

# Role of Echocardiography in Cardiac Risk Assessment of Patients at Risk of Cardiac Disease before Non-Cardiac Surgical Intervention

Saeed Ahmed<sup>1</sup>, Rashed Mahmood<sup>1</sup>, Khurram Shahzad Khan<sup>1</sup> and Fareed Khan<sup>2</sup>

## ABSTRACT

**Objective:** In our study we have tried to find the effectiveness and role of echocardiogram in cardiac risk assessment of patients who were at risk of cardiac disease before non-cardiac surgery.

**Study Design:** Prospective observational study

**Place and Duration of Study:** This study was conducted at the Kashmir Institute of Cardiology, Mirpur AJK, from Jan 2018 to Jan 2020.

**Materials and Methods:** Patients planned for non-cardiac surgery were referred to our department for cardiac evaluation, based on presence of 1 or more cardiac risk factors we performed their echocardiogram to diagnose and risk stratify their cardiac risk.

**Results:** 135 patients were observed in our setup.

**Conclusion:** In our study we used echocardiogram as a diagnostic test in patients who were planned for non-cardiac surgery. After risk assessment we did echocardiogram in such patients and found out that echocardiography does changes the decision about surgery in more than 40% of the patients due to presence of previously undiagnosed cardiac disease which includes wall motion abnormalities and valvar anomalies. So our recommendation is that echocardiography should be a routine test in patients who have more than 1 cardiac risk factors.

**Key Words:** Non cardiac surgery, echocardiography

**Citation of article:** Ahmed S, Mahmood R, Khan KS, Khan F. Role of Echocardiography in Cardiac Risk Assessment of Patients at Risk of Cardiac Disease before Non-Cardiac Surgical Intervention Med Forum 2021;32(2):42-44.

## INTRODUCTION

Non cardiac surgeries are done all over world, Cardiovascular mortality and morbidity during such surgeries is a special concern in patients who either have risk of cardiac disease or have cardiac disease. Guidelines by AHA provide information for management of such patient due to this reason mortality rate from undiagnosed cardiac disease have fallen across all forms of surgeries<sup>1</sup>.

Several risk factor models have been used till date, one such risk index is revised cardiac risk index (RCRI). These risk factors included type of surgery, history of coronary artery disease, previous stroke, diabetes, chronic kidney disease.

In our study we used same parameters to assess the outcome of non-cardiac surgery<sup>2</sup>.

<sup>1</sup>. Department of Cardiology, KIC, Mirpur, AJK.

<sup>1</sup>. Department of Cardiology, Poonch Medical College, Rawalkot, AJK.

Correspondence: Dr. Saeed Ahmed, Assistant Professor of Cardiology, KIC, Mirpur, AJK.

Contact No: 0334-5805335

Email: saeed\_ahmed441@hotmail.com

Received: August, 2020

Accepted: October, 2020

Printed: February, 2021

Presence of coronary artery Disease, hypertension, heart failure, vulvular heart disease, congenital heart disease, arrhythmias poses a risk for development of cardiac complications during non-cardiac surgery<sup>2,3</sup>. Use of beta blockers in chronic hypertensive patients undergoing non cardiac surgery also has shown beneficial<sup>4</sup>.

High risk of cardiac complications was seen in patients with severe or critical aortic stenosis<sup>5</sup>. Patient with Mechanical valves are at high risk during non-cardiac surgery, they need anticoagulation to be maintained during surgery to prevent the risk of thromboembolism<sup>6,7,8</sup>. In patients above 50 years SVT and A. fibrillation was very common and incidence of SVT and A. fibrillation was related to higher 30 days mortality after non cardiac surgery<sup>8</sup>.

Type of surgery is also very important factor in determining the risk, High risk surgeries included aortic and other vascular surgeries, while intermediate risk surgeries included abdominal and intrathoracic surgeries, head and neck surgeries, orthopedic surgeries<sup>9</sup>.

In our study we used brief history, Basic clinical examination, baseline blood labs including renal function tests along with echocardiogram to evaluate the cardiac disease. In our study we used echocardiogram in all patients as a basic test for pre anesthesia cardiac evaluation.

