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Complete Heart Block Following Intracoronary Administration of Nicorandil During Percutaneous Coronary Intervention – CASE SERIES

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ABSTRACT

BACKGROUND

Acute coronary syndrome (ACS) patients can be successfully treated with percutaneous coronary intervention (PCI). The anti-anginal drug Nicorandil works to improve microvascular circulation and boost coronary blood flow. During percutaneous coronary intervention (PCI), an intracoronary injection of nicorandil can be utilized to treat the severe no-reflow phenomena. By enhancing microvascular circulation in those with acute myocardial infarction, it also lessens the occurrence of the slow-flow phenomena.

We describe case series pertaining to complete heart block following intracoronary administration of nikorandil during percutaneous coronary intervention. Electrocardiography monitor of cath- lab unit showed complete heart block during hemodynamic monitoring while PCI.Coronary angioplasty was done in all three patients. In all three the patients after placing a stent in proximal RCA , coronary angiography showed TIMI grade 2 flow in RCA, 2 mg nicorandil was intracoronary administrated. Immediately, there was complete heart block

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following Nicorandil administration .the rhythm reverted to sinus after immediate administration of 0.6 mg atropine. All patients had a good outcome during follow-up after 1 month.

Addition to the literature:

Up to now, there has been no report of complete heart block caused by intracoronary administration of nicorandil. Although intracoronary nicorandil is one of the most often employed techniques to increase coronary flow, much more focus should be placed on nicorandil's side effects.

INTRODUCTION

Stenosis or obstruction of the coronary arterial lumen brought on by atherosclerosis, which results in myocardial ischemia, angina pectoris, and/or infarction, is what causes coronary heart disease (CHD) .[1]Due to improvements in therapeutic choices and drug development, CHD has developed into a long-lasting chronic condition that continues to be a significant public health burden .[2] Although total CHD mortality has been consistently declining over the past few years, the prevalence of CHD has continued to rise quickly, especially in developing nations.[3]

By enhancing microvascular circulation in individuals with acute myocardial infarction, intracoronary nicorandil treatment decreased the occurrence of the sluggish flow or no-reflow phenomena.[4]The dilatation of coronary microcirculation, ischemic preconditioning, antiarrhythmia, and decrease of reperfusion injury are some of the mechanisms of intracoronary nicorandil.[5] In this case series , we three female patients who developed complete heart block immediately following intracoronary administration of Nikorandil.

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CASE SERIES DESCRIPTION .

The patients have given their approval in writing for the case to be published.

A 50-year-old post menopausal woman experienced abrupt onset chest pain that lasted for nearly an hour. She was not a known case of hypertension, diabetes or previous cardiac ailments. A physical examination revealed a heart rate of 80 beats per minute and a blood pressure of 130/70 millimeters of mercury. Ainitial 12-lead ECG was acquired, which showed ST-segment elevation in leads II and III and aVF. Echocardiography showed regional wall motion abnormality in RCA territory with left ventricular ejection fraction of 50% .Acute STEMI (inferior wall) was her preliminary diagnoses. An immediate coronary angiography revealed that the left anterior descending artery and left circumflex (LCX) did not have any significant stenosis but she had near total occlusion of proximal RCA artery.

A predilation was done with a 1.5X 15 mm balloon. A 2.75 X44mm stent was placed in the proximal RCA. A 2.75 X 12 mm NC balloon post dilatation .Following post dilation , TIMI grade 1 flow was noted in the RCA on an angiography. Following that, intracoronary administration of 2mg of nicorandil. Immediately following administration, complete heart block was noted. Patient was asked cough and 0.6 mg of intravenous atropine was given. Rhythm was converted to sinus rhythm and achieved TIMI III flow.

