

Case report

Management of Heart Rate and Blood Pressure of a Patient after Successful Coronary Angioplasty and Stenting: A Case Study

Rahman N¹, Rahman MA², Sohrabuzzaman APM³, Bhuiyan MAS⁴

Abstract

In this case study the persistence of hypertension in a patient after successful coronary angioplasty was assessed. Pulse and blood pressure were recorded twice daily for 33 days at random interval. The results show the patient had high blood pressure for a total of 17 days in the 33 days of study period after Coronary Angioplasty and Stenting. The patient's blood pressure never exceeded above 170/90 and pulse remained normal through the study period. In the case study multiple drugs failed to control blood pressure adequately. Other external factors may play a role in failure of management of BP. Indeed the patient's lack of lifestyle modification as per advice of the physician may play a significant role in the persistence of hypertension. The patient should seek further medical assistance from specialists and drugs should be altered to control blood pressure adequately. Further investigation might be considered to rule out secondary causes of persistent hypertension.

Keywords: Management; Heart Rate; Blood Pressure; Coronary Angioplasty; Stenting

*Bangladesh Journal of Medical Science Vol. 17 No. 03 July'18. Page : 501-506
DOI: <http://dx.doi.org/10.3329/bjms.v17i3.37009>*

Introduction

During cardiac contraction the ejected blood creates a lateral pressure against the blood vessels termed "Blood pressure". If blood pressure is too high, it puts extra strain on the arteries (and heart) and this may lead to heart attacks and strokes. Having high blood pressure (hypertension) is usually asymptomatic. Blood pressure is measured in 'millimetres of mercury' (mmHg).

The ideal blood pressure is below 120/80 mmHg¹⁻³. Most adults in the UK have blood pressure readings in the range from 120/80 140/90. High blood pressure (hypertension) indicates sustained blood pressure readings at 140/90, or higher. High blood pressure is related to heart and kidney disease, and is closely linked to some forms of dementia. People from African-Caribbean and South Asian communities are at greatest risk from hypertension⁴.

Blood supply of the heart is maintained by the

coronary arteries. In older people, these arteries can become narrowed and hardened (known as atherosclerosis), which can cause coronary heart disease. If the flow of blood to the heart becomes restricted, it can lead to chest pain known as angina. A coronary angioplasty is a procedure used to widen blocked or narrowed coronary arteries¹. The term 'angioplasty' means using a balloon to stretch open a narrowed or blocked artery. However, most modern angioplasty procedures are followed by insertion of a short wire-mesh tube, called a stent, into the artery². The stent is left in place permanently to re-establish blood flow. The combination of coronary angioplasty with stenting is usually referred to as percutaneous coronary intervention (PCI)⁶. PCI is often used as an emergency treatment after a heart attack. Around 75,000 procedures are performed in England each year⁴. This procedure is generally safe but serious complications of the procedure include

1. Dr. Nadeem Rahman, HMO, Comilla Medical College Hospital, Comilla
2. Dr. Md. Aatur Rahman, Professor of Surgery, Eastern Medical College, Comilla
3. Dr. A P M Sohrabuzzaman, Senior Consultant (Cardiology), Labaid Cardiac Hospital, Dhaka
4. Dr. Mohammad Abdus Sattar Bhuiyan, Junior Consultant (Cardiology), Mymensingh Medical College Hospital, Mymensingh

Correspondence to: Dr. Nadeem Rahman, Comilla Medical College Hospital, Comilla, Bangladesh, E-mail: nadeemrahman140890@gmail.com

excessive bleeding, a heart attack and a stroke⁵.

Patient's History and Angioplasty

A patient of 57 years old, hypertensive (on regular antihypertensives), non-diabetic, non-alcoholic, past smoker (10 cigarettes a day for 34 years), having height of 1.72 m and weight of 80 kg was reasonably well 6 months back. Then the patient started to develop central chest discomfort which was aggravated by exertion and relieved by rest. The patient also complained of loss of consciousness for one time 2 months back. Routine investigation including CBC, serum creatinine, serum electrolyte and lipid profile were done. Triglyceride level was found higher than normal while potassium level was found to be low for which the patient was treated (Table 1).