**MATERIALS AND METHODS**

This is an observational study and was performed in Kashmir institute of cardiology from Jan 2018 to Jan 2020 after approval from ethical committee. Inclusion criterion was ages 0 to 85 years, planned for non-cardiac surgery, referred from our medical department so that a close follow up and final outcome can be determined easily, unable to exercise due to obesity or joint problems. Exclusion criterion was ages more than 85 years, low GCS or unconscious patients, unstable angina, decompensated heart failure, severe valvular disease, conduction abnormalities.

After a verbal consent patient who were fit according to inclusion criterion, a brief history about Diabetes, high blood pressure, renal disease, previous coronary artery disease and about medicine was taken. Echocardiogram was done in patients who were unable to run or walk on treadmill, patients were given three risk scores 1: high risk, 2: moderate risk 3: low risk based on the presence of risk factors like diabetes, high blood pressure, age more than 50 years, previous coronary artery disease, de-arranged renal functions and echocardiogram findings. Each of these parameters was given a single score.

**RESULTS**

In our study we found that around 5% of patients had HTN, 3% had diabetes and 3% had previous coronary artery disease for which they were taking medicine.

**Table No.1: Distribution by age**

		Frequency	Valid Percent	Cumulative Percent
Valid	0-5 years	10	7.4	7.4
	5-20 years	4	3.0	10.4
	21-40 years	12	8.9	19.3
	41-60 years	60	44.4	63.7
	61-80 years	41	30.4	94.1
	more than 80 years	8	5.9	100.0
	Total	135	100.0	

In this study we had around 44% patient with age around 41-60 years and 30% patients with ages 61-80 years. So 75% of our patients had an age of 41-80 years. In our study 53% of patients were male and 46.7% of patients were females.

In our study 30.8% of patients were planned for cholecystectomy, 28% were planned for Laprotomy and 17.9% patients were planned for prostate surgery. Incidental cardiac anomalies were found in many patients, around 6% of patients had mild mitral regurgitations and were asymptomatic, 2.2% patients had mild aortic regurgitation, 4.4% patients had asymptomatic mild tricuspid regurgitation on echocardiogram.

**Table No.2: Distribution by gender**

		Frequency	Valid Percent	Cumulative Percent
Valid	Male	72	53.3	53.3
	Female	63	46.7	100.0
	Total	135	100.0	

**Table No.3: Type of surgery planned**

		Frequency	Valid Percent	Cumulative Percent
Valid	cholecystectomy	12	30.8	30.8
	laprotomy	11	28.2	59.0
	head and neck surgery	1	2.6	61.5
	hysterectomy	2	5.1	66.7
	BPH surgery	7	17.9	84.6
	hip fracture surgery	2	5.1	89.7
	testicular surgery	2	5.1	94.9
	hernia repair	1	2.6	97.4
	hemorrhoids	1	2.6	100.0
	Total	39	100.0	
Missing	System	96		
Total		135		

Around 5.9% of patients in this study had reduced ejection fraction and out of these 3.7% patients had severely reduced ejection fraction on echocardiogram. Around 2.2% of the patients in this study had more than moderate diastolic heart failure which was asymptomatic.

**Table No.4: LVEF**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	LVEF 55-75%	125	92.6	94.0	94.0
	LVEF 45-54	3	2.2	2.3	96.2
	LVEF 30-44%	3	2.2	2.3	98.5
	LVEF 15-30%	2	1.5	1.5	100.0
	Total	133	98.5	100.0	
	Missing	System	2	1.5	
Total		135	100.0		

Based on these findings it is clear that around 5-10% of the patients had severe LV systolic or diastolic heart failure which was an incidental finding on echocardiogram. Based on these finding patients were labelled as at risk patients for non-cardiac surgery, most of these patients were deferred from their elective non-cardiac surgeries and were put on cardiac medicine and advised to follow up after 3-4 weeks for reassessment of their clinical condition.

**Table No.5: Diastolic dysfunction**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	0	1	.7	.8	.8
	grade 1 DD	125	92.6	96.9	97.7
	grade 2 DD	2	1.5	1.6	99.2
	grade 3 DD	1	.7	.8	100.0
	Total	129	95.6	100.0	
Missing	System	6	4.4		
Total		135	100.0		

## DISCUSSION

In a study by Canty they used echocardiogram for diagnosis of cardiac disease in emergency non cardiac surgery cases, in their study echocardiogram lead to change in diagnosis and management in more than 60% of the patients<sup>9</sup>.

