Cardio Mag

Volume 2|Issue 26|2021

Dear Doctor,
*Greetings from Micro Labs Limited. We are happy to bring you "**Cardio Mag**", which contains latest and interesting news in the field of Cardiology.*

This issue contains

- Acute conditions associated with Secondary Atrial Fibrillation in patients with newly diagnosed Atrial Fibrillation
- Acute pericarditis, Graves' disease, and thymic hyperplasia: a case report
- The role of mechanical support devices during percutaneous coronary intervention

*Should you require any specific article or medical information, please feel free to contact us at **medicalservices@microlabs.in***

Looking forward to your valuable feedback.
Best Regards,
Medical Team, Micro Labs Limited

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Acute conditions associated with Secondary Atrial Fibrillation in patients with newly diagnosed Atrial Fibrillation

Introduction:

Atrial fibrillation (AF) is an important ischemic stroke risk factor, increasing the risk 5-fold and accounting for 1 in 4 ischemic strokes. Presence of AF at the time of ischemic stroke is associated with increased stroke severity, mortality, and risk of recurrence. Acute conditions associated with secondary AF include pulmonary embolism, sepsis, acute coronary syndrome, myocarditis, pericarditis, thyrotoxicosis, cardiothoracic surgery, and alcohol intoxication (hereafter referred to as AF precipitants). Earlier it was thought that AF occurring in the setting of acute conditions to be a self-limited event that is potentially curable with elimination of the underlying cause. But, there is now a there is enough evidence demonstrating that the AF will likely recur even after elimination of the inciting event. Secondary AF is associated with elevated risk of stroke, and the risk may be similar to the stroke risk in AF without precipitants. The 2014 US AF guidelines stated that patients with secondary AF require long-term follow-up to evaluate for recurrence. Guidelines also highlighted knowledge gaps in long-term outcomes and the role of OAC in secondary AF. An assessment of current OAC utilization in relation to presence of AF precipitants is a critical, initial step to understanding current prescribing patterns and potential targets for future intervention.

Objective: To identify the acute conditions associated with secondary Acute fibrillation including pneumonia, sepsis, pneumothorax, respiratory failure, myocarditis, pericarditis, alcohol intoxication, thyrotoxicosis, cardiothoracic surgery, other surgery in patients with newly diagnosed Atrial fibrillation and determine their association with subsequent oral anticoagulant use.

METHODS: A cohort of patients with a new diagnosis of Atrial fibrillation with (185) and without (172) Atrial fibrillation precipitants were assembled. To identify Atrial fibrillation precipitants, combinations of International Classification of Diseases, Tenth Revision (ICD-10) codes, Current Procedural Terminology codes, laboratory values, imaging reports, and physician notes including

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discharge summary were taken. Individual charts were manually reviewed to validate presence of Atrial fibrillation precipitants. Pneumonia, Sepsis, myocardial infarction, respiratory failure, and cardiothoracic surgery were the most common precipitants observed. Patients with Atrial fibrillation precipitants were less likely to receive subsequent anticoagulation therapy at 30 days after the initial AF diagnosis.

Result:

Of the 185 patients with a precipitant, 54 (29%) patients experienced ≥2 precipitants. Respiratory failure, sepsis (including pneumonia), MI, and cardiothoracic surgery were the most common precipitants identified. The electronic to identify at least 1 AF precipitant had the following diagnostic performance in UMass EHR—89% (95% CI, 84–93) positive predictive value, 83% (78–87) negative predictive value, 82% (77–88) sensitivity, and 90% (83–93) specificity. Algorithm performance varied considerably for individual precipitants. Patients with precipitants had greater prevalence of heart failure (31.4% versus 21.5%; P=0.04) and coronary artery disease (33.5% versus 22.1%; P=0.02), and higher mean CHA2DS2- VASc score (3.8 versus 3.2; P=0.003). Among patients with an echocardiogram available (n=280, 78% of the sample), patients with precipitants were less likely to have normal LV ejection fraction compared with those without (73% versus 84%; P=0.03). There was no significant difference in LA size (n=279) between the 2 groups. When compared Patients with Atrial fibrillation precipitants were less likely to receive oral anti coagulants for new-onset Atrial fibrillation than with patients without precipitants (40.5% versus 61.1%; P<0.001). Patients with new-onset Atrial fibrillation with Atrial fibrillation precipitants are less likely to receive oral anti coagulants compared with those without a precipitant.

