Painless Radial Access Procedures with Nicorandil: A Comparative Assessment with Conventional Verapamil-Nitroglycerine Cocktail

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Abstract

Background: Radial artery spasm is a major limitation of the transradial approach. This study was designed to compare the spasmolytic effect between nicorandil and the conventional