CLINICAL CONVERSATIONS

Case Reports

Dextrocardia: TAVR

Dr Atul Mathur
Executive Director - Interventional Cardiology & Chief of Cath Lab,
Fortis Escorts Heart Institute, Okhla, New Delhi

A 75-year-old gentleman presented to the Fortis Escorts Heart Institute emergency with complaints of breathlessness on exertion NYHA II since last one and half year and retrosternal discomfort since last 1 week. He was a known type 2 diabetic, hypertensive, dyslipidemic, morbidly obese, with chronic obstructive airway disease and obstructive sleep apnea. X-Ray chest PA view showed dextrocardia (Figure 1). Transthoracic echocardiogram revealed left ventricular hypertrophy, a LV ejection fraction of 60% and severe aortic stenosis with AVA of 0.7 cm with a mean PG of 46 mmHg. (Figure 2). This was also confirmed with transesophageal echocardiogram. Coronary angiography documented noncritical coronary artery disease. CT aortogram was done which also confirmed dextrocardia with a moderately calcific tricuspid aortic valve (Calcium score of the valve - 3420 H.U) with mildly calcific aortic annulus (mean diameter of 25.1 mm and area derived - 25.3 mm), along with adequate height of both the coronaries (right- 14.1 mm and left- 15.2 mm) and minimal calcification at LV outflow tract.

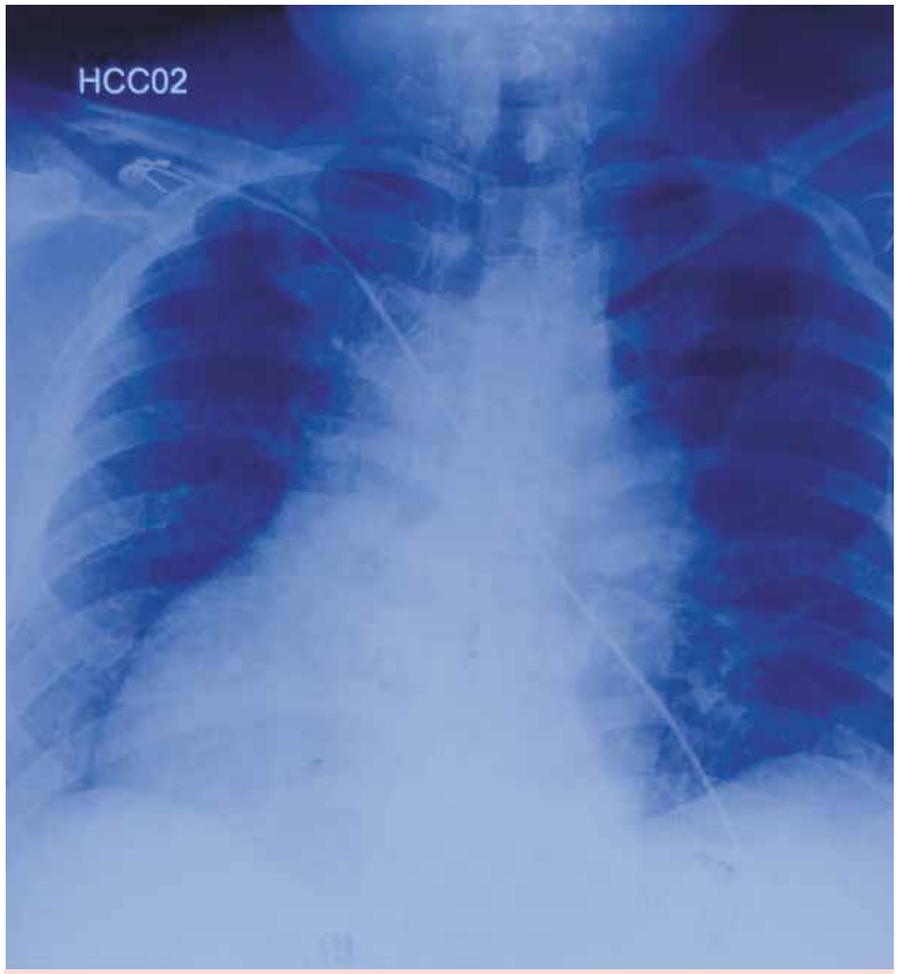

Figure1: X Ray Chest PA View

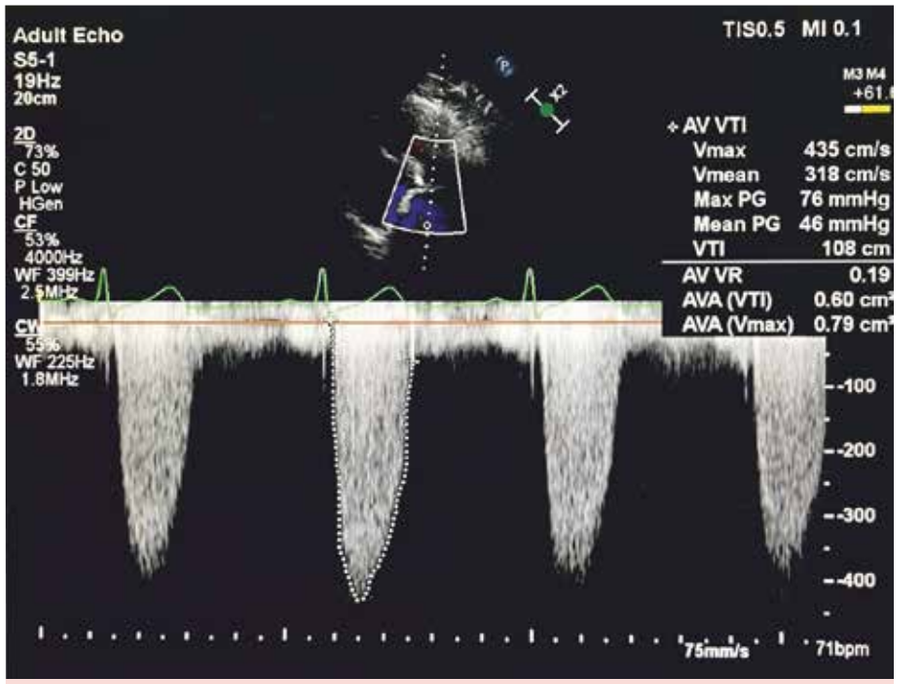

Figure 2: Transthoracic Echo Finding

(Figure 3) After the Heart Team met (group comprising of interventional cardiologist, echocardiographer, anesthetist and cardio-thoracic surgeon), based on his STS Score 4.2%, his history of COAD, OSA, and morbid obesity, it was decided for TAVR as he would fare better versus SAVR. The patient as well as the relatives were counselled regarding the same and consent was taken. Based on the CT aortogram guidance, (Figure 4) access for the TAVR sheath was taken from the right femoral artery. A 6-F pigtail catheter was parked at the noncoronary cusp which was used for aortography in the coplanar view. By using the "prone position" acquisition mode, the image was reversed, which allowed the procedure to be continued in a standard fashion. The valve was crossed using an Amplatz left (AL-1) catheter and a 0.038 straight wire. A 29-mm Core Valve Evolut Pro (Medtronic, EvolutPro-29, Minnesota) was advanced over the Confida guidewire (Medtronic). Parallax of the valve was adjusted by rotating the image-intensifier to a more RAO with slight caudal angulation (contrary to the usual left anterior oblique and caudal angulation). After ensuring adequate placement, the Core Valve was successfully deployed. Post the procedure the patient had developed left bundle branch block, which recovered subsequently on post TAVR day 2 to a narrow QRS. Patient was discharged from the hospital in stable condition after 4 days with transcatheter aortic PHV mean gradient of 5 mmHg and no paravalvular leak.

The uniqueness of this case was that our patient had dextrocardia. This meant that implantation of the valve had to be done in its mirror image view of the usual situs solitus heart with which we are quite familiar. (Figure 5) Hence, we had changed our implantation view accordingly. "Prone position" imaging helps to normalize TAVR procedure in such situations where the patient has dextrocardia.

We have documented this to be the first case in our country where TAVR has been done in a dextrocardia patient and is globally the first TAVR case with isolated dextrocardia.

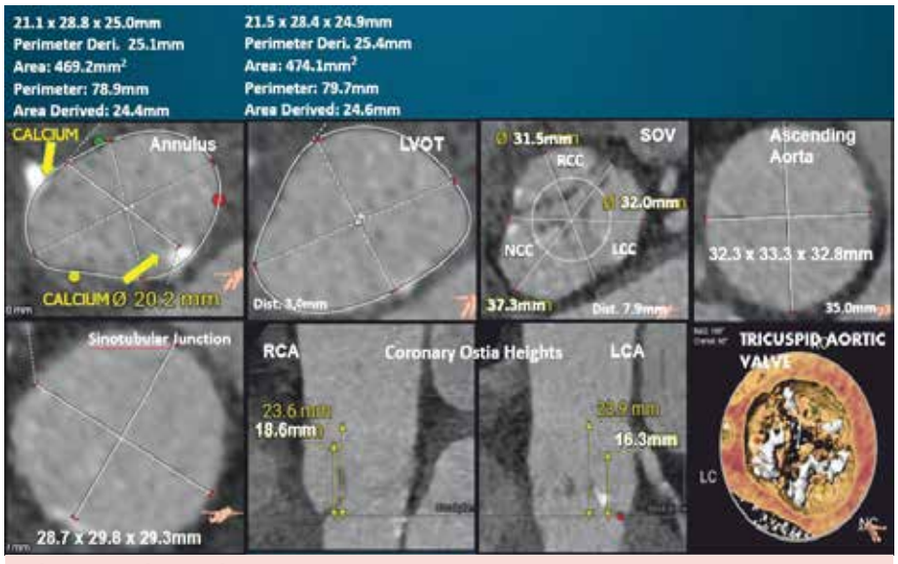

Figure 3: Dimenssions

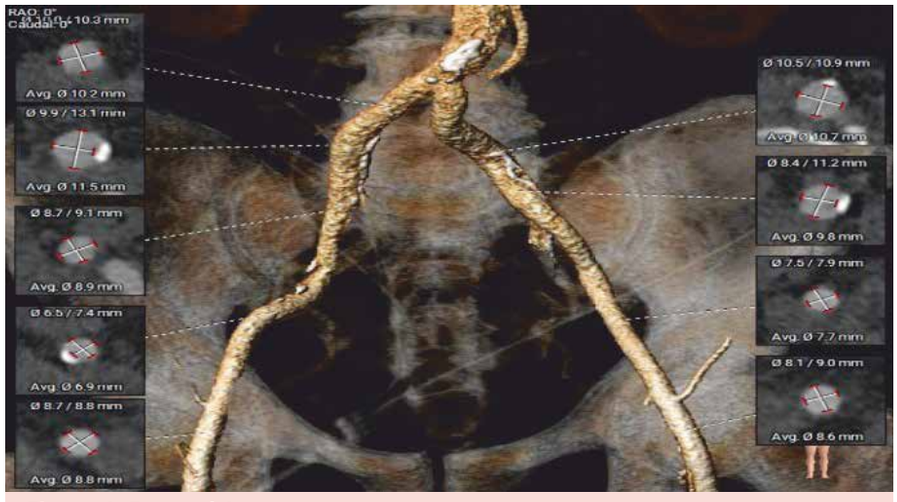

Figure 4: Femoral Access

Figure 5: Implanter's View

Prosthetic Valve Thrombosis Secondary to Heparin Induced Thrombocytopenia – Double Trouble

Dr Nishith Chandra
Principal Director -
Fortis Escorts Heart Institute,
Okhla, New Delhi

Background

Prosthetic valve thrombosis (PVT) is a dreaded complication of mechanical heart valves, which is associated with significant morbidity[1]. Prompt recognition and management is of utmost importance. Herein, we describe a case of prosthetic valve thrombosis in a perioperative scenario which was complicated by heparin induced thrombocytopenia.

Case

A 45-year-old gentleman had undergone triple valve replacement (St Jude bileaflet valve at aortic and mitral position whereas Starr-Edwards valve at tricuspid position) in 2006. He had tricuspid valve thrombosis in 2012, for which he had undergone fibrinolysis. Currently, he was shifted from oral to parental anticoagulation (Heparin) for umbilical hernia repair. Preoperative prosthetic valve and ventricular function was normal. After an uneventful surgery, he was restarted on OAC (post-operative day 3) after bridging anticoagulation.

On post-operative day (POD) 5, he developed acute heart failure with elevated mitral valve gradients (28/15 mmHg) and restricted leaflet motion on transthoracic echocardiography(TTE). Transesophageal echocardiography(TEE) revealed mobile thrombus on atrial side of mitral prosthesis. Fluoroscopy revealed that one leaflet of mitral prosthesis was completely stuck in closed position (Figure 1A). The patient was started on heparin infusion and planned for fibrinolysis, in view of prohibitive risk for redo surgery. However, a significant decline in platelet counts (145,000 -30,000/µL) was noted in the interim period.

Considering the possibility of heparin induced thrombocytopenia(HIT), he was shifted to Bivalirudin infusion (1.75 mg/kg/h). Functional assay for HIT was strongly positive, confirming the diagnosis of HIT. There were no bleeding episodes despite platelet counts reaching a nadir of 25,000/µl (Figure 1B). Considering persistently high mitral valve gradients, the patient underwent fibrinolysis using alteplase(75mg) once the platelet counts improved (110,000/µL). Post fibrinolysis, there was immediate reduction in mitral valve gradients with normal mitral leaflet motion on fluoroscopy. The patient received bridging therapy with Bivalirudin + OAC followed by OAC monotherapy (target INR 3.5-4). TTE prior to discharge showed mitral gradient of 12/7 mmHg.

Discussion

The present case highlights the challenges involved in managing prosthetic valve thrombosis in the background of HIT. Surgery is recommended in patients with left sided obstructive PVT with large thrombus (>0.8 cm2)[2]. In patients with high surgical risk, fibrinolysis and heparin therapy are considered. HIT is a rare complication arising from heparin exposure, with an incidence of 3% [3]. The clinical diagnosis of HIT relies on the Warkentin's 4T clinical scoring system[4] whereas confirmatory diagnosis is made by functional platelet reactivity assay. The incidence of PVT in a background of HIT is uncommon. Severe thrombocytopenia in these settings precludes surgery and fibrinolysis. Early post-operative PVT with HIT have been successfully managed with lepirudin and danaparoid[6]. Prosthetic valve thrombosis was also noted in 11% of HIT patients, after valve surgery[7]. There is scarce data regarding use of bivalirudin prosthetic valve thrombosis. In our

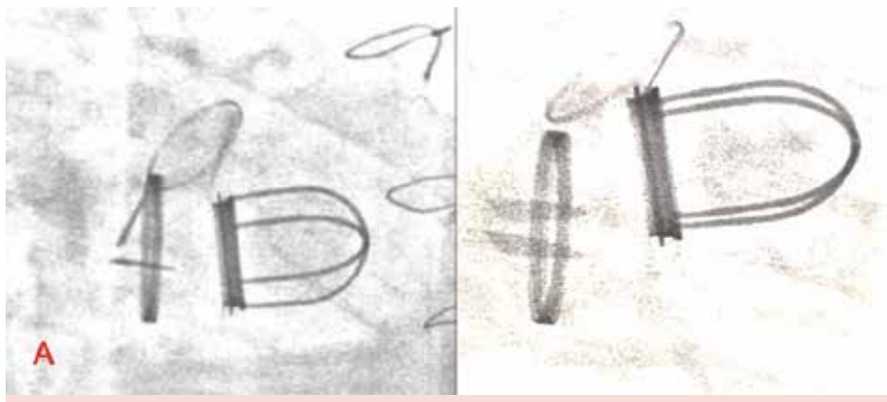

Figure 1A

case, we successfully used bivalirudin to manage PVT with a dose equivalent to that used in percutaneous coronary interventions (PCI). High dose infusion of bivalirudin is required to maintain optimal anticoagulation levels before OAC effect takes over.

Conclusion

Prosthetic valve thrombosis in the background of HIT presents a clinical conundrum. Newer parenteral anticoagulants like bivalirudin can be effectively used to manage PVT.

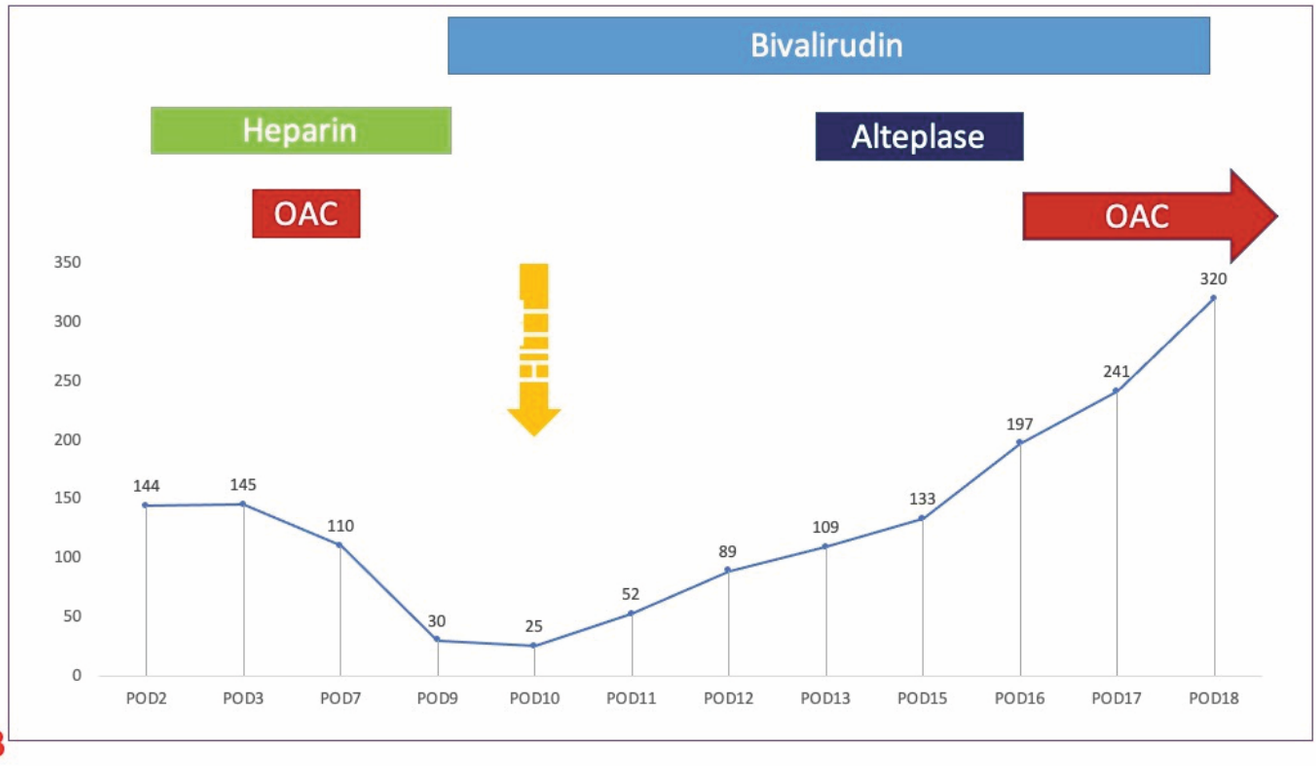

Figure 1B

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Heart Failure Secondary to Systemic Condition

Dr Keshava R
Director - Interventional Cardiology
Fortis Hospital, Cunningham Road,
Bangalore

Dr P.R.L. N Prasad, Dr Anusha.S.Rao,
Dr Lavanya , Dr Arvind Bansal

A 37year old gentleman presented to our outpatient department with history of numbness of both hands, associated with weakness, with frequent dropping of objects and difficulty in gripping, radiating pain in both forearms for the past eight months which was aggravated since a fortnight. He also had breathlessness on exertion (NYHA class ¾). His past history was unremarkable, there was no significant family history. On evaluation, his vitals were stable and cardiac examination was not significant. Nervous system examination revealed weak hand grips and he was diagnosed as bilateral carpal tunnel syndrome.

Investigations-ECG showed sinus rhythm, normal rate with low voltage complexes, ECHO showed dilated left atrium, concentric LV hypertrophy with speckled appearance, LV global hypokinesia with an ejection fraction of 45 percent and a Global Longitudinal Strain (GLS) of -8% with apical sparing, features suggestive of Amyloidosis. His hemogram, renal and liver function tests were normal, NT pro BNP was elevated 1888pg/ml (135 pg/ml normal). Nerve conduction studies showed bilateral sensory and motor, demyelinating and axonal neuropathy at wrist suggestive of carpal tunnel syndrome.

Further evaluation done such as serum protein electrophoresis showed no M band with elevated kappa light chains. Bone marrow showed plasma cell dyscrasia with 32% plasma cells. Cardiac MRI showed normal LV size with mildly depressed systolic function, severe burden of non-ischemic scar, because of global late gadolinium enhancement, with altered kinetics, elevated extracellular volume fraction (ECV) with decreased GLS -8, the differential of amyloidosis was

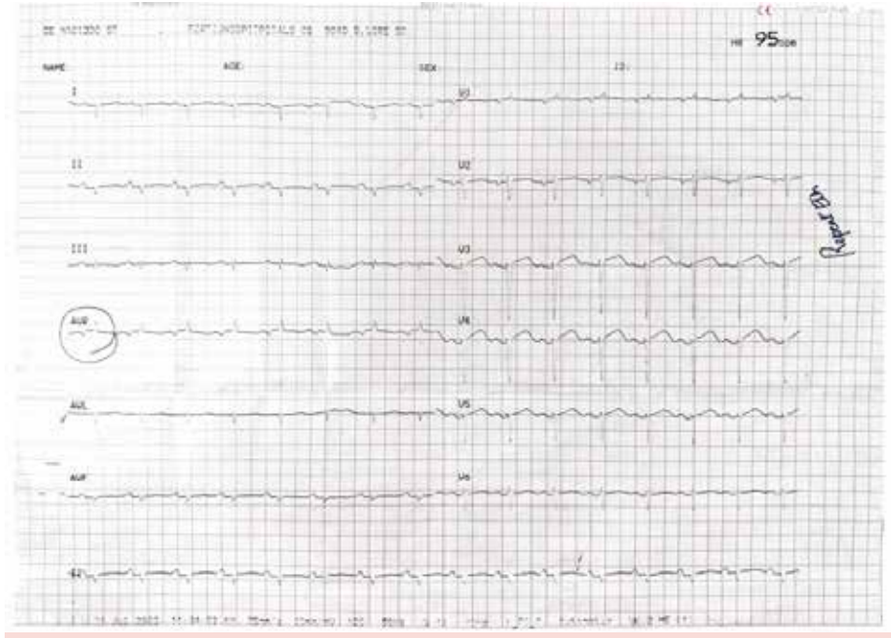

Figure 1: ECG

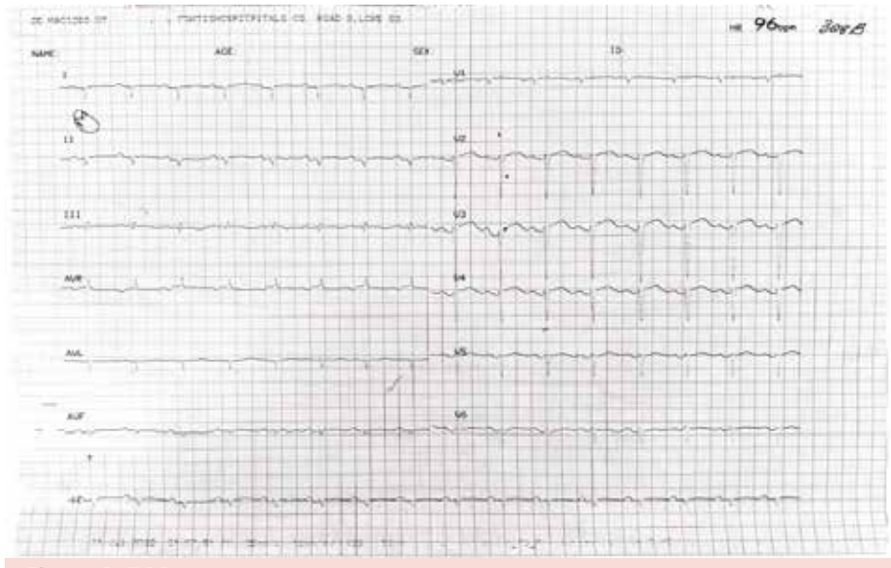

Figure 2: ECG

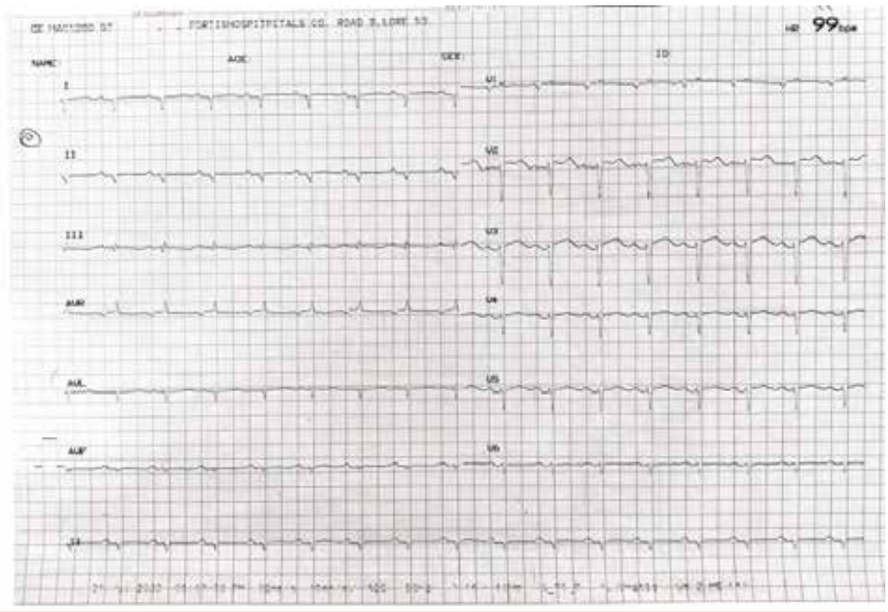

Figure 3: ECG

CLINICAL DIAGNOSIS: FOR CARDIAC EVALUATION

MEASUREMENTS

Vital Signs and Body Measurements													
HR	104	bpm	B.Pr		mmHg	Height		cm	Weight		kg	BSA		m²
M – Mode (Parasternal view)							Conventional and Tissue Doppler						
AO	2.9	cm	LVID - d	3.6	cm		Mitral Valve		E : 0.61		A : 0.45		m/sec
LA	4.3	cm	LVID – s	2.9	cm		Aortic Valve		0.82		-		m/sec
IVS - d	1.5	cm	EDV	55	ml		Pulmonary Valve		0.67		-		m/sec
IVS - s	1.7	cm	ESV	27	ml		E' Septal (TDI)		5		E/E12		cm/sec
LVPW - d	1.3	cm	FS	23	%		E' Lateral (TDI)		7		-		cm/sec
LVPW - s	1.9	cm	LV MASS	210	gm		RV Function						
2 – Dimensional (A4C View) by Biplane Simpsons							TAPSE	1.8	cm	PSV RV (TDI)		9	cm/sec
LV EDV	-	ml	LV ESV	-	ml		RA Size	3.7	cm	RV Size		2.6	cm

DESCRIPTIVE FINDINGS: Technically Adequate Study. Normal sinus rhythm During Study

RIGHT ATRIUM	Normal in Size
LEFT ATRIUM	Dilated
RIGHT VENTRICLE	Normal in Size
LEFT VENTRICLE	Hypertrophied with speckled appearance
WALL MOTION ANALYSIS	LV global hypokinesis(basal and mid segments hypokinetic, LV apex hyperkinetic)
MITRAL VALVE	Normal
TRICUSPID VALVE	Normal
AORTIC VALVE	Normal
PULMONARY VALVE	Normal
IAS & IVS	Intact
AORTA & PA	Normal in Size
SYSTEMIC & PULMONARY VEINS	Normally Draining
COLOR FLOW	Trivial MR/ Mild TR
DOPPLER STUDY	PASP:28mmHg
PERICARDIUM	Normal
OTHERS	No Intra Cardiac Thrombus, Tumour or Vegetation

IMPRESSION:

Concentric LVH / Dilated LA
LV global hypokinesia
Mild TR
No Pulmonary Artery Hypertension
Mild Left Ventricular Systolic Dysfunction (LVEF-45%)
GLS AVG: -8%
Features Suggestive of ? Amyloidosis

DR. KESAVA R. MD, DNB
INTERVENTIONAL CARDIOLOGIST

ECHO TECHNICIANS

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Regd. Office : Fortis Escorts Heart Institute and Research Centre, Okhla Road, New Delhi - 110 025 (India)
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Figure 4: Clinical Diagnosis Cardiac Evaluation

considered first, others were probably myocarditis or sarcoidosis.

