1-year rate of major bleeding with ticagrelor versus aspirin in patients with CKD (6.6% vs. 4.7%, P=0.48) and without CKD (3.3% vs. 2.9%, P=0.65).

Comments:

Optimal antiplatelet therapy remains controversial in these patients as potential benefits with more potent antithrombotic therapies are offset by increased bleeding risk. The presence of CKD was associated with an increased risk of cardiovascular death, stroke, non-fatal myocardial infarction, or revascularization (MACCE), all-cause death and bleeding at 1 year after CABG irrespective of antiplatelet therapy. When compared with patients without CKD, patients with CKD displayed a nearly two-fold increase in major bleeding rates. Ticagrelor, on a background of aspirin, resulted in a greater risk reduction for the ischemic primary endpoint versus clopidogrel in acute coronary syndrome patients with CKD. The Ticagrelor in Coronary Artery Bypass (TiCAB) trial compared the effect of ticagrelor monotherapy with aspirin on clinical events within the first year after CABG. Possible explanation for the differences seen in the effect of ticagrelor in the TiCAB trial and other trials of ticagrelor is an efficacy disparity between ticagrelor on a background of aspirin as DAPT versus ticagrelor monotherapy.

Take Home Message: In patients with CKD and CABG, those who received ticagrelor had a higher incidence of MACCE but a similar incidence of major bleeding compared to those who received aspirin.

Incidence, predictors, and outcome for post-operative atrial fibrillation in Indian patients undergoing off-pump coronary artery bypass grafting—a prospective observational study (IJTCVS)

Potdar, S.P., Shales, S., Baviskar, M. *et al.* Incidence, predictors, and outcome for post-operative atrial fibrillation in Indian patients undergoing off-pump coronary artery bypass grafting—a prospective observational study. *Indian J Thorac Cardiovasc Surg* **38**, 366–374 (2022). https://doi.org/10.1007/s12055-022-01358-7

Key points:

- In this prospective observational study, all patients undergoing isolated OPCAB in a single institution over a 12-month period were included.
- Investigators recruited 1108 patients in the study of which 88 (7.94%) patients developed post operative atrial fibrillation (POAF). Age (OR = 1.082, $p < 0.001$, 95%CI: 1.050–1.114), unstable angina (OR = 16.32, $p = 0.036$, 95% CI: 1.2–221.4), presence of diabetes mellitus (OR 1.781, $p = 0.025$, 95%CI: 1.074–2.955), left atrial size (OR 2.506, $p = 0.001$, 95%CI: 1.478–4.251), and presence of chronic renal failure (OR 8.7, $p = 0.001$, 95%CI: 2.4–31.53) were significant predictors of POAF.
- Both the EuroSCORE ($p = 0.035$) and the STS score ($p = 0.001$) were significantly higher in patients developing POAF. The area under the ROC curve for the EuroSCORE II was 0.62 and for the STS score was 0.64 suggesting satisfactory and similar discriminatory power of both the scores to predict POAF in these patients. POAF was asso-

ciated with significantly increased adverse outcomes like stroke and prolonged hospital stay.

Comments:

Indian patients who undergo surgical revascularization are relatively younger than their Western counterparts and are predominantly revascularized using off-pump coronary artery bypass grafting (OPCAB) technique. They may therefore be at a reduced risk of developing POAF. The aim of this study was to assess the incidence of POAF, measure its impact on outcomes, and identify the predictors for POAF in the Indian patients undergoing OPCAB. Besides, the ability of European System for Cardiac Operative Risk Evaluation (EuroSCORE) and Society of Thoracic Surgeons (STS) scores in predicting POAF was also assessed.

Take Home Message: In this study, the incidence of POAF was much lower (7.94%) than that reported previously. POAF significantly increased adverse outcomes and length of hospital stay. Both EuroSCORE II and STS scores had similar discriminating power in predicting POAF.

Slow gait speed is associated with worse postoperative outcomes in cardiac surgery: A systematic review and meta-analysis (JCS)

Chang J, Nathalie J, Nguyenhuy M, Xu R, Virk SA, Saxena A. Slow gait speed is associated with worse postoperative outcomes in cardiac surgery: A systematic review and meta-analysis. J Card Surg. 2022 Jan;37(1):197-204. doi: 10.1111/jocs.16089. Epub 2021 Oct 19. PMID: 34665474.

