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– 72nd Annual Cardiology Conference

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Coronavirus Updates

WHO APPROVES COVOVAX COVID-19 VACCINE FOR EMERGENCY USE

The World Health Organization (WHO) has issued an emergency use listing (EUL) for Covovax "NVX-CoV2373" produced by the Serum Institute of India under licence from Novavax. Covovax requires two doses and is produced by creating an engineered baculovirus containing a gene for a modified SARS-CoV-2 spike protein. It is a subunit of the vaccine developed by Novavax and the Coalition for Epidemic Preparedness Innovations (CEPI) … *(Source: WHO, December 17, 2021)*

MORE THAN 5 TIMES HIGHER RISK OF REINFECTION WITH OMICRON THAN DELTA

New research from the Imperial College London has found that Omicron was associated with a 5.41-fold higher risk of reinfection compared with Delta suggesting that immunity accorded by previous infection is as low as 19%. Persons who had taken their second vaccine dose 2 or more weeks before and were 2 or more weeks past their booster dose were at an increased risk of developing a symptomatic Omicron case compared to Delta … *(Source: Imperial College, Report 49, December 16, 2021)*

OMICRON MAY BECOME THE DOMINANT STRAIN IN EUROPE EARLY NEXT YEAR

The European Centre for Disease Prevention and Control (ECDC) has stated that the "Omicron variant of concern (VOC) was likely to overtake Delta within the first 2 months of 2022". There is a very high-risk of it becoming the dominant strain in Europe because of its high transmissibility, although data is inadequate at this point of time to actually determine the severity of the infection caused by Omicron variant. Stella Kyriakides European Health Commissioner has expressed concern about the slow vaccination rates in countries like Bulgaria, Romania and Slovakia, where less than 50% of the population has been immunized…. *(Medscape, December 16, 2021)*

THE NEXT-GENERATION SARS-COV-2 VACCINE

The US Army has developed a spike ferritin nanoparticle vaccine, which is expected to protect from other respiratory viruses and not just SARS-CoV-2. The vaccine uses ferritin as a soccer ball-shaped "platform". It has 24 "faces" to which are attached the replicas of the spike proteins through which the virus enters the cells. The vaccine would not require special storage as it is stable at varying temperatures. The first trial of the vaccine in humans has been completed and results are being evaluated. According to Gordon Joyce of the Walter Reed Army Institute of Research in Silver Spring, Maryland, the study lead author said, "*Presenting multiple copies of spike in an ordered fashion may be the key to inducing a potent and broad immune response.*" *(Source: Medscape)*

RISK OF MYOCARDITIS AFTER ADENOVIRUS-BASED COVID-19 VACCINE

Nature Medicine has probably published the first report of risk of acute myocarditis with an adenovirus-vector vaccine. The incidence rate ratios (IRRs) for myocarditis 1 to 7 days after the first AstraZeneca, Pfizer, and Moderna injections were 1.76, 1.45, and 8.38, respectively, and 23.1 after the second dose of the Moderna vaccine… *(Source: Medscape, December 16, 2021)*

COMPULSORY VACCINATION FOR HEALTHCARE WORKERS IN GERMANY

Healthcare workers at hospitals, doctor's offices and nursing homes in Germany are now required by law to get the Covid-19 vaccine. They must prove that they are vaccinated or have recovered from COVID-19 by mid-March as part of new legislation passed by the parliament on Friday. The new legislation allows closure of bars and restaurants and banning of large gathering events. Health Minister Karl Lauterbach, "It's absolutely unacceptable that in establishments where people live, who put their trust in us to protect them, that people are unnecessarily dying because unvaccinated work there."… *(Medscape, December 13, 2021)*

Common Coronary Anomalies on MDCT

RAMA MURTHY SK*, MAHESH C*, AMARESH RAO M†, SUJATA PATNAIK*

ABSTRACT

Coronary artery anomalies are rare, and the incidence is around 1 to 2% in the general population. Majority of the patients are asymptomatic and detected while investigating another clinical issue. A few anomalies may be life-threatening due to the malignant course with potential for ischemia and even sudden death. Multidetector computed tomography (MDCT) has high accuracy in detecting these anomalies because of volume rendering (VR) and multiplanar reconstruction (MPR). 'High take-off', origin of the coronary artery from the opposite or noncoronary cusp with anomalous course and coronary artery fistula are three most frequent anomalies. MDCT can be a useful screening tool in the study of coronary anomalies.

Keywords: Coronary artery anomalies, MDCT, high take-off

Coronary artery anomalies are rare, and the incidence is around 1 to 2% in the general population. Multidetector computed tomography (MDCT) has high accuracy in detecting these anomalies because of volume rendering (VR) and multiplanar reconstructions (MPRs). Majority of the patients are asymptomatic and detected while investigating another clinical issue. A few anomalies may be life-threatening due to the malignant course with potential for ischemia and even sudden death. Moreover, failure to cannulate these vessels during conventional angiography can be minimized if the existence of these anomalies is known to the operator. This article presents an unpublished retrospective case series and review of literature of common coronary anomalies detected on MDCT.

At Nizam's Institute of Medical Sciences (NIMS), Hyderabad, 770 patients underwent CT-conventional coronary angiography (CAG), on 128-slice single source MDCT (SOMATOM Definition AS ± SEIMENS) during the last 3 years (unpublished data). On analysis, coronary artery anomalies were found in 23 patients (3%). Their ages ranged from 25 to 82 years. Majority of the cases were in 51 to 60 years age group. Among them, 17 were males. The most common anomaly seen was high take-off of coronary arteries, seen in 10 cases. Of them, 2 were having high origin of right coronary artery (RCA) (Fig. 1), 7 were having high origin of left main coronary artery (LMCA) and one was having high origin of both coronary arteries with acute kink at the origin of RCA. Anomalous origin of coronary artery from opposite sinus was seen in 8 cases (Figs. 2-5). RCA from left coronary sinus with interarterial course between aorta and right ventricular outflow tract was seen in 5 cases. Anomalous origin of left coronary artery (LCA) from right coronary sinus with interarterial course between aorta and right ventricular outflow tract was seen in 2 cases. Anomalous origin of left circumflex artery (LCx) from right coronary sinus with retroaortic course was seen in 1 case (Fig. 6). Separate ostia for left anterior descending artery (LAD) and LCx was noted in 3 patients (Figs. 7 and 8). Shepherd crook deformity of proximal segment of RCA was seen in 1 patient. Super-dominant RCA with absent LCx was seen in 1 patient (Fig. 9).

Figure 1. Two different patients of 'high take-off' of LCA in patient aged 61/M and RCA in patient aged 58/M.

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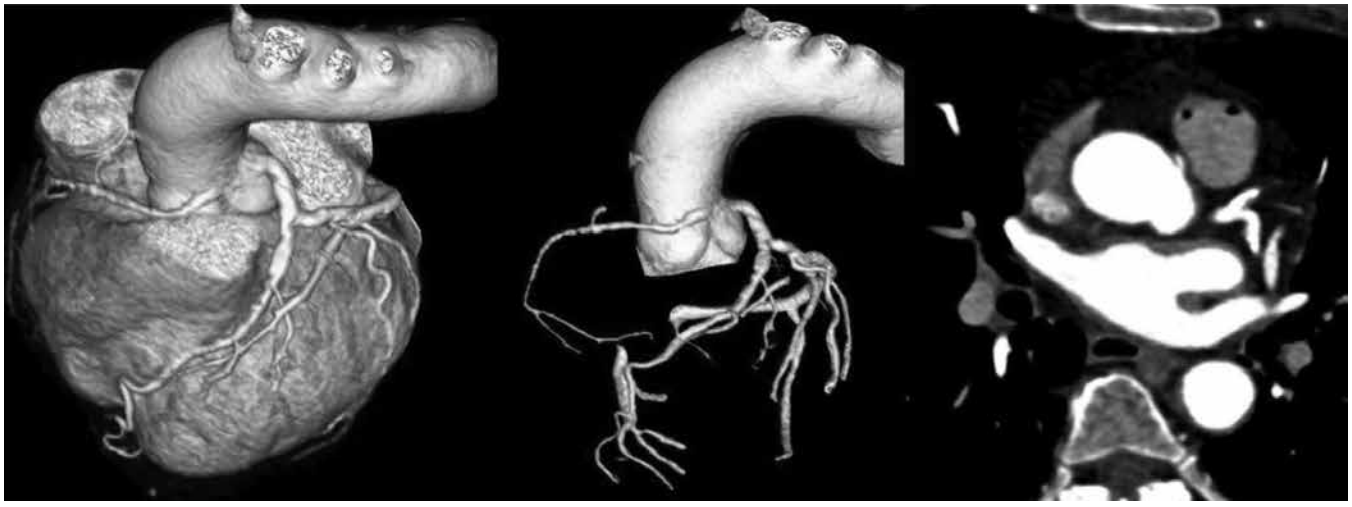

Figure 2. VRT and axial images of a patient (55/F) showing RCA originating from left coronary sinus of Valsalva. Course of RCA is interarterial.

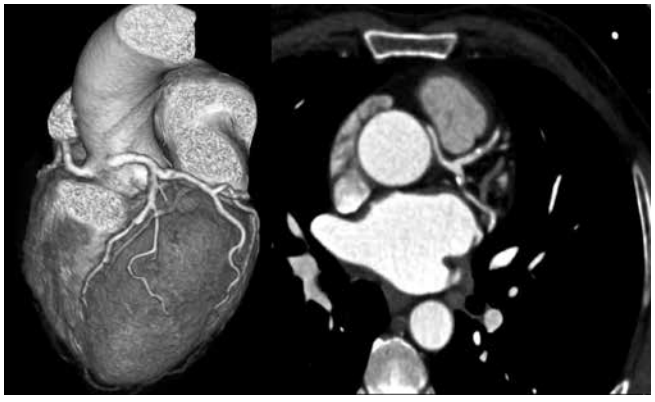

Figure 3. VRT and axial images of a patient aged 59/M depicting the origin of LCA from RCA having interarterial course.

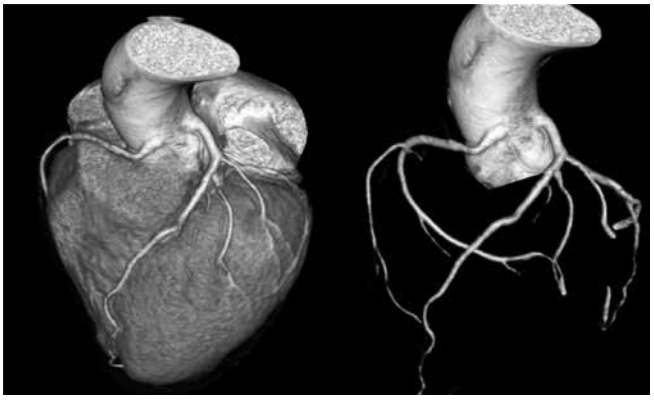

Figure 4. Origin of RCA and LCA from left coronary sinus in a patient aged 35/M.