Positron emission tomography with 2-deoxy-2- [fluorine- 18] fluoro- D-glucose integrated with computed tomography (18F-FDG PET/CT) scan showed no abnormal or metabolically enhancing lesions in the body. SPECT-CT scan with injection of Technetium Pyrophosphate 99m showed features suggestive of TTR Amyloid (focal uptake in myocardium and more concentration in heart (>1.5 times compared to the contralateral lung). In view of increased light chains, bone marrow abnormality, he was diagnosed as having AL Amyloidosis.

Management

He was subsequently started on therapy for AL Amyloidosis (Bortezomib, Lenalidomide, Dexamethasone).

Discussion

Cardiac Amyloidosis is a rare cause of restrictive cardiomyopathy, causing heart failure with preserved ejection fraction (HFpEF). It is caused by the deposition of amyloid fibrils in the myocardium. These are abnormal, unstable proteins that misfold, aggregate and deposit as amyloid fibrils.

Their classification is based on the precursor proteins, with two main types, variety caused by abnormal clonal proliferation of plasma cells (AL) and transthyretin (ATTR).

The ATTR variety has two subgroups, a genetically inherited Autosomal Dominant type ATTRv or a denovo mutation wild type ATTRw.

Though it can involve peripheral and autonomic nervous system (as happened in this patient) the main determinant of prognosis is the cardiac involvement.

Patients may have features of heart failure with preserved ejection fraction, dyspnea, fatigue and edema, the ECG may have low

voltage (50% in AL, 25-40% in ATTR) which is discordant with the LV hypertrophy seen on ECHO. Anterior and inferior pseudo infarct patterns in AL, Atrial dysrhythmias are common in wtATTR types. Differentials may include hypertrophic cardiomyopathy, aortic stenosis and Fabry's disease. ECHO may further show small LV cavity, thick RV, impaired GLS with sparing of apex as shown in our case.

In AL type plasma cell dyscrasia (lambda more than kappa) is common, though it can occur in 40-50% of ATTR variety too.

MRI may show elevated native T1, increased extracellular volume fraction, late gadolinium enhancement pattern (diffuse, sub endocardial, or transmural), abnormal gadolinium kinetics. Bone scintigraphy might show normal light chain assays and grade 2/3 cardiac uptake or a heart to contralateral lung (H/CL) quantitative uptake ratio of >1.5. False positives may occur from AL-CM amyloidosis, previous myocardial infarction, diffuse myocardial scarring observed in chronic renal disease and mitral valve calcification, overlying previous rib facture.

In the absence of a light chain abnormality, the 99mTechnitium-PYP scan is diagnostic of ATTR-CM if there is grade 2 to 3 cardiac uptake or a heart/contralateral chest ratio >1.5. Single-photon emission computed tomography is assessed in all positive scans to confirm that uptake represents myocardial retention of the tracer, not blood pool signal.

Endomyocardial biopsy may be necessary to establish the diagnosis: (1) a positive 99mTc- PYP scan and evidence of a plasma cell dyscrasia by serum/urine IFE or serum free light chain analysis to exclude AL type amyloid (2) a negative or equivocal 99mTc-PYP scan despite a high clinical suspicion to confirm ATTR-CM; and (3) unavailability of 99mTc-PYP scanning.

If TTR is confirmed, a genetic sequencing is necessary to distinguish the wild and family variants for genetic counselling of family members and the type with Val122Ile has an aggressive clinical course.

Management involves treating the heart failure and other complications.

Congestion is treated with loop diuretics, aldosterone antagonists, either alone or in combination.

There is not much data to support the use of regular heart failure medications like angiotensin converting enzyme inhibitors, angiotensin receptor blockers, angiotensin receptor neprilysin Inhibitors, beta blockers.

These patients are prone for atrial arrhythmias and are managed with amiodarone and oral anti coagulation.

For those with conduction defects permanent pacemaker implantation is done and for those with recurrent ventricular arrhythmia and aborted sudden death an AICD implantation is done.

Use of disease modifying therapies, TTR stabilizers (Tafamidis, Diflunisal, AG10) bind to the TTR tetramer and prevent misfolding and thus deposition of amyloid fibrils. TTR silencers (patirisan, Inotensen) target TTR hepatic synthesis. TTR disruptors (Doxycycline, monoclonal antibodies) target the clearance of amyloid fibrils from tissues.

In patients with predominantly cardiac disease resulting from ATTRv or ATTRwt, tafamidis is indicated, in those with NYHA class I to III symptoms, an early initiation appears to slow disease progression. The benefit of tafamidis has not been observed in patients with class IV symptoms, severe aortic stenosis, or impaired renal function (glomerular filtration rate <25 mL·min−1·1.73 m−2 body surface area).

Patients with ATTRv and polyneuropathy should be considered for TTR silencing therapy with patisiran35 or inotersen.

Diflusinal (250 mg orally twice daily) may be considered with caution for off-label therapy for asymptomatic ATTR carriers, for patients with ATTR-CM who are not eligible for TTR silencers, or for patients with ATTR-CM who are intolerant of or cannot afford tafamidis.

Heart transplantation may be considered in patients with stage D heart failure, heart-liver transplantation is performed in patients with ATTRv-CM at risk for neuropathy because neuropathy may progress with heart transplantation alone.

Our patient is a young male with AL Amyloid with features of nervous and cardiac systems involvement with classical changes in the ECG, ECHO, SPECT. Previously most cases needed confirmation by endomyocardial biopsy but nowadays more definitive findings of SPECT with Tc PYP scan has substituted the invasive procedure. He had many classical features ot AL Amyloid. He was started on chemotherapy and is being followed up.

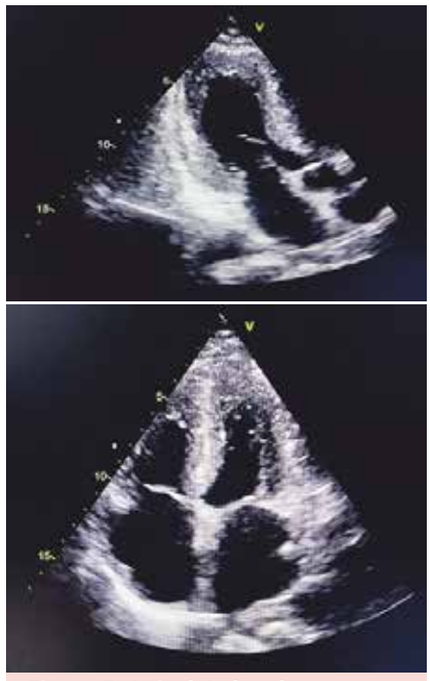

Figure 5: Apical 4 chamber view showing dilated LA

Transcatheter Leadless Permanent Pacemaker in Complex Congenital Heart Disease with Interrupted Inferior Vena Cava: A Challenging Implantation

Source:- https://www.sciencedirect.com/science/article/pii/S0972629222000493?via%3Dihub

Dr Babu Ezhumalai
Senior Consultant -
Interventional Cardiologist
Fortis Malar Hospital, Adyar, Chennai

Abstract

31 years lady with complete atrioventricular canal defect, large primum atrial septal defect (ASD), inlet ventricular septal defect (VSD) and Eisenmenger syndrome, presented with atrial flutter and complete heart block. She was not suitable for corrective cardiac surgery and not yet indicated for heart-lung transplantation. She was advised single chamber permanent pacemaker and eventually Micra VR transcatheter leadless pacemaker was finalised for her. Transcatheter leadless pacemaker was deployed in her RV septum despite some unforeseen technical problems. This patient had intrahepatic interruption of IVC with Azygous continuation draining into SVC but this altered venovascular course was detected only fluoroscopically midway during the pacemaker implantation procedure and this was not detected in the preprocedural transthoracic echocardiography. This abnormal venous course was clearly demonstrated in the cardiac CT which was performed only after completion of the pacemaker implantation procedure in this patient. The technical challenges encountered mainly were mostly during the manipulation of the 27F delivery catheter of Micra through this altered cardiovascular anatomy via transfemoral approach and also due to the presence of septal defects. Thus, transcatheter leadless permanent pacemaker was implanted successfully through transfemoral access in this complex congenital heart disease with interrupted IVC and azygous continuation. Besides transthoracic echocardiography, it may be better to perform transesophageal echocardiography or even preferably radiological imaging like cardiac CT or MRI prior to transcatheter leadless pacemaker implantation in patients with complex congenital heart disease to understand the cardiovascular anatomy and plan the procedure.

Double Outlet Both Ventricles - Morphologic, Echocardiographic and Surgical Considerations

Dr K.S. Iyer
Executive Director -
Paediatric Cardiac Surgery
Fortis Escorts Heart Institute,
Okhla, New Delhi

Abnormalities of ventriculo-arterial connection are one of the features producing so-called complex congenital heart diseases. From a surgical stance, these abnormal connections fall into three reasonably well-defined groups, the first group is made up of discordant connections, or transposition, where the arterial trunks arise from morphologically inappropriate ventricles. The second group is characterized by double outlet from the right ventricle, where more than half (or three-quarters for some) of both arterial roots are supported by the morphologically right ventricle. The third group is very much rarer, being found when the morphologically left ventricle supports the majority of both roots – the double outlet left ventricle.

There is then a less recognized situation wherein the inter-ventricular communication is located such that both arterial roots override the crest of the inter-ventricular septum in equal measure, producing the arrangement of both the ventricles seemingly connected in equal fashion to both arterial trunks. The term Double Outlet Both Ventricles (DOBV), which aptly describes this condition, was first used by Brandt et al in 1976. To the best of our knowledge, no further clinical or surgical description of this entity has been published. When found, preoperative identification is important, as it has relevance to the surgical technique required to achieve a satisfactory biventricular repair. We describe seven patients of Double Outlet of Both Ventricles presenting with similar anatomical findings, but in varied fashion. We achieved successful intra-cardiac surgical repair in six while one patient was lost to follow-up after diagnosis. We present a two-patch technique for the correction of this defect, which we feel is the optimal strategy for repair. We believe that this is the first large detailed case series that explores the clinical aspects, implications for surgery and post-operative management of this unusual entity. We also recommend that this entity be incorporated into the classification of disorders of ventriculo-arterial connections.

Atrial Pace on PVC Algorithm Inducing Ventricular Fibrillation

Dr Rajat Gupta
Consultant - Pediatric Cardiology
Fortis Hospital, Mohali

Case

We present a case of a 4-year-old boy from Yemen, who was suspected to have congenital heart disease in view of presence of a heart murmur and low weight for age. Echocardiography and CT angiography showed a large coronary arteriovenous fistula from the left main coronary artery to the coronary sinus. All the four cardiac chambers were dilated.

Plug/device occlusion of this fistula was planned and the same was done under monitored sedation. Angiography showed a large fistulous tract from the left main coronary artery to coronary sinus. This was then closed with an Amplatzer vascular plug 8.0 mm. Angiography after plug occlusion showed no residual shunt. The child was discharged two days after the procedure.

Discussion

Coronary fistulae are rare anomalous communications from one or more coronary arteries to a cardiac chamber or a great vessel. These are called coronary cameral fistula when the fistula terminates in cardiac chamber and coronary arteriovenous fistula when it terminates into a venous structure. This anomaly more frequently arises from the right coronary artery (55%) but can arise from left coronary artery (35%) or bilaterally (5%). Drainage site of these fistulae in decreasing order of frequency are the right ventricle, the right atrium, the pulmonary artery, the left atrium and the left ventricle.

The pathophysiology of coronary cameral fistulae depends upon the size and site of termination. Small fistulae are usually asymptomatic and are detected incidentally while large fistulae may lead to heart failure, growth retardation and all the features of left to right shunt. Coronary fistulae can also cause disturbance in coronary hemodynamics by producing a coronary steal phenomenon.

Current guidelines recommend intervening on all the large fistulae and small to medium fistulae if they are symptomatic. Treatment options for coronary artery fistula include surgery or catheter intervention. Catheter closure of these fistulae is now considered to be effective and safe alternative to surgery. Treated patients need long-term antiplatelet or anticoagulation depending upon the size and morphology of the fistula.

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2. Siobhan B, Lalith S, Carly J et al. Coronary Cameral Fistula. Circulation: Cardiovascular Imaging.2019; 12:e008691.

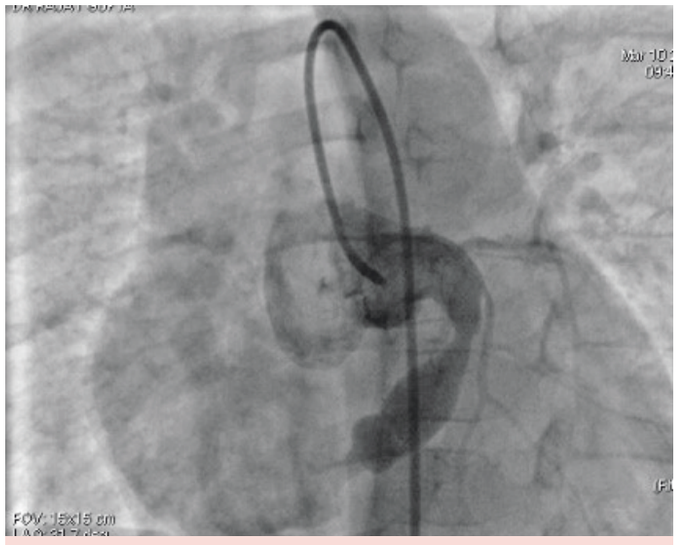

Figure 1: Coronary angiogram in LAO angulation showing large fistula from left main coronary artery to coronary sinus. Left anterior descending coronary artery and circumflex artery are normal

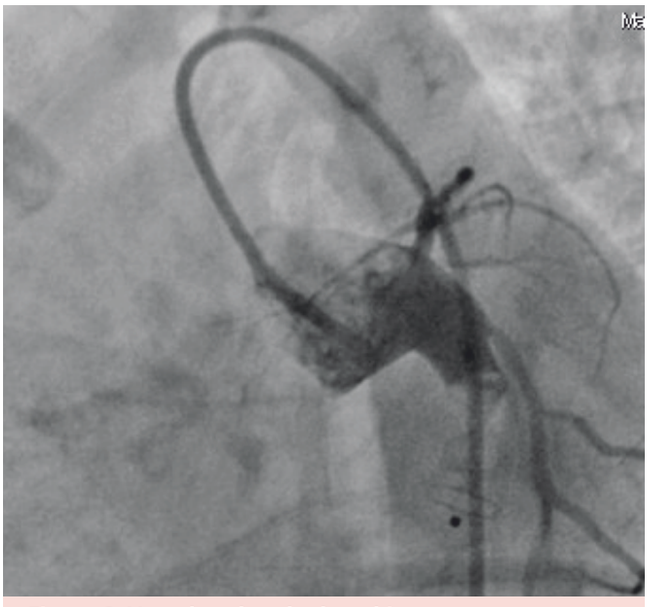

Figure 2: Vascular plug deployed in coronary arteriovenous fistula

Left Main Coronary Interventions in Pediatric and Adolescent Patients

Dr Hasmukh Ravat
Director - Cardiology
Fortis Hospital, Mulund, Mumbai

Percutaneous coronary intervention (PCI) is commonly used in adult patients with coronary artery disease, but data on PCI in children and adolescents remain limited. Herein, we describe our experience with the use of PCI in the three pediatric and adolescent left main coronary artery disease patients (LMCA). Each of these cases is unique and first of its kind.

Case 1

This is the first case in literature as youngest to receive coronary angioplasty for atherosclerotic CAD. Youngest to receive LMCA angioplasty. Youngest to receive bioresorbable stent at LMCA.

Anine year-old girl (weight 24 kg., BSA 0.9 m2), presented to our pediatric cardiac clinic with 3 months history of exertional angina and dyspnea (NYHA class II–III). Her family history was significant as her elder sister had similar complaints and expired undiagnosed at the age of five years. On physical examination, multiple xanthomas of varying size (1 mm–40 mm) were observed. An electrocardiogram revealed mild elevation of ST segment in lead avR with ST segment depression in the anterior leads. Her 2D Echo showed anterior wall hypokinesia with ejection fraction of 40-45 %. The fasting lipid profile revealed total cholesterol of 23.19 mmol/L (897 mg/dL), low density lipoprotein (LDL) of 15.12 mmol/L (585 mg/dL), triglyceride of 5.18 mmol/L (459 mg/dL), and elevated apo-lipoprotein. Her blood tests for renal, liver, and thyroid function were normal.

Considering the lipid profile suggestive of Familial Hypercholesterolemia, premature atherosclerosis was possible. Patient was put on regular anginal medicines and dual antiplatelets, The CT Coronary angiogram was performed which revealed stenosis of 90 % severity of mid Left Main Coronary artery disease. (Figure1)

A coronary angiogram was performed under deep sedation and local anesthesia. A sub selective angiography of the left coronary artery (LCA) catheter was performed which showed mid LMCA 90% stenosis and mild LCx disease. The gold standard for LMCA stenosis is coronary artery bypass surgery but this was ruled out, considering the age of the patient, just nine years old! There were lot of practical difficulty in doing angioplasty in a nine- year old child. By chance if she collapses, it was impossible to put in an IABP. In spite of so many hurdles and difficulty, coronary angioplasty to LMCA in the nine-year old child was performed successfully (Figure 2 & 3).

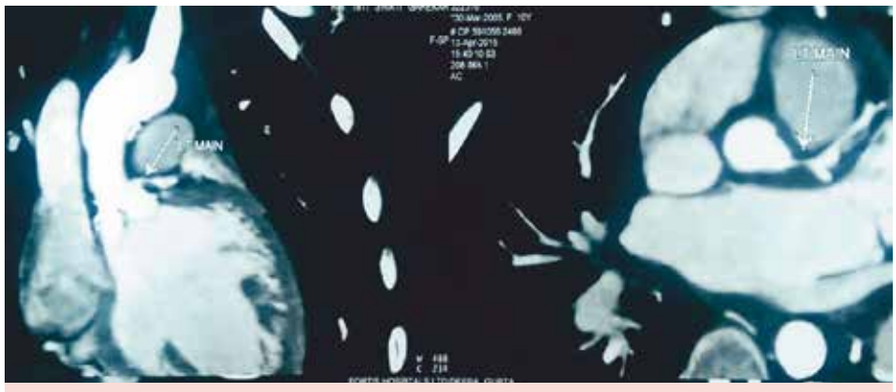

Figure1: CT coronary angiogram showed stenosis of 90% severity of mid Left Main Coronary artery disease

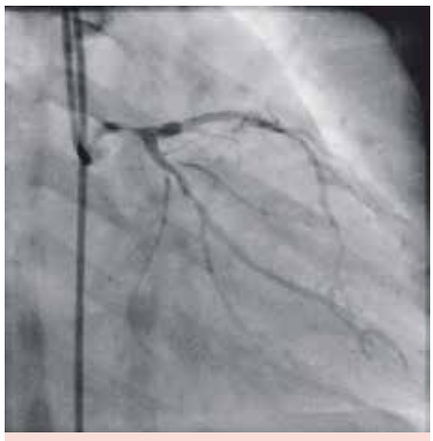

Figure 2: Non-selective Left coronary angiogram showing mid LMCA 90% stenosis and mid LCx disease

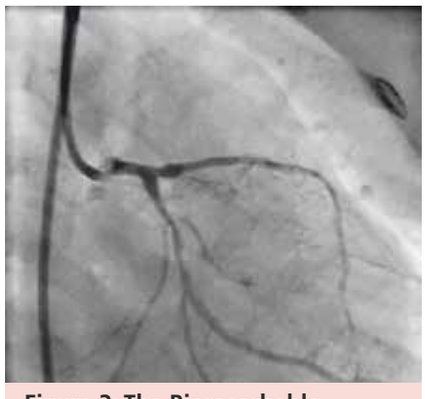

Figure 3: The Bioresorbable vascular scaffold (stent) 3.0x12mm was prepared and deployed to the LMCA just before the bifurcation and covering LMCA ostium

Case 2

A 13year old boy was suffering from dilated cardiomyopathy with a very low ejection fraction. He had a history of repeated hospitalization and was admitted in a critical state of cardiac failure with shock. He was put on a LV support device and the plan was to do a heart transplant. In spite of a long wait, no suitable donor heart was available. Ultimately, one elderly donor of a road accident became available. As the child's condition was deteriorating, after discussing with the relatives and proper consent, the elderly gentlemen's heart was transplanted.

The child did well for one year but then he started developing breathlessness. His non-invasive tests revealed LMCA ostial/proximal significant 80% lesion. He started developing ischemic LV dysfunction.