Table 1. Investigation for assessing heart and kidney conditions before PCI in 2016

Date	Test (Time)	Result	Reference Value
12/10/2016	Blood Sugar Random (13:48)	6.5 mmol/L	M: <7.8 mmol/L
12/10/2016	Creatinine (13:48)	1.0 mg/dl	Adult: 0.6-1.3 mg/dl
12/10/2016	SGPT (ALT) (13:48)	31 U/L	15-61 U/L
12/10/2016	Cholesterol (Total) (13:48)	178 mg/dL	150-200 mg/dL
12/10/2016	Triglyceride (13:48)	350 mg/dL	50-150 mg/dL
12/10/2016	HDL-Cholesterol (13:48)	37 mg/dL	>35 mg/dL
12/10/2016	LDL-Cholesterol (13:48)	89 mg/dL	<130 mg/dL
12/10/2016	Uric Acid (13:48)	7.8 mg/dL	M:3.4-7.0 mg/dL
12/10/2016	Na ⁺ (13:48)	138.0 mmol/L	M:135-145 mmol/L
12/10/2016	K ⁺ (13:48)	3.0 mmol/L	M:3.5-5.0 mmol/L

Than on 23rd November 2016 the patient developed central chest discomfort while resting associated with sweating. The patient was given Emergency

management with Tablet Ecosprin 300mg, Tablet Anclog 300mg and Anril spray 800µg sub lingually at 15:00 hours (Table 3) and admitted into the CCU on the same day at 23:00 hours after preliminary ECG was done in the emergency ward.

Troponin-I was measured in the CCU which was found elevated slightly (0.086 ng/ml with a reference value of up to 0.034 ng/ml) and Pro-BNP which was greatly elevated (4359.0 pg/ml with a reference value of 0125 pg/ml for people aged < 75 yrs).

Family history reveals both the patient's father and mother suffered from high blood pressure. Father also suffered from unstable angina and expired from HCC when he was 77 and mother died from stroke when she was 74. The patient had no previous history of CVD, CKD, or Bronchial asthma. On admission his pulse was 81 bpm while blood pressure was 140/80 mm of Hg. Heart sounds S1 & S2 was normal and lungs base was clear.

After admission the patient was treated conservatively with LMWH and other antianginal drugs. A multitude of tests were done to assess the fitness of the patient for Angiogram and possible Angioplasty with stenting (Table 2).

After stabilization coronary angiogram was done using local anaesthesia on 26 November 2016 and two major narrowings were found in the LCx and RCA. PCI to LCx & RCA was done adhoc. The procedure was well tolerated. There was no complication during and after the procedure. Patient's further hospital stay was uneventful. Therefore, the patient was discharged on 28 November 2016 at 11:15 hours in a stable haemodynamic condition with specific medications and advice (Table 6). With the above background this study was designed to stabilize the heart rate and blood pressure of a patient after successful PCI.

Objectives

1. To manage blood pressure by applying medicines
2. To normalize heart rate along with blood pressure by applying medicines

Materials and Method

Different investigations were done at random interval to assess coronary and renal risk factors from 2014 onward (Tables 1 & 2). Radial Pulse rate was measured by palpation and BP was measured by a sphygmomanometer at 9:00 and 20:00 hours daily at random interval for 33 days. After successful angioplasty, a course of medicines were prescribed by the Intervention Cardiologist. The type and doses of medicines were as follows (Table3). Seven days