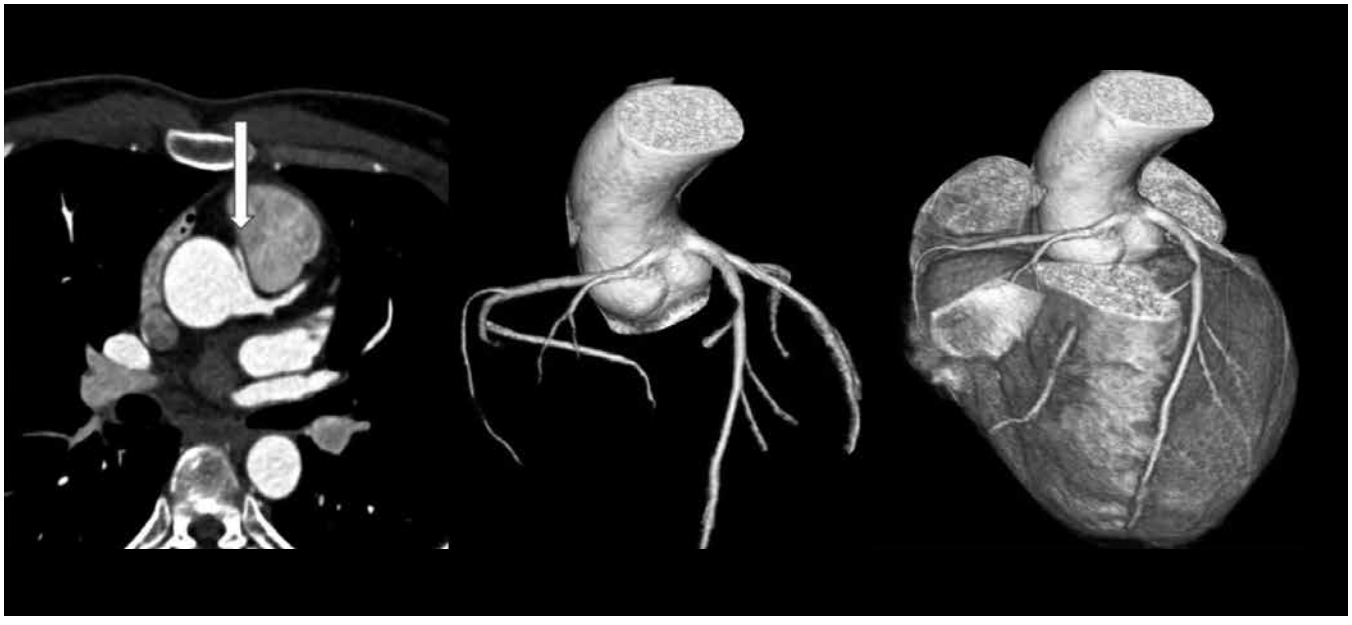

Figure 5. Origin of RCA and LCA from left sinus of Valsalva with interarterial course of RCA in a patient aged 25/M.

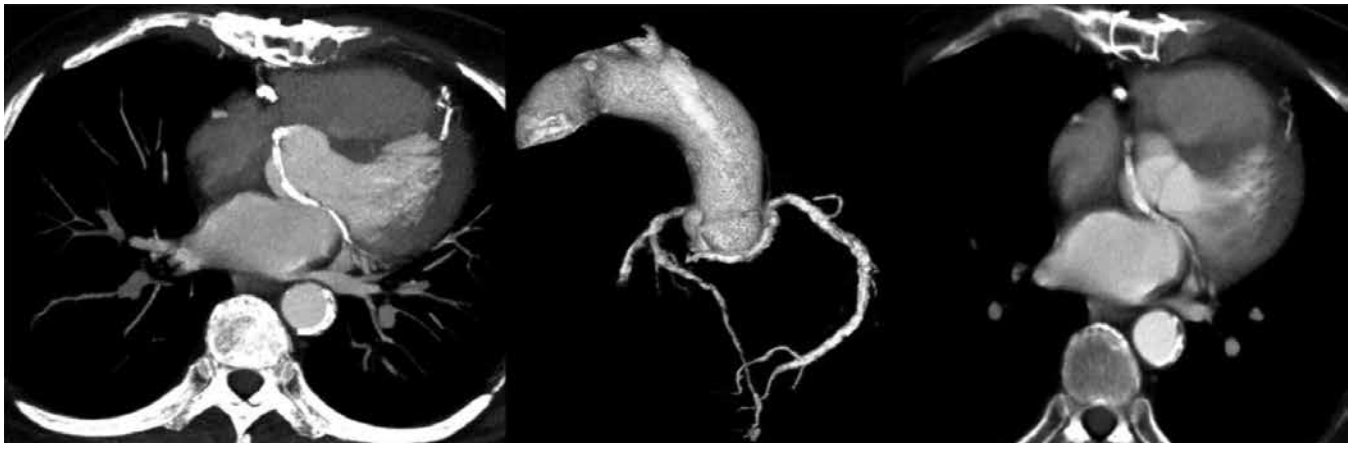

Figure 6. LCx is originating from right coronary sinus with retroaortic course in axial and VRT images of patient aged 82/M.

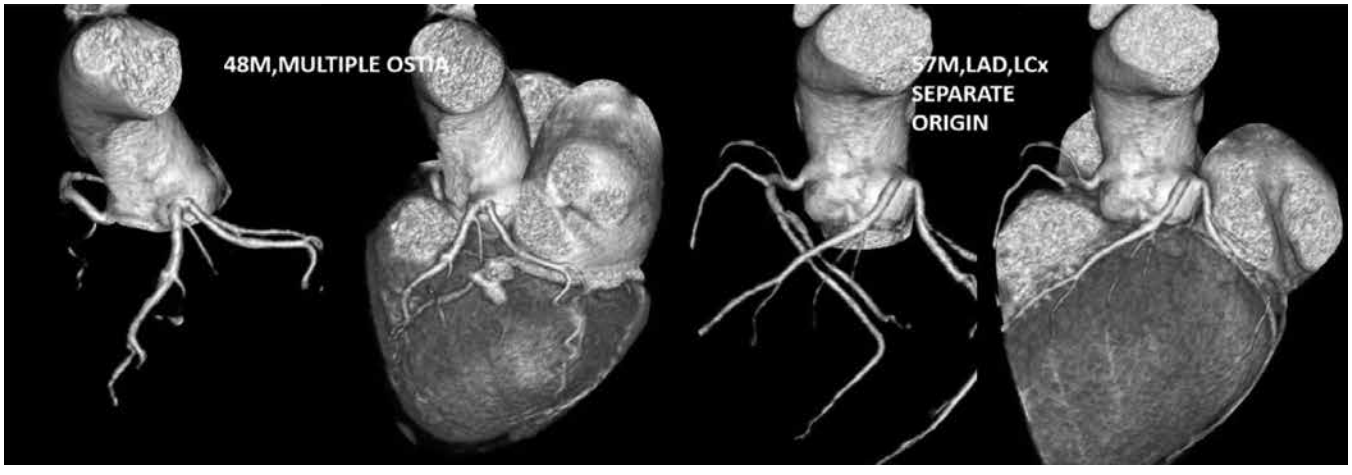

Figure 7. Two patients aged 48/M and 57/M, CT-CAG VRT images showing separate origin of LAD, LCx and there is no LMCA.

Figure 8. Separate origin of LAD and LCx in a patient aged 71/M.

Figure 9. A patient aged 52/F having super-dominant RCA. LCx is absent.

The prevalence of coronary anomalies is reported to be approximately 0.3 to 1% in various studies.[1] Due to lack of uniformity of diagnostic criteria, the true incidence is not known. Any coronary pattern with deviation in the number of ostia, variation in the sinus of origin, the course that is not common in the general population, can be counted as an anomaly. It is important to categorize them as major or minor depending on their potential for clinical consequence. With advances in noninvasive imaging, more anomalies are getting diagnosed compared to autopsies or invasive cine-angiograms. Recent advances in MDCT technology with 100%

sensitivity in detecting these anomalies, have made it a more acceptable diagnostic tool. Although majority of the anomalies are benign with conceptual and educational interest, a few have potential for ischemic symptoms, and even sudden cardiac death especially during exercise or during competitive sports. The anomalies associated with structurally abnormal hearts have to be a special group due to their importance during the surgical correction. It is most convenient to consider the isolated coronary anomalies as − 1) Anomalies of the origin and course (High origin, ostia in unexpected sinus, single coronary artery, separate LAD and LCx, etc.); 2) Anomalies of the intrinsic anatomy (Coronary ectasia, hypoplasia, total absence, etc.); and 3) Anomalies of termination (Coronary-cameral fistulae, etc.).

The authors observed coronary anomalies in 3% that is 23 out of 770 cases using 124 slice MDCT. In a study, 6,014 consecutive patients that underwent 64 slice MDCT were analyzed by Yang et al and coronary anomalies were found in 66 (1.09%) patients. All had one or more symptoms like chest pain, dyspnea, palpitations, arrhythmias and myocardial infarction. They found high take-off, origin of the coronary artery from the opposite or noncoronary cusp with anomalous course, and coronary artery fistula as three most frequent anomalies. They opined that due to VR technique in CT angiograms they identified a few lesions, which were not clear in conventional cineangiograms.[2]

Most common anomalies are high origin of coronaries from aorta with a normal course. There are cases when RCA arises few millimeters above sinotubular junction, but distance of 2 cm has also been recorded.[3] In our experience, there were 10 (1.3%) out of 770 cases with high take-offs. High take-off usually has no clinical problems but may cause difficult cannulation. Incidence is 0.60% as per a study by Fujimoto et al in their series of 5,869 cases.[4]

Multiple ostia of right and left coronaries can be considered as important anomalies. RCA and conus branch may arise separately. Similarly, LAD and circumflex arise separately with no LCA, which accounts for small percentage with normal course. Incidence of separate ostia for LAD and LCx from left coronary sinus was 0.26% in a series.[4] In our series, we had 3 cases of separate origin of LAD and LCx accounting for 0.39%.

Origin of coronary artery or branch from the opposite or noncoronary sinus is another anomaly that is commonly observed. These anomalies are classified into 4 types. One is interarterial course between aorta and pulmonary artery. Second one is retroaortic course. Third is prepulmonic and septal or subpulmonic course. The interarterial course is clinically important as it is associated with sudden death.[5] Fujimoto et al, in their series of 5,869 cases, noted that 29 cases had opposite coronary sinus and in 27 of these cases RCA arose from left coronary sinus.[4] All these cases had interarterial course. It is reported that 30% of these have sudden cardiac death. Anomalous origin of coronary artery from opposite sinus was seen in 8 cases accounting for 1.04%. RCA from left sinus were 5 and LCA from right coronary sinus were 2 with interarterial course. In 1 case, LCx was arising from right coronary sinus with retroaortic course.

Finocchiaro et al in their study of 5,100 cases found anomalous coronary arteries in 0.6%. Anomalous left coronary artery (ALCA) arising from right sinus of Valsalva with interarterial course (11) and RCA originating from left sinus of Valsalva (RACA) with interarterial course (11) were most commonly found. ALCA arising from pulmonary artery was present in 7 cases and in 1 case, the LCA arose from noncoronary sinus.[6] In a similar study by Nguyen, the incidence of anomalies was 47 out of 9,572 cases (0.49%). LCx from RCA/right sinus of Valsalva was seen in 31.9%. High take-off of RCA was seen in 23.4%, RCA from left coronary sinus was noted in 17% and LCA from right coronary sinus was seen in 10.6%.[7] Approximately 1.04% of our cases had anomalous origin of coronary artery (5 RCA and 2 LCA, and in 1 LCx was originating from right coronary sinus with retroaortic course).