The challenge was to treat a 13year old boy for CAD in a transplanted heart. We performed an Intra Vascular Ultra Sound guided ostial/Proximal LMCA angioplasty with drug eluting stent successfully. (Figure 4 & 5)

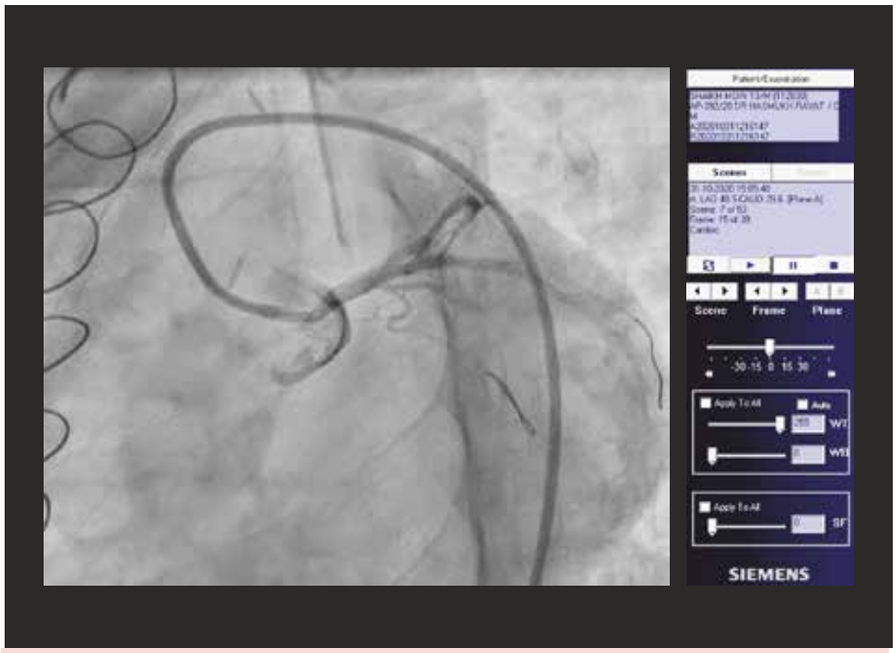

Figure 4: Left Coronary Angiogram in post heart Transplant Patient showing ostial/proximal LMCA lesion of 80%

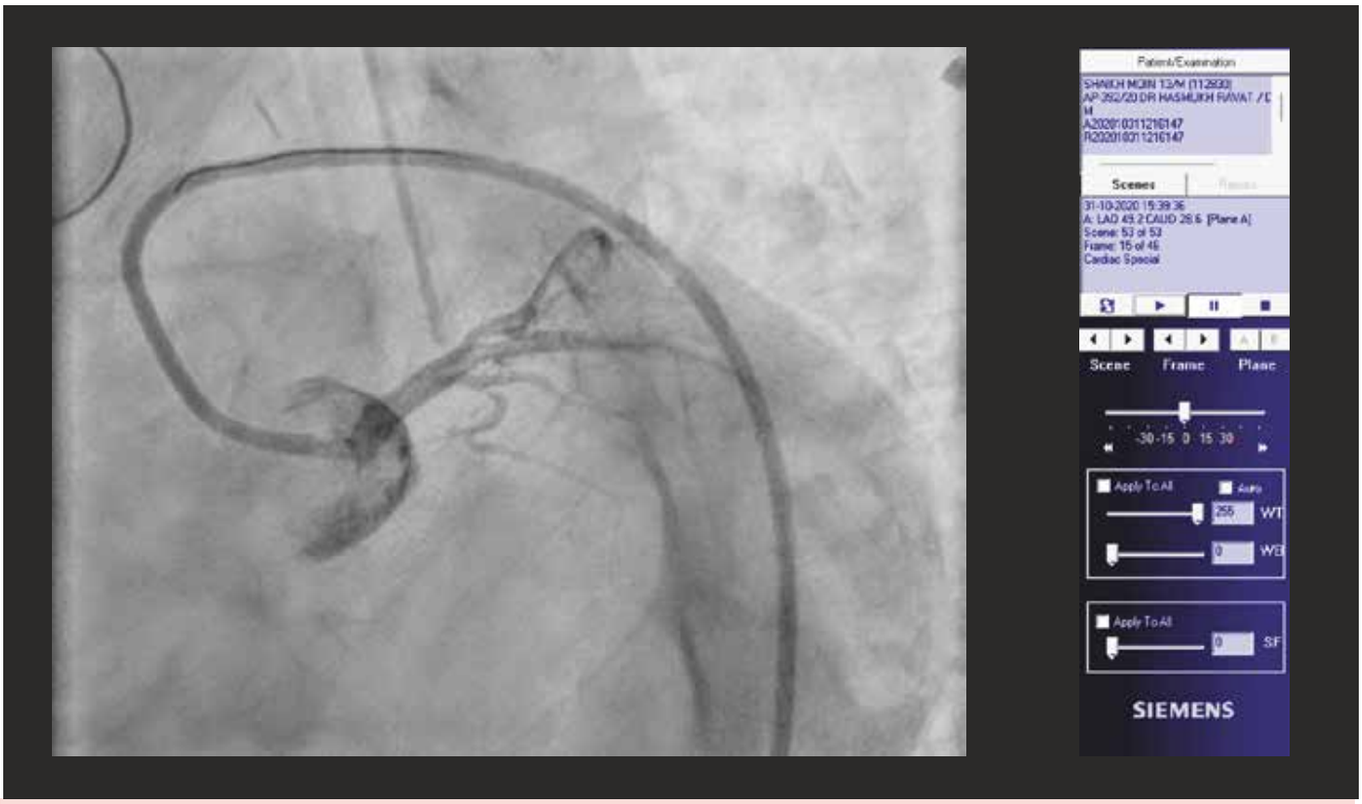

Figure 5: Left coronary angiogram in post heart transplant patient after ostial/proximal angioplasty/stenting

Case 3

A 19year old female, had sudden onset chest pain with a syncopal episode while at college. She was a known case of single ventricle; Fontan procedure done at the age of 4 years. She was asymptomatic till date but had stopped anticoagulants. She was conscious, afebrile with PR-126; BP-80/60 mm Hg; RR-20/min. Saturation was 80%. On admission ECG was as follows.

The ECG was suggestive of infero-posterior myocardial infarction (Figure 6). However, in a single ventricle (Double Inlet Left Ventricle - DILV) anatomy with absent septum, it could be misleading. She was taken for coronary angiography, which itself was difficult because of lack of clarity in anatomy. The CAG was performed which revealed LMCA totally occluded with thrombus.

Aspiration of thrombus LMCA to LAD artery and LMCA-LCx artery was performed with good result. (Figure 7 & 8) Unfortunately, because of the complications and the underlying heart condition of single ventricle, she could not make it. She was given the option of heart transplant which was refused by the relatives.

Conclusion

PCI in children and adolescents can be utilized to improve coronary blood flow in a variety of special clinical situations. There are multiple challenges in performing coronary interventions in the paediatric age group. The size of vascular access, choice of hardware, administration of immediate and long-term antiplatelet therapy are some of the core issues which needs further clarification. Close angiographic follow-up is critical as these patients are at risk for in-stent restenosis. To tackle the CAD in new subsets of patients like those with heart transplants and adult congenital heart disease is a challenge.

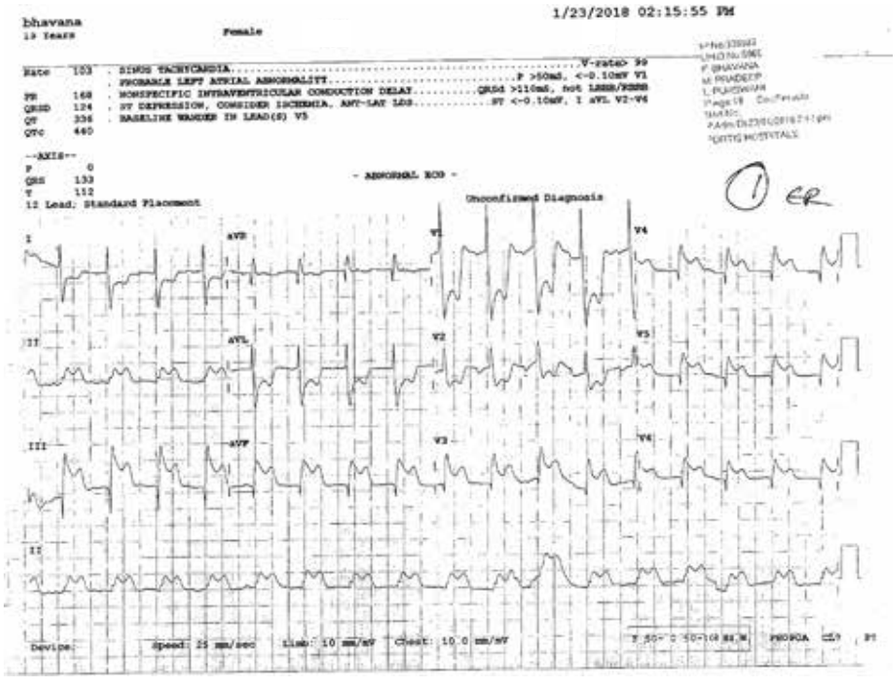

Figure 6: ECG was suggestive of Infero-posterior myocardial infarction

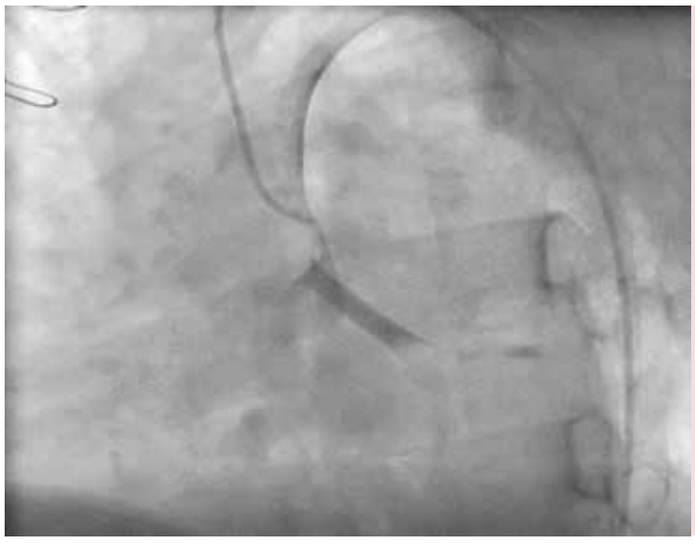

Figure 7: Nonselective coronary angiogram showing LMCA totally occlude with thrombus

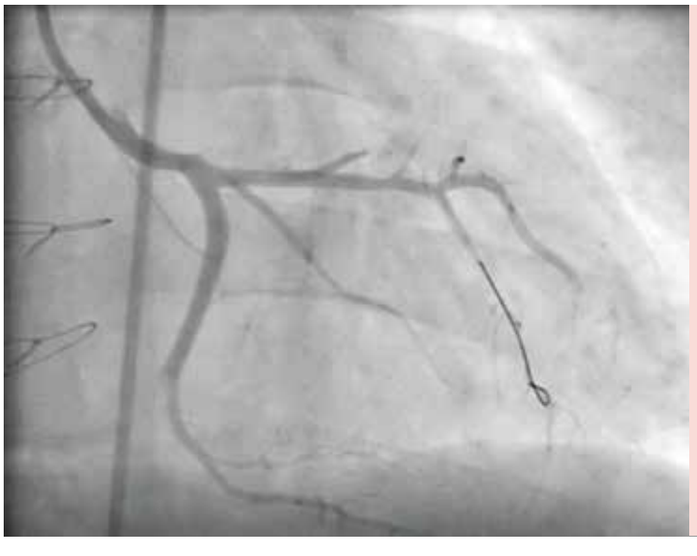

Figure 8: LCA angioplasty after LMCA-LAD and LMCA-LCx artery thrombus aspiration

Issue: 6 | September 2022

Imaging Guided Hybrid Coronary Angioplasty (Using Bioabsorbable Stent & Non-Bioabsorbable Stent) In A Middle-Aged Patient with Ischemic Heart Disease

Dr Amit Singhal
Senior Consultant - Cardiology
Fortis Escorts Hospital, Jaipur

Abstract

Ischemic heart disease is the leading cause of death worldwide. Coronary angioplasty & stenting have revolutionized the management of ischemic heart disease in the last few decades. However, in-stent restenosis (ISR) & loss of endovascular (auto-regulatory) properties of stented vessel due to metal cage (stent) lead to efforts to invent self-absorbable stents which dissolve completely over a period of time, after restoring vessel patency and thus leaving the vessel in native form with restored endovascular properties. Herein, I am describing a case of a middle-aged patient with ischemic heart disease (unstable angina) who underwent coronary angioplasty of the left circumflex coronary artery with a bioabsorbable drug eluting stent under Optical Coherence Tomography (OCT) guidance & stenting of the posterior descending artery (PDA) with non-bioabsorbable drug eluting stent in the same sitting. This hybrid stenting strategy using different types of stents, depending upon lesion anatomy and offering advantages of bioabsorbable stent to patients with suitable lesions, especially young & middle-aged patients can improve the patient outcomes in the long run.

Key Words

Coronary Angioplasty, Bioabsorbable Stents, Non-Bioabsorbable Stents, Optical Coherance Tomography (OCT)

Introduction

Coronary interventions have gone through several milestones since the introduction of coronary angioplasty by Andreas Gruntzig in 1977.Drug eluting Stents[1] were first introduced in 2002.Due to the limitations of drug eluting stents like ISR & loss of vascular properties of stented vessel, the first bioabsorbable stents[2] were introduced in 2012,with the optimism of restoring endovascular properties of stented vessel after dissolution of stent over a period of time, after restoring vessel patency. However due to the thicker strut size, a higher incidence of late stent thrombosis was encountered and interest in these stents [5] waned. Recently, the second generation bioabsorbable stents have been launched with better safety profile & thinner strut size. These stents have overcome major limitations of the first generation bioabsorbable stents and have documented encouraging results in studies so far [3,4]. These bioabsorbable stents spontaneously dissolve after deployment in the vessel over a period of one to two years after providing patency and restored lumen in the atherosclerotic vessel. This helps the restoration of the endovascular flow auto-regulatory properties of the vessel after disappearing and uncaging the vessel from the stent cage. Not all lesions are suitable for deploying bioabsorbable stents due to thicker strut size & lesser flexibility, issues of trackability etc. of these stents. Therefore, stenting suitable lesions with bio-absorbable stents & non-suitable lesions with non-bio-absorbable drug eluting stents should be the strategy. Using combinations of bio-absorbable & non-bio-absorbable stents in the same patient, based on lesion morphology helps in implanting minimum amount of metal in the coronary arteries and thus helps in restoring the endovascular properties in the larger coronary tree over a period of time. The present case report is one such case where two different stents (bio absorbable & non-bio absorbable) were deployed in a middle-aged patient with IHD-unstable angina, as dictated by the lesions, in the same sitting, under OCT, guidance with good final results. Such hybrid stenting cases are now coming into the lime light and should be accepted & encouraged, in the interest of the patients.

Case History

47 year- old Patient presented with complaints of chest pain (crescendo symptoms) along with uneasiness & sweating since last two days. The Patient was hypertensive & diabetic. Recent CTMT was positive for inducible ischemia. ECG revealed non-specific ST-T changes, the Troponin-T was in the normal range. There was no RWMA on 2D Echocardiography. After giving loading doses (Aspirin, Ticagrelor, Rosuvastatin), the patient was taken for coronary angiography. The CAG revealed 95% discrete tubular stenosis in the LCX (Figure 1) after Major OM branch & 85% discrete tubular stenosis in the PDA (Figure 2) In view of suitable vessel anatomy & vessel diameter of 3 mm, after proper

bed preparation, 3x29 mm Bio-Absorbable DES was implanted in the LCX (Figure 3), followed by post dilatation with 3.5 mm NC balloon. OCT imaging was performed & proper stent deployment was confirmed (Figure 4). Another lesion in the PDA was 2.5 mm in diameter, the proximal vessel was tortuous and the smallest available bio absorbable stent was of 2.75 mm in diameter. Therefore, a non-bio absorbable stent of 2.5x18 mm was deployed successfully in the PDA (Figure 5). The patient remained stable thereafter and was discharged the next day.

Discussion

The second-generation bio absorbable stents have overcome limitations of the first-generation bio absorbable stents like late stent thrombosis which were primarily due to thicker strut size of the first generation bioabsorbable stents [3,4,5]. Recent research data has also documented safety & efficacy of second generation bioabsorbable stents [3,4]. Given the advantages of these stents like dissolution over a period of time & thus uncaging vessel & restoring auto-regulatory properties of vessel, these stents should be utilized in suitable anatomy lesions, especially in young & middle-aged patients. In patients with lesions of different coronary anatomy, using combinations of bio absorbable & non -bioabsorbable stents (hybrid stenting) should be explored so that minimum metal is deployed in the coronary bed and more and more coronary tree can be restored to normalcy after dissolution of the bio absorbable stent.

Summary

Using combinations of different types of available stents, depending upon lesion anatomy & morphology, with emphasis on second generation bioabsorbable stents, especially in light of available safety & efficacy data, should be encouraged to provide optimum benefits to the patients in the long run. Imaging modalities like OCT should be used more often in coronary interventions for lesion assessment and to ensure optimum stent deployment.

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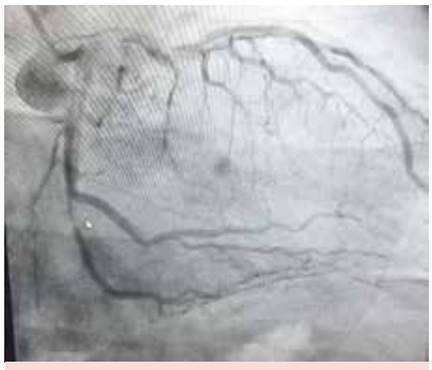


Figure 1: Pre PTCA LCX

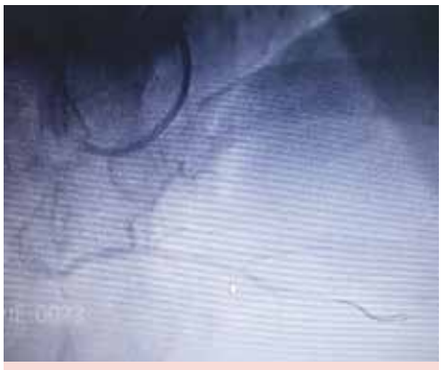


Figure 2: Pre PTCA PDA

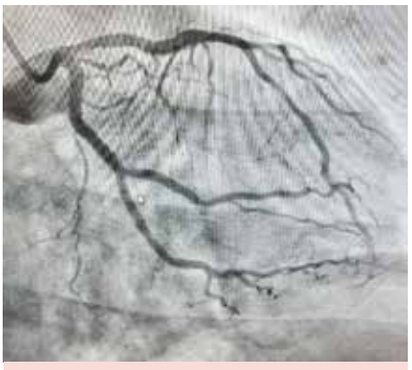


Figure 3: Post PTCA LCX

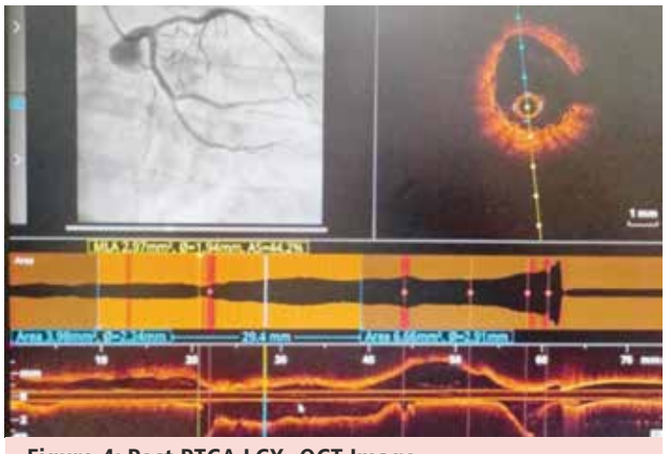


Figure 4: Post PTCA LCX- OCT Image

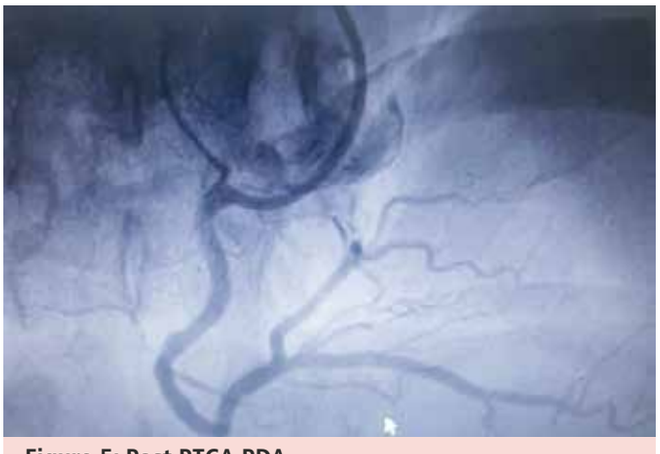


Figure 5: Post PTCA PDA

Snaring Victory from the Jaws of Defeat

Source:- J Am Coll Cardiol Case Rep. 2022 Aug, 4 (15) 987–989

Dr Hiteshi K C Chauhan
Associate Consultant - Critical Care
Fortis Hospital, Mohali

Moses Mathur , Chad J. Zack , Hiteshi K.C. Chauhan

Case Report: Clinical Case: Percutaneous Ventricular Assist Device Fracture in the Right Ventricle and its Retrieval

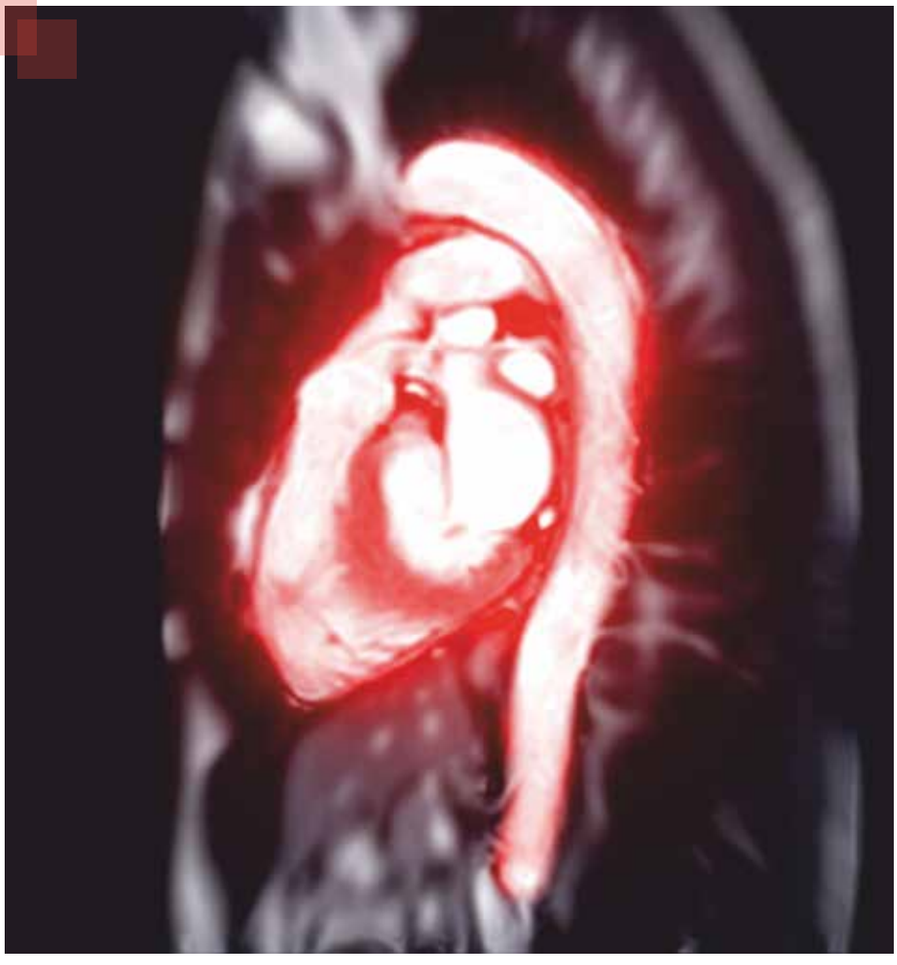
In this issue of JACC: Case Reports, Alhasan et al describe their management of a patient with submassive bilateral pulmonary embolism (PE) using catheter-directed thrombolysis. Unfortunately, the patient then experienced progress to right ventricular (RV) failure and cardiogenic shock, prompting escalation to RV mechanical circulatory support (MCS) with the Impella RP device (Abiomed).

Recognition of acute RV failure is important because it is a major determinant of clinical severity and outcomes. The use of MCS devices can make a critical impact in such scenarios and is recommended as a final rescue step in current PE rescue team (PERT) treatment algorithms. Common percutaneously delivered RV MCS options currently include extracorporeal membrane oxygenation, the micro-axial flow pump–based Impella RP catheter, and double lumen single-cannula based devices such as the ProtekDuo (LivaNova) and the Spectrum Medical dual-lumen cannula (Spectrum Medical).

In the choice between these options, attention should be paid to differences in approved indications, implantation durations, and device-specific technical nuances.

Ideally, considerations surrounding access size and approach (eg, femoral vs internal jugular), location(s) of concomitant thrombus burden, and ability to oxygenate through the circuit should also be carefully weighed. More realistically, however, the choice of MCS is often dictated by institutional availability and operator expertise.

Advancements over recent years have brought forth the advent and maturation of specialist teams such as PERT and shock teams. But, as highlighted here, cross-team training is just as important as cross team collaboration. With the growing technical complexities of our field, it is likely that each of us will occasionally find ourselves in uncharted territory, where improvising on a borrowed trick may become necessary. It is in these situations that personal creativity, intuition, and fortitude form the difference between success and failure. Much is said about the "art of medicine." Cases like these exemplify what that looks like in real-life practice.



Eroding Pseudo Aneurysm of Ascending Aorta - Case Report

Dr Satish Javali
Senior Consultant -
Cardiothoracic Vascular Surgery
Fortis Hospital, Mulund, Mumbai

A 22-year old female patient had undergone intra cardiac VSD (Ventricular Septal Defect) repair in 2016. She had upper sternal wound infection and was in the hospital for 3 weeks after the surgery. Recently she presented with a palpable pulsating mass in the upper part of the chest. A CT scan revealed a large mass (pseudoaneurysm) arising from the ascending aorta 2 cm above the aortic valve and extending into the right hemithorax measuring 12cm x 10cm in size. It had also eroded through the sternal bone and was palpable just below the skin & subcutaneous tissue.