Table 2. Results of different tests of Blood before Coronary Angioplasty in 2016

Date	Test (Time)	Result	Reference Value	Test Method/Mechine
24/11/2016	Haemoglobin (7:43)	14.5 g/dL	M: 13.5-18.0 g/dL	
24/11/2016	ESR (7:43)	16 mm in 1 st hr	M: < 29 MM	Capillary Method - Alifax
24/11/2016	RBC (7:43)	5.5x10 ¹² /L	M: 4.5-5.5x10 ¹² /L	
24/11/2016	Platelets (7:43)	165x10 ⁹ /L	150-450x10 ⁹ /L	
24/11/2016	WBC (7:43)	6.84x10 ⁹ /L	4.0-11.0x10 ⁹ /L	
24/11/2016	PCV (Hct) (7:43)	45%	M: 40-50%	
24/11/2016	BT (7:43)	3 min 15 sec	M: 2-8 min	Duke's Method
24/11/2016	CT (7:43)	6 min 25 sec	M: 4-10 min	Capillary Tube Method
24/11/2016	Plasma Glucose Random (18:55)	5.8 mmol/L	M: <7.8 mmol/L	
24/11/2016	Sodium (18:55)	140 mmol/L	M: 135-146 mmol/L	
24/11/2016	Potassium (18:55)	3.8 mmol/L	A: 3.5-5.5 mmol/L	
24/11/2016	Creatinine (18:55)	129 µmol/L	M: 60-130 µmol/L	
24/11/2016	Prothrombin Time Patient (18:55)	13.9 seconds		Stago STA CC (Compact Coagulation)
24/11/2016	Prothrombin Time Control (18:55)	13.7 seconds		Stago STA CC
24/11/2016	Prothrombin Time INR (18:55)	1.01		Stago STA CC
24/11/2016	HBS (18:55)	Negative		Immunochromatography (ICG)
24/11/2016	HIV Ab I & II (18:55)	Negative		ICG
24/11/2016	Anti-HCV Ab I & II (18:55)	Negative		ICG

(4 December 2016) after of the procedure, the patient's pulse and blood pressure was checked, which were 80 bpm and 160/90, respectively. Tablet Mitozan was added. Tablet Nitrin SR 2.6 mg was taken for 7 days while Tablet Rivotril was not taken at all as the patient believed that he had no problem with sleep. Injection Intravas was taken thrice in three consecutive days while Nitrocard spray was not used following advice of the cardiologist as further chest discomfort was not experience by the patient (Table 3).

Table 3. Type, rate and doses of medicines to manage BP and Pulse (26/11/2016-04/12/2016)

SI	Medicine	Strength	Dose	Schedule
1	Tablet Carva	75 mg	1+0+0	After meal
2	Tablet Ticarel	90 mg	1+0+1	After meal
3	Tablet Nitrin SR	2.6 mg	1+0+1	8:00 & 17:00
4	Tablet Bislol	2.5 mg	1+0+0	-
5	Tablet Mitosan	40 mg	0+0+1	20:00
6	Tablet Stacor	40 mg	0+0+1	Before meal
7	Tablet Pantonix	20 mg	1+0+1	Before meal
8	Tablet Rivotril	0.5 mg	0+0+1	For sleep
9	Inj. Intravas	80 mg	s/c	Daily for 3 days
10	Nitrocard spray	-	1 Puff	When required

After one month on 24 December 2016, the patient was checked and evaluated again. The pulse and BP were 80 bpm and 150/90, respectively. Tablet Ticarel was discontinued and replaced by Tablet Prasurel while Tablet Mitosan 40 Plus was added as BP was not adequately controlled (Table 4).

Table 4. Type and doses of medicines to manage BP and Pulse (25/12/2016-Till date)

SI	Medicine	Strength	Dose	Schedule
1	Tablet Carva	75 mg	1+0+0	After meal
2	Tablet Prasurel	10 mg	0+0+1	After meal
3	Tablet Bislol	2.5 mg	1+0+1	8:00 & 20:00
4	Tablet Mitosan 40 Plus	40 mg Plus	1+0+0	8:00
5	Tablet Mitosan	40 mg	0+0+1	20:00
6	Tablet Stacor	40 mg	0+0+1	Before meal
7	Tablet Pantonix	20 mg	1+0+1	Before meal