Key points:

- This is a systematic review and meta-analysis to examine the effect of slow gait speed on postoperative cardiac surgical patients. PubMED, MEDLINE, and EMBASE databases were searched from January 2000 to August 2021 for studies comparing slow gait speed and “normal” gait speed.
- Primary outcome was in-hospital mortality. Secondary outcomes were composite mortality and major morbidity, AKI, stroke, deep sternal wound infection, prolonged ventilation, discharge to a healthcare facility, and ICU length of stay.
- Seven eligible studies with 36,697 patients were considered and it was found that Slow gait speed was associated with increased likelihood of in-hospital mortality. Additionally, they were more likely to suffer from composite mortality and major morbidity, AKI, deep sternal wound infection , prolonged ventilation >24 h , reoperation , institutional discharge and longer ICU length of stay.

Comments:

Slowness was defined as gait speed less than 0.83 m/s or longer than 6 s to complete the 5-m walk in six studies. One study defined slowness as time to complete 5 m walkt test (5MWT) greater than 6.4 s, that is, gait speed less than 0.78 m/s.Four studies additionally categorized nonslow group into intermediate (gait speed 0.83-1 m/s) and fast (gait speed > 1 m/s) groups.10-13 Slow gait speed is a simple, validated, and reliable marker of frailty. Frailty is associated with poorer outcomes in cardiac surgery. Frailty is associated with poorer outcomes in cardiac surgery. Frail patients are twofold more likely to die during hospital admission than nonfrail counterparts and are at an increased risk of developing various perioperative complications.

Take Home Message: Slow gait speed is associated with poorer outcomes in cardiac surgery.