Repair of the pseudoaneurysm with a redo stenotomy and sternal reconstruction with the pectoralis major myocutaneous (PMMC) flap was planned.

Anticipating difficulty in performing a redo sternotomy, a 8mm graft was sutured to the right axillary artery and cannulated with a 22 Fr arterial cannula, the right femoral vein was cannulated with a 25 Fr venous ECMO cannula and bypass was commenced. The temperature was kept at 37 degrees. Redo sternotomy was done. The upper manubrium and lower sternum were divided and the pseudoaneurysm dissected to open the sternum. After brief dissection of the right ventricle to access the right superior pulmonary vein to vent the LV (failed due to dense adhesions) it was decided to dissect around the ascending aorta so as to get space to cross clamp the aorta above the pseudoaneurysm. At this stage the pseudoaneurysm ruptured and even on bypass it was difficult to maintain the blood pressure.

Attempt to close the sternum or close the aortic rent with finger failed. A 14 Fr Foley catheter was inserted and inflated. The balloon gave control over the bleeding and allowed continuation of the bypass. Cooling of the patient was initiated to achieve circulatory arrest. When the temperature decreased to 32 degrees, the heart fibrullated. Both, the attempts to shock with the external defibrillator and pacing with the RV pacing wire failed. On TEE LV looked non-distended but with lot of stasis (seen on ECHO). The Foley's balloon was actually obstructing the whole ascending aorta. Cardioplegia was attempted through the' Foley's as it was acting like an ascending aortic clamp. Del neido cardioplegia was given through the catheter channel of Foley and the heart arrested.

The patient was cooled to 20 degrees and TCA achieved. On TCA, the Foley's was removed and the, defect in the ascending aorta was assessed. The coronary ostia and aortic valve were examined. Bovine pericardial patch was used to close the ascending aortic defect. (TCA time was -13 min; a) cannula was inserted in the distal ascending aorta for LV venting. Circulation was restarted. Patient was warmed and weaned off successful. Clots and necrotic material were removed from the remaining cavity of the pseudoaneurysm.

Sternum was sutured back together with steel wires and defects in the sternum closed with subcutaneous sutures. The patient was shifted to the ICU in stable condition and the patient was extubated the next day morning.

With meticulous planning, involvement of the whole team- the anaesthesiologists, the perfusionists nurses and assistants along with smooth execution of circulatory arrest and sheer luck, we could achieve a good result. The patient was discharged home on POD7.

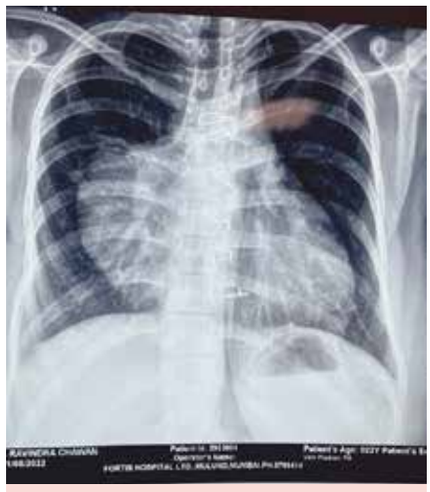


Figure 1: Preop XRay Chest

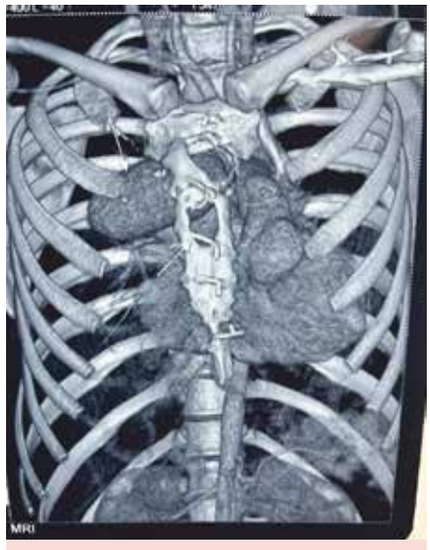


Figure 2: Preop CT Scan showing the defects in sternum

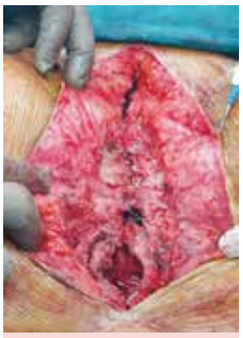


Figure 3: Sternum approximated with defects in the manubrium and sternum

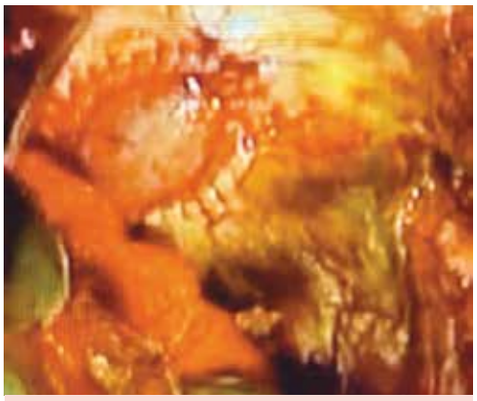


Figure 4: Introp photo of closed defect in ascending aorta

Figure 5: Clots and necrotic material removed from the sac of pseudoaneurysm

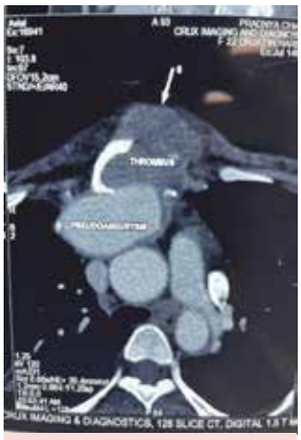


Figure 6: Preop CT scan

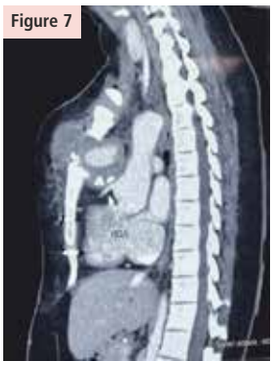


Figure 7

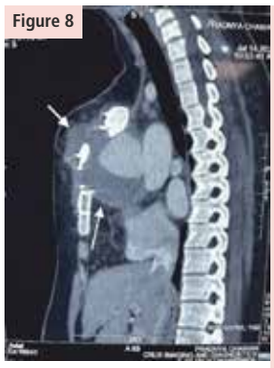


Figure 8

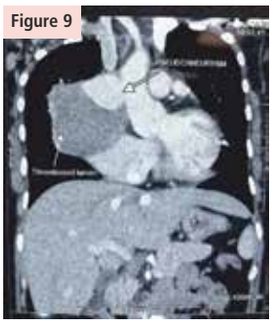


Figure 9

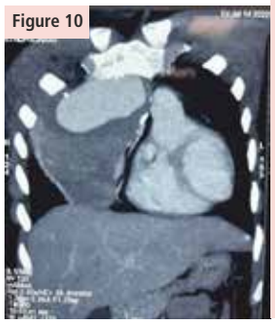


Figure 10

Figure 7,8,9,10: Preop CT scan showing origin and extent of pseudoaneurysm, eroding thro' the sternum

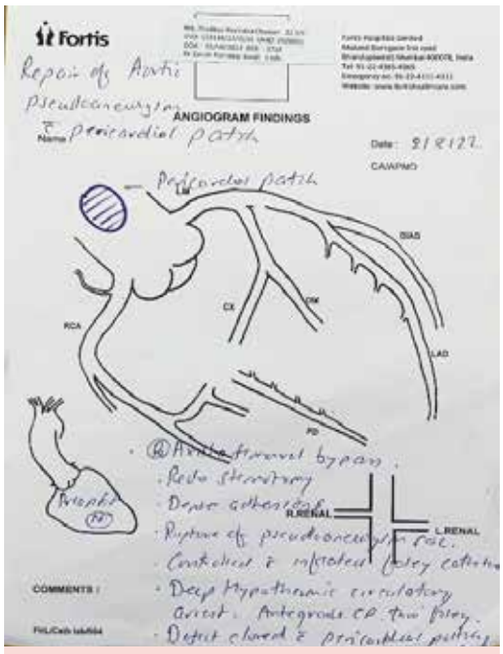


Figure 12: Operative details

Figure 11

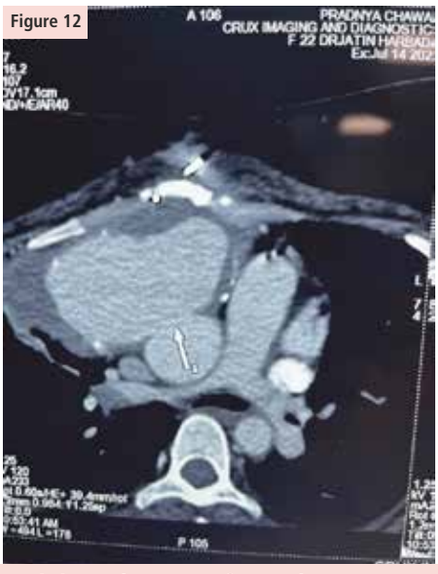


Figure 12

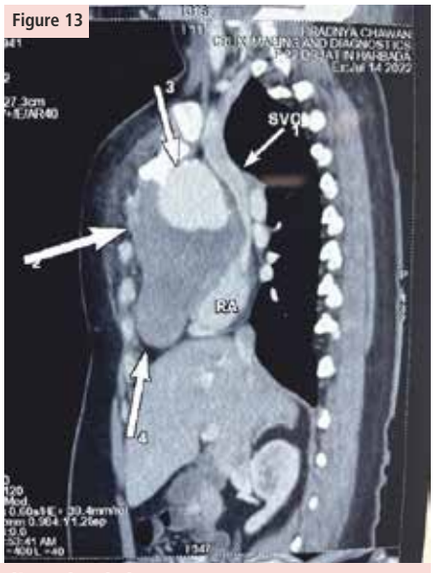


Figure 13

Figure 11, 13, 14: Preop CT scan showing origin and extent of pseudoaneurysm, eroding thro' the sternum

Challenging Case of Extensive Intramural Hematoma: Exhausting Journey of Successful Management

Dr Ashwani Kumar Sharma
Consultant - Cardiology
Fortis Escorts Hospital, Jaipur

Mrs S D, 56- year- old lady without other co- morbidities was admitted in the emergency with severe angina pectoris associated with perspiration. Her ECG revealed ST segment elevation in the inferior leads (III > aVf > II). 2 D echocardiography revealed moderate hypokinesia in the basal-mid anterolateral and inferolateral segments. With the diagnosis of acute coronary syndrome in the form of acute inferior ST- segment elevation myocardial infarction, she underwent coronary angiography (figure 1a, b) through right distal transradial access (snuff box approach). There was thrombotic 100% occlusion of the left circumflex coronary artery (LCx) 15 mm distal to the origin of high obtuse marginal (OM) branch with short left main coronary artery (LMCA). Primary percutaneous coronary angioplasty (PTCA) was started after informed consent. BMW wire was advanced with the support of corsair micro catheter, but this micro catheter could not be advanced across the lesion. Hence, focal serial pre-dilatation was performed with 1.5 mm, 2.0 mm and 2.5 mm balloons. Check angiogram revealed long spiral dissection just distal to that focal segment extending into mid segment of second OM along with smooth luminal narrowing extending into proximal non-dilated segment (figure 1c-d). To resolve the enigma intra vascular ultrasound (IVUS) and optical coherence tomography (OCT) imaging were performed which showed extensive intramural hematoma (IMH) encircling more than 270-degree arc in maximum dimensions with luminal collapse at places (figure 2 a-h). As the patient was pain free with electrical and hemodynamic stability along with so much extensive IMH without distal landing zone, stenting was deferred. The plan was to perform interval angiography after resorption of IMH and sealing of the dissection. She had exertional angina and dyspnea NYHA class III despite maximum goal directed medical treatment (GDMT).

Coronary angiography performed after 6 weeks had showed extensive spiral dissection extending into the mid segment of the second OM (figure 1e, f) so intervention was again deferred. She had to live poor quality of life with limited physical activity.

Coronary angiography was performed at an interval of 6 months and then there was discrete 99% stenosis at the corresponding segment with distal TIMI I flow. With the help of corsair micro catheter Runthrough NS could be advanced easily across the lesion, however, cineangiogram revealed its sub intimal course in spiral manner. Keeping it as landmark (parallel wire), Whisper ES, Pilot 50 and Gaia II were used successively but failed to cross. Ultimately Conquest pro 8-20 wire crossed the lesion and parked in distal second OM (figure 4a). Luminal course confirmed by selective contrast injection though distally advanced micro catheter followed by IVUS.

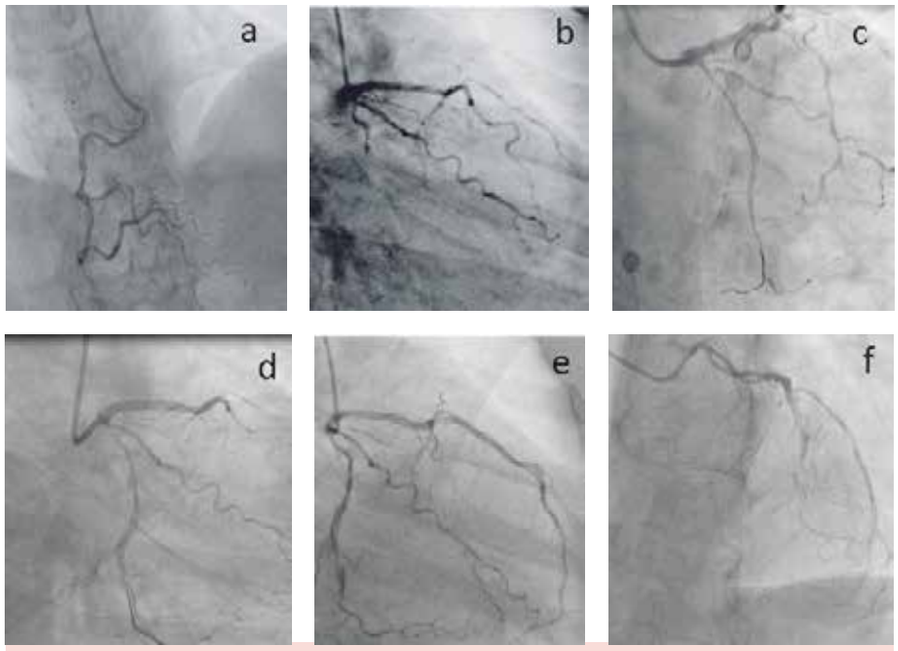


Figure 1: Angiogram performed in January 2022 revealed anomalous RCA with noncritical plaque (a), proximal thrombotic occlusion of LCx (b), smooth narrowing proximal to focal dilatation and distal long spiral dissection (c, d) Coronary angiography performed after 6 week revealed same extensive spiral dissection extending into second OM (e, f)

Sequential pre dilatation performed with 2.0, 2.5 and 3 mm balloons and DES 3 x 38 and 2.25 x 32 were deployed with adequate overlap. After proximal optimization (POT) to high OM with 3.5 mm balloon there was ostial pinching (figure 4b) which was successfully managed with kissing balloon inflation (3 and 2.5 mm in LCx and OM respectively) followed by rePOT with 3.75 mm balloon (figure 4c). After post dilatation TIMI III flow (figure 4d) and good results were achieved in IVUS run. Next day morning the very first exclamatory comment of the patient was that she had been feeling alright then.

IMH is a type of dissection where there is accumulation of blood in tunica media displacing internal elastic membrane inward and external elastic membrane outward. Most of the time it arises in eccentric lesions at the junction of healthy and unhealthy media. The most common location is distal to the lesion followed by proximal with least common being at the lesion site. There might be gradual absorption and resolution without intervention or progression causing various short (myocardial infarction, repeat revascularization) or long term complication (stent mal apposition). There might be gradual absorption and resolution without intervention or progression causing various short term (myocardial infarction, repeat revascularization) or long term complication (stent mal apposition). There is no common consensus for management of intramural hematoma. Focal hematomas causing poor distal flow or angina are usually first decompressed by micro fenestrations created with cutting or scoring balloon followed by relatively longer stent deployment.

The given case was truly complicated by extensive and voluminous IMH which was extending distally as well as proximally despite focal dilatation. In absence of distal landing zone further intervention was to be deferred for six months until sealing of dissection and resorption of hematoma.

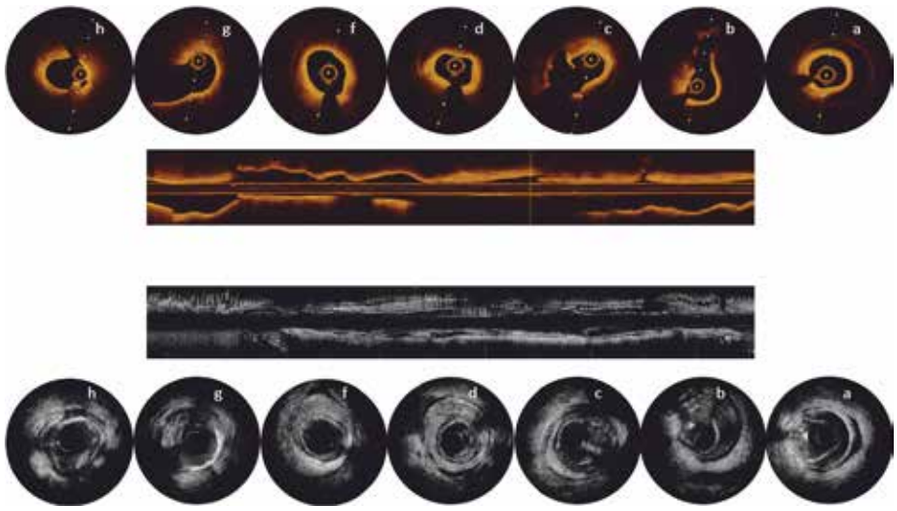


Figure 2: Imaging run from distal to proximal LCx (right to left) in OCT (upper panel) and IVUS (lower panel) showing IMH (10 to 6 o'clock in a), ostium of distal LCx from true lumen at 12 o'clock (b), entry point of IMH at 7 to 9 o'clock (c), IMH outside the diseased intima (d, e), origin of high OM (g) and diseased ostium of LCx (h)

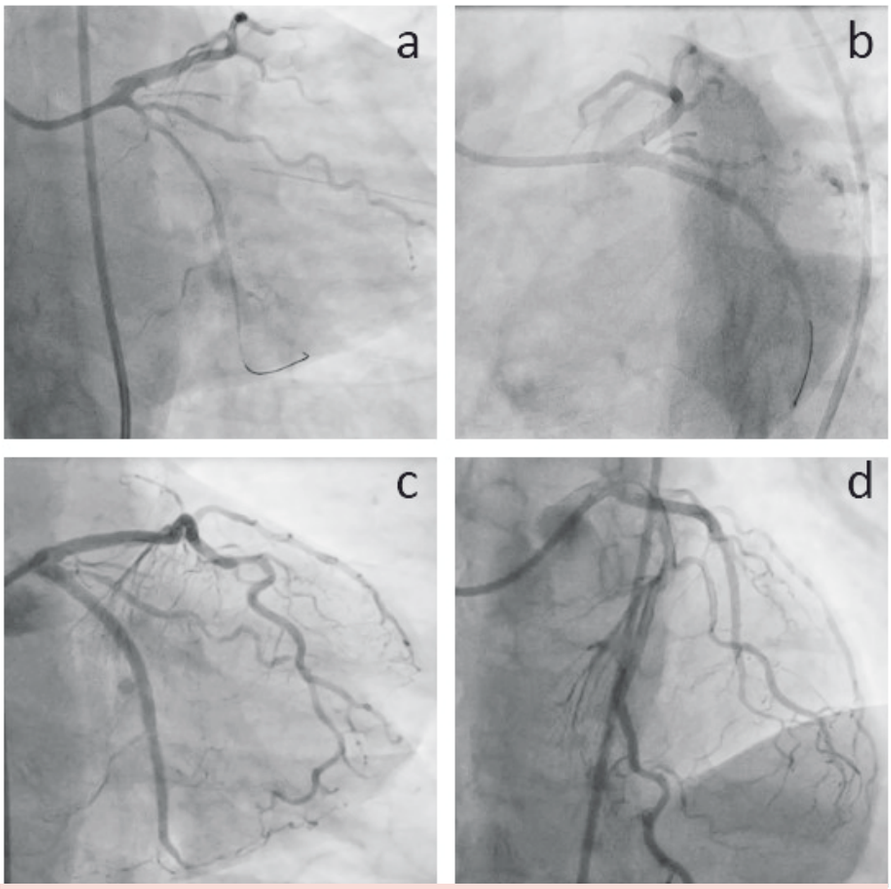


Figure 4: Work horse wire advanced was subintimal and finally conquest pro could enter distal lumen (a). There was ostial pinching of first OM after POT (b) which was managed with KBI with good angiographic outcomes (c,d)

An Anomalous Story of a Rare Percutaneous Intervention to Left Anterior Descending / Right Coronary Artery Bifurcation

Dr Amreen Dhindsa
Associate Consultant - Cardiology
Fortis Hospital, Mohali

Authors:
Harinder Kumar Bali, Sankalp Bharti

A single coronary artery arising from the left coronary sinus, with the right coronary artery arising from the left anterior descending artery, is an extremely rare coronary artery anomaly. Usually benign, it may result in ischemia by various mechanisms including atherosclerotic involvement of the vessels, rendering a critical area of myocardium at at risk. Percutaneous intervention in anomalous coronary arteries is particularly challenging. Use of nonstandard hardware may be required for adequate access and support. We describe a complex and rare percutaneous intervention to the left anterior descending and right coronary artery bifurcation in a 77-year-old patient with anomalous origin of the right coronary artery from mid-left anterior descending artery and Medina 1,1,1 disease at the bifurcation. The Left anterior descending artery (LAD)/Right coronary artery (RCA) bifurcation lesion was successfully treated using the mini-crush technique.

Reference

Bali, HK, Dhindsa, A, Bharti, S. An anomalous story of a rare percutaneous intervention to left anterior descending/right coronary artery bifurcation. Clin Case Rep. 2021; 9:e03764.

https://doi.org/10.1002/ccr3.3764

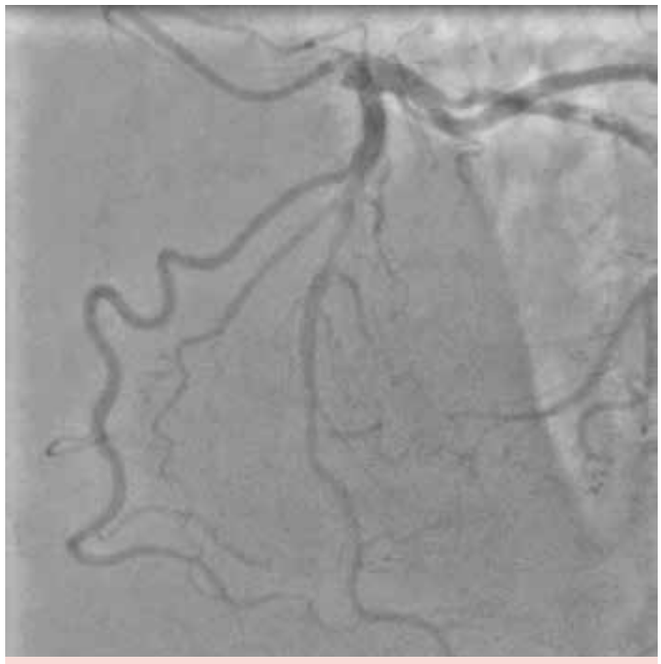


Figure 1: Left coronary angiogram showing a heavily calcific LAD with ostio-proximal patent LAD stent and diffuse 70%-80% stenosis in mid-LAD, a dominant RCA with anomalous origin from mid-LAD and ostial 90% stenosis (Medina 1,1,1 disease at the mid-LAD and anomalous RCA bifurcation)

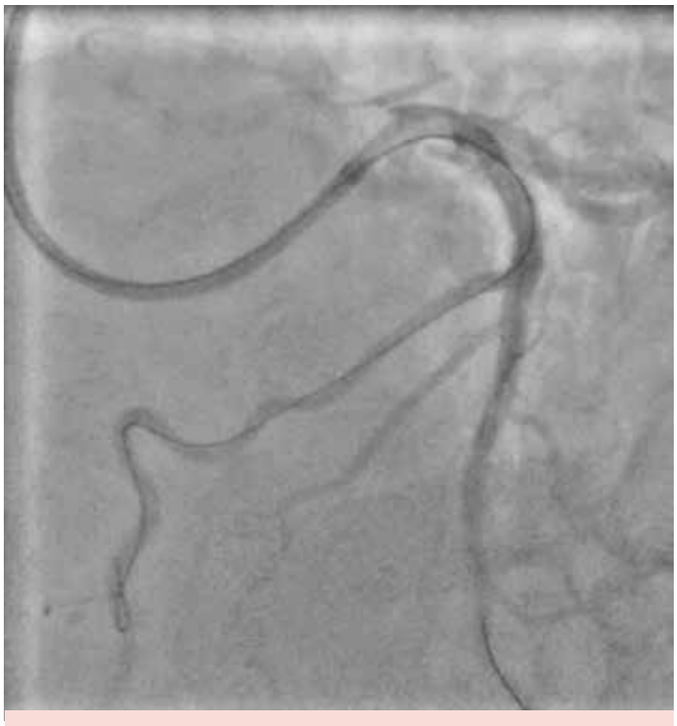


Figure 2: After complex percutaneous intervention, a satisfactory angiography results with TIMI three flow in both LAD and RCA seen with no residual stenosis and no dissection

Intra Vascular Lithotripsy Facilitated Transfemoral TAVR

Dr Ashok Seth
Chairman -
Fortis Escorts Heart Institute
Chairman - Fortis Medical Council
Chairperson -
Cardiology Specialty Council
President - Asian Pacific Society of Interventional Cardiology (APSIC)
Fortis Escorts Heart Institute,
Okhla, New Delhi

Co-Authors
Vijay Kumar, Vivudh Pratap Singh, Dhananjay Kumar, Vishal Rastogi

Abstract

Transcatheter aortic valve replacement (TAVR) is now the standard of therapy for elderly population with severe aortic stenosis. Several studies have established that the outcomes of TAVR are superior when compared with Surgical aortic valve replacement (SAVR), especially when the access route is transfemoral arterial approach. In the elderly population with advanced age and numerous comorbidities, iliofemoral arterial disease (IAD) is not uncommon and it precludes the use of this route for TAVR. Peripheral Intravascular lithotripsy (IVL) has been previously established as an excellent safe and efficient modality to treat symptomatic occlusive calcific iliofemoral artery disease. The same principle of IVL has been recently used successfully to modify the vascular compliance of heavily calcified iliofemoral arteries thereby enabling large bore sheath advancement and safe passage of TAVR delivery catheter systems. We report the first case of Intravascular lithotripsy facilitated Transfemoral TAVR (TF-TAVR) in India. This case was done in December 2020 by the "femoral route" in order to keep the TAVR procedure simple straightforward and discharge the patient back home quickly in Covid times. The use of Intravascular Lithotripsy (IVL)was based on evidence of good outcomes in trials of peripheral vascular disease of lower limbs as well as from the good outcomes of few registries on IVL facilitated TAVR.[1,2,3,4,5,6,8] The second case was done in August 2021 by us for another patient successfully.