Although echocardiogram is not class 1 recommended for pre anesthesia evaluation of routine patients<sup>10</sup>. But this modality is low risk, noninvasive and cost effective, it is used as first line test before non-cardiac surgery in many hospitals in Korea. In these comparative studies in Korea they found echocardiography as a very suitable test to predict to risk of cardiac complications in patients who were planned for non-cardiac surgery.<sup>9,10,11,12</sup> We also had similar findings in our study all those patients who had normal echocardiogram underwent low to moderate risk non cardiac surgery with no complications. So based on these international data and our data we can safely conclude that echocardiogram being a safe and noninvasive modality should be used for cardiac risk assessment of patient undergoing non cardiac surgery.

## CONCLUSION

In our study we used echocardiogram as a diagnostic test in patients who were planned for non-cardiac surgery. After risk assessment we did echocardiogram in such patients and found out that echocardiography does change the decision about surgery in more than 40% of the patients due to presence of previously undiagnosed cardiac disease which includes wall motion abnormalities and valvar anomalies. So our recommendation is that echocardiography should be a routine test in patients who have more than 1 cardiac risk factors.

### Author's Contribution:

Concept & Design of Study: Saeed Ahmed  
 Drafting: Rashed Mahmood  
 Data Analysis: Khurram Shahzad Khan, Fareed Khan  
 Revisiting Critically: Saeed Ahmed, Rashed Mahmood

Final Approval of version: Saeed Ahmed

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

## REFERENCES

1. Fleisher LA, Beckman JA, Brown KA, et al. ACCF/AHA focused update on perioperative beta blockade incorporated into the ACC/AHA 2007 guidelines on perioperative cardiovascular evaluation and care for non-cardiac surgery: A report of American college of Cardiology foundation/American heart association task force on practice guidelines. *Circulation* 2009;120:e169.
2. Gupta PL, Gupta H, Sundaram A, et al. Development and validation of a risk calculator for prediction of cardiac risk after surgery. *Circulation* 2011;124:381.
3. Hammill BG, Curtis LH, Bennett-Guerrero E, et al. Impact of heart failure on patients undergoing major non cardiac surgery. *Anesthesiol* 2009; 111:432.
4. Devereaux PJ, Yang H, Yusuf S, et al: Effects of extended release metoprolol succinate in patients undergoing non cardiac surgery (POISE trial): A randomized control trial. *Lancet* 2008;371:1839.
5. Cannesson M, Earing MG, Collange V, et al. Anesthesia for non cardiac surgery in adults with congenital heart disease. *Anesthesiol* 2009; 111:432.
6. Kovacs MJ, Kearon C, Rodger M, et al: Single arm study of bridging therapy with low molecular weight heparin for patient at risk of arterial embolism who require temporary interruption of warfarin. *Circulation* 2004;110:1658.
7. O'Donnel MJ, Kearon C, Johnson J, et al. Brief communication: Preoperative anticoagulant activity after bridging low molecular weight heparin for temporary interruption of warfarin. *Ann Int Med* 2007;146:184.
8. Winkel TA, Schouten O, Hoeks SE, et al. Prognosis of new onset atrial fibrillation, during vascular surgery. *Eur J Vasc Endovasc Surg* 2009;38:683.
9. Canty DJ, Royse CF, Kilpatrick D, et al. The Impact of Pre-Operative Focused Transthoracic Echocardiography in Emergency Non-Cardiac Surgery Patients With Known or Risk of Cardiac disease. *Anaesthesia* 2012;67:714-720.
10. Canty DJ, Royse CF, Kilpatrick D, et al. The impact on cardiac diagnosis and mortality of focused transthoracic echocardiography in hip fracture surgery patients with increased risk of cardiac disease: a retrospective cohort study. *Anaesthesia* 2012;67:1202-1209.
11. Cowie B. Focused transthoracic echocardiography predicts perioperative cardiovascular morbidity. *L Cardiothorac vasc Anesth* 2012;26(1-6):989-993.
12. Cowie B. Three years' experience of focused cardiovascular ultrasound in the peri-operative period. *Anaesthesia* 2011;66:268-273.