Results

Pulse and blood pressure was measured a total of 33 times between 4/12/2016 to 2/03/17 at 9:00 and

20:00 hours (Table 5). Between 4/12/16 to 24/12/16 BP and pulse was measured 16 times. The systolic and diastolic pressure ranged from 130 to 170 and 70 to 90 respectively at 9:00 while 130 to 160 and 70 to 90 respectively at 20:00. Pulse was ranged between 60 and 80 at 9:00 and also at 20:00 (Table 5). During this period patient had BP above acceptable level 8 times with highest BP recorded at 170/90 on 22/12/2016. Between 12/01/2017 and 2/03/2017 BP and pulse was measured 17 times and the systolic and diastolic pressure was measured to be ranged from 130 to 160 and 70 to 90 respectively at 9:00 while 120 to 150 and 70 to 80 respectively at 20:00. Pulse was ranged between 62 and 74 at 9:00 and 60 and 70 at 20:00. During this interval Patient had Blood pressure above normal 9 times with the highest BP measured at 160/90 on 15/01/17 (Table 5).

Discussion

In this case study we studied a single case who had suffered an Acute Coronary Syndrome and underwent PCI. The results show the patient had high blood pressure for a total of 17 days in the 33 days of study period after the PCI. The patient's blood pressure never excided above 170/90 and pulse remained normal through the study period. During the study period the patient's medication was changed twice on 4/12/2016 and 26/12/2016 due to failure of control of hypertension. The change in medication did not adequately control the patient's blood pressure. The study shows the patient had blood pressure which was higher in the morning than at late evening. The cause of this is unknown but the cause may be due to work related stress before going to office and lack of sleep due to overtime work at night. The patient failed to maintain the lifestyle modifications recommended by the doctors which included relaxation therapy, decreasing work load and anger management. All these are possible factors which may have contributed to uncontrolled hypertension. This agrees with the findings of ⁸Djindjic *et al.* (2012) who found that total Occupational Stress Index (OSI) associated significantly with arterial hypertension, DM type 2 and dyslipidemia in both genders. Patient was advised to undergo regular checkup which the patient did. The patient underwent multiple investigation including CK-MB, HB% which were normal and Troponin-I which was initially slightly high but later normalized (Table 6). All evidence indicated a successful Angioplasty and Stenting.

Table 5. Blood Pressure (mm Hg) and Pulse (bpm) of a patient after successful Coronary Angioplasty

Date	BP (9:00)		Pulse (9:00)	BP (20:00)		Pulse (20:00)
	S	D	P	S	D	P
4/12/2016	150	85	74	160	90	80
9/12/2016	130	90	68	140	80	64
10/12/2016	160	85	68	140	82	68
11/12/2016	160	85	72	150	85	68
12/12/2016	140	85	68	150	90	68
13/12/16	150	80	62	130	70	72
14/12/2016	130	70	72	130	70	64
15/12/2016	130	75	80	140	80	66
16/12/2016	130	80	72	140	80	64
17/12/2016	140	80	72	140	80	60
18/12/2016	150	80	64	150	80	60
19/12/2016	140	85	64	140	80	64
20/12/2016	140	82	68	140	80	66
21/12/2016	160	80	75	130	80	60
22/12/2016	170	90	60	140	80	68
24/12/2016	150	90	80	150	90	74
12/1/2017	140	80	68	120	70	66
13/1/17	130	70	64	140	80	66
14/1/17	140	70	62	140	70	60
15/1/17	160	90	64	150	80	62
7/2/2017	140	80	72	120	60	68
8/2/2017	150	80	64	130	70	66
9/2/2017	140	70	70	140	80	70
10/2/2017	140	80	66	140	80	64
11/2/2017	150	70	74	140	80	66
12/2/2017	150	80	72	150	70	66
13/2/17	150	80	68	150	70	66
25/2/17	140	80	64	150	70	62
26/2/17	150	80	66	130	70	66
27/2/17	160	80	66	130	70	60
28/2/17	160	80	72	145	70	66
1/3/2017	160	80	68	140	80	68
2/3/2017	140	75	68	140	80	66