A 76-year male patient who had severe aortic stenosis, low STS score was planned for TAVR. The pre TAVR - MSCT analysis of aortic root complex was without any challenges but the femoral -iliac arteries were unsuitable due to heavy calcification. The mean lumen diameter (MLD) was 3.6mm in the right external iliac and left external iliac artery had a MLD of 3.3mm (Figure 1). The length of the lesion was tightest focally but the calcium was present all along the segment from bifurcation of iliac up to the femoral head (Figure 1). The angle of calcification was 270-360 on both sides. It was thus a non-feasible access vessel for large bore sheath needed in TF-TAVR. Conventionally an alternative access is chosen in this anatomy, but the other option was to do a lithotripsy treatment of the femoro iliac artery by cracking the calcium and making the vessel accommodative and suitable for a larger sheath and then perform the transfemoral TAVR. In our case, the right side iliofemoral system was chosen for IVL treatment and then inserting the large bore sheath for TAVR was planned. Femoral arterial puncture was done above the femoral bifurcation using an ultrasound guidance identifying a calcium free segment in the anterior wall. A 7 French sheath was then inserted. 2 proglides were preplaced at 10' clock and 2' clock position. A 0.014" extra support coronary wire was used to cross and park in the ascending aorta. A shockwave balloon (6.5mm wide x 60mm long) (Shockwave Medical Inc, Santa Clara, California) (Figure 6) was prepared using a 50:50 saline-contrast and tracked over the wire across the lesion and then parked in the iliacs using the marker bands for alignment with the lesion (Figure 2). The balloon was inflated to 4mm and one cycle of 30 IVL pulse was given, the inflation was then done to 6 atm in order to achieve maximum lumen gain. The balloon was then deflated. Shockwave was administered in 30 pulses per cycle. The cycle was repeated along the length of iliac and femoral artery. The total dose given in the case was 270 pulse (Figure 2). The IVL balloon treatment was done all the way from the iliofemoral bifurcation level down to femoral artery (Figure 2). The vessel lumen appeared bigger as compared to the pre IVL treatment size. The shockwave catheter was then taken out and a stiff amplatz wire was exchanged for the 0.014 guide wire. The large bore 14 French TAVR sheath was then inserted. The standard stiff confida wire was then taken through the sheath and parked in Left ventricle. The EnVeo delivery catheter system was then tracked with gentle rotation and twisting over the confida wire (Figure 3). The 29mm Evolut R valve was tracked along the arch of aorta to the aortic root, positioned in the usual manner and implanted successfully (Figure 4). The delivery catheter system was then removed and the haemostasis of access vessel achieved with the 2 preplaced proglides. The check angiogram and Digital subtraction angiography (DSA) of the IVL modified femoral iliac artery showed no disruption, perforation, thrombus formation or any other complication of the access vessel (Figure 5). The patient was discharged the third day as any patient would be after a coronary intervention.

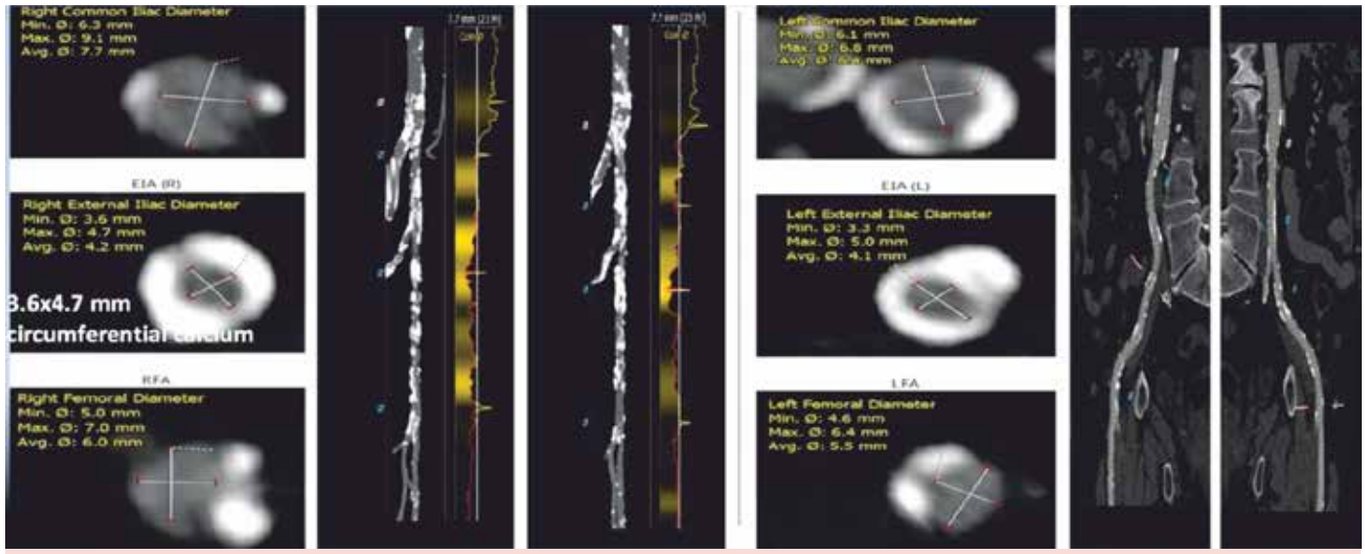


Figure 1: MSCT scan images iliofemoral artery system a) Severe stenosis of right external iliac artery (3.6 × 4.7mm); horseshoe calciumb b) Calcium over the femoro iliac systemic c) Left femoral artery stenosis: Circumferential 360 calcium, Calibre (3.3 × 4.1mm) d) Stretched view of both iliacs and femoral arteries

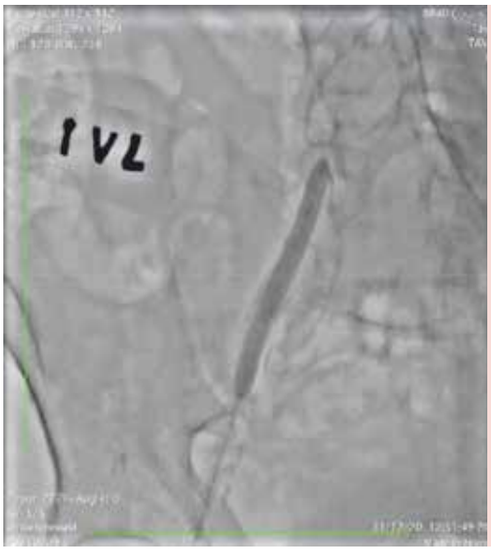


Figure 2: IVL with shockwave balloon 6.5 £ 60 mm and 270 pulses for treating stenotic ileo-femoral artery of right side

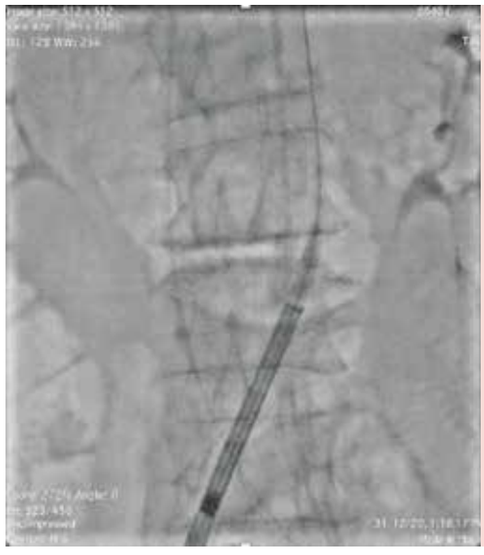


Figure 3: Gentle rotation and navigation of catheter delivery system

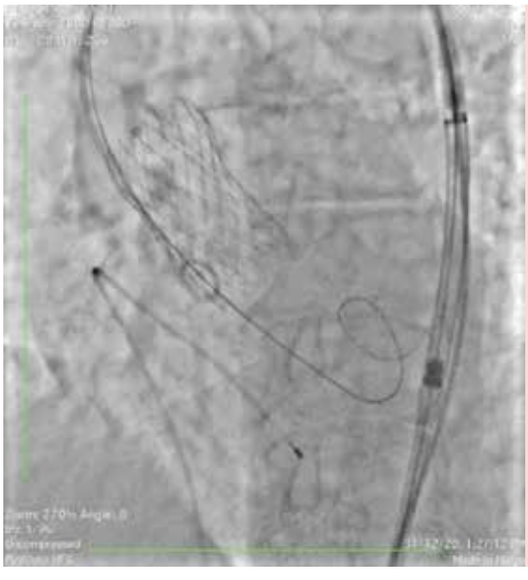


Figure 4: 26 mm Evolut R deployed successfully at aortic position

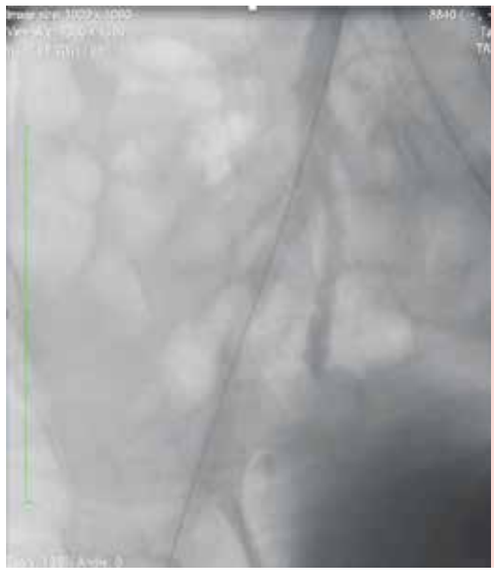


Figure 5: Final DSA of access Vessel post IVL and end of TAVR procedure shows no complication

Case 2 :

75 years lady with severe aortic stenosis, similarly, had a bilateral severely narrowed bilateral iliac arterial system making it unsuitable for TF -TAVR (Figure 7). The access vessel chosen here was right femoral artery. It was treated with IVL successfully using an IVL balloon 6.0 × 60 mm and 270 pulses were delivered at the target site following the same steps as described in the previous case (Figure 8). A 16 French sheath was introduced safely in the IVL treated vessel and the EnVeo Pro delivery catheter system was then successfully navigated through right femoral iliac artery system (Figure 9). Evolut Pro 23 mm valve was then implanted successfully (Figure 10). There was no complication in the IVL treated vessel (Figure 11) and the TAVR procedure was successfully completed by the transfemoral approach. Both the patients are doing well in their follow up till date and have no clinical or doppler evidence of occlusion of their IVL treated vessels.

Conclusion

Significant Calcific femoral iliac arterial system is not an uncommon challenge in patients planned for TAVR, there by resorting to alternate access approach. IVL is a great tool to address this prohibitive calcific iliofemoral artery anatomy and make it possible to be used as the access vessel for Transfemoral TAVR. Peripheral IVL appears to be safe and effective in patients with severe disease and has high success and low rates of complications. IVL facilitated TF-TAVR cuts down the need of alternate access and thereby helps preserving the established best outcomes of TAVR therapy.

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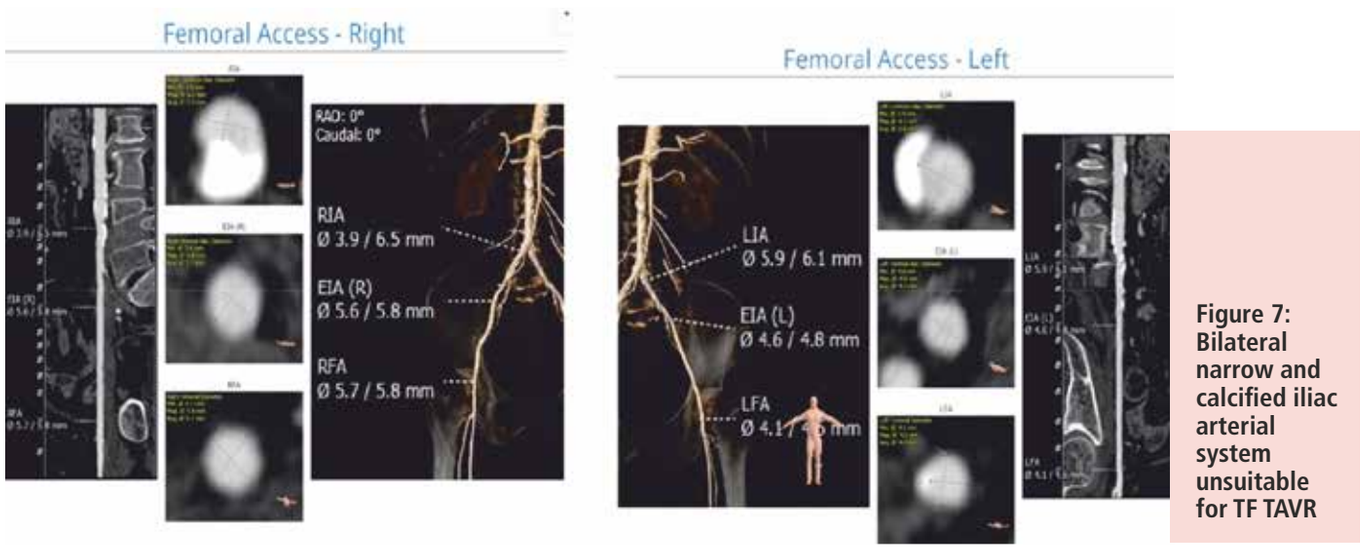


Figure 7: Bilateral narrow and calcified iliac arterial system unsuitable for TF TAVR

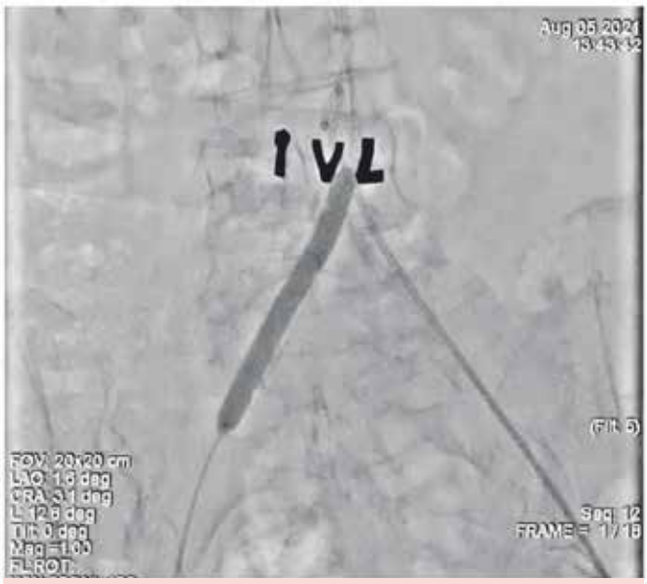


Figure 8: IVL treatment using 6.0 £ 60 mm IVL balloon, 270 pulses delivered

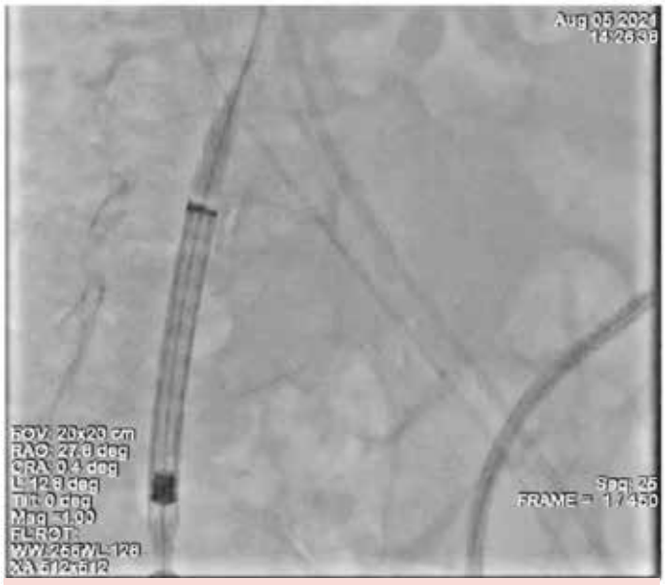


Figure 9: Navigation of the EnVeo Pro catheter delivery system

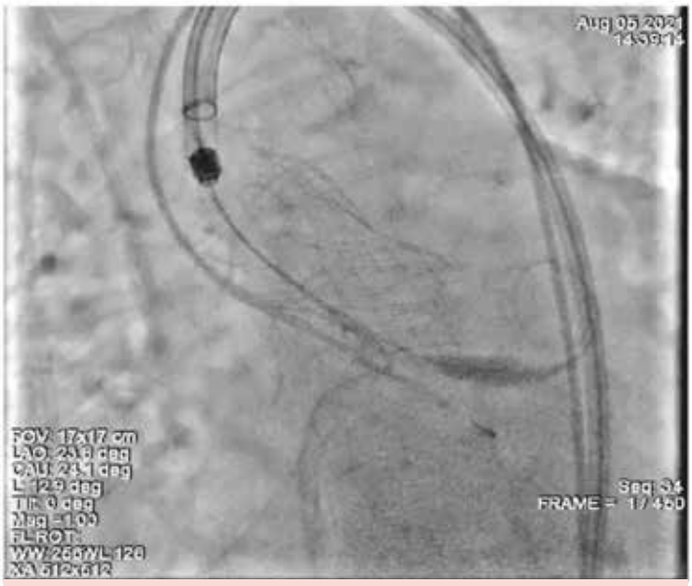


Figure 10: Successful deployment of Evolut Pro 29 mm valve in aortic position

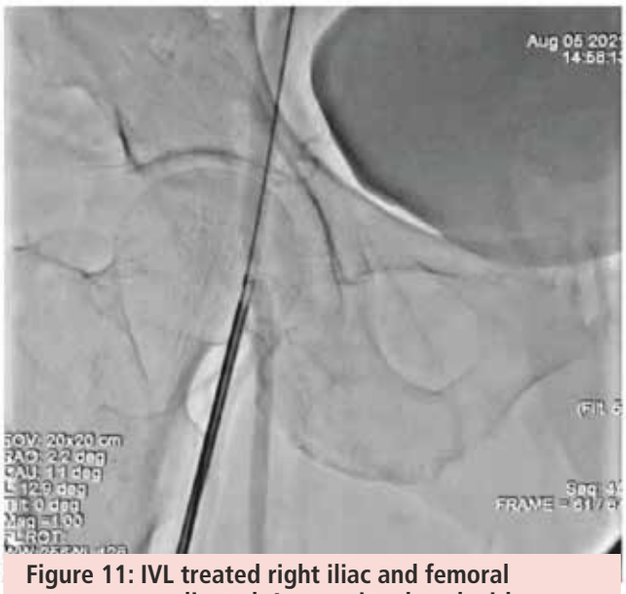
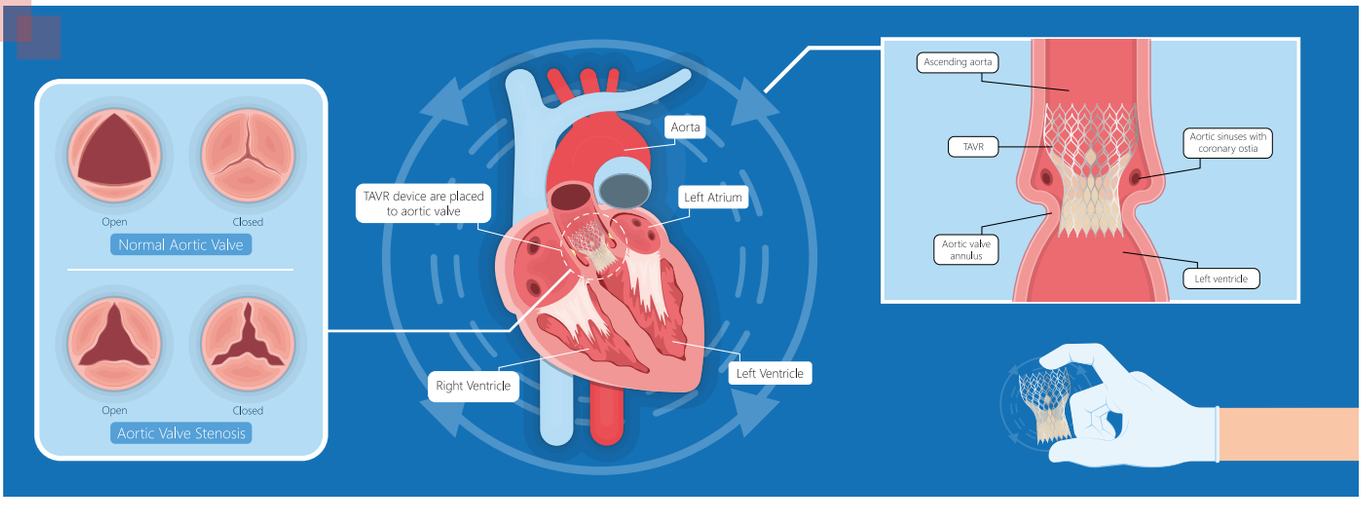


Figure 11: IVL treated right iliac and femoral artery uncomplicated. Access site closed with preplaced proglide suture system



Issue: 6 | September 2022

Isolated Myocardial Abscess Cavity: An Incidental Finding on Intraoperative Transoesophageal Echocardiography

Dr Jyotsna Bhargava
Additional Director - Anesthesiology
Fortis Escorts Hospital, Jaipur

Mukesh Garg, Madhuri Garg[2], Sukhdev Garg[3]

Introduction

Myocardial abscess is a rare and potentially fatal condition. It has been reported in about 20% patients of infective endocarditis, which is the most common predisposing factor. Occurrence of myocardial abscess without any evidence of infective endocarditis is a rare finding and infrequently reported in medical literature. We report a case of myocardial abscess within the anterior wall of the LV that was incidentally detected during intraoperative transesophageal echocardiography (TEE), in a patient scheduled for stenotic Aortic Valve (AV) replacement.

Case Report

A 47yearold man presented with the complaints of progressive breathlessness and chest discomfort. Preoperative transthoracic echocardiography (TTE) showed a bicuspid AV with severe stenosis and moderate regurgitation. The LV was dilated with mild systolic dysfunction (ejection fraction: 45–50%), with no other abnormality. Coronary angiography revealed normal coronary arteries. AV replacement surgery was planned.

Patient was induced with titrated doses of intravenous fentanyl, rocuronium, and propofol. Depth of anaesthesia was maintained with intermittent doses of intravenous fentanyl, vecuronium, and midazolam, in addition to sevoflurane as an inhalational agent. Intraoperative TEE confirmed preoperative findings. The mid-esophageal two chamber view showed a hypoechoic abnormality in the basal anterior segment of the left ventricle. It was approximately 30–22.6 mm echo free space [Figure 1]. The echo lucent defect with well-defined margin looked like an old healed myocardial abscess cavity. The same abnormality was also appreciated in the trans- gastric two chamber view [Figure 2].