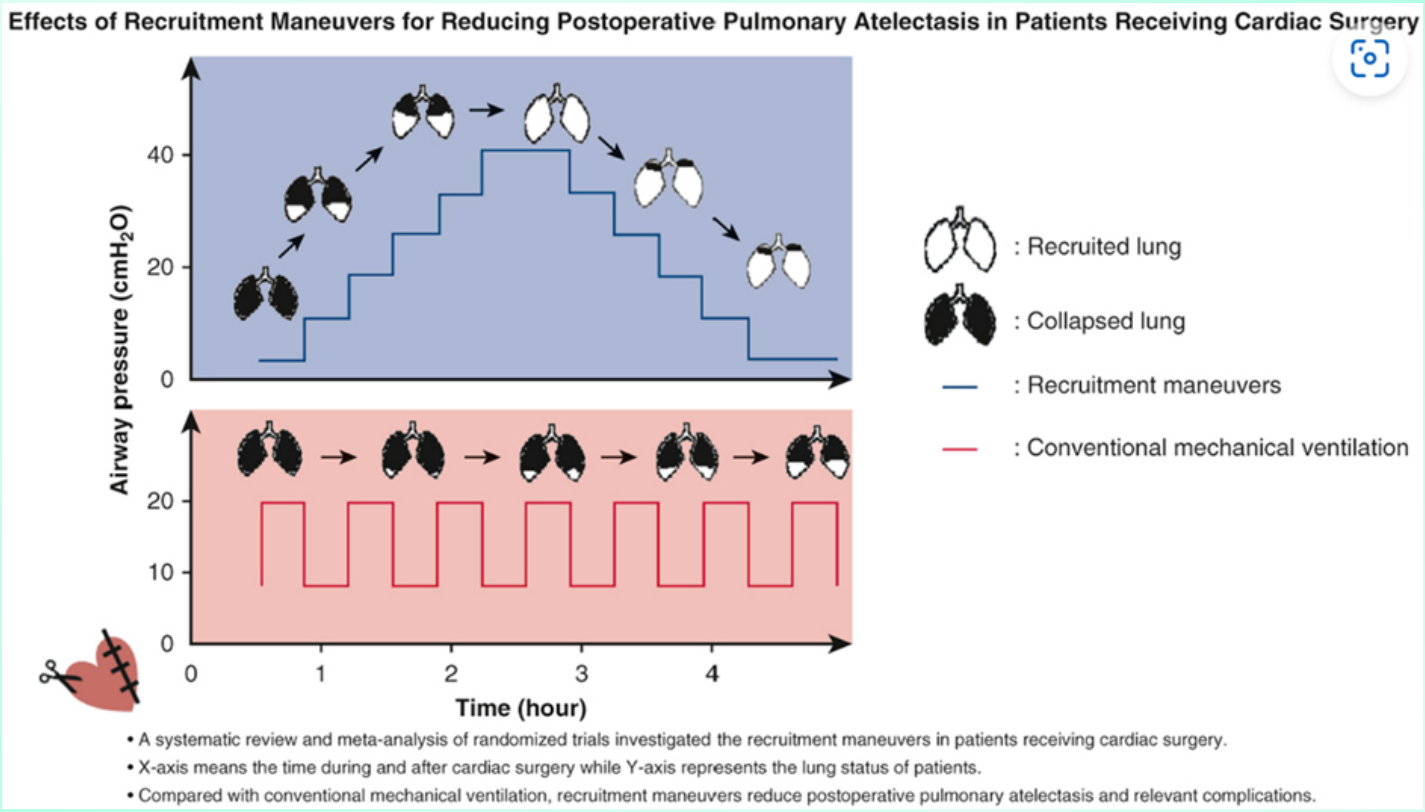
ADULT: PERIOPERATIVE CARE

Recruitment maneuvers to reduce pulmonary atelectasis after cardiac surgery: A meta-analysis of randomized trials (JTCVS)

Hu MC, Yang YL, Chen TT, Lee CI, Tam KW. Recruitment maneuvers to reduce pulmonary atelectasis after cardiac surgery: A meta-analysis of randomized trials. J Thorac Cardiovasc Surg. 2022 Jul;164(1):171-181.e4. doi: 10.1016/j.jtcvs.2020.10.142. Epub 2020 Nov 26. PMID: 33341273.

Key points:

- This is a meta-analysis of 16 randomized controlled trials published before March 2020, involving 1455 patients to evaluate the effectiveness of recruitment maneuvers in patients undergoing cardiac surgery.
- Patients receiving recruitment maneuvers had a reduced incidence of pulmonary atelectasis, reduced incidence of hypoxic events, reduced incidence of and improved Pao_2/Fio_2 ratio without disturbing the cardiac index or mean arterial pressure as compared with those who received conventional mechanical ventilation.
- The incidence of pneumothorax was nonsignificant between the groups.



Comments: Pulmonary atelectasis is a common postoperative complication that may lead to intrapulmonary shunt, refractory hypoxemia, and respiratory distress. Conventionally, incentive spirometry, intermittent positive pressure breathing, and mucolytic agents are routine adjuvant therapies administered to patients undergoing cardiac surgery, but their efficacy and efficiency depend on the patient's vital capacity and threshold of pain. This study had shown the efficacy and safety of recruitment manoeuvres with conventional mechanical ventilation in reducing pulmonary atelectasis and hypoxic events in patients undergoing cardiac surgery.

The limitations of the study are 1) the recruitment maneuver approach in each trial is varied in terms of strength, frequency, timing, and positive end-expiratory pressure ;2) Appropriate timing for the use of recruitment maneuvers in patients undergoing cardiac surgery remains unclear. 3) quantitative hemodynamics analysis was insufficient 4) only 2 included RCTs examined patients with hypoxemia, the study number was insufficient to make a conclusive result in patients with hypoxemia. 5) most patients included in our study had normal pulmonary function and stable hemodynamics. Therefore, the findings might be applicable only to patients without severe cardiac or pulmonary complications.

Take Home Message: Recruitment maneuvers may reduce postoperative pulmonary atelectasis, hypoxic events, and pneumonia and improve Pao_2/Fio_2 ratios without hemodynamic disturbance in patients undergoing cardiac surgery.

SUGGESTED READING

Artificial intelligence for the echocardiographic assessment of valvular heart disease

Ten things to know about ten cardiovascular disease risk factors – 2022

Intravenous ferric derisomaltose in patients with heart failure and iron deficiency in the UK (IRONMAN): an investigator-initiated, prospective, randomised, openlabel, blinded-endpoint trial

Virtual Reality Simulation for Minimally Invasive Coronary Artery Bypass Grafting With Aortic No-Touch Total Arterial Grafting Technique

Pain Management Strategies for Minimally Invasive Cardiothoracic Surgery

Cannulas and Cannulation Options for Minimally Invasive Surgery

Conventional Versus Minimally Invasive Aortic Valve Replacement Surgery: A Systematic Review, Meta-Analysis, and Meta-Regression

Aortic Valve Reconstruction with Ozaki Technique

Short-Term Results of Ivabradine versus Metoprolol: The Effects on Atrial Fibrillation in Patients Undergoing Off-Pump Coronary Artery Bypass Grafting

2022 ACC/AHA Guideline for the Diagnosis and Management of Aortic Disease: A Report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines

Nuclear cardiology for a cardiothoracic surgeon