Super-dominant RCA with absent LCx artery is an exceedingly rare congenital anomaly that can be confused with atherosclerotic total occlusion. There are a few such case reports in the literature.[8] We observed one such case of super-dominant RCA with absent LCx. Single coronary artery is extremely rare with prevalence of 0.09% (5 out of 5,869 cases) in a study by Fujimoto et al.[4] Its clinical implication is complex when the patient develops atherosclerosis in the proximal segment and it can be a challenging situation for either angioplasty or coronary artery bypass grafting (CABG).

CONCLUSION

Due to the noninvasive nature of the modality and the advantage of VR and MPR techniques, MDCT can be a useful and preferred screening tool in the study of coronary anomalies.

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■■■■

An Observational Study on Incidence of Ischemic Mitral Regurgitation Following First-time Acute Coronary Syndrome

S SARAVANAMOORTHY*, N VIJAYAKUMAR†, R UMARANI‡

ABSTRACT

Aims and objectives: To study the incidence of ischemic mitral regurgitation (IMR) following first episode of acute coronary syndrome (ACS) and to study the correlation between IMR and infarct location. **Methods:** Patients admitted in coronary care unit (CCU) of Rajah Muthiah Medical College and Hospital (RMMCH) during the period of January 2019 to March 2019 were screened. After satisfying the inclusion and exclusion criteria, 48 patients were enrolled in the study. The demographic details, risk factors for coronary artery disease (CAD), clinical findings, ECG findings, course in hospital, outcomes (till 10 days from admission) were recorded in a specially designated proforma. All these patients underwent ECHO imaging and the incidence of IMR was evaluated. **Results:** Out of 48 patients enrolled in our study, 25% (n = 12) of patients were found to have IMR. Among the patients with IMR following ACS, 75% had inferior wall myocardial infarction (IWMI) and 25% had anterior wall myocardial infarction (AWMI). **Conclusion:** Mild functional IMR following ACS is a very common finding on echocardiographic analysis. It was found to be more likely in elderly, diabetics and dyslipidemics. Patients with IWMI with right ventricular extension are more prone for IMR.

Keywords: Mitral regurgitation, ischemic mitral regurgitation, acute coronary syndrome

Mitral regurgitation (MR) is a well-known complication of myocardial infarction. It can occur either in patients with long-standing coronary artery disease (CAD) or in the setting of acute myocardial ischemia.

Ischemic mitral regurgitation (IMR) is a frequent complication of acute myocardial infarction, with a variable presentation depending on the severity of MR and the integrity of the subvalvular apparatus. While most cases are asymptomatic or have mild dyspnea, rupture of chordae tendineae or papillary muscles are catastrophic complications that may rapidly lead to cardiogenic shock and death. Echocardiography is the definite diagnostic modality, allowing quantification of the severity of MR and the structural abnormalities within the subvalvular apparatus.

In our study, we studied the profile of patients with IMR following an acute coronary syndrome (ACS) in whom the valve leaflets were structurally normal.

AIMS AND OBJECTIVES

- To study the incidence of IMR following first episode of ACS.
- To study the correlation between IMR and infarct location.

Inclusion Criteria

- Patients admitted in CCU for the first time with a diagnosis of ACS.

Exclusion Criteria

- Previous history of ACS/heart failure.
- Organic mitral valve diseases (rheumatic heart disease [RHD], mitral valve prolapse syndrome [MVPS], autoimmune diseases).
- History of mitral valve surgery.

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METHODS

Patients admitted in coronary care unit (CCU) of Rajah Muthiah Medical College and Hospital (RMMCH) during the period of January 2019 to March 2019 were screened. After satisfying the inclusion and exclusion criteria, 48 patients were enrolled in the study. The demographic details, risk factors for CAD, clinical findings, ECG findings, course in hospital, outcomes (till 10 days from admission) were recorded in a specially designated proforma. All these patients underwent echocardiographic imaging and the incidence and severity of MR were noted. The presence and degree of MR were evaluated using the proximal isovelocity surface area method. The ejection fraction was measured using the Simpson's method. Statistical analysis was done using the SPSS software. Figure 1 depicts an ECHO image showing IMR.

RESULTS AND ANALYSIS

- Incidence of IMR in patients with first episode ACS in our hospital was 25%.

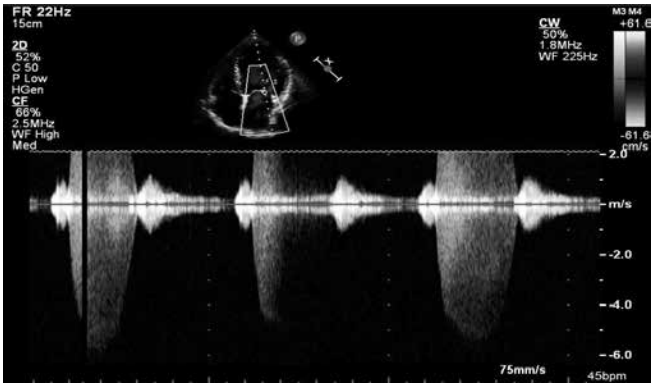

Figure 1. ECHO image showing IMR (continuous wave Doppler).

Table 1. Patient Characteristics

Variables		MR		Pearson Chi-square	P value
		Present	Absent		
Age	<60 years	3	20	3.346	0.067
	>60 years	9	16		
Dyslipidemia	Present	12	34	0.658	0.417
	Absent	0	2		
Diabetes mellitus	Present	10	15	6.211	0.013*
	Absent	2	21		
Systemic hypertension	Present	3	12	0.356	0.551
	Absent	9	24		
BMI	Under weight	2	5	4.726	0.094
	Normal Weight	3	21		
	Over weight	7	10		
Smoking	Present	3	7	0.247	0.616
	Absent	9	29		
Type of MI	IWMI	3	9	1.133	0.287
	IWMI with RV extension	6	12		
	AWMI	3	15		
Level of cardiac enzymes	Normal	3	6	0.247	0.613
	Increase	9	30		
Killip class	I	1	9	3.656	0.299
	II	6	8		
	III	3	10		
	IV	2	9		

*Statistically significant ($p < 0.05$).

- All patients with MR (n = 12) had dyslipidemia.
- Incidence of IMR in patients with diabetes mellitus was higher (n = 10) than the incidence of IMR in nondiabetic patients (n = 2), which was statistically significant (p = 0.013).
- Systemic hypertension, body mass index (BMI), smoking, level of cardiac enzymes had less effect on incidence of IMR (Table 1).

DISCUSSION

- IMR was found in 25% of ACS patients in our study population, which is in accordance with older studies.
- It was found to be higher in older age group, diabetics, dyslipidemics and IWMI with right ventricular extension patients, which was consistent with previous studies.

CONCLUSION

Mild functional IMR following ACS is a very common finding on echocardiographic analysis. It was found to be more likely in elderly, diabetics and dyslipidemics.

SUGGESTED READING

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CLINICAL STUDY

Correlation of Paroxysmal and Persistent Cardiac Arrhythmias with Clinical and Echocardiographic Parameters in Patients of Rheumatic Fever and Rheumatic Heart Disease

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ABSTRACT

Introduction: Acute rheumatic fever (ARF) is a multi-system disease caused by an abnormal immunological response after Group A β-hemolytic streptococcus (GABHS) infection. Arrhythmias, atrial fibrillation (AF) occurring in patients of rheumatic heart disease (RHD) are associated with increased risk of stroke. In the Framingham Heart Study, patients with RHD and AF had a 17-fold increased risk of stroke compared with age-matched controls, and the attributable risk was 5 times greater in those with nonrheumatic AF. **Material and methods:** A total of 92 patients of ARF and RHD from Medicine OPD, Medicine IPD, CCU, Cardiology OPD, Pediatrics OPD, Pediatrics IPD of a tertiary care hospital in North India were recruited in this study. A detailed history, physical examination and routine investigations were carried out. Ambulatory 24-hour Holter recordings were obtained in a standard fashion with 3-channel PC card recorders in all patients. **Results:** Of the 92 patients studied, 84 had RHD and 8 had rheumatic fever (RF). Maximum number of patients was in the age group 31-40 years. On echocardiography, range of left atrial diameter was 32-81 mm with mean of 50.45 ± 11.27 mm. Thirteen patients were found to have paroxysmal AF detected on Holter monitoring. Thirty-nine patients were found to have pauses detected on Holter monitoring. Out of these, 25 patients were found to have pauses >2.5 seconds. Forty-eight had episodes of paroxysmal supraventricular tachycardia (PSVT) detected on Holter. Seventy-two patients were found to have premature ventricular contractions (PVCs) on ambulatory ECG monitoring. Twenty-five patients had Holter detected episodes of bigeminy; 29 patients had episodes of nonsustained ventricular tachycardia (NSVT) detected on Holter. The association of arrhythmias with age was evaluated. Pauses, PSVT, AF and NSVT were found to have a significant association with advanced age. Severity of mitral stenosis was significantly associated with presence of AF and PVCs. Severity of mitral regurgitation was significantly associated with AF. Eight patients had acute RF and all patients were in New York Heart Association (NYHA) Class I. The PR interval was prolonged in 2 patients and was within normal limits in 6 patients. Pauses >1.5 seconds were detected in 2 patients. The duration of the longest pause was 1.60 seconds. **Conclusion:** RHD is a significant health problem in our region. It commonly affects young patients, compromising the workforce of a country. Only more symptomatic, severe cases belonging to higher functional classes report to hospital. Around one-third of patients are already in AF when they first seek treatment. Even in those patients who are in sinus rhythm, various arrhythmias can be detected on Holter monitoring.

Keywords: Acute rheumatic fever, arrhythmias, atrial fibrillation, rheumatic heart disease, echocardiography

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Acute rheumatic fever (ARF) is a multi-system disease caused by an abnormal immunological response after Group A β-hemolytic streptococcus (GABHS) infection. In 30-50% of cases, recurrent episodes of rheumatic fever (RF) may lead to chronic rheumatic heart disease (RHD), with progressive and permanent damage of the cardiac valves. The associated cardiac morbidity of RF with possible sequelae of heart failure, development of atrial fibrillation (AF), systemic embolism, transient ischemic attacks, strokes, endocarditis, the need

for interventions including cardiac surgery and impaired quality-of-life, and shortened life expectancy, impose a heavy burden and has major implications for the individual.

Arrhythmias, AF occurring in patients of RHD are associated with increased risk of stroke. In the Framingham Heart Study, patients with RHD and AF had a 17-fold increased risk of stroke compared with age-matched controls, and the attributable risk was 5 times greater in those with nonrheumatic AF. Holter monitoring is one of the most effective noninvasive clinical tools in the diagnosis and assessment of cardiac symptoms, prognostic assessment or risk stratification of various cardiac populations and in the evaluation of many cardiac therapeutic interventions. Data are limited regarding prevalence of arrhythmias in RHD patients and Holter monitoring is not part of their routine diagnostic work-up. The present work aims to study cardiac arrhythmias by Holter monitoring in patients of RF and RHD.