A communication underneath the left coronary cusp of AV was found by the surgical team. The abscess cavity was debrided of friable margin and closed with Dacron patch. The diseased valve was replaced with a bi-leaflet mechanical valve, and patient weaned off the cardiopulmonary bypass uneventfully. The hemodynamic parameters were maintained within normal range with inotropic infusions of epinephrine (0.08 µg/kg/min) and dobutamine (2 µg/kg/min). Three sets of blood cultures were drawn

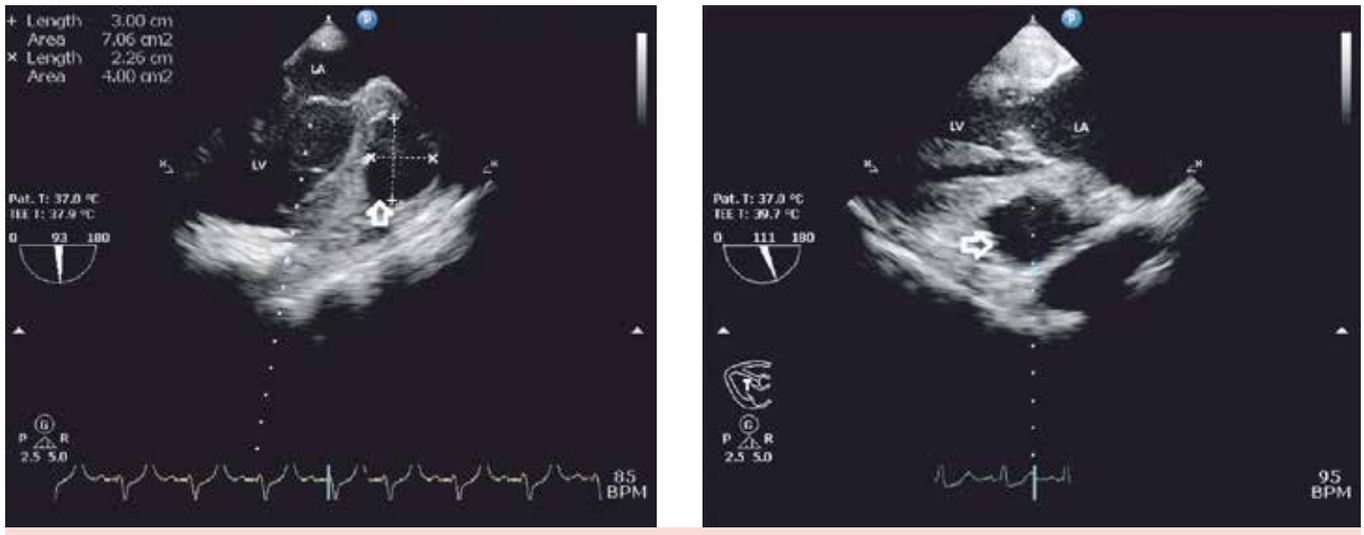


Figure 1&2: Midesophageal two-chamber view showing echolucent lesion (arrow) with well-defined border of myocardium at the basal segment of left ventricle anterior wall (maximal size 30-22.6 mm). LA: Left atrium, LV: Left ventricle

from different sites of the patient. Considering the abscess cavity, antibiotic coverage was stepped up to intravenous cefoperazone sulbactam (1.5 g twice a day) and amikacin (500 mg twice a day). Although, all three blood cultures did not show any growth and reported negative, the empirically commenced antibiotics were continued for 10 days. Postoperative course of the patient remained uneventful.

Discussion

Nonvalvular isolated mural abscess is a rare condition and can be found in the setting of septicaemia without infective endocarditis. It has been found in relation to septic foci such as decubitus ulcer, infected burns, bronchiectasis, and thrombophlebitis in patients with immunodeficiency. One case report demonstrated myocardial abscess at the site of infarcted myocardium. None of the aforementioned conditions existed in our patient.

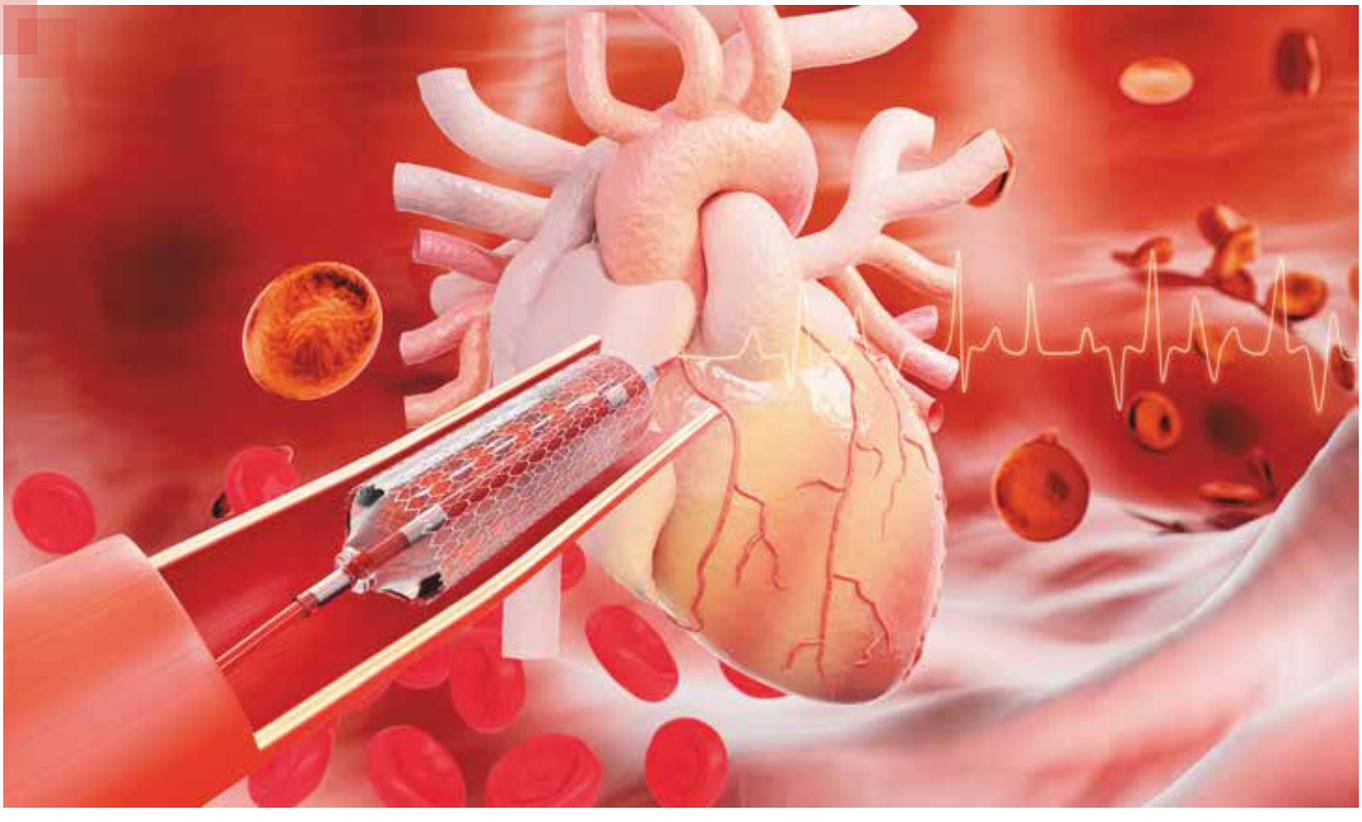
Despite advances in diagnostics, identification of myocardial abscess still remains a challenge. Echocardiography is accepted as a non-invasive gold standard technique to detect infective endocarditis and myocardial abscess. TEE has an improved sensitivity (90%), in comparison to the TTE (50%). Trans-oesophageal approach provides better detection of perivalvular abscesses, associated vegetations, valvular perforations, fistulae and rupture of chordae tendineae; especially in mitral prosthetic valves. The complications of myocardial abscess, like pseudoaneurysm and fistulisation, may also be diagnosed by TEE. However, both approaches are complimentary to each other and mandatory in suspected patients.

The clinical picture of a patient with myocardial abscess may vary from an asymptomatic state to myocardial wall rupture. ECG usually does not show any specific changes. However, few cases have presented with fatal arrhythmia (ventricular tachycardia or fibrillation); PR prolongation, and complete heart block. Management varies from intensive medical treatment with antibiotics to surgical abscess drainage and repair of the defect, depending upon clinical findings and imaging.

These patients must be monitored closely, with serial TEE at intervals of 2, 4, and 8 weeks after completion of antimicrobial therapy. As 40% of cases involve more than one microbial etiology, we used third generation cephalosporin with lactamase inhibitor along with aminoglycoside as an empirical antibiotic.

The case demonstrates utility of intraoperative TEE in detection of additional findings during open heart surgery, which are often overlooked during preoperative TTE.

How to cite this article: Garg M, Bhargava J, Garg M, Garg S. Isolated myocardial abscess cavity: An incidental finding on intraoperative transoesophageal echocardiography. Ann Card Anaesth 2021;24:411-4



Issue: 6 | September 2022

Redo Tricuspid Valve Replacement Post Mitral Valve Replacement: A Case Study

Dr Rakesh Chittora
Director & Unit Head -
Cardiothoracic Vascular Surgery,
Fortis Escorts Hospital, Jaipur

The incidence and prevalence of tricuspid regurgitation is very high in patients with mitral valve surgery (commonly rheumatic in origin). The incidence of tricuspid stenosis after mitral valve replacement is around 12-15%.

Redo cardiac surgery carries a risk of 6-8 % mortality as per literature' while isolated redo tricuspid valve surgery carries a risk of 16-20%. In our case, the redo isolated tricuspid valve replacement was done mainly for tricuspid surgery which is not so common after pervious valve surgery. Our patient was in age group of 65-70 years.

Case Presentation

A 57 year-old female was admitted with complaints of abdominal distention following meals with pedal edema off and on. She was operated for MVR in 2007, using a tilting disc prosthesis. Her 2D ECHO showed a normal functioning mitral valve prosthesis. Her 2D echo showed normal functioning mitral valve with severe tricuspid stenosis (peak gradient 8-10. mmHg) and severe tricuspid regurgitation with a low-pressure jet. She was in atrial fibrillation.

After routine work up and CT chest, she was taken for surgery using a femoral by-pass. Median sternotomy was done, and adhesions were removed. The tricuspid valve was severely stenotic with commissural fusion and sub-valvular stenosis. Tricuspid valve commissurotomy was done and chordal elongation with papillary muscle splitting was done. Tricuspid valve replacement was done using a 31epic valve with all leaflets preservation.

Post operatively intermittent heparin was given with oral anticoagulants (due to presence of functioning mitral valve).

Patient was discharged uneventfully on the 6th POD.

Conclusions

Patients undergoing redo isolated tricuspid valve surgery carry a high risk of early mortality. Satisfactory results are achievable in redo tricuspid valve surgery. Tricuspid stenosis is difficult to manage medically and surgery is the best option for these patients. Redo surgery carries a high mortality risk but is better done before the development of RV failure.

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Figure 1

Interesting Insights from Fortis Hospital, Mulund

Source:- Ann Thorac Surg. 2022 Apr;113(4):e299-e302

The Paediatric Cardiac Team - Fortis Hospital, Mulund

Dr Dhananjay Malankar, Dr Bharat Soni - Pediatric Cardiovascular Surgeons
Dr Swati Garekar, Dr Ronak Sheth - Pediatric Cardiologists
Dr Shivaji Mali, Dr Shyam Dhake - Pediatric Cardiac Anesthesiologists and Intensivists
Dr Dilip Bind, Dr Amit Mhatre, Dr Komal Kamdi - Pediatric Cardiac Intensivists
Mr K Dinesh and Mr S Sathish - Physician Associates
Mr Sujit Bamne - Perfusionist
Mansi Gharat and Sonal Chogale - Registered Nurses
Mr Phil - Social worker
Mr Vijay Sawant - Coordinator
Ms Vidya Shetty - OPD coordinator

Single-Stage Unifocalization and Intracardiac Repair Using Two Tube Grafts

Abstract

Unifocalization of the major aortopulmonary collaterals (MAPCAs) followed by intracardiac repair with ventricular septal defect (VSD) closure and restoration of right ventricle-to-pulmonary artery continuity is the ultimate treatment goal in a case of VSD with pulmonary atresia and MAPCAs. It may be achieved in a single stage or may require multiple surgeries. We present a case of a 2-year-old boy with VSD with pulmonary atresia who underwent single-stage unifocalization of MAPCAs through the midline followed by intracardiac repair using 2 polytetrafluoroethylene tube grafts: one for unifocalization and other as a bicuspid valved right ventricle-to-pulmonary artery conduit.

Neo-cusp Reconstruction Procedure for Aortic Regurgitation Induced by Transcatheter Occluder Device for Ventricular Septal Defect Closure.

World J Pediatr Congenit Heart Surg. 2022 Jul;13(4):495-498.

Abstract

Aortic regurgitation after transcatheter device closure of a peri membranous ventricular septal defect is a known complication. We present the case of an 11-year-old boy with severe aortic valve regurgitation due to cusp perforation complicating previous device closure of a ventricular septal defect. The patient underwent successful aortic valve repair (neo-cusp reconstruction technique) by replacement of a cusp and shaving off of a rim of the device 5 years after device closure.

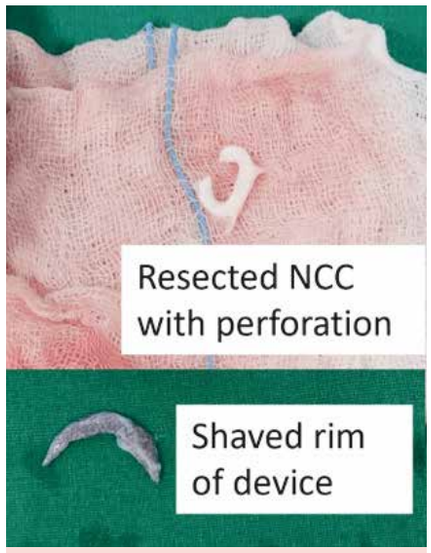

Figure 8:
Resected cusp and shaved off rim of device

Re-do ALCAPA Repair with Left Subclavian Artery-to-left Main Coronary Artery Bypass for Left Coronary Atresia.

World J Pediatr Congenit Heart Surg. 2022. Accepted for publication.

Abstract

Different surgical techniques have been described for the primary repair of anomalous left coronary artery arising from the pulmonary artery (ALCAPA). However very few techniques are described for management of coronary artery occlusion following repair for ALCAPA. We present a case of 7 year old girl with left main coronary atresia status post left coronary button transfer for ALCAPA in infancy. She underwent redo-sternotomy and left subclavian artery to left main coronary bypass grafting with mitral valve repair.

Fontan Procedure on Deep Hypothermic Circulatory Arrest: Short Term Results and Technique

Annals of Pediatric Cardiology. Accepted; to be published in the next issue.

Abstract

Various operative strategies are described for the Fontan procedure. In this study, we describe our short term results and technique of Fontan procedure on cardiopulmonary bypass (CPB) and deep hypothermic circulatory arrest (DHCA). This was a retrospective study of 32 patients, median age of 6 years (4–19 years) and median weight of 20 kg (13–51 kg), who underwent Fontan procedure on CPB and DHCA from July 2016 to July 2021. The median CPB time was 125 min (77–186 min), the median DHCA time was 42 min (27–50 min), and the median Fontan pressure was 14 mmHg (10–18 mmHg). The median time to extubation was 4h (1–20h), the duration of chest tube drainage was 8 days (5–24 days), and the median intensive care unit stay was 4 days (3–8 days). The presence of heterotaxy was associated with longer duration of pleural drainage (P = 0.01). There was no operative mortality and no major adverse events such as seizures, gross neurological deficits, or arrhythmias in the postoperative period. Fontan procedure can be safely performed on CPB and DHCA with good operative results. This operative strategy may be used in special circumstances like in patients with situs and systemic venous anomalies and those requiring repair of a complex intracardiac defect. Long term follow up will be required to evaluate if this strategy has any impact on the neuro-developmental outcome and the long term sequelae of Fontan.

Giant Right Atrial Aneurysm in an Infant

World J Pediatr Congenit Heart Surg. 2022 Mar 15;21501351221085529. Published online prior to print

Abstract

Right atrial aneurysm (RAA) is a rare congenital anomaly with a diverse clinical spectrum. We present a case of antenatal detection of a giant RAA. The infant had 3 episodes of staring spells presumed to be thrombo-embolic phenomena originating from the RAA. The infant underwent successful RAA resection with preservation of the right coronary artery that was displaced from its usual position due to invagination of the RAA in the subepicardial space of the right atrio-ventricular groove.

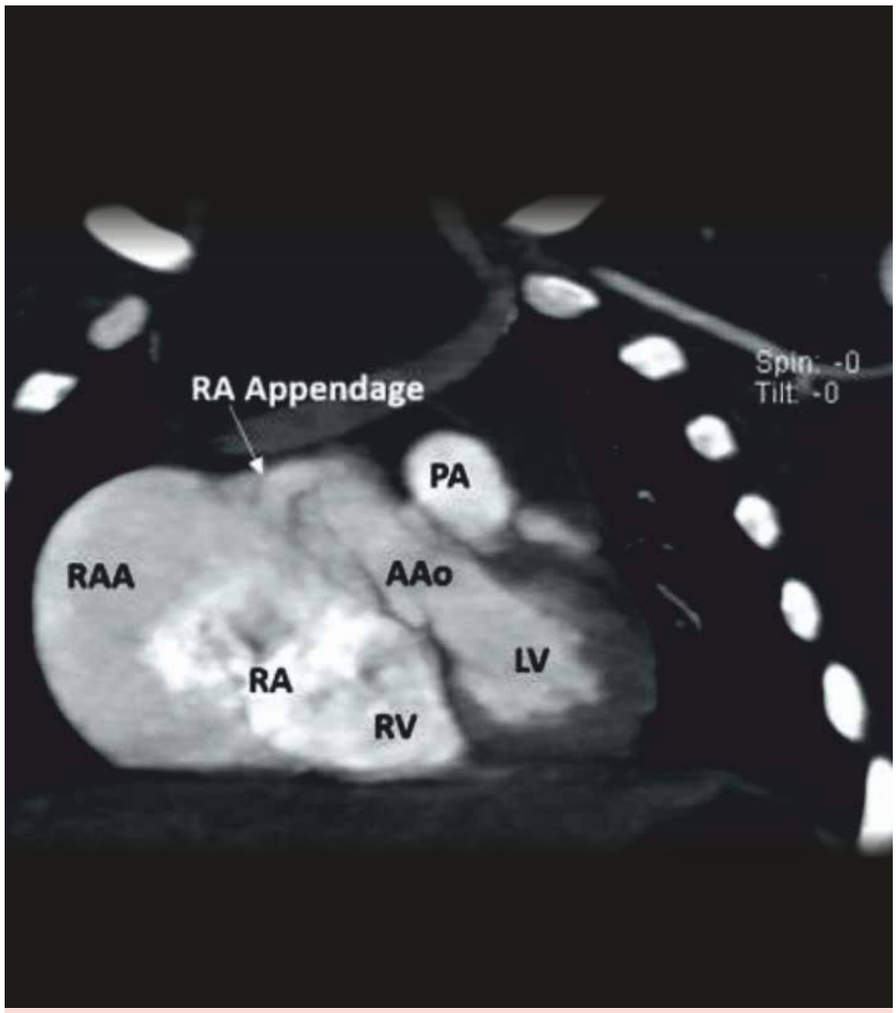

Figure 9: Pre-operative CT scan showing giant right atrial aneurysm (RAA)

Combined Aortic and Pulmonary Valve Stenosis in a 28-Year-Old Managed Percutaneously

Dr Sanjay Khatri
Additional Director - Pediatric and Interventional Cardiology
Fortis Escorts Hospital, Jaipur

Abstract

Combined valvar aortic and pulmonary stenosis is an extremely rare entity and few case reports exist in current literature describing this condition. We present the case of a 28-year-old woman who presented with symptoms of breathing difficulty, chest pain and syncope and was found to have combined severe valvar aortic and pulmonary stenosis. She underwent balloon valvuloplasty for both valves during the same interventional procedure and the obstruction was successfully relieved on both sides.

Key Words

Pulmonary stenosis, aortic stenosis, balloon valvuloplasty.

Introduction

Isolated stenoses of aortic or pulmonary valve are common conditions, however, combined valvar aortic and pulmonary stenoses is a very rare entity with few case reports existing in current literature [1, 2, 3, 4]. The precise diagnosis of this entity is extremely important as it can have fatal repercussions for a patient if only one of the obstructions is relieved. We present a case of combined severe valvar aortic and pulmonary stenosis which was managed successfully with balloon valvuloplasty of both valves during the same interventional procedure. The case discusses management dilemmas and risks involved with the combined procedure.

Case Report

A 28-year-old female, presented to the emergency department with symptoms of recurrent exertional dyspnea, chest pain and syncope. She was normotensive, had a regular heart rate of 90/minute, had a single S2 and a grade III/VI ejection systolic murmur heard best at the second left sternal border, radiating to the second right sternal border. Cardiac troponins were within normal range. She underwent an echocardiogram on the day of admission in view of her cardiovascular examination findings, which demonstrated situs solitus levocardia, secundum atrial septal defect measuring 7-8 mm and shunting left to right, bicuspid, thickened and doming pulmonary valve (annulus 25 mm) with a peak instantaneous gradient of 156 mmHg. The aortic valve was bicuspid as well (annulus 22 mm) with a peak instantaneous gradient of 100 mmHg and a mean gradient of 60 mmHg across the valve. There was biventricular hypertrophy with normal ventricular function.

Given the favorable morphology of the aortic and pulmonary valves it was decided to take the patient to the catheterization laboratory and attempt balloon dilation of both valves, under conscious sedation. Right and left heart catheterization demonstrated the peak-to-peak gradients across the aortic and pulmonary valves of 68 mmHg and 96 mmHg respectively. The aortic valve was balloon dilated first with a 20x40 mm Tyshak II balloon, followed by the pulmonary valve which required a 23x50 mm Tyshak II balloon. At both valves, the balloons were dilated twice until there was a complete disappearance of the stenotic waist. On catheter pullback post intervention, the peak-to-peak gradients across the aortic and pulmonary valves were recorded as 6 mmHg and 16 mmHg respectively. There were no complications during the procedure and the post procedure echocardiogram showed mild AR and mild to moderate PR.

Discussion

Isolated aortic or pulmonary valve stenosis is a common congenital as well as acquired lesion, with an incidence of 3-8% for the aortic valve and 8-10% for pulmonary valve stenoses[5]. A combination of the two in a single patient is very rare and has been mentioned in literature via few case reports[1, 2, 3, 4,] which have described patients from neonates to an octogenarian, and some with associated septal defects[6,7,8].

Despite its rare occurrence, it is vital to recognize and correctly diagnose this entity as incomplete management can be catastrophic. Relief of obstruction at either one valve has been reported in literature to be fatal[4]. If only the left sided obstruction is relieved, the right sided obstruction will cause decreased pulmonary venous return and low cardiac output, followed by shock and death. Similarly, relieving the pulmonary obstruction without relieving left outflow obstruction can lead to increased pulmonary blood flow and pulmonary edema[4]. While planning our case, we decided to

balloon the aortic valve before the pulmonary valve to avoid a sudden increase in pulmonary blood flow and possible pulmonary edema. However, in one case report with similar lesion, the pulmonary valve was dilated prior to the aortic valve with successful results[8].

Although, ours is not the first reported case of combined aortic and pulmonary valvar stenoses, this entity remains very rare and requires a high index of suspicion when isolated aortic or pulmonary valve stenosis are seen on echocardiogram. The importance of correctly diagnosing this lesion cannot be underscored enough, given the fatal consequence of relieving just the left or right sided obstruction. It is also vital to relieve these obstructions during a single procedure and not perform them in a staged manner due to the complications cited above.

Balloon valvuloplasty has become the standard first line procedure for isolated pulmonary or aortic valve stenosis, however given that combined obstruction of both valves is extremely rare, there are no specific treatment guidelines for the same. We decided to attempt balloon valvuloplasty for our patient before subjecting her to surgery, given the favorable appearing valve morphology, age of the patient and our experience with the procedure. The procedure successfully relieved both obstructions and the patient has not developed any restenosis as seen on follow up echocardiograms. She had a small secundum atrial septal defect, which is being followed and is not hemodynamically significant yet.

Our patient had severe obstruction at both valvar levels, however, there might be cases with milder obstruction at one valve more than the other with the potential to increase. Therefore, it cannot be stressed enough that combined stenoses of aortic and pulmonary valve should not be missed on echocardiogram and when an isolated stenosis of one semilunar valve is encountered, the other valve should be completely and thoroughly examined.