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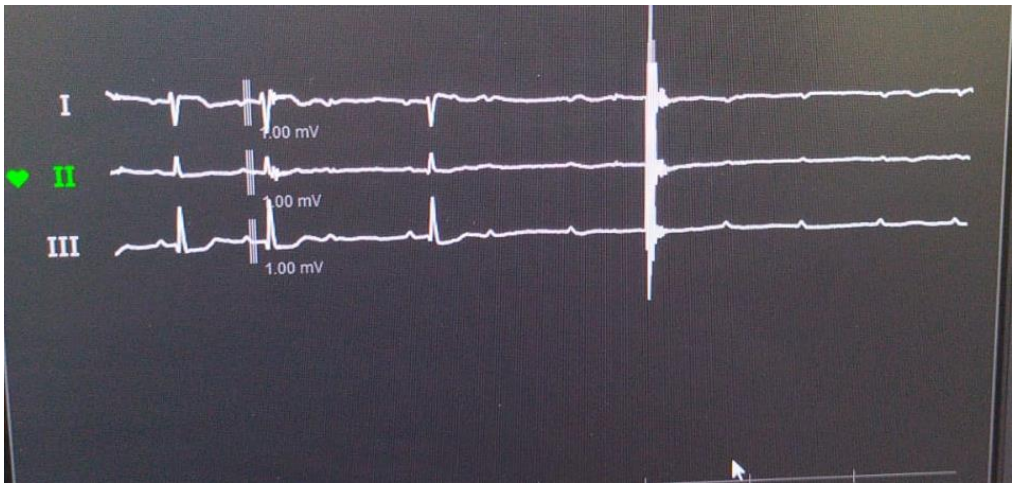

Image 1: complete heart block immediately after administration of intracoronary nikorandil in patient 1

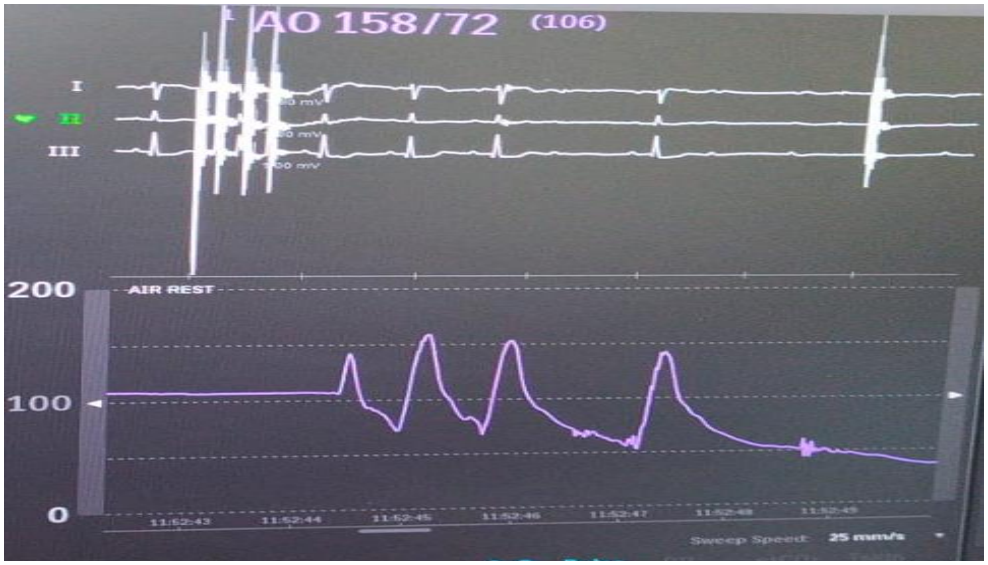

Image 2: Complete heart block immediately after administration of intracoronary nikorandil in patient 2

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Second patient, a 74 yrs woman was admitted with chest pain since 3 days . She is not known case hypertension or diabetes mellitus. 12-lead ECG showed ST-segment elevation in leads II and III and aVF. Echocardiography revealed regional wall motion abnormality in RCA territory with left ventricular ejection fraction of 45%. Coronary angiography revealed that the left anterior descending artery and left circumflex (LCX) did not have any significant stenosis but she had 90% stenosis of mid to distal RCA artery. A predilation was done with a 1.5X 15 mm balloon. A 3.0 X 38 MMstent was placed in the mid to distal RCA. 3.0x12mm NC balloon post dilatation . Since there was slow phenomenon , intracoronary nicorandil was administered Complete heart block with ST elevation was noticed immediately after 2 mg of nicorandil administered intracoronary. After being requested to cough, the patient received 0.6 mg of atropine intravenously. TIMI III flow was attained once the rhythm was changed to sinus rhythm.