MATERIAL AND METHODS

This was an open-label, cross-sectional, hospital-based study. A total of 92 patients of ARF and RHD from Medicine OPD, Medicine IPD, CCU, Cardiology OPD, Pediatrics OPD, Pediatrics IPD of a tertiary care hospital in North India were recruited in this study. A detailed history and physical examination were carried out. Investigations carried out included, complete hemogram, blood urea, serum creatinine, urine analysis, liver function test, chest X-ray, electrocardiography (ECG), echocardiography and Doppler study. In patients of RF, additional investigations carried out were erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), serological examination for streptococcal antibodies (antistreptolysin-O, antideoxyribonuclease B), throat culture or rapid antigen test for Group A streptococcus.

Ambulatory 24-hour Holter recordings were obtained in a standard fashion with 3-channel PC card recorders in all patients. All Holter recorders were subsequently analyzed using specialized software. All results were then visually analyzed to correct for artefact and any erroneous analysis.

STATISTICAL ANALYSIS

All statistical data were analyzed by using SPSS software version 20. Continuous variables were expressed as mean ± standard deviation (SD, Gaussian distribution) or range while proportions were expressed as percentages. Chi-square test was used for comparison of categorical variables between the groups, while unpaired *t*-test for independent samples was used for comparing continuous variables between two groups. Values of $p < 0.05$ were considered statistically significant.

RESULTS

Of the 92 patients studied, 84 had RHD and 8 had RF. Maximum number of patients was in the age group 31-40 years. Mean ± SD of age of RHD patients was 34.52 ± 14.47 years (range 13-76 years). Median age was 35 years.

Twenty-eight patients (33.33%) were males and 56 (66.67%) were females. Among the 56 females, 26.8% were seen in 31-40 years age group and around 8% were seen in more than 50 years age group. The most common valvular lesion in RHD patients was mitral stenosis seen in 73 (86.9%) patients, followed by mitral regurgitation seen in 64 (76.2%) patients. Almost equal number of patients had aortic regurgitation and tricuspid regurgitation, which was seen in 25 (29.8%) and 24 (28.6%) patients, respectively. Aortic stenosis was seen in 3 (3.54%) patients. None of the patients had tricuspid stenosis or involvement of pulmonary valve.

On echocardiography, range of left atrial diameter was 32-81 mm with mean of 50.45 ± 11.27 mm. Maximum mitral valve area was 4.40 cm^2 and minimum was 0.60 cm^2 with mean of 1.41 ± 1.15 cm^2. Range of ejection fraction was 18-76% with mean of 58.79 ± 10.44% (Table 1).

Figure 1 depicts scatter diagram showing plot of age and left atrial diameter on Echo of RHD patients.

Among the 53 patients who had sinus rhythm on baseline ECG, 13 patients were found to have paroxysmal AF detected on Holter monitoring. Out of 84 RHD patients, 39 patients were found to have pauses detected on Holter monitoring. Out of these 39, 25 patients were found to have pauses >2.5 seconds. Among 39 patients who had pauses detected on Holter monitoring, 26 had chronic AF. Presence of pauses was strongly associated with AF ($p < 0.001$). Among 13 patients who

Table 1. Echocardiography Findings

	Minimum	Maximum	Mean	SD
LA diameter (mm)	32.00	81.00	50.45	11.27
MVA (cm^2)	0.60	4.40	1.41	1.15
EF (%)	18.00	76.00	58.79	10.44

LA = Left atrial; MVA = Mitral valve area; EF = Ejection fraction.

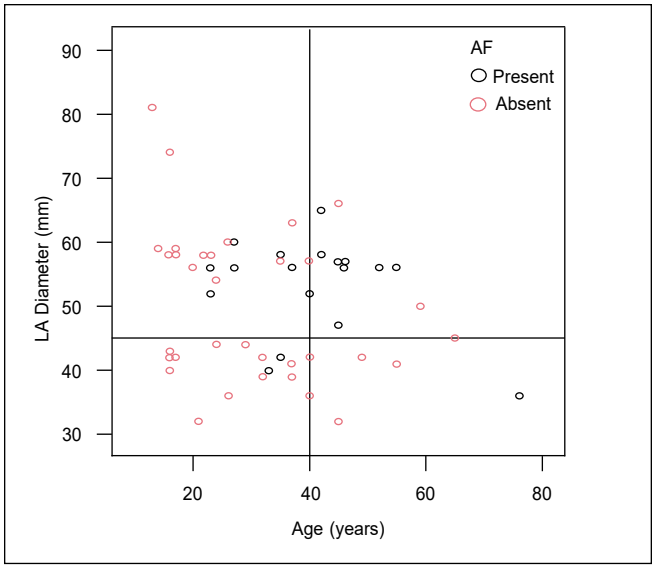

Figure 1. Scatter diagram showing plot of age and left atrial diameter on Echo of RHD patients.

Table 2. Presence of Atrial Fibrillation in Relation to Pauses on Holter Monitoring

		Atrial fibrillation		Total
		Present	Absent	
Pause	Present	26	13	39
	Absent	5	40	45
Total		**31**	**53**	**84**

had pauses and were in sinus rhythm, 2 were found to have paroxysmal AF (Table 2).

Out of 84 patients, 48 had episodes of paroxysmal supraventricular tachycardia (PSVT) detected on Holter. Seventy-two patients were found to have premature ventricular contractions (PVCs) on ambulatory ECG monitoring. Twenty-five patients had Holter detected episodes of bigeminy and 29 patients had episodes of nonsustained ventricular tachycardia (NSVT) detected on Holter (Table 3).

The association of arrhythmias with age was evaluated. Pauses, PSVT, AF and NSVT were found to have a significant association with advanced age. There was an appreciable increase in these arrhythmias after the age of 40 years. Association of arrhythmias with increasing New York Heart Association (NYHA) class was found to be significant for pauses, PSVT, AF, couplets, bigeminy and trigeminy. Severity of mitral stenosis was significantly associated with presence of AF and PVCs. Severity of mitral regurgitation was significantly associated with

Table 3. Arrhythmias Seen in RHD Patients

Arrhythmia	No. of patients, n (%)
Pauses	39 (46.7)
PSVT	48 (57)
AF	31 (37)
Paroxysmal AF	30 (35.7)
PVC	72 (86)
Couplets	52 (62)
Bigeminy	25 (30)
Trigeminy	17 (20)
NSVT	29 (35)

Table 4. Association of Arrhythmias with Different Parameters

Parameter	Association	P value
Age	Yes	<0.001
NYHA class	Yes	0.032
Severity of MS	Yes	0.007
Severity of MR	No	0.110
Severity of TR	No	0.06
Severity of AS	No	0.596
Severity of AR	No	0.209

MS = Mitral stenosis; MR = Mitral regurgitation; TR = Tricuspid regurgitation; AS = Aortic stenosis; AR= Aortic regurgitation.

AF. Severity of tricuspid regurgitation was found to have significant association with presence of bigeminy and NSVT. No association was found between severity of aortic stenosis/aortic regurgitation and cardiac arrhythmias. Arrhythmias significantly associated with left atrial diameter >45 mm were pauses, AF, PVCs, bigeminy, trigeminy and NSVT (Table 4).

Paroxysmal AF was found to have a statistically significant association with advanced age, higher NYHA functional class and severity of mitral stenosis.

In our study, 8 patients had ARF. All patients were in 11-20 years age group. Mean ± SD of age of RHD patients was 13.25 ± 1.17 years with range of 12-15 years. Out of 8 patients in the RF group, 5 were females and 3 were males. Fever was the commonest clinical manifestation seen, being present in 7 (87.5%) patients. Among the major manifestations, polyarthritis and carditis were

the commonest, both being present in 6 (75%) patients. One patient had chorea. None of the patients had erythema marginatum or subcutaneous nodules. Two out of 8 patients gave prior history of sore throat infection 1-5 weeks before disease onset. Six out of 8 patients had mild mitral regurgitation, which was confirmed on echocardiography.

No other valvular involvement was seen. All patients were in NYHA Class I. The PR interval was prolonged in 2 patients and within normal limits in 6 patients. No advanced degree atrioventricular block was observed. None of the patients had junctional rhythm. Two patients had ventricular premature contractions in 24-hour ECG. In none of the patients, ventricular couplets were present and no ventricular runs were detected. Pauses >1.5 seconds were detected in 2 patients. The duration of the longest pause was 1.60 seconds. No patient had AF, PSVT or ventricular tachycardia.

DISCUSSION

Rheumatic heart disease is the world's most common acquired cardiovascular disease. Worldwide, this disease is the leading cause of heart failure in children and young adults, resulting in disability and premature death and severely affecting the workforce in the developing nations. Because secondary prevention can prevent adverse outcomes, early echocardiography-based identification of silent RHD (showing no clinical signs) with minimal valve lesions by active surveillance programs might be of major importance. In the present study, the commonest valvular lesion among RHD cases was combined mitral stenosis with mitral regurgitation, seen in 22 (26.2%) RHD cases, which was similar to the findings of Joseph et al and Melka A where this pattern was seen in 25.4% cases. However, other studies have reported mitral regurgitation to be the commonest valvular presentation in RHD cases. The differences in the pattern of involvement of valvular lesion could be possibly due to the difference in the age of subjects in various studies.

The mean left atrial diameter in our study was 50.45 ± 11.27 mm which was similar to the findings of Banerjee et al who found it to be 54.25 ± 1.48 mm. In current study, AF was present in 31 (37%) RHD patients on baseline ECG. Other studies have found rates ranging between 5.9% and 40%. Paroxysmal AF was detected on Holter in 13 out of 53 patients who had sinus rhythm on baseline ECG. This finding of 24% in our study was similar to the findings of 27% by Karthikeyan et al and 22.2% by Ramsdale et al.

PVCs occurred in 72 (85.7%) RHD patients, with couplets in 52 (62%) patients, bigeminy in 25 (29.7%) and trigeminy in 17 (20.2%) patients. This was similar to the findings of Ramsdale et al who found PVCs in 87.3% patients in a study done in Liverpool, UK. In our study, pauses were found in 39 (46.7%) patients detected on Holter monitoring. In a study done by Uebis et al to study asystolic pauses in 100 patients having AF by Holter monitoring, pauses longer than 2 seconds occurred in 57% of patients, but longer than 4 seconds only in 6 cases. They also found that a statistically higher frequency was seen in patients with permanent (78.3%) than in those with paroxysmal (24.5%) AF, and in patients with rheumatic valve disease (82.4%) in comparison with the rest (54.3%). They noted asystoles of up to 4 seconds duration in AF can be regarded as "normal" and longer asystoles must be anticipated particularly in patients with rheumatic valvular disease. It is only here that permanent pacemaker therapy appears to be indicated.