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Association between Presence of a Secondary Precipitant and Initiation of OAC

Multivariable models			
	Model 1—age and sex OR (95% CI)	Model 2—model 1+patient conditions* OR (95% CI)	Model 3—model 2+other factors† OR (95% CI)
Secondary precipitant (n=185)	0.42 (0.28–0.65)	0.39 (0.25–0.62)	0.31 (0.19–0.52)
Sepsis§ (n=64)	0.51 (0.29–0.89)	0.45 (0.25–0.82)	0.46 (0.25–0.85)
Myocardial infarction (n=32)	1.29 (0.62–2.68)	1.41 (0.65–3.06)	1.23 (0.53–2.88)
Respiratory failure (n=56)	0.52 (0.29–0.95)	0.45 (0.24–0.85)	0.41 (0.21–0.80)
Cardiothoracic surgery (n=23)	0.73 (0.31–1.71)	0.76 (0.30–1.94)	0.69 (0.26–1.87)
Other surgery (n=25)	0.44 (0.18–1.04)	0.39 (0.16–0.98)	0.37 (0.14–0.96)
Other precipitants‖ (n=40)	0.71 (0.36–1.38)	0.74 (0.37–1.49)	0.67 (0.32–1.39)

Conclusion: This study explained the lower usage of oral anticoagulant in secondary atrial fibrillation in contemporary clinical practice.

Reference:

Ko D, Saleeba C, Sadiq H, Crawford S, Paul T, Shi Q, Wang Z, Benjamin EJ, Walkey AJ, Lubitz SA, Kapoor A. Secondary Precipitants of Atrial Fibrillation and Anticoagulation Therapy. Journal of the American Heart Association. 2021 Mar 22:e021746.

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Acute pericarditis, Graves' disease, and thymic hyperplasia: A case report

Background:
Acute pericarditis as a sign of mediastinal mass is rare and aetiological diagnosis can be challenging without adequate imaging. Thymic hyperplasia is a rare condition of benignity of thymic tissue without mitosis, necrosis, or atypical cells. It is known that this condition can be associated with Graves' disease.

Case Description:
This is a case report of an 18-year-old woman with chief complaints of acute sharp chest pain radiated to the left arm, exacerbated with supine positioning and attenuated while sitting or leaning forward. Her past medical history showed Graves' disease and was on treatment with methimazole at a dosage of 5 mg/die. Her present laboratory findings (like cardiac markers, D-dimer, complete blood count, C-reactive protein, and procalcitonin) showed no significant abnormalities. The ECG showed diffuse ST elevation and PR depression, with sinus tachycardia and absence of pericardial effusion. She showed no inflammation or bacterial infection (PCR and procalcitonin were normal). Thyroid-stimulating hormone plasma levels were suppressed, showing decompensated thyrotoxicosis while Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), Epstein–Barr virus, human immunodeficiency virus, hepatitis C virus, Enterovirus, Parvovirus B19, and Adenovirus tests were normal. Chest computed tomography (CT) was performed and showed the presence of slightly increased density pericardial effusion, with a maximum thickness of 15 mm in the upper mediastinum. To characterize this effusion, gadolinium cardiac magnetic resonance imaging (MRI) was performed and the effusion turned out to be an extra pericardial mass of 73*51 mm located in the upper mediastinum. The mass was taken for the biopsy with video-assisted thoracoscopic surgery and the histological analysis showed thymic hyperplasia.

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Figure 1 Electrocardiogram showing tachycardia at 128 b.p.m. and diffuse, non-specific, concave ('saddle-shaped') ST-segment elevations in all leads except aVR and V1 and PR-segment depression except in aVR.