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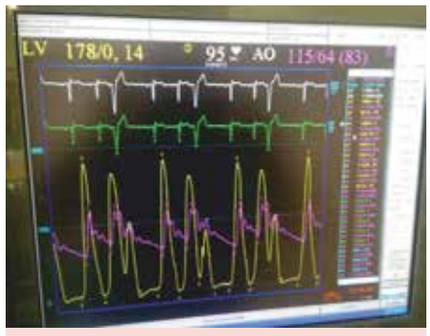

Figure 1: Post Aortic Balloon Valvotomy Left Ventricular and Aortic pressure trace

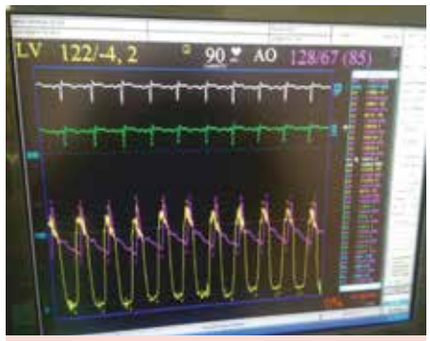

Figure 2: Pre-Aortic Balloon Valvotomy Left Ventricular and Aortic pressure trace

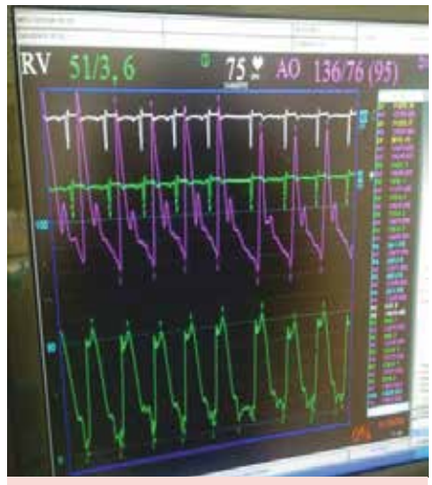

Figure 3: Post Pulmonary Balloon Valvotomy Right Ventricular and Aortic pressure trace

Figure 4: Pre-Pulmonary Balloon Valvotomy: Right Ventricular and Aortic pressure trace

An Interesting Case of Incessant Tachycardia in a Young Female

Dr Anil Saxena
Executive Director -
Electrophysiology & Cardiac Pacing,
Fortis Escorts Heart Institute,
Okhla, New Delhi

Dr Aparna Jaswal
Director - Electrophysiology
& Cardiac Pacing
Fortis Escorts Heart Institute,
Okhla, New Delhi

Dr Ravikant Telikicherla
Associate Consultant - Cardiology, Fortis Escorts Heart Institute, Okhla, New Delhi

An 18year old student presented to us with recurrent palpitation since 1 year. There was no history of presyncope or syncope. She had a small Patent Ductus Arteriosus (PDA) which closed spontaneously during childhood. A 12 lead electrocardiogram during tachycardia showed a narrow complex tachycardia with long RP interval, P wave morphology being negative in the inferior leads, V1; positive in Lead I and aVL and biphasic in V2-V6 (Fig1). Baseline 12 lead ECG showed an ectopic atrial rhythm with P wave morphology being similar to that of the tachycardia.

A 2D echocardiogram and Cardiac MRI showed structurally normal heart with no evidence of PDA. 24 hour holter study revealed incessant supraventricular tachycardia (63% of the time in tachycardia) and tachycardia being initiated with a sinus beat. Carotid sinus massage terminated the tachycardia. A differential diagnosis of atrial tachycardia or Paroxysmal Junctional Re-entrant Tachycardia (PJRT) was made. She was symptomatic despite maximum tolerable doses of medication; a trial of medication was given for 6-9 months.

Thereafter, she was taken up for electrophysical study with 3D electroanatomical mapping. She was in incessant tachycardia during the study which was similar to the clinical tachycardia. The tachycardia cycle length was 425msec with long VA interval (273msec) with concentric atrial activation (Proximal to distal CS activation). Ventricular overdrive pacing showed VAAV response with VA dissociation. His refractory VPC did not pre excitate or post excitate the tachycardia. Tachycardia was induced spontaneously (Fig 3).

During sinus rhythm, basal intervals were normal with no evidence of preexcitation on rapid atrial pacing. There was concentric atrial activation on ventricular pacing suggesting no evidence of any accessory pathway. Even it was confirmed with Ventricular pacing after giving adenosine which showed VA block at 500msec. The diagnosis of Ectopic atrial tachycardia was confirmed.

3D mapping of the Right Atrium (RA) was done with CARTO 3 version 7 system using NAVISTAR unidirectional catheter. Activation mapping of the right atrium showed earliest activation point at the inferior part of the Crista Terminalis region (Figure 4).

Propagation velocity mapping revealed the tachycardia to be focal in origin (with early not meeting Late) arising from the same point. Lesion given at the target site with NAVISTAR unidirectional catheter at 40°C, 30W for 8 seconds. Tachycardia was terminated (Figure 6).

On follow up, she was asymptomatic and holter showed no runs of SVT or atrial ectopics with echo showing normal LV function.

Focal AT represents 3-17% of SVT referred for ablation1.8-10% of focal AT develop Tachycardia Induced Cardiomyopathy (TIC)2. Typically seen in structurally normal hearts. Adenosine response can differentiate focal AT from re-entrant At3. Right atrial focal tachycardias are far more common than left atrial tachycardias (73% vs 27%). Crista terminalis is the commonest site in the right atrium. However, lower part of crista is a rare site for the origin of focal atrial tachycardias (Figure 7).

Our patient had focal atrial tachycardia arising from the lower part of the crista terminalis which is a rare site. Successful ablation was done in our patient. Success rate of catheter ablation of focal atrial tachycardia is 90% (acute) with electro anatomical mapping with a recurrence rate of 8% over 6 months[4].

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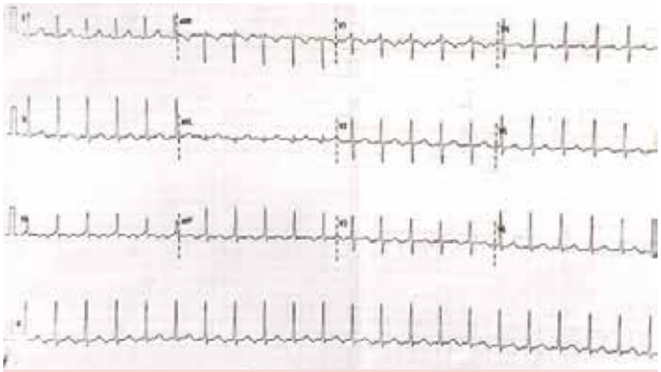

Figure 1: 12 Lead ECG during Tachycardia showing Long RP tachycardia with the P wave morphology as discussed above

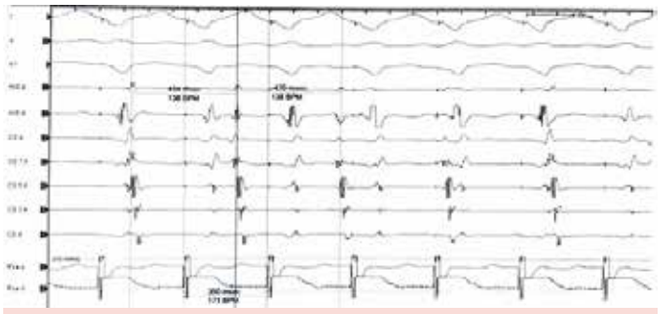

Figure 2: On ventricular overdrive pacing during tachycardia - There was VA dissociation. CS-coronary sinus, ABL-ablation catheter, RVa- Right Ventricular apex

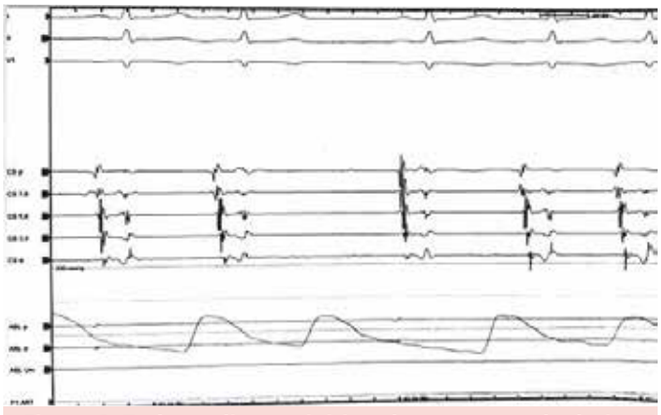

Figure 3: Tachycardia was initiated spontaneously during the EP study. The activation pattern in CS being the same during the sinus rhythm and tachycardia

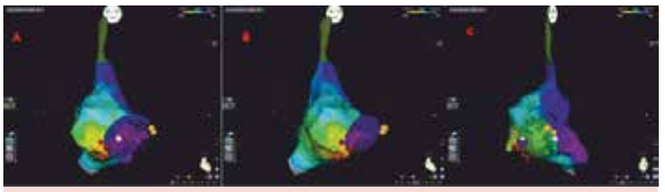

Figure 4: Activation mapping of Right Atrium (RA) showing earliest activation site at the inferior part of the Crista Terminalis in A. AP view B. RAO view C. LAO view. Red shows earliest activation points and Blue shows latest activation point. In this figure, earliest activation point is noted in the Inferior crystal region. Unidirectional electrodes showed QS at the point of the earliest activation (Figure 5)

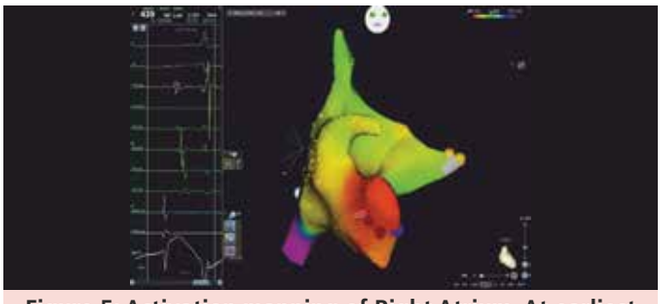

Figure 5: Activation mapping of Right Atrium. At earliest point tagged, QS noted in the unipolar electrode

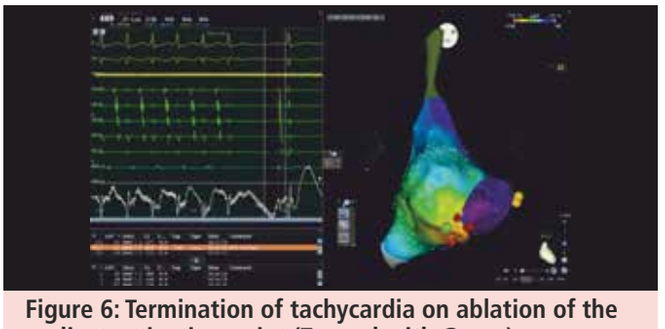

Figure 6: Termination of tachycardia on ablation of the earliest activation point (Tagged with Green)

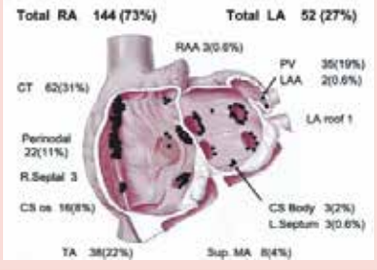

Figure 7: Site of origin of Focal atrial tachycardias adopted from Peter M Kistler, Kurt C Roberts - Thomason etal

Permanent Pacemaker Implantation in a Young Patient of Symptomatic Sick Sinus Syndrome (Tachycardia – Bradycardia Syndrome) with Syncopal Attacks

Source:- This Case Report is under review for publication in the Journal of Indian College of Cardiology (Reference number "jicc_28_22". (https://www.joicc.org)

Dr Amit Kumar Singhal
Senior Consultant - Cardiology
Fortis Escorts Hospital, Jaipur

Topic

Permanent Pacemaker Implantation in a young Patient of Symptomatic Sick Sinus Syndrome (Tachycardia-Bradycardia Syndrome) with Syncopal Attacks

Abstract

Symptomatic Sick Sinus syndrome (Tachycardia Bradycardia Syndrome) in otherwise healthy young patients, leading to syncopal attacks & requiring pacemaker implantation is an uncommon entity. Herein I describe a case of a 27-year-old otherwise healthy female who presented with complaints of recurrent syncopal attacks since last two months. Evaluation (Holter monitoring) revealed episodes of inappropriate sinus bradycardia during syncopal attacks along with episodes of atrial fibrillation leading to palpitations off & on (Tachycardia Bradycardia Syndrome) with normal sinus rhythm in between. No other correctable cause was detected during evaluation. Patient responded dramatically after dual chamber permanent pacemaker implantation. Rhythm abnormalities can lead to syncope or other neuro-cardiac symptoms & can occur in otherwise normal people with a structurally normal heart. Proper assessment with high index of suspicion can detect such manageable symptomatic intermittent arrythmias.

Introduction

Sino-Atrial (SA) node is the default pacemaker in the heart. Congenital, acquired, degenerative and idiopathic causes [1,2,5] can lead to dysfunction in the conduction system including the SA & AV nodes. Sick Sinus Syndrome is a constellation of different combinations [1,2,3,4] of the cardiac conduction system disorder that includes sinus pauses, inappropriate sinus bradycardia, variable degrees of SA & AV nodal blocks, sinus arrest & tachycardia-bradycardia syndrome [1,2,5]. The present case report is a rare case of symptomatic sick sinus syndrome (Tachycardia-Bradycardia Syndrome) with syncopal attacks in a young patient requiring pacemaker implantation. These cases are rarely reported in literature and helps the medical fraternity in understanding the diversity of diseases associated with the conduction system of heart.

Key Words

Sick Sinus Syndrome, Syncopal attacks, Tachycardia-Bradycardia Syndrome, Permanent Pacemaker

Case History

27 year old female patient presented with complaints of episodes of loss of consciousness & palpitations off and on since last 2 months. Patient evaluated for the cause thoroughly. Patient was averagely built & nourished with no major abnormalities on General Physical Examination & Systemic evaluation, except for pallor. Blood investigations revealed anaemia with normal liver & renal functions, normal thyroid profile & serum electrolytes. No family history of similar illness, normal antenatal & perinatal course with normal childhood milestones. No evidence of collagen vascular diseases were detected, ANA were not detected in serum. CXR, USG abdomen were normal as do 2D Echo with normal LV ejection fraction & structurally normal heart. Patient was not on any drugs with negative chronotropic effects. Holter monitoring revealed episodes of extremely slow heart rate (inappropriate sinus bradycardia) coinciding with episodes of giddiness & syncope & episodes of atrial fibrillation coinciding with episodes of Palpitations. Patient diagnosed as case of Symptomatic Sick Sinus Syndrome (Tachycardia-Bradycardia Syndrome) with Syncopal attacks & managed accordingly.

Discussion

Symptomatic Sick sinus syndrome in young patients requiring Pacemaker Implantation is an uncommon entity. Rhythm abnormalities, specially brady arrythmias can lead to impaired cerebral perfusion, leading to fainting, giddiness & syncope. Differential diagnosis of syncope in young patients involves seizures, cyanotic spells in Patients with Cyanotic CHD, hysterical reaction, Neuro Cardiogenic Syncope (Vasovagal reaction), stenotic valvular heart disease, tachy-arrythmias & idiopathic ones. Brady arrythmias in young Patients as cause of syncope is lesser appreciated in clinical practice & often missed as a cause, especially when it is intermittent in nature with normal rhythm in between episodes of syncope. High index of suspicion with rhythm monitoring for appropriate durations (Holter, Loop recorders) can help in detecting intermittent symptomatic brady arrythmias.

Summary

Symptomatic Sick Sinus Syndrome (Tachycardia Bradycardia Syndrome) in otherwise healthy young Patients is an uncommon entity. Patients with structurally normal heart & without any other comorbidities can develop this disorder. High index of suspicion & proper assessment using rhythm monitoring with Holter/ILR can detect these arrythmias. It is amenable to treatment with suitable devices.

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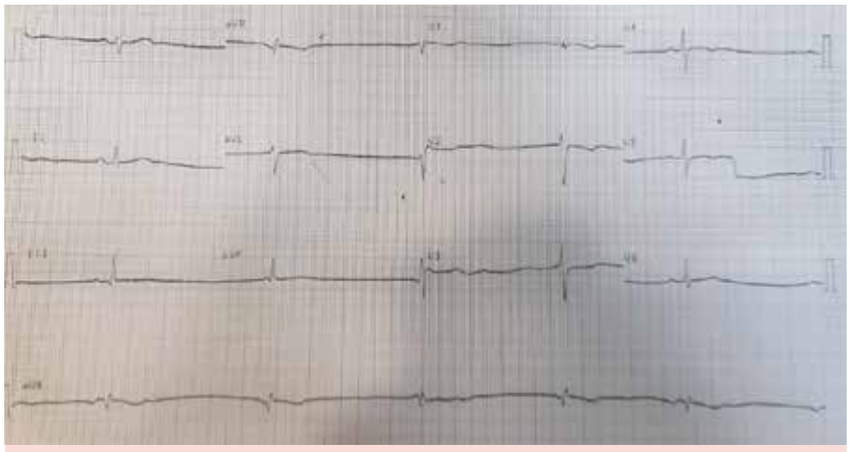

Figure 1: Bradycardia

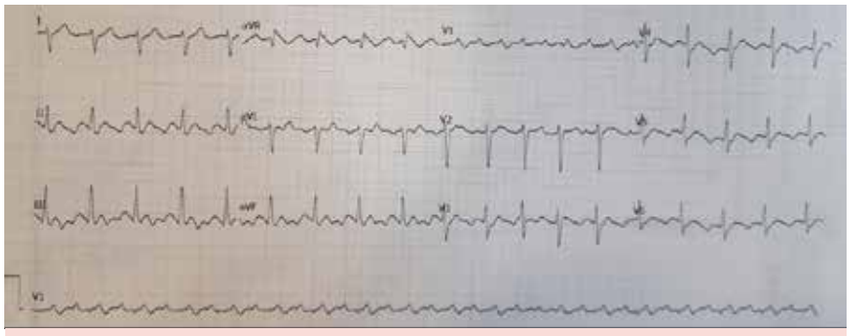

Figure 2:Atrial Fibrillation

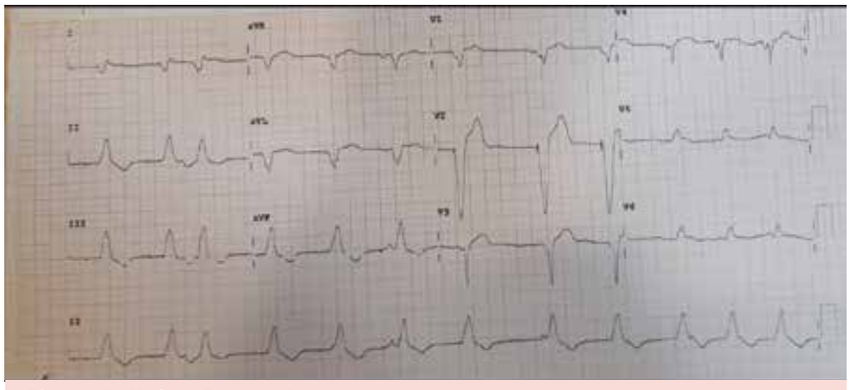

Figure 3: Holter Report Summary

Figure 4: Pacing Rhythm

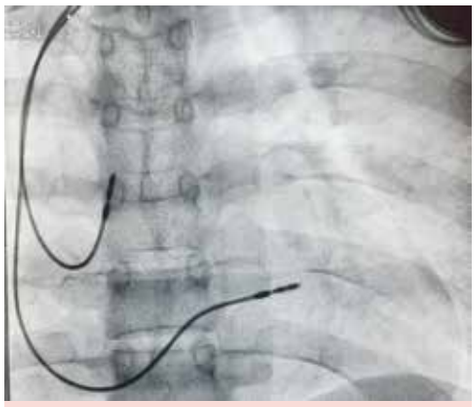

Figure 5: Dual Chamber PPI 1

Figure 6: Dual Chamber PPI 2

Stellate Ganglion Block and Neurolysis for Refractory Ventricular Arrhythmia

Dr Anurag Aggarwal
Senior Consultant and HOD - Emergency Medicine
Fortis Hospital, Noida

Co-Authors:
Rohit Balyan, Varun Suresh, Bhavna Gupta

Abstract

Enhanced electrical activity, ventricular arrhythmia (VA), and cardiac instability due to increased sympathetic tone may be refractory to standard medical treatment and ablation procedures. Stellate ganglion block (SGB) has been used to treat refractory VA; however, there is insufficient information in the literature on its long-term outcome. Herein, we described three patients that were successfully treated with ultrasound-guided left SGB (LSGB) and chemical neurolysis. Ultrasound-guided LSGB may be considered as rescue or bridge therapy for stabilizing ventricular rhythm before a definitive procedure is planned.

Introduction

Recurrent and refractory ventricular arrhythmias (VAs) are major hemodynamic events that predict morbidity and mortality in cardiac disease patients.[1] Medical and cardiac-electrophysiological therapies aimed at downscaling these arrhythmias can significantly improve the patient outcomes.[2] The role of the autonomic nervous system (ANS) in the escalation of cardiac arrhythmogenicity must not be overemphasized; however, down-regulatory ANS therapies are not without systemic adverse effects.[3] Novel therapies such as cardiac sympathetic denervation, catheter ablation of arrhythmia trigger zone, thoracic epidural blockade (TEB), spinal cord stimulation (SCS), and stellate ganglion blocks (SGB) assume relevance in this context.[4] SGB, a widely used diagnostic/treatment modality for vascular insufficiency and sympathetically mediated upper extremity pain, has gained considerable acclaim for managing highly selected cases of refractory VA.[5] We report three patients with refractory VA management due to varied etiology, who were treated with left SGB (LSGB) under ultrasonography and fluoroscopy guidance. Written informed consent was obtained from all the participating patients or their legal representatives.

CASE REPORTS

Case 1:

A 54-year- old male patient diagnosed with hypertrophic obstructive cardiomyopathy, with left ventricular ejection fraction (LVEF) 45% presented to us with episodes of recurrent symptomatic ventricular tachycardia (VT) [Table 1]. The patient had undergone alcohol septal-ablation and implantable cardioverter-defibrillator (ICD) placement 3 months prior. Subsequently, the patient had undergone radiofrequency ablation of VT trigger zone with 3-dimensional mapping using the CARTO mapping system. Under fluoroscopic and ultrasonographic guidance, we performed an LSGB with bupivacaine 0.5% and subsequently left stellate ganglion chemical neurolysis with phenol [Figure 1c]. Sinus rhythm with intermittent sinus tachycardia was achieved immediately after the procedure. Thereafter, on 8 months periodic follow-up, the patient remained free of VA, and medical management was de-escalated to single oral anti-arrhythmic.

Case 2

A 62-year-old female patient with acute myocardial infarction (LVEF 25%) underwent percutaneous coronary intervention (PCI). Post PCI, the patient was mechanically ventilated (MV) because of ongoing congestive heart failure. The patient sustained recurrent VT intractable to lignocaine and amiodarone intravenous (IV) infusions in the intensive care unit. Check coronary angiogram revealed no residual or subacute thrombus. We conducted LSGB [Figure 1a and b] using a local anaesthetic (LA) after which, anti-arrhythmic infusions were tapered and discontinued and block repeated after 48 h with similar dose of LA [Table 1]. The patient was serially weaned off from MV and anti-arrhythmic infusions.

Case 3

A 68-year-old patient with triple-vessel coronary artery disease developed recurrent VT with cardiogenic shock immediately following coronary artery bypass graft surgery [Table 1]. Arrhythmia is resistant to medical management (IV amiodarone, lignocaine, and esmolol infusion) and electrical cardioversion. Bedside ultrasound-guided LSGB

[Figure 1a and b] terminated VT, however the patient was on mechanical ventilation and hemodynamic was supported with noradrenaline and intra-aortic balloon pump and arrhythmia were controlled on amiodarone infusion. However, on the 5th postoperative day, this patient succumbed to a resistant cardiogenic shock.

Conclusion

LSGB may serve as a rescue option in refractory cases to standard treatment protocols for patients with VA. It can reasonably be recommended as an alternative therapy or as part of combination therapy for the management of ES or recurrent VA.

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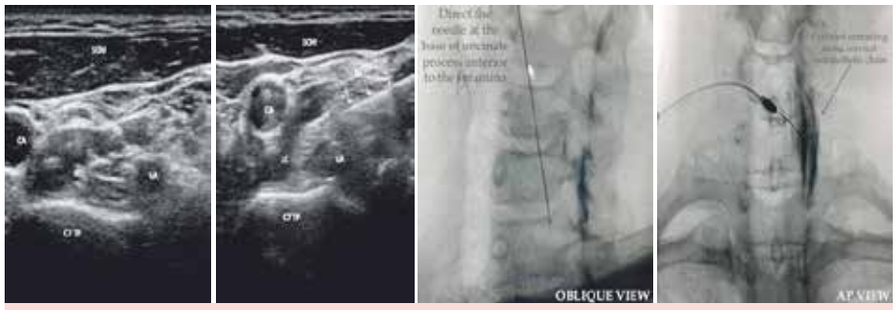

Figure 1: (a and b) Lateral axial view of the ultrasound neck Image at the C7 vertebral level. (a) Showing identification of C7 transverse process and surrounding structures for giving stellate ganglion block at an appropriate level. (b) Showing echogenic needle trajectory approaching the target point toward cervical sympathetic chain and stellate ganglion. (c) Oblique and anti-posterior fluoroscopic images of the stellate ganglion block's performance. The stellate ganglion, composed of the inferior cervical ganglion and the first thoracic ganglion, is anterior to the first rib's neck, extending to the lower side of the transverse process of the 7th cervical vertebrae. C-arm was obliquely rotated to the left to allow adequate visualization of the neural fortamine. The needle was directed at the uncinate process's junction with the vertebra

Variable	Case 1	Case 2	Case 3
Age (years)	54	62	68
Gender	Male	Female	Male
Type and frequency of VA	Recurrent VT, 3-4 episodes per day	Recurrent VT, 4-5 episodes per day	Recalcitrant VT in the postoperative period after CABG Ischemic
Underlying pathology	Hypertrophic obstructive cardiomyopathy	Ischemic heart disease after PCTA	cardiomyopathy after CABG on IABP
LVEF	45	25	20
Possible trigger	No triggers	Inadequate sedation	Inadequate sedation
Anti-arrhythmic medications used	Oral-amiodarone and sustained release metoprolol	Intravenous-lignocaine and amiodarone infusion	Intravenous-amiodarone, lignocaine, esmolol
Procedure/treatments received before or after SGB	Alcoholic septal ablation with implantable cardioverter defibrillator in situ	Nil	Nil
Interventional technique	Left SGB with bupivacaine under fluoroscopic guidance followed by left SG chemical neurolysis with 6ml of 8% phenol under ultrasonography and fluoroscopic guidance	Left SGB with bupivacaine 0.25% under ultrasonography guidance, repeated with same dose after 48 h	Left SGB with bupivacaine under ultrasonography guidance
Type and volume of LA Immediate follow-up	12 mL of 0.5% bupivacaine plain Arrhythmia-free for 48 h immediately after SGB	8 mL of 0.25% bupivacaine plain Arrhythmia-free for 48 h on Amiodarone infusion	10 mL of 0.25% bupivacaine plain Left SGB ceased VT for 48 h
Reduction of VA and defibrillator shocks	No shockable rhythm post-SGB	No shockable rhythm post-SGB	No shockable rhythm post-SGB
Long-term follow-up	Arrhythmia free on periodic follow-up up to 8th postprocedural month; continued on oral metoprolol only	VA controlled on oral amiodarone and metoprolol	Mortality

CABG: Coronary artery bypass grafting, IABP: Intra-aortic balloon pump, LA: Local anesthetic, LVEF: Left ventricular ejection fraction, PTCA: Percutaneous transluminal coronary angioplasty, SGB: Stellate ganglion blockade, VA: Ventricular arrhythmia, VT: Ventricular tachycardia

Table 1: Demographic and patient characteristics of the cases studied

Hand Sewn Valved Conduit for the Right Ventricular Outflow

Dr Nischal R. Pandya
Consultant - Paediatric Cardiac Surgery
Fortis Hospitals, Bangalore

Introduction

A right ventricular (RV) to pulmonary artery (PA) conduit is an integral part of the operation for the correction of many conotruncal anomalies that include Tetralogy of Fallot physiology or even a right ventricular outflow tract (RVOT) obstruction (RVOTO) at various valvar/sub valvar levels. The options for reconstructing the RVOT lesions is not always permanent and may be very expensive at times. We would like to highlight the use of hand sewn valved conduits in such cases and some of their advantages.

Case 1

A two-year old male child presented with the diagnosis of Tetralogy of Fallot-pulmonary atresia and confluent branch PAs with fair sized branch pulmonary arteries (left smaller than right). He underwent intra-cardiac repair (ICR)with MAPCA take down for the same and a hand sewn valved Gore-Tex (Gore-Tex, WL Gore and Associates Inc, Flagstaff, Ariz) tube graft created and sutured in place of the RVOT.

The child was extubated the next day and echo showed good biventricular function with no residual shunts, mild+ pulmonary regurgitation and an outflow gradient of less than 30 mmHg. At one year, the child is growing well with no symptoms. The valved conduit is still functioning well, with no significant gradient and moderate pulmonary regurgitation with preserved right ventricular dimensions.

Case 2

A 16-year-old girl presented with the diagnosis of TOF, severe infundibular and valvar stenosis. Intraoperatively she was found to have a narrow pulmonary annulus (Z less than -2.5) with severe infundibular tubular stenosis and she underwent an ICR and a hand sewn valved Gore-Tex graft was sutured into the RVOT.

The patient was extubated the same evening and weaned off supports over the next 48 hours. Post-operative echo showed mild pulmonary valvar regurgitation with a gradient of 24 mm Hg.

Discussion & Conclusion

Gore-Tex valved conduits are tailored to the individual and are being used more frequently now a days. The tube and valve are made of polytetrafluoroethylene (PTFE) which is inert. Valve leaflets are made of 0.1mm PTFE which is pliable as well.

Use of this conduit helps in cases where other conduit options like homografts/Contegra/Medtronic freestyle valved conduits are not available for want of appropriate size or availability. Also some of these are quite expensive and not affordable by all. Since the PTFE material is inert the risks of calcification in the long run are less in these hand sewn PTFE valved conduits. It provides a valved RVOT which is helpful in the immediate postoperative management of these children with stiff right ventricles and also prevents the necessity of large transannular patches.

Although it does not have growth potential, it is a viable option in situations involving cases where a valved conduit is not available for various reasons. It would be interesting to see the long term follow up and how these valves perform in different situations in our settings.

Figure 1: Inverted Gore-Tex graft with sutured valves

Figure 2: Graft everted back showing valves (pulmonary confluence end)

Figure 3: Post op echo showing mild PR

Rare Cause of Cyanosis in an Adult and its Transcatheter Treatment: Large Fistula from the Pulmonary Artery to the Left Atrium

The Paediatric Cardiac Team - Fortis Hospital, Mulund

Dr Dhananjay Malankar, Dr Bharat Soni - Pediatric Cardiovascular Surgeons
Dr Swati Garekar, Dr Ronak Sheth - Pediatric Cardiologists
Dr Shivaji Mali, Dr Shyam Dhake - Pediatric Cardiac Anesthesiologists and Intensivists
Dr Dilip Bind, Dr Amit Mhatre, Dr Komal Kamdi - Pediatric Cardiac Intensivists
Mr K Dinesh and Mr S Sathish - Physician Associates
Mr Sujit Bamne - Perfusionist
Mansi Gharat and Sonal Chogale - Registered Nurses
Mr Phil - Social worker
Mr Vijay Sawant - Coordinator
Ms Vidya Shetty - OPD coordinator

A 29year old man presented for the evaluation of significant exertional fatigue. He had central cyanosis (saturation 80%), grade 3 clubbing and a Hb of 24g/dl. He had been evaluated on multiple occasions at other centres and treated for Kochs and pneumonia. On detailed cardiac evaluation at Fortis Hospital, Mulund, echocardiography showed a large fistula from the right pulmonary artery communicating with a dilated left atrium. The passage of blood from RPA to the LA was confirmed by agitated saline contrast echocardiography (filling of LA through the fistula within 3 cardiac cycles). A CT scan (Figure 6 chest radiograph and CT image) showed the detailed anatomy. We proceeded with transcatheter device closure of the fistula and an 18mm device (the one designed to close vsds) was deployed under (Figure 7 angiograms) under fluoroscopic and angiographic guidance to occlude it. The patient had a remarkable improvement of symptoms (normal pulse oximetry) post-procedure and at 3 months follow-up, he continues to do well.

Figure 6a: Frontal Chest Radiograph showing no cardiomegaly, normal pulmonary vascularity and rounded radio opacity at right mid cardiac border-outline marked by white arrows

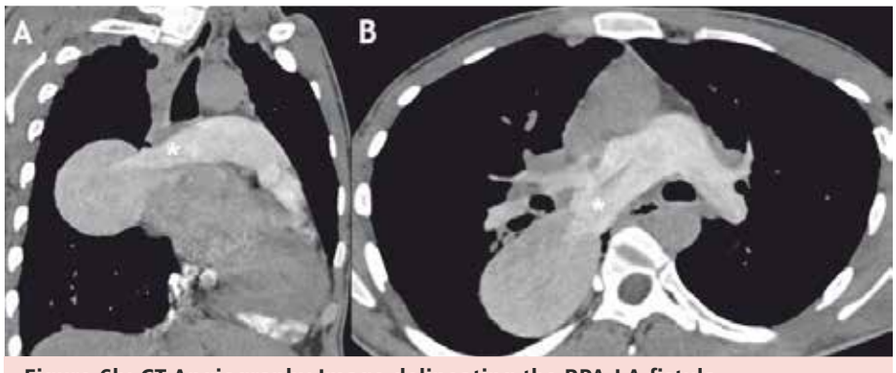

Figure 6b: CT Angiography Image delineating the RPA-LA fistula

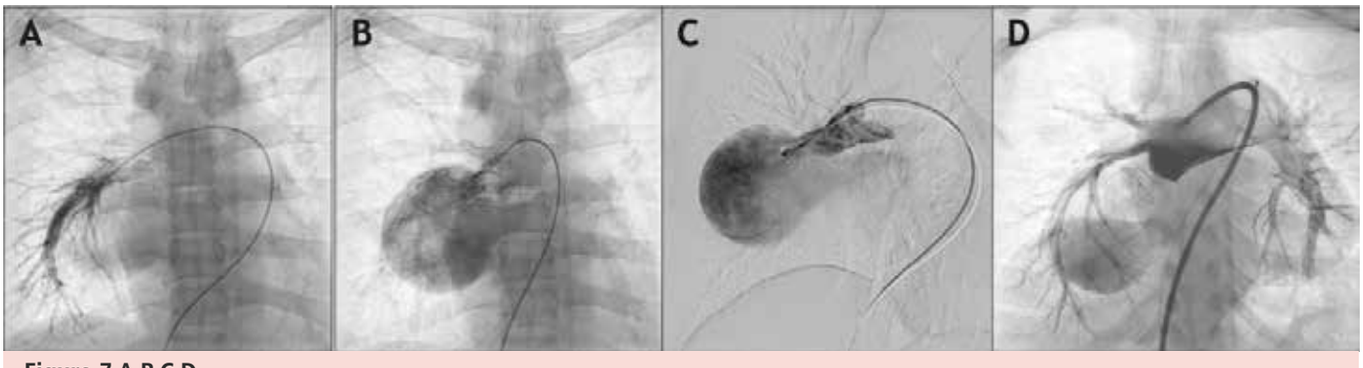

Figure 7 A,B,C,D

A Novel Malignant Anomaly of the Coronary Arteries

Dr Amreen Dhindsa
Associate Consultant - Cardiology
Fortis Hospital, Mohali

Authors:
Harinder Kumar Bali,
Surinder Kumar Bali,
Kapil Kumar Chattree

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A 58-year-old man presented with complaints of retrosternal chest pain and diaphoresis. Electrocardiogram revealed ST depressions in leads V2–V5. Two- dimensional echocardiography revealed an ejection fraction of 45% with moderate mitral regurgitation. Troponin-I levels were 24.1ng/mL (normal 0–0.4 ng/mL). A diagnosis of non-ST-elevation myocardial infarction was made. Coronary angiography revealed triple vessel coronary artery disease along with a unique coronary artery anomaly. The left anterior descending (LAD) had an anomalous high origin above the aortic sinus. The right coronary artery (RCA) originated from the left coronary sinus (LCS), close to the LAD ostium. The left circumflex (LCx) arose as a proximal branch of the anomalous RCA. Multidetector computed tomography (MDCT) was done. The examination was carried out by a 128-slice computed tomography with 0.8 mm acquiring thickness and 0.35 s rotation time. 100 mL of non-ionic contrast was injected at 5 mL/s. In view of atrial fibrillation, image quality was reduced. However, MDCT further confirmed the anomalous origin of RCA from LCS, close to the origin of LAD (Figures 1 and 2). The RCA had a slit-like orifice. It followed an inter-arterial course between the great vessels and continued in the right atrioventricular groove (). The LCx arose as a proximal branch of this anomalous RCA. It followed a retro-aortic course coursing behind the aortic annulus, into the left atrioventricular groove, such that the RCA and LCx formed a girdle around the aorta. The patient underwent coronary artery bypass grafting with saphenous venous graft to LAD and RCA. He later underwent percutaneous intervention to native LCx.

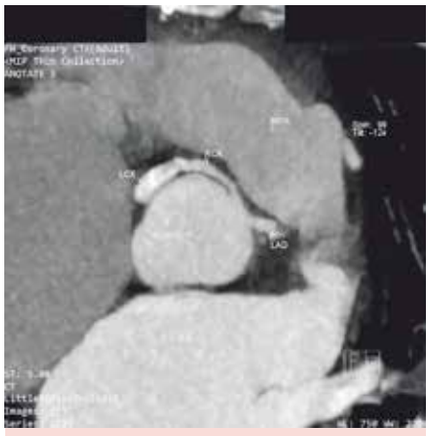


Figure 1: Multidetector computed tomography coronary angiography (two-dimensional axial) showing the anomalous origin of the right coronary artery from the left coronary sinus, close to the origin of the left anterior descending. The proximal part of right coronary artery is seen to follow an inter-arterial course between the aortic root and pulmonary trunk, and continues in the right atrioventricular groove. The left circumflex is seen to arise as a proximal branch of this anomalous right coronary artery and has a retroaortic course, with the proximal right coronary artery and left circumflex forming a loop around the aorta

Reference

Harinder Kumar Bali, Amreen Dhindsa, Surinder Kumar Bali, Kapil Kumar Chattree, A novel malignant anomaly of the coronary arteries (Bali's girdle), European Heart Journal - Case Reports, Volume 5, Issue 6, June 2021, ytab138, https://doi.org/ 10.1093/ehjcr/ytab138

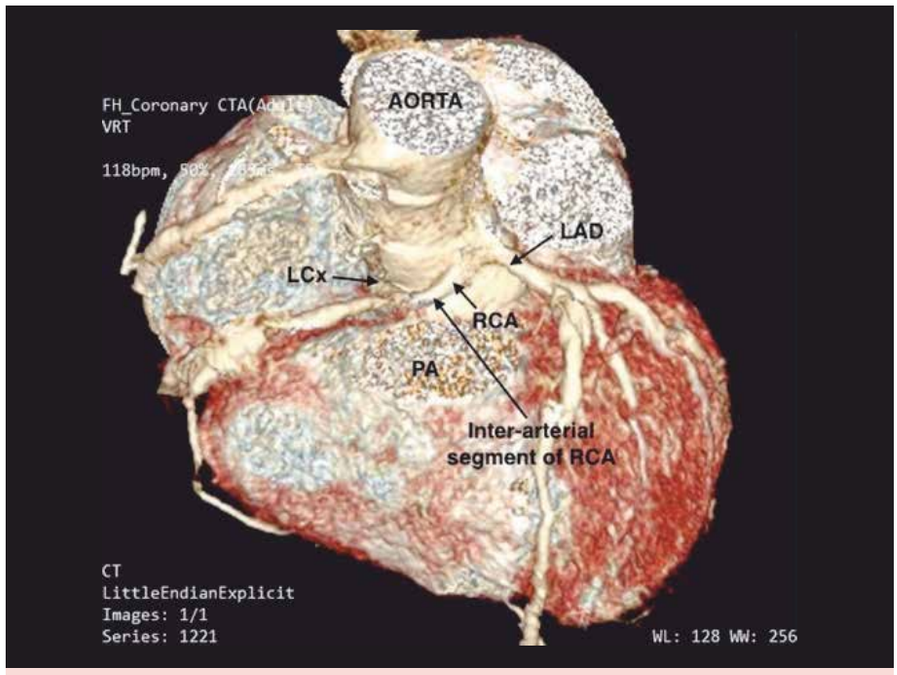


Figure 2: Three-dimensional reconstruction of multidetector computed tomography coronary angiography showing the separate origins of the right coronary artery and left anterior descending from the left coronary sinus. The proximal right coronary artery is seen to follow an inter-arterial course and the left circumflex arises as a proximal branch of the right coronary artery

Complex EPS and RFA with 3D Electro- Anatomical Mapping (EAM) Through Ensite System

Dr Rahul Singhal
Additional Director - Cardiology
and Cardiac Electrophysiology
Fortis Escorts Hospital, Jaipur

A 58 years old female, hypertensive and having non-critical CAD had undergone EPS and RFA in past for typical AVNRT. This time she presented to Fortis Hospital with recurrent palpitations to the extent she was not able to sleep at night with perspiration and ghabrahat.

Her ejection fraction was normal and the ECG revealed Atrial Tachycardia (AT). The patient was planned for EPS and RFA by 3D EAM.

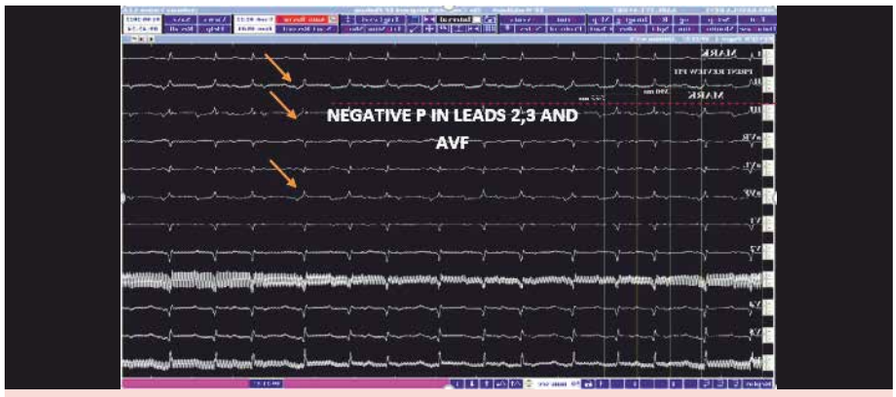
At baseline patient was in sinus rhythm. However, she continued to have episodes of spontaneously induced non-sustained episodes of AT. The catheters were placed in appropriate locations and 3D electro-anatomical geometry of RA, SVC and IVC was created with the help of mapping catheter during tachycardia. HIS area was tagged.

TACHYCARDIA 1

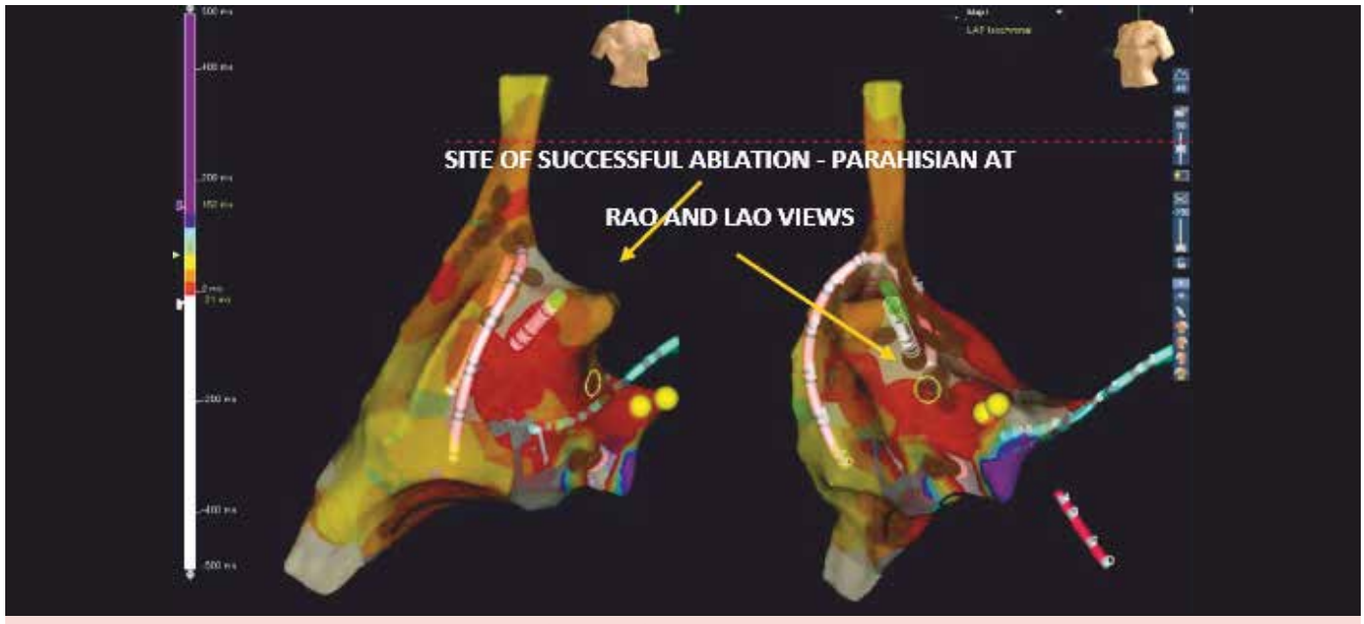
The earliest point of activation was found to be anterior septal area very close to HIS bundle. The tachycardia cycle length was 370 msec with variable 1:1 AV conduction; negative P in the inferior leads and negative/ positive in V1 (Fig.1A). The HIS area was tagged and RF ablation lesions were given at power of 40 W and temp 550 C with thermo-cool irrigation catheter. The tachycardia got terminated during RF application after 8-10 lesions. (Fig 1B).

After the termination of tachycardia (AT 1), programmed electrical stimulation of Right atrium induced another tachycardia

Figure 1: Atrial Tachycardia 1 Para-hisian AT



(A) 12 lead ECG



(B) 3D Right Atrial geometry showing the site of successful ablation

TACHYCARDIA 2

Got induced with different QRS axis. This tachycardia with TCL of 363msec; has inferior axis with positive P in L2,3 and aVF, negative in aVR, isoelectric in aVL and negative component in V1(Fig.2A). Activation mapping of this tachycardia revealed focal point of activation in the RA appendage area on the septal side. RF ablation applications were given in and around this area with power of 45 W and Temp 550 C. The tachycardia terminated during ablation, however returned back after few secs. The line of ablation was further extended down to the area around anterior septum close to previously tagged HIS region. Few lesions around this area finally terminated the tachycardia with no recurrence later on (Fig 2B).

Final Impression

3D Electro-anatomical mapping has become the time tested strategy for EPS and RFA in present era. From simple to complex procedures it makes a very difference. This patient with recurrent severely symptomatic palpitations has totally become asymptomatic at present.

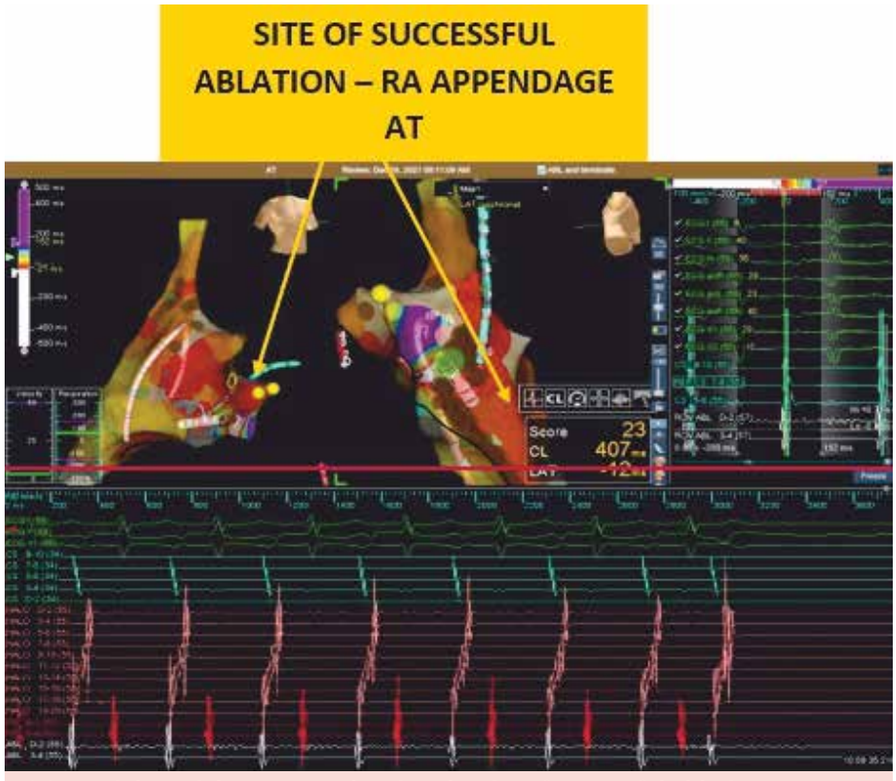
With 3D Electro-anatomical mapping complex procedures get not only more accurate but also safe and less time consuming with dramatic results.

Key Words

Dual Tachycardia, 3D EPS RFA, Ablation, Complex

Figure 1: Atrial Tachycardia 2 RA Appendage AT

(A) 12 lead ECG



(B) 3D Right atrial geometry showing the site of successful ablation

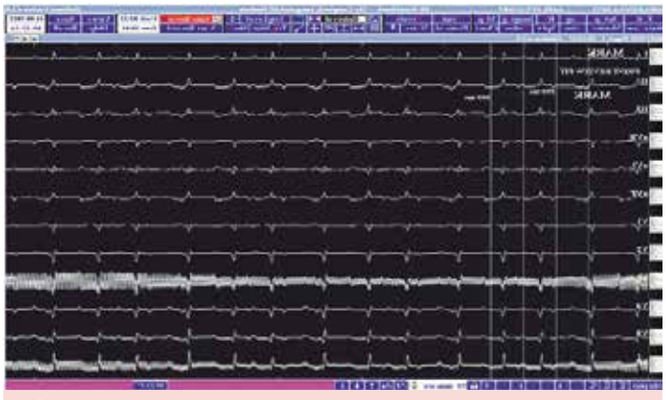


Figure 1

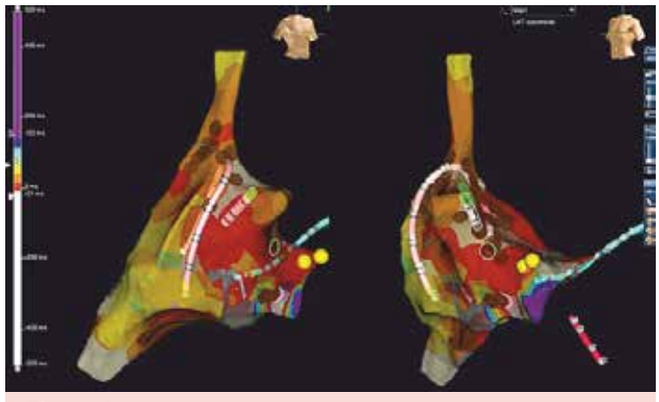


Figure 2