Pauses, PSVT, AF and NSVT were found to have a significant association with advanced age and were found to be more common in patients over 40 years of age. Paroxysmal arrhythmias were also found to be more common in advanced age by Ramsdale et al. Significant association of arrhythmias was found with increasing NYHA class for pauses, PSVT, AF, couplets, bigeminy and trigeminy. The possible explanation could be that patients who are having paroxysmal arrhythmias are more symptomatic and thus belong to higher NYHA functional class. Besides, the presence of arrhythmias not only indicates chronicity and severity of lesions but could also be contributing factor for higher NYHA functional class. In our study, subclinical AF detected on Holter was associated with increasing age, higher NYHA functional class and severe mitral stenosis. In our study, presence of PVCs was associated with severity of mitral stenosis. Also, AF was found to be strongly associated with severity of mitral stenosis. Similar findings were noted in earlier studies. Presence of AF was also associated with severity of mitral regurgitation. This may be due to the reason that majority of patients in our study had combined mitral stenosis and mitral regurgitation. A study done by Diker et al noted that the highest frequency of AF in RHD occurs in those with mitral stenosis, mitral regurgitation and tricuspid regurgitation in combination.

In patients of ARF, prior history of sore throat infection 1-5 weeks before disease-onset was found in 2 out of 8 cases and has ranged between 14% and 45.9% among cases in other studies. This wide variation in infection rates could be because of differing immunity status and living conditions among patients in different parts of the world. Cases with sore throat reported at schools and villages should be immediately referred

to health centers for confirmation. PR prolongation in many ARF patients has been a well-known finding since 1920.

In the present study, a pause >1.5 seconds on ECG was detected in 2 patients. The duration of the longest pause was 1.60 seconds. In the study by Karacan et al, on standard ECG, the frequency of the first-degree atrioventricular block was found to be 21.9%. ECG at 24 hours detected three additional and separate patients with a long PR interval. Mobitz type 1 block and atypical Wenckebach periodicity were determined in one patient (1.56%) on 24-hour ECG. Lower incidence of conduction abnormalities in our study could be due to small number of cases in our study. However, our results point towards the need of further Holter-based studies in patients of ARF. The prevalence of rhythm and conduction abnormalities may be much higher than determined on standard ECG.

CONCLUSION

Rheumatic heart disease is a significant health problem in our region. It commonly affects young patients, compromising the workforce of a country. Only more symptomatic, severe cases belonging to higher functional classes report to hospital. Around one-third of patients are already in AF when they first seek treatment. Even in those patients who are in sinus rhythm, various arrhythmias can be detected on Holter monitoring. Detection of paroxysmal AF on Holter can identify high-risk patients in which anticoagulation can be started and may prevent morbidity and mortality from stroke in such patients. Very few cases of RF report to hospital. Rhythm and conduction can be seen in RF patients also, although they are less common as compared to RHD patients. Very few Holter-based studies exist in literature to detect arrhythmias in patients of RHD and RF. Our study provides new insights as such a study has not been conducted previously in our region. More such studies are needed in future, so that high-risk patients can be identified and strategies can be formulated to improve outcomes in such patients.

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Stroke in Hanging: Ischemic or Thrombotic?

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ABSTRACT

Hanging is among the most common methods of committing suicide in India, as reported in recent data published by National Crime Records Bureau. Neurological injury in such cases occurs due to compression of the neck. We present the case of a 52-year-old male who presented to the emergency with an alleged history of attempted suicide by hanging with nylon thread. Patient was started on supportive therapy, and 24 hours following admission, he became stable with normal blood pressure without any antihypertensive medications. However, on Day 3 of admission, he developed weakness of left upper limb and lower limb and deviation of angle of mouth to the left side. Repeat CT imaging of brain showed two hypodense foci in right caudate nucleus, head of adjacent internal capsule and a focus in right lentiform nucleus and posterior limb of internal capsule. MRI of brain, including MRA, showed an acute infarct with restricted diffusion in right lentiform nucleus, caudate nucleus, with filling defect in proximal M1 segment of right middle cerebral artery (MCA) suggestive of thrombus and attenuated signal was also noted in distal branches of right MCA. This case highlights the neurological complication following suicidal hanging and a structured approach to it.

Keywords: Suicidal hanging, neuroimaging, CT, MRI, stroke, hypoxia, thrombosis

Suicidal hanging is among the most common methods of committing suicide in India according to recent data published by National Crime Records Bureau, where neurological injury occurs due to compression of the neck. The neck is the target organ for hanging. Easy accessibility, rounded contours, minimum bony shields, the small diameter and unsafe location of the airway, vital blood vessels and spinal cord make it susceptible to life-threatening injuries by hanging, which has been practiced as a popular method of committing suicide since ancient times.

The jugular veins are the first structures to get compressed (force of 2 kg) followed by the carotid arteries (5 kg), causing cerebral edema and hypoxic brain damage, respectively. Compression of the airways needs greater force (15 kg), which can lead to severe hypoxia and death. Neurological outcomes in hanging vary from death, permanent hypoxic brain damage to complete recovery.

In the reviewed literature, the neuroimaging findings in hanging have consistently been described as bilateral hemorrhagic and/or ischemic lesions in the thalamus, cerebellum and other areas of the basal nuclei. Unilateral lesions seem to be a very rare event and to the best of our knowledge, very few cases have been reported.

We report a case of suicidal hanging where the patient survived an initial brain insult, but later developed a neurological deficit in the form of hemiplegia due to an infarct in the right lentiform nucleus, caudate nucleus and corona radiata. Patient recovered with supportive treatment. This case highlights the neurological complication following suicidal hanging and a structured approach to it.

CASE REPORT

A 52-year-old male presented to the emergency with an alleged history of attempted suicide by hanging with nylon thread. After few seconds of suspension, he fell down, and was rushed to the hospital. There as no history of seizure, bleeding from nostrils, eyes and mouth. There were no pre-existing comorbid conditions.

At the time of admission, patient was conscious and oriented. The pulse rate was 110/min, blood pressure was 170/100 mmHg, respiratory rate was 18/min and oxygen

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saturation by pulse oximeter was 98%. Local examination revealed one circumferential shallow abraded ligature mark over anterior aspect of the neck. There was no cyanosis or subconjunctival hemorrhages. Nasal mucosa, post pharyngeal wall and bilateral tympanic membrane were not congested. Neurological examination was normal except for bilateral extensor Babinski response. Fundus was normal. Both pupils were mid-dilated and responding to light. All biochemical investigations and baseline computed tomography (CT) imaging of brain was normal, and there were no fractures of the cervical spine. Patient was started on supportive therapy, and 24 hours following admission, patient became stable with normal blood pressure without any antihypertensive medications.

On Day 3 of admission, patient developed weakness of left upper limb and lower limb and deviation of angle of mouth to the left side. Neurological examination revealed hemiparesis of left upper limb and lower limb with a power of 3/5. Tone was increased, reflexes were diminished on both left upper limb and lower limb. Extensor plantar was present on the left side and right side plantar was not elicitable; left upper motor neuron (UMN) type of facial nerve palsy was also present.

Urgent repeat CT imaging of brain (Fig. 1a) showed two hypodense foci in right caudate nucleus, head of adjacent internal capsule and a focus in right lentiform nucleus and posterior limb of internal capsule. Magnetic resonance imaging (MRI) of brain (Fig. 1b), including magnetic resonance angiography (MRA), showed an acute infarct with restricted diffusion in right lentiform nucleus, caudate nucleus, with filling defect in proximal M1 segment of right middle cerebral artery (MCA) suggestive of thrombus and attenuated signal was also noted in distal branches of right MCA. Magnetic resonance venography (MRV) had no evidence of venous thrombosis. Cardiac evaluation including echocardiogram was found to be normal.

Patient was treated with fluid restriction, mannitol, intravenous antibiotics, low molecular weight heparin, physiotherapy and other supportive measures. Patient gradually improved and was discharged on Day 9, with advice to continue physiotherapy.

DISCUSSION

The factors that contribute to death after suicidal hanging include pulmonary complications and neurological complications. *Pulmonary complications* include pulmonary edema and bronchopneumonia, secondary to aspiration. The edema may be due to a centrally mediated sympathetic discharge or due to negative intrathoracic pressure, which

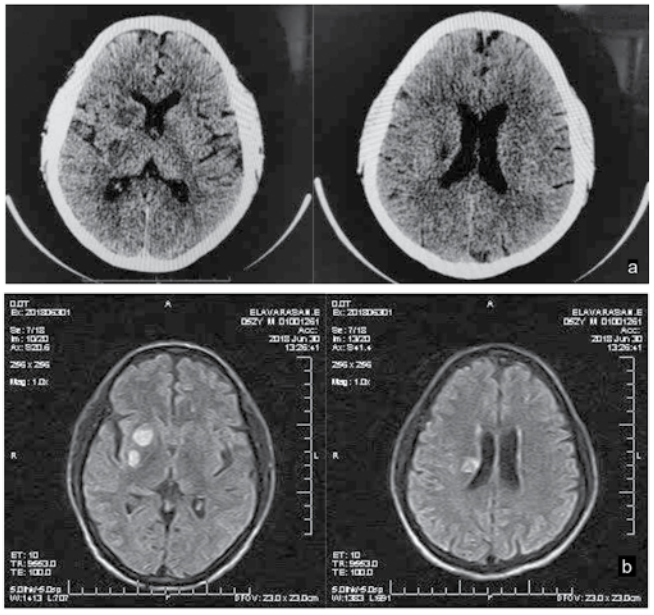

Figure 1. a and b. CT imaging of brain showing two hypodense foci in right caudate nucleus, head of adjacent internal capsule and a focus in right lentiform nucleus and posterior limb of internal capsule **(a).** MRI showing acute infarct with restricted diffusion in right lentiform nucleus and caudate nucleus **(b).**

is generated as the person attempts to inspire through an obstructed airway. *Neurological complications* include transient hemiparesis, spinal cord syndromes, focal cerebral deficits, cerebral edema, various nerve palsies and larger infarctions. Other complications like hyperthermia, subarachnoid hemorrhage, pneumoperitoneum, ruptured esophagus may also occur. Some factors such as systolic blood pressure <90, Glasgow coma scale score ≤8, anoxic brain injury on CT scan and injury severity score >15 have been found to be significantly associated with mortality in hanging.

In suicidal hanging, there is slower development of *cerebral hypoxia and ischemia*, with both the events being strongly dependent on the materials, location and the method of suicide attempt. This cerebral hypoxia and ischemia can be attributed to the mechanical compression and obstruction of the airway and vasculature of the neck. Further, airway can be compromised by the upward displacement of the tongue and epiglottis, jugular vein occlusion by mild neck closure and vertebral artery occlusion by spinal injury. These combined factors can easily lead to acute cerebral hypoxia. In rare instances, direct injury to the spinal cord and brainstem can also occur.

The most sensitive areas of hypoxic and ischemic damage are the cerebral cortex, border zones between arterial territories, Ammon's horn, Purkinje cells, particularly the basal ganglia. In the early stages, ischemic neuronal

changes are demonstrated by cytotoxic edema (swelling of neurons, glia and endothelial cells) and failure of the sodium ion exchange pump. Sodium accumulates within the cell and water follows this movement to maintain the osmotic equilibrium. The venous hypertension and stasis of blood flow caused by the acute bilateral compression of the internal jugular veins result in hydrostatic transudation of intravascular contents and subsequently rapid occurrence of hypoxia and infarction.