Third patient, a 64 yrs woman was admitted with chest pain since 5 days. She 12-lead ECG showed ST-segment elevation in leads II and III and aVF. Echocardiography revealed regional wall motion abnormality in RCA territory with left ventricular ejection fraction of 40%. Coronary angiography revealed that she had 90% stenosis of mid RCA artery. A predilation was done with a 2X 8mm balloon. A 3.0 X 24 MMs tent was placed in the mid RCA. 3.0x12mm NC balloon post-dilatation was done . After stent deployment TIMI grade 2 flow in the RCAwas noted . Complete heart block with ST elevation was noticed immediately after 2 mg of nicorandil administered intracoronary. The patient received 0.6 mg of atropine intravenously. TIMI III flow was attained once the rhythm was changed to sinus rhythm.

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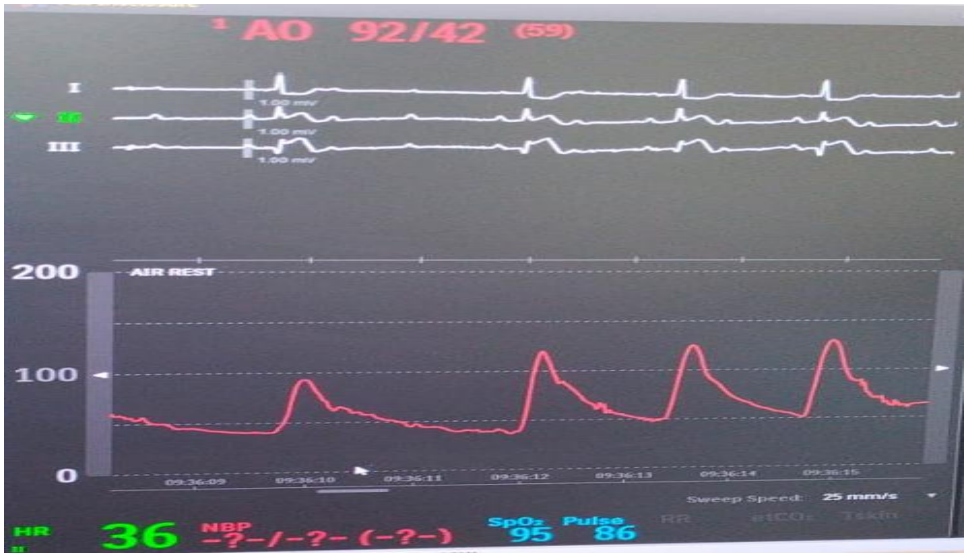

Image 3 : complete heart block with ST-elevation immediately after administration of intracoronary nikorandil in patient 3

All the patients are doing well on monthly follow-up.

DISCUSSION

Up to 50% of STEMI patients experience the slow flow or no-reflow phenomena, which is a kind of microvascular dysfunction following the culprit artery's revascularization.[6]As a result, patients with microvascular dysfunction have worse prognoses, greater myocardial infarct sizes, and more early postinfarct consequences.[7] There are numerous ways to evaluate microvascular dysfunction. It is generally convenient and used in practice to use angiography to assess

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microvascular dysfunction. In the present cases, after stenting and post-dilation, microvascular dysfunction occurred in this patient indicated by TIMI grade 2 flow in RCA. It may be brought on by ischemia-related injury, reperfusion-related injury, distal embolization from the offending plaque, thrombus, and individual vulnerability to microcirculatory injury. Given that microvascular dysfunction was discovered upon post-dilation, we hypothesize that the main factor causing the sluggish flow phenomena in this patient was distal embolization brought on by emboli from fissured plaques or thrombus.

Intracoronary medication administration may be successful for microvascular dysfunction morethan residual thrombus aspiration. In various clinical trials, intracoronary adenosine, sodium nitroprusside, verapamil, nicorandil, and GPIIb/IIIa inhibitors were evaluated for their potential to enhance microvascular function.[8] Nicorandil was chosen to increase blood flow because the patients had low blood pressure. Because it has almost no effect on heart rate, nicorandil, a hybrid of nitrate-like and ATP-sensitive potassium (KATP) channel activator, is regarded as the best medication to improve coronary flow in acute coronary syndromes. In our cases, we reported intracoronary administration of nicorandil induced complete heart block. The instance of life-threatening bradycardia brought on by nicorandil-induced hyperkalemia was also reported by Lee et al.[9] However, the serum potassium levels in both of our patients were within acceptable limits. Also, Wei et al reported c case of Intracoronary administration of nicorandil-induced cardiac arrest during primary percutaneous coronary intervention.[10]

Thus, intracoronary nicorandil should be carefully administered in the treatment of microvascular dysfunction and side effects like complete heart block should be considered and warrant further evaluation.

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