Table 6. Results of different tests after PCI in 2016

Date	Test (Time)	Result	Reference Value	Test Method/Mechine
26/11/2016 After CAP	Troponin-I (15:09)	0.33 ng/ml	Cut off 0.78 ng/ml	Automated Chemiluminescence Immunoassy Advia Centaur XP
26/11/2016	CK-MB (4:09)	19 U/L	Upto 25 U/L	
27/11/2016 After CAP	Troponin-I (14:51)	0.93 ng/ml	Cut off 0.78 ng/ml	Automated Chemiluminescence Immunoassy Advia Centaur XP
27/11/2016	CK-MB (14:51)	19 U/L	Upto 25 U/L	
27/11/2016	Haemoglobin (14:38)	12.4 g/dL	M: 13.5-18.0 g/dL	
27/11/2016	HTC (14:38)	36%	M: 40-52%	
27/11/2016	CK-MB (7:47)	23 U/L	Upto 25 U/L	
27/11/2016 After CAP	Troponin-I (7:47)	1.19 ng/ml	Cut off 0.78 ng/ml	Automated Chemiluminescence Immunoassy Advia Centaur XP

Conclusion

Hypertension is a major risk factor in development of different cardiovascular events. Control of hypertension is crucial in reducing overall mortality and morbidity from ACS. In the study multiple drugs failed to control blood pressure adequately. Other external factors may play a role in failure of management of BP. Indeed the patients lack of lifestyle modification as per advice of the physician

may play a great role in the persistence of hypertension especially in the morning. Further study is needed to verify the correlation of work related stress and uncontrolled hypertension after angioplasty and stenting. The patient should seek further medical assistance from specialists and drugs should be altered to adequately control blood pressure. Further investigation might be considered to rule out secondary causes of persistent hypertension.

Reference

1. AHA (American Heart Association) (2017). What is coronary angioplasty? http://www.heart.org/HEARTORG/Conditions/More/ToolsForYourHeartHealth/Answers-by-Heart-Fact-Sheets-Treatments-and-Tests_UCM_300573_Article.jsp#.V5JJSdj2aUk. Accessed July 7, 2016.
2. ASA(American Stroke Association)(2017). Angioplasty and vascular stenting. Radiological Society of North America. <http://www.radiologyinfo.org/en/info.cfm?pg=angioplasty>. Accessed 12 March 2017.
3. ASA(American Stroke Association)(2016). Angioplasty. National Heart, Lung, and Blood Institute. <http://www.nhlbi.nih.gov/health/health-topics/topics/angioplasty>. Accessed 10 March 2016.
4. NHS (National Health Services) (2017) (<http://www.nhs.uk/Conditions/Coronary-angioplasty/Pages/Lynns-story.aspx>). Accessed on 10 March 2017.
5. Carrozza J P. (2017). Periprocedural complications of percutaneous coronary intervention. <http://www.uptodate.com/home>. Accessed 12 March 2017.
6. Longo D.L.*et al.*(2017).eds. Percutaneous coronary interventions and other interventional procedures. *In: Harrison's Principles of Internal Medicine*. 19thed. New York, N.Y.: McGraw-Hill Education, 2015. <http://accessmedicine.com>. Accessed 12 March 2017.
7. Mayo Clinic USA. (2017). <http://www.mayoclinic.org/tests-procedures/coronary-angioplasty/home/ovc-20241582>.
8. Djindjic N., J. Jovanovic, B. Djindjic, M. Jovanovic, J. J. Jovanovic (2012). Associations between the Occupational Stress Index and Hypertension, Type 2 Diabetes Mellitus and Lipid Disorders in Middle Aged Men and Women. *The Annals of Occupational Hygiene*, **56** (9): 1051-1062.<https://doi.org/10.1093/annhyg/mes059>