Bilateral involvement is the common finding in hypoxic ischemic injury in suicidal hanging. However, unilateral involvement of brain in the form of hemiplegia due to thrombotic stroke can occur rarely. Traumatic thrombosis of internal carotid artery is reported as being caused by one of the four mechanisms:

- Injury to intrapetrous or cavernous part of the carotid artery during the basal skull fracture
- Injury to point of emergence of carotid artery from the cavernous sinus as a result of strain
- A direct blow to the neck or trauma to peritonsillar area by a foreign object carried in the month
- Stretching of the carotid artery by hyperextension and lateral flexion of neck.

The pathophysiology of thrombosis is due to adherence of platelets to the endothelium with subsequent aggregation, which releases thromboplastin leading to initiation of coagulation cascade.

The neuroimaging in hypoxic ischemic brain injury is often symmetrical, diffuse, low-density lesions found in the watershed areas of the brain. However, in thrombotic injury, the CT and MRI findings are consistent with the vascular territory of the vessels involved. MRA and MRV may show filling defects with attenuated signals.

CONCLUSION

The mechanism of injury, pathophysiology, clinical features and neuroimaging are distinct and different in both cerebral hypoxic ischemic injury and traumatic thrombotic injury to the brain in patients with suicidal hanging. Detailed neurological examination daily to look for subtle changes in clinical features in the patient, repeated neuroimaging studies including MRA and MRV, would help in early diagnosis of thrombotic episodes in suicidal hanging and for early medical management, and if required, surgical management.

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72nd Annual Cardiology Conference

VACCINATION IN HEART FAILURE

Dr Vidyut Jain, Indore

Heart failure (HF) is a common cardiovascular disease (CVD) and often associated with recurrent hospitalization and high mortality due to multiple comorbidities. Respiratory infections are very common in HF and more so in elderly group which forms the major group of HF patients. Common respiratory infections are pneumococcal and influenza in such patients. Preventing influenza infection with vaccines has proved to reduce HF hospitalization in multiple studies, like FLUVAC, PARADIGM-HF substudy, FLUCAD and INVEST. Frequency of vaccination of once in 5 years for pneumococcal and every year for influenza is a feasible and affordable approach for secondary prevention in HF. Guidelines from the Heart Failure Society and ESC also affirm the same but only a small number of patients receive vaccinations.

TREATMENT OF IRON DEFICIENCY IN HF: IRONING OUT THE EVIDENCE

Dr Anoop George, Vellore

Iron deficiency (ID) is seen in 30% in stable and 50% in hospitalized patients (HFrEF and HFpEF). Anemia is a mediator or marker of HF severity. In healthy subjects, diagnosis of ID is made through an assessment of ferritin. As a single value transferrin saturation (TSAT) <19.8% alone performed at least as well in detecting true ID. It is linked with reduced exercise capacity, impaired quality of life, and poor prognosis independently of anemia and left ventricular ejection fraction (LVEF). Observational studies have shown that ID with and without anemia is significantly associated with mortality. The treatment options include erythropoietin stimulating agents. The other option is transfusion with a restrictive red blood cell transfusion strategy rather than a liberal threshold.

ISCHEMIC LV DYSFUNCTION, MYOCARDIAL VIABILITY AND INDICATIONS FOR REVASCULARIZATION

Dr Robert O Bonow, USA

- Assessment of myocardial viability if often used to predict improvement in left ventricular (LV) function after coronary artery bypass grafting (CABG) and thus select patients for CABG. Identification of viable myocardium also predicts improved survival after CABG.
- STICH viability substudy: The presence of viable myocardium was associated with a greater likelihood of survival in patients with coronary artery disease (CAD) and LV dysfunction, but this relationship was not significant after adjustment for other baseline variables. The assessment of myocardial viability did not identify patients with a differential survival benefit from CABG, as compared with medical therapy alone.
- Viability testing does identify high risk patient subgroups and is associated with: outcome with evidence-based medical therapy; outcome with revascularization. BUT, does not independently predict survival benefit from revascularization. Viability testing should not be considered a prerequisite for decisions regarding medical vs. surgical management in patients with ischemic LV dysfunction.

STROKE PREVENTION IN HIGH RISK PATIENTS WITH AF

Dr Jan Steffel, Zurich

Non-vitamin K oral anticoagulants (NOACs) are standard therapy for stroke prevention in atrial fibrillation in 2020: Based on randomized controlled trial (RCT) evidence, confirmed in large observational analyses. Individualize treatment!: No "one size fits all" NOAC; many aspects to consider. Patient engagement! Listen to patients' fears and preferences. Apixaban: Very good efficacy and safety profile across a large range of patient populations.

IMPLICATIONS FOR DECISION-MAKING FOR THE MANAGEMENT OF PATIENTS WITH STABLE CAD

Dr Sripal Bangalore, New York

- Data from approximately 65,000 patient-years of follow-up from RCTs of routine revascularization vs. initial medication therapy suggest: 1 in 3 in the initial medication therapy undergo revascularization over ~4.5 years of follow-up; Similar survival; Reduced non-procedure myocardial infarction (MI); Reduced unstable angina; Greater freedom from angina; Increased procedural MI.
- Revascularization to improve survival in stable ischemic heart disease (SIHD) and high-risk

subgroups: It is recommended in the left main disease and LV dysfunction. It is not recommended in 3-vessel disease, proximal left anterior descending (LAD) disease, and extensive ischemia. Patient preference matters!

ANTIHYPERTENSIVE DRUG CHOICES AND SEQUENCING: GUIDELINE UPDATE AND PERSPECTIVES

Prof Neil R Poulter, UK

- 2018 ESC/ESH guideline: Initial therapy – Dual combination: angiotensin-converting enzyme (ACE) inhibitor or angiotensin receptor blocker (ARB) + calcium channel blocker (CCB) or diuretic; Step 2 – Triple combination: ACE inhibitor or ARB + CCB + diuretic; Step 3 – Triple combination + spironolactone or other drug.
- ISH 2020: Drug choice and sequencing – Step 1: Dual low-dose combination (ACE inhibitor or ARB + CCB); Step 2: Dual full-dose combination (ACE inhibitor or ARB + CCB); Step 3: Triple combination (ACE inhibitor or ARB + CCB + Thiazide-like diuretic); Step 4: Triple combination + spironolactone or other drug.
- Amlodipine is the choice of CCB as it is most effective, has longest duration of action and has robust RCT evidence.
- Single pill combinations – More effective and rapid BP control than monotherapy and two 'free' drugs; reduced side effects; enhanced adherence; improved cardiovascular (CV) protection; more cost-effective.

ACUTE ISCHEMIA WITH NORMAL CORONARY ARTERIES – HOW, WHY AND WHAT NEXT?

Dr Rajiv C, Kochi

The optimal evaluation for patients with a diagnosis of MINOCA (Myocardial Infarction with Non-Obstructed Coronary Arteries), after excluding other causes for troponin elevation, should be aimed at determining the specific cause for each patient so that targeted therapies can be used. In general, patients who have survived ST-segment elevation MI (STEMI) without evidence of significant CAD have a better long-term outlook than those with atherosclerotic-mediated STEMI; in-hospital mortality is approximately 60% lower, and 1-year mortality, 40% lower. However, the subsequent risk for patients presenting with MINOCA is largely based on the underlying etiology and comorbidities.

STATINS: DURING COVID TIMES

Dr Sandeep Chopra, Ludhiana

Patients with COVID-19 infection have an increased risk of CV complications and thrombotic events. Statins are known for their pleiotropic anti-inflammatory, antithrombotic and immunomodulatory effects. Studies in patients with CVD have shown decreased C-reactive protein, thus providing evidence of the anti-inflammatory benefits of statins along with their cholesterol-lowering effects. The same anti-inflammatory activity might improve outcomes in COVID-19 patients with increasingly severe illness, worsening respiratory failure, and increasing D-dimer and IL-6 levels, all of which are associated with increased mortality. Earlier studies have pointed to the possible effectiveness of statins in decreasing influenza-related hospitalizations and deaths. During the 2009 H1N1 pandemic, statin therapy was found to be linked with reduced disease severity among hospitalized patients. Features such as relatively good lung compliance despite poor oxygenation, lack of pulmonary vasoconstriction with resultant significant shunting, as well as thrombotic microangiopathy indicate that vascular endothelial dysfunction has a key role in the pathogenesis of COVID-19. Statins might improve endothelial and vascular function in these patients. A combination of statin/ARB was used in an unconventional and poorly documented experience to target the host response and prevent endothelial barrier damage in Ebola patients during the outbreak in West Africa.

The JUPITER trial assessed relatively healthy patients with high CRP levels and noted a significantly decreased rate of deep vein thrombosis in those administered rosuvastatin compared to placebo. Another study noted that statin therapy was associated with a 50% decline in recurrent pulmonary embolism. It is believed that statins might mitigate the effects of COVID-19 infection in selected patients based on the understanding of its associated coagulopathy, endothelial dysfunction and dysregulated inflammation.

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Medicolegal Insights

CAN THE CONSENT BE TAKEN A FEW DAYS BEFORE THE PROCEDURE?

Recall of informed consent is not affected by the timing of obtaining informed consent before any procedure.

Evidence: Sixty patients scheduled for colonoscopy or esophagogastroduodenoscopy were enrolled in a prospective, randomized study. Each patient received informed consent 24-72 hours or immediately before the procedure, and follow-up occurred 1-3 days post procedure. There was no statistically significant difference in recall of informed consent or the individual elements of informed consent (indication, risks, benefits, alternatives) between the two groups. The study concluded that recall of informed consent is similar whether consent is obtained immediately or several days before endoscopic procedures.

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WHAT ARE THE DUTIES OF A DOCTOR IN RESPECT OF SIGNING PROFESSIONAL CERTIFICATES, REPORTS AND OTHER DOCUMENTS?

Regulation 7.7 elaborates on the issue of signing professional certificates, reports and other documents.

It states as follows: "Registered medical practitioners are in certain cases bound by law to give, or may from time to time be called upon or requested to give certificates, notification, reports and other documents of similar character signed by them in their professional capacity for subsequent use in the courts or for administrative purposes, etc. Such documents, among others, include the ones given at Appendix 4.

Any registered practitioner who is shown to have signed or given under his name and authority any such certificate, notification, report or document of a similar character which is untrue, misleading or improper, is liable to have his name deleted from the Register."

CAN DEVIATION FROM MEDICAL PRACTICE BE TERMED MEDICAL NEGLIGENCE?

In Jacob Mathew v. State of Punjab SC/0457/2005:(2005) 6 SCC 1, the Supreme Court of India has observed: "Deviation from normal practice is not necessarily evidence of negligence. To establish liability on that basis, it must be shown:

- that there is a usual and normal practice
- that the defendant has not adopted it and
- that the course adopted is no professional man of ordinary knowledge skill would have taken had he been acting with ordinary care."

WHAT ARE THE VIOLATIONS IN ADVERTISING IN INDIAN PENAL CODE?