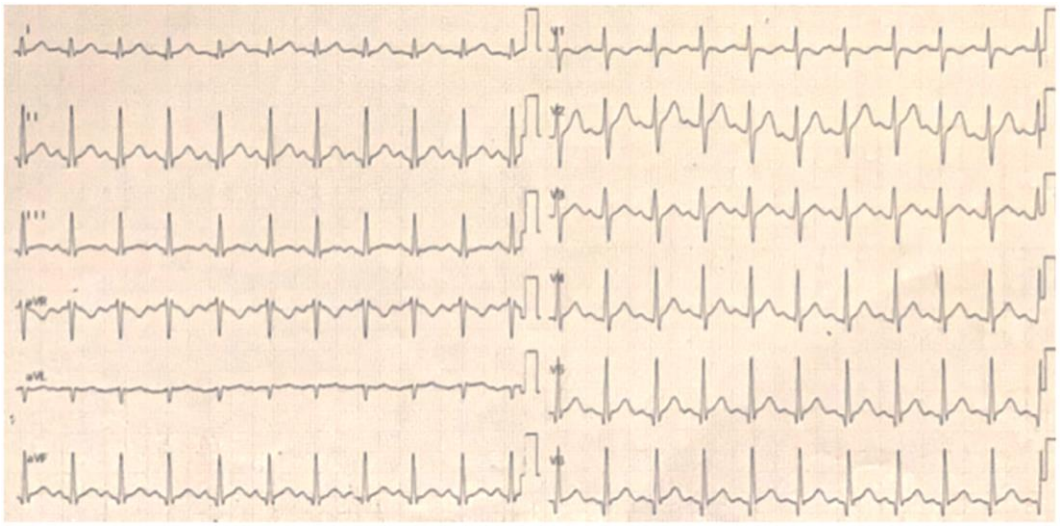

Figure 2 Non-electrocardiogram-gated chest computed tomography with contrast agent—transverse plane, showing presence of a pericardial effusion with slightly increased density (with radiological characteristic not consistent with blood nature) having a maximum thickness of 15mmin the upper mediastinum.

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Figure 3 Cardiac RM—TIRM sequences (turbo inversion recovery magnitude), T2—short-axis view, showing a mass of 73 *51mm located in the upper mediastinum

Figure 4 The same RM scan in orthogonal view, showing minimal pericardial effusion near the anterior mid-basal wall of the left ventricle where the mass has contact with the pericardium in absence of infiltration of the pericardium itself

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Conclusion:

This case report showed the importance of cardiac MR imaging in the appropriate clinical context, such as that of Graves' disease and with symptoms of acute pericarditis. This case highlighted that, a negative chest CT finding may not be sufficient to rule out the diagnosis and cardiac MR imaging is necessary.

Reference: Acquaro M, Breviario F, Greco A, Ghio S. Acute pericarditis, Graves' disease, and thymic hyperplasia: a case report. European Heart Journal-Case Reports. 2021 Oct; 5 (10):ytab392.

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The role of mechanical support devices during percutaneous coronary intervention

Background:

Since the first balloon angioplasty was invented by Andreas Gruentzig, the practice of interventional cardiology has changed dramatically over the decades. Technological upgradation in stent design and interventional techniques have improved the routine treatment in patients, with complex coronary artery disease and poor left ventricular function, and more often in the setting of cardiogenic shock and complicating acute myocardial infarction.

Objective:

To find out the uses and haemodynamic effect of mechanical cardiac support devices during percutaneous coronary intervention and also to examine the clinical evidence for their use in patients with cardiogenic shock, and those undergoing high risk percutaneous coronary intervention

Working Principles of mechanical cardiac support devices:

Mechanical cardiac support devices have the potential haemodynamic effect of unloading the LV, decreasing LVEDP/LVEDV, stroke work, increasing cardiac output and thereby improving systemic and coronary perfusion.

Available mechanical cardiac support devices:

Currently available percutaneous mechanical cardiac support devices are **Impella, VAECMO, Tandem Heart and IABP**. An ideal mechanical cardiac support device should provide haemodynamic support to maintain adequate systemic perfusion, improve mean arterial pressure, and decrease myocardial oxygen demand by a concomitant reduction in left ventricular pre and after load, whilst maintaining, or increasing coronary perfusion.