Sec. 292(2) (d) of Indian Penal Code, 1860, makes it a punishable offence to publish, distribute, sell, hire or circulate any obscene advertisement.

Section 292 in The Indian Penal Code

[260][292. Sale, etc., of obscene books, etc.—[261]]

(1) For the purposes of Sub-section (2), a book, pamphlet, paper, writing, drawing, painting, representation, figure or any other object, shall be deemed to be obscene if it is lascivious or appeals to the prurient interest or if its effect, or (where it comprises two or more distinct items) the effect of any one of its items, is, if taken as a whole, such as to tend to deprave and corrupt person, who are likely, having regard to all relevant circumstances, to read, see or hear the matter contained or embodied in it.

[262][(2)] Whoever—

(a) sells, lets to hire, distributes, publicly exhibits or in any manner puts into circulation, or for purposes of sale, hire, distribution, public exhibition or circulation, makes, produces or has in his possession any obscene book, pamphlet paper, drawing, painting, representation or figure or any other obscene object whatsoever, or

(b) imports, exports or conveys any obscene object for any of the purposes aforesaid, or knowing or having reason to believe that such object will be sold, let to hire, distributed or publicly exhibited or in any manner put into circulation, or

(c) takes part in or receives profits from any business in the course of which he knows or has reason to believe that any such obscene objects are for any of the purposes aforesaid, made, produced, purchased, kept, imported, exported, conveyed,

publicly exhibited or in any manner put into circulation, or

(d) advertises or makes known by any means whatsoever that any person is engaged or is ready to engage in any act which is an offence under this section, or that any such obscene object can be procured from or through any person, or

(e) offers or attempts to do any act which is an offence under this section, shall be punished [263][on first conviction with imprisonment of either description for a term which may extend to 2 years, and with fine which may extend to two thousand rupees, and, in the event of a second or subsequent conviction, with imprisonment of either description for a term which may extend to 5 years, and also with fine which may extend to five thousand rupees].

CAN A PATIENT SEEK REDRESSAL FOR GRIEVANCES REGARDING TREATMENT RECEIVED?

Yes, patient who is the sufferer from the negligent act of the doctors can seek remedy under various laws:

1. **Compensatory action -** Complaint against doctors, staff or hospital whether private or government hospitals who committed negligence seeking monetary compensation before:
   i. Civil Court under law of Torts or Law of Contract,
   ii. High Court under the Constitutional Law, or
   iii. Consumer Courts under Consumer Protection Act.
2. **Punitive action -** Criminal complaint under Indian Penal Code against the doctor.
3. **Disciplinary action -** Complaint seeking disciplinary action against the medical practitioner or the hospitals as the case may be, before statutory bodies governing the medical practitioners such as Medical Council of India or State Medical Council.
4. **Recommendatory action -** Complaint before the National/State Human Rights Commission seeking compensation.

DOES A DECISION TAKEN IN GOOD FAITH AMOUNT TO NEGLIGENCE?

A decision taken in good faith is not a crime. Defenses are available to the doctors under Indian Penal Code (IPC) sections 88, 92 and 93.

- **Section 88.** Act not unintended to cause death, done by consent in good faith for person's benefit: Nothing, which is not intended to cause death, is an offence by reason of any harm which it may cause, or be intended by the doer to cause, or be known by the doer to be likely to cause, to any person for whose benefit it is done in good faith, and who has given a consent, whether express or implied, to suffer that harm, or to take the risk of that harm.

  The illustration along with this section is: "A, a surgeon, knowing that a particular operation is likely to cause the death of Z, who suffers under a painful complaint, but not intending to cause Z's death and intending in good faith, Z's benefit, performs that operation on Z, with Z's consent. A has committed no offence."
- **Section 92.** Act done in good faith for benefit of a person without consent: Nothing is an offence by reason of any harm which it may cause to a person for whose benefit it is done in good faith, even without that person's consent, if the circumstances are such that it is impossible for that person to signify consent, or if that person is incapable of giving consent, and has no guardian or other person in lawful charge of him from whom it is possible to obtain consent in time for the thing to be done with benefit.

  The illustration along with this section is: Z is thrown from his horse, and is insensible. A, a surgeon, finds that Z requires to be trepanned. A, not intending Z's death, but in good faith, for Z's benefit, performs the trepan before Z recovers his power of judging for himself. A has committed no offence. A, a surgeon, sees a child suffer an accident which is likely to prove fatal unless an operation be immediately performed. There is no time to apply to the child's guardian. A, performs the operation in spite of the entreaties of the child, intending, in good faith, the child's benefit. A committed no offence.
- **Section 93.** Communication made in good faith. No communication made in good faith is an offence by reason of any harm to the person to whom it is made, if it is made for the benefit of that person. Illustration A, a surgeon, in good faith, communicates to a patient his opinion that he cannot live. The patient dies in consequence of the shock. A has committed no offence, though he knew it to be likely that the communication might cause the patient's death.

A SPECIALIST GIVES AN OPINION TO A PHYSICIAN ON PHONE REGARDING A PATIENT (NOT SEEN BY HIM). IS HE/SHE LIABLE FOR ANY MISHAP?

No legal liability will fall upon the doctor for giving an opinion on phone for cases not seen by him as there is no contract between him and the patient. For negligence to be proved there has to be a duty,

breach of that duty and resultant damage. In this case, there will no breach of duty. But, if the specialist has charged a fee for his opinion from the patient (patient can sue) or from the physician (patient and doctor both can sue), then he/she is liable. If the fee has been paid by the referring physician, it will be deemed to be paid by the patient.

IS THERE A DIFFERENCE BETWEEN ACTIVE EUTHANASIA AND PASSIVE EUTHANASIA?

Yes. Active euthanasia and passive euthanasia differ from each other.

Active euthanasia means where death is caused by the administration of a lethal injection or drugs. Active euthanasia also includes physician-assisted suicide, where the injection or drugs are supplied by the physician, but the act of administration is undertaken by the patient himself. Active euthanasia is not permissible in most countries. The jurisdictions in which it is permissible are Canada, the Netherlands, Switzerland and the States of Colorado, Vermont, Montana, California, Oregon and Washington DC in the United States of America.

Passive euthanasia is when medical practitioners do not provide life-sustaining treatment (i.e., treatment necessary to keep a patient alive) or remove patients from life-sustaining treatment. This could include disconnecting life support machines or feeding tubes or not carrying out life-saving operations or providing life extending drugs. In such cases, the omission by the medical practitioner is not treated as the cause of death; instead, the patient is understood to have died because of his underlying condition.

In the matter titled as **"Common Cause versus Union of India, 2018 (5) SCC 1" the Hon'ble Constitution Bench of 4 Judges of the Supreme Court of India,** has held that:

"(v) There is an inherent difference between active euthanasia and passive euthanasia as the former entails a positive affirmative act, while the latter relates to withdrawal of life support measures or withholding of medical treatment meant for artificially prolonging life.

(vi) In active euthanasia, a specific overt act is done to end the patient's life whereas in passive euthanasia, something is not done which is necessary for preserving a patients life. It is due to this difference that most of the countries across the world have legalized passive euthanasia either by legislation or by judicial interpretation with certain conditions and safeguards."

CAN A PATIENT SEEK REDRESSAL FOR GRIEVANCES REGARDING TREATMENT RECEIVED?

Yes. The National Board for Accreditation of Healthcare (NABH) Patient Charter has provisions for this.

5. Right to redress

- Patient has the right to justice by lodging a complaint through an authority dedicated for this purpose by the health care provider organization or with government health authorities.
- The patient has the right to a fair and prompt hearing of his/her concern.
- The patient in addition has the right to appeal to a higher authority in the health care provider organization and insist in writing on the outcome of the complaint.

THE PATIENT WAS NOT GETTING CURED. CAN THIS BE TERMED AS MEDICAL NEGLIGENCE?

No doctor can give 100% guarantee about the treatment or surgery. The only assurance which a doctor can give or can be understood to have given by implication is that he is possessed of the requisite skill in that branch of profession which he is practicing and while undertaking the performance of the task entrusted to him he would be exercising his skill with reasonable competence.

The Hon'ble Apex Court in various judgments has duly held that no guarantee is given by any doctor or surgeon that the patient would be cured.

- In the matter titled as **"P. B. Desai versus State of Maharashtra, AIR 2014 SC 795,"** the Hon'ble Apex Court has held that:

"39. It is not necessary for us to divulge this theoretical approach to the doctor-patient relationship, as that may be based on model foundation. Fact remains that when a physician agrees to attend a patient, there is an unwritten contract between the two. The patient entrusts himself to the doctor and that doctor agrees to do his best, at all times, for the patient. Such doctor-patient contract is almost always an implied contract, except when written informed consent is obtained. While a doctor cannot be forced to treat any person, he/she has certain responsibilities for those whom he/she accepts as patients. Some of these responsibilities may be recapitulated, in brief:

(a) to continue to treat, except under certain circumstances when doctor can abandon his patient;

(b) to take reasonable care of his patient;

(c) to exhibit reasonable skill: The degree of skill a doctor undertakes is the average degree of skill possessed by his

professional brethren of the same standing as himself. The best form of treatment may differ when different choices are available. There is an implied contract between the doctor and patient where the patient is told, in effect, "Medicine is not an exact science. I shall use my experience and best judgment and you take the risk that I may be wrong. I guarantee nothing."

(d) Not to undertake any procedure beyond his control: This depends on his qualifications, special training and experience. The doctor must always ensure that he is reasonably skilled before undertaking any special procedure/treating a complicated case.

(e) Professional secrets: A doctor is under a moral and legal obligation not to divulge the information/knowledge which he comes to learn in confidence from his patient and such a communication is privileged communication."

- In the matter **"Malay Kumar Ganguly vs. Sukumar Mukherjee & Ors. AIR 2010 SC 1162,"** the Hon'ble Supreme Court of India has held that:

  "INDIVIDUAL LIABILITY OF THE DOCTORS There cannot be, however, by any doubt or dispute that for establishing medical negligence or deficiency in service, the courts would determine the following:

  (i) No guarantee is given by any doctor or surgeon that the patient would be cured.

  (ii) The doctor, however, must undertake a fair, reasonable and competent degree of skill, which may not be the highest skill.

  (iii) Adoption of one of the modes of treatment, if there are many, and treating the patient with due care and caution would not constitute any negligence.

  (iv) Failure to act in accordance with the standard, reasonable, competent medical means at the time would not constitute a negligence. However, a medical practitioner must exercise the reasonable degree of care and skill and knowledge which he possesses. Failure to use due skill in diagnosis with the result that wrong treatment is given would be negligence.

  *(v) In a com*plicated case, the court would be slow in contributing negligence on the part of the doctor, if he is performing his duties to the best of his ability.

  Bearing in mind the aforementioned principles, the individual liability of the doctors and hospital must be judged."

- In the landmark judgment of **"Jacob Mathew Petitioner v. State of Punjab & Anr. 2005 (3) CPR 70 (SC),"** the Hon'ble Supreme Court has held that:

  "Para 28: No sensible professional would intentionally commit an act or omission which would result in loss or injury to the patient as the professional reputation of the person is at stake. A single failure may cost him dear in his career. Even in civil jurisdiction, the rule of res ipsa loquitur is not of universal application and has to be applied with extreme care and caution to the cases of professional negligence and in particular that of the doctors. Else it would be counterproductive. Simply because a patient has not favorably responded to a treatment given by a physician or a surgery has failed, the doctor cannot be held liable per se by applying the doctrine of res ipsa loquitur."

- In the matter titled as **"Martin F. D'Souza versus Mohd. Ishfaq, 2009(3) SCC 1,"** the Hon'ble Supreme Court has held that:

  "Para 124: "It must be remembered that sometimes despite their best efforts the treatment of a doctor fails. For instance, sometimes despite the best effort of a surgeon, the patient dies. That does not mean that the doctor or the surgeon must be held to be guilty of medical negligence, unless there is some strong evidence to suggest that he is."

- In the matter titled as **"Lok Nayak Hospital versus Prema, RFA No. 56/2006,"** the Hon'ble High Court of Delhi vide judgment dated 06.08.2018 has held that:

  "8. Firstly, it is to be noted that the only allegation of negligence alleged by the respondent/plaintiff against the appellant/defendant is that the tubectomy/ sterilization operation failed. ***Since medically there is never a 100% chance of success in sterilization operations, the mere fact that the operation was not successful, that by itself cannot be a reason to hold the appellant/defendant and its doctors guilty of negligence.*** *This aspect is no longer res integra and is so held by a Division Bench of this Court in the case of Smt. Madhubala Vs. Govt. of NCT of Delhi, 118 (2005) DLT 515 (DB)."*

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Vedic Principles Behind Cognitive Behavior Therapy

WHAT IS COUNSELING?

The mental process involves generation of a thought or idea, which is analyzed and then acted upon. Thought, analysis and action, are the three processes of human mind. Counseling encompasses actions at all the three levels.

WHAT ARE DIFFERENT TYPES OF COUNSELING?

Counseling involves two principles – Cognitive counseling and behavioral counseling. Behavioral counseling focuses only on the actions, while cognitive counseling focuses on the changes in either the thought process or in the interpretation of the thought process.

WHAT IS COGNITIVE BEHAVIOR THERAPY?

As opposed to pure behavior therapy where a person is counseled to do predefined things at regular intervals, cognitive behavior therapy is aimed at changing the actions by altering observations of the interpretation of a particular situation.

WHAT IS THE ORIGIN OF COUNSELING IN INDIA?

The origin of counseling dates back to the Vedic era. Upanishads were nothing but textbooks on counseling based on the original knowledge of Rigveda, Yajurveda, Samveda and Atharvaveda.

IS THERE A RELATIONSHIP OF BHAGAVAD GITA WITH COUNSELING?

Bhagavad Gita is counseling done by Krishna that aims to resolve the conflict in Arjuna's mind whether to fight or not. Counseling at that time was done by the elders in the family.

ARE THE PRINCIPLES OF BHAGAVAD GITA FOLLOWED TODAY?

All the principles of cognitive behavior therapy today have their roots in the principles that have originated from Bhagavad Gita.

WHAT IS THE FIRST PRINCIPLE?

The first principle is that counseling cannot be done in 1 or 2 sessions. It requires up to 18 sessions which is what Krishna did in Bhagavad Gita. Bhagavad Gita contains 702 dialogues in the form of Shlokas. A proper counseling involves in-depth conversation between the counselor and the patient.

WHAT IS THE SECOND PRINCIPLE OF COUNSELING?

The second principle of counseling is to listen to the patient in the first session in great detail. Krishna did the same in Bhagavad Gita. In Chapter 1, only Arjuna speaks and Krishna listens. A patient listening is half the healing done.

WHAT IS THE THIRD PRINCIPLE?

The third principle states that the second (first interactive) session between counselor and the patient should be the longest one. Chapter 2 of Bhagavad Gita is the gist of Krishna's counseling.

WHAT IS THE FOURTH PRINCIPLE?

The fourth principle is that after giving a detailed counseling in the second session, the patient is expected to be confused. In start of Chapter 3, Arjuna says to Krishna "I am confused. Sometimes you are talking about one path and other time you are talking about another path. Guide me again." The third counseling session is the most important where one has to counsel slowly and in great detail.

WHAT IS THE FIFTH PRINCIPLE?

The fifth principle is to give reasoning to the counseling. One should not take the patient for granted. Krishna discusses each and every aspect of life with Arjuna in great detail giving scientific reasoning at every stage.

WHAT IS THE SIXTH PRINCIPLE?

Provide reassurance to the patient repeatedly. During his counseling, Krishna assures Arjuna on multiple occasions to do his job and not to worry. I am with you.

WHAT IS THE SEVENTH PRINCIPLE?

The seventh principle involves creating some fear in the patient's mind. This is what Krishna does while showing his viratswaroop. This especially works in patients of addiction. Some degree of fear with re-assurance from the counselor works well.

WHAT IS THE EIGHT PRINCIPLE?

The summing up counseling session should be as long as the second session. Chapter 18 of Bhagavad Gita is as big as Chapter 2 where the whole Bhagavad Gita is summarized again.

WHAT ARE THE INGREDIENTS OF COUNSELING?

Counseling involves in-depth knowledge of dharma, artha, kama and moksha.

They are greatly described in Dharmashastra, Arthashastra, Kamasutra and Upanishads through various Vedas.

WHAT IS STRESS?

Stress is the reaction of the body or the mind to the interpretation of any situation.

HOW CAN STRESS BE MANAGED?

Stress can be managed by either changing the response of the body through yogic living, or changing the interpretation by understanding the principles of counseling or changing the reaction by wilful actions.

ARE DIFFERENT NITIS OF OUR SCRIPTURES BASED ON COUNSELING?

Yes. Vidur Niti was the counseling given by Vidur to Dhritarashtra when he was not sleeping and Chanakya Niti involved how to rule a country. Yoga Vashishtha was the counseling given by Vashishtha to Rama to acquire higher levels of spiritual knowledge.

■■■■

Lighter Side of Medicine

HUMOR

Can I help you: A young businessman had just started his own firm. He had just rented a beautiful office and had it furnished with antiques. He saw a man come into the outer office. Wishing to appear the hot shot, the businessman picked up the phone and started to pretend he had a big deal working. He threw huge figures around and made giant commitments.

Finally, he hung up and asked the visitor, "Can I help you?"

"Yeah, I've come to activate your phone lines."

Did you hear about the guy who lost his whole left side? He's is all right now!

Why did the doctor tell the nurse to walk past the pill cupboard quietly? So, she wouldn't wake the sleeping pills.

Woman: My husband swallowed an Aspirin by mistake, what shall I do? Doctor: Give him a headache now, what else!

Funny meanings:

Coma: A punctuation mark

Genes: Blue denim slacks

Nitrates: Cheaper than day rates

Tumor: More than one, an extra pair

Artery: The study of fine paintings

Bacteria: Back door to cafeteria

Terminal illness: Getting sick at the airport.

Coffee dilemma: A man and his wife were having an argument about who should brew the coffee each morning.

The wife said, "You should do it, because you get up first, and then we don't have to wait as long to get our coffee."

The husband said, "You are in charge of the cooking around here and you should do it, because that is your job, and I can just wait for my coffee."

Wife replies, "No you should do it, and besides it is in the Bible that the man should do the coffee."

Husband replies, "I can't believe that, show me." So she fetched the Bible, and opened the New Testament and shows him at the top of several pages, that it indeed says: "HEBREWS".

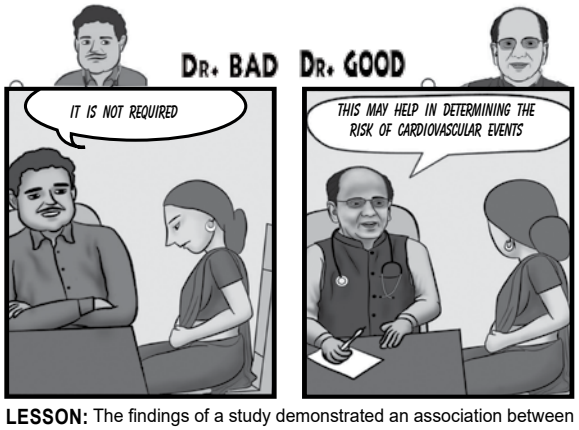
Getting dressed: Hospital regulations required a wheelchair for patients being discharged. However, while working as a student nurse, I found one elderly gentleman – already dressed and sitting on the bed with a suitcase at his feet – who insisted he didn't need my help to leave the hospital.

After a chat about rules being rules, he reluctantly let me wheel him to the elevator. On the way down I asked him if his wife was meeting him.

"I don't know," he said. "She's still upstairs in the bathroom changing out of her hospital gown."

Dr. Good and Dr. Bad

SITUATION: A 62-year-old female with type 2 diabetes (BMI: 32.4 kg/m^2) was advised investigations to determine combined serum free light chain level and its relation with B-score and high-sensitivity C-reactive protein.



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LESSON: The findings of a study demonstrated an association between levels of combined serum free light chain and carotid atherosclerosis in individuals with type 2 diabetes mellitus.

Diab Vasc Dis Res. 2018;15(2):162-4.

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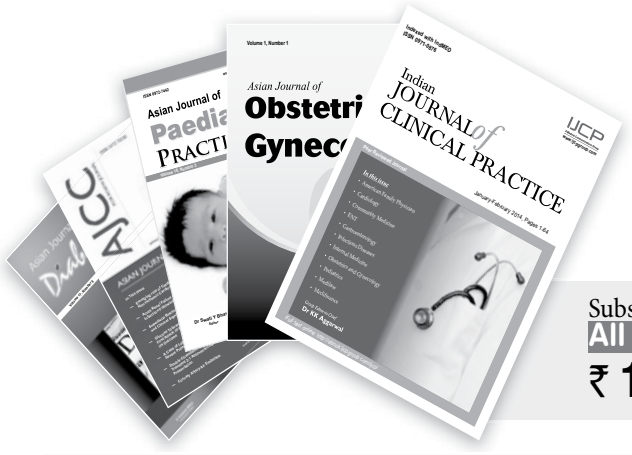

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Paintal AS. Impulses in vagal afferent fibres from specific pulmonary deflation receptors. The response of those receptors to phenylguanide, potato S-hydroxytryptamine and their role in respiratory and cardiovascular reflexes. Q. J. Expt. Physiol. 1955;40:89-111.

Books

Stansfield AG. Lymph Node Biopsy Interpretation Churchill Livingstone, New York 1985.

Articles in Books

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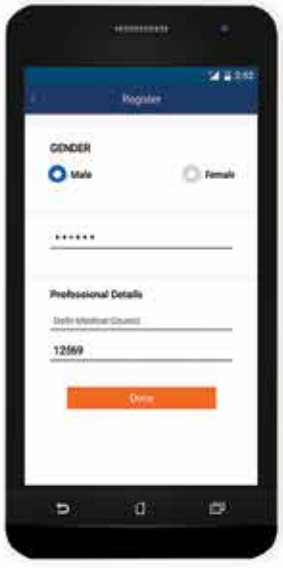

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