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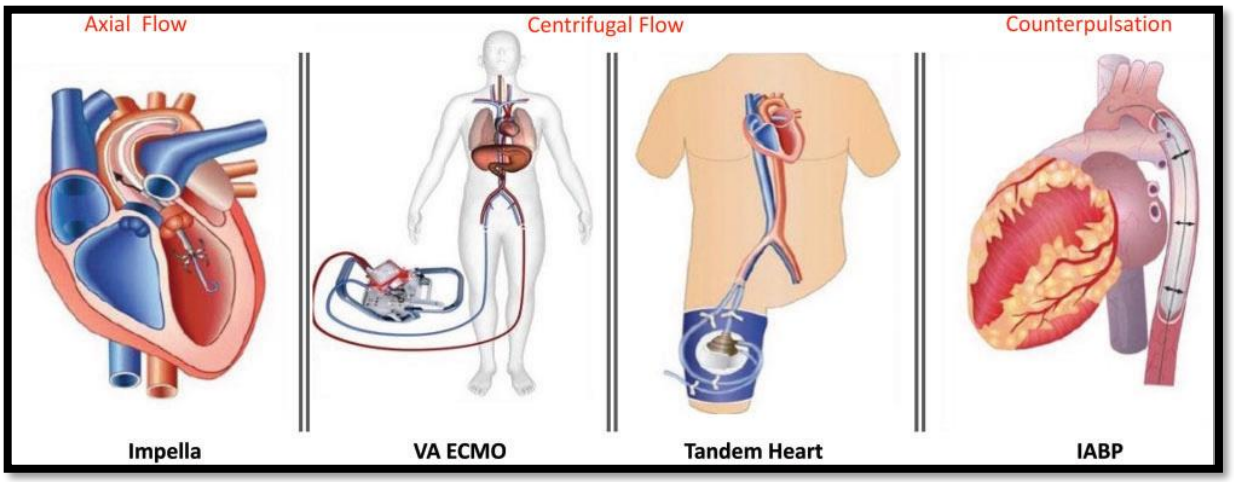
Percutaneous LV support options available



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Comparison of different mechanical support devices

	IABP	IMPELLA	Tandem Heart	VA ECMO
Mechanism				
Principle	Pneumatic (pressure counter pulsation)	Axial flow	Centrifugal flow	Centrifugal flow
Cardiac synchrony	Yes	No	No	No
Flow rate	0.3–0.5L/min	1–5L/min	2.5–5 L/min	3–7L/min
Cardiac power output	↑	↑↑	↑↑	↑↑
LV preload	-	↓↓	↓↓	↓↓
LVEDP	↓	↓↓	↓↓	↔
Afterload	↓	↓	↑	↑↑↑
PCWP	↓	↓↓	↓↓	↔
Coronary perfusion	↓	?	?	?
Myocardium O2 demand	↓	↓	↓ ↔	I↔
TPR		↓	↑	↑↑
Haemodynamic support	+	++	+++	+++
Procedural aspects				
Sheath size	7–8 Fr	13–14 Fr , Impella 5.0–21 Fr	15–17 Fr Arterial 21 Fr Venous	14–16 Fr Arterial 18-21 Fr Venous
Implantation time	Short	Short - Medium	Long	Medium
Maximum no. of implant days	_7 Days	7 Days	14 Days	Weeks
Closure	Percutaneous	Percutaneous/ Surgical	Surgical	Surgical
Cost	£400-600	£6600–15000	£90,000b	£10,000

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Contraindications and risks associated with MCS

	IABP	Impella	Tandem Heart	VA ECMO
Contraindication				
Vascular	Severe PAD	Severe PAD		
Valve	Mod-Severe AR	Mechanical Aortic Valve, Mod-Severe AR, AS with AVA<0.6cm2	Severe AR	Mod-Severe AR
Structural	Significant Aortic Disease i.e. aortic aneurysm/ dissection	LV thrombus	LA thrombus, VSD	Unrepaired aortic dissection
Complication				
Bleeding	Low	Moderate	Very High	High - Very High
Vascular	Low	Moderate- High	High	Very High
Haemolysis	No	Yes	Yes	Yes
Device related	Balloon Rupture	Device Migration/Malfunction	Device Migration	Device Malfunction
Rare	Aortic Dissection/Rupture, Thrombocytopenia	Aortic Valve Injury	Cardiac Tamponade	Thrombocytopenia, Neurological Injury

Conclusion:

There is now a hope of mechanical cardiac support devices providing varying degrees of haemodynamic support during percutaneous coronary intervention. However, results of clinical outcomes of these devices in any randomised clinical trial in patients with cardiogenic shock or those undergoing high risk percutaneous coronary intervention are still awaited.

Reference:

Kanyal R, Byrne J. The role of mechanical support devices during percutaneous coronary intervention. JRSM Cardiovascular Disease. 2021 Oct;10:20480040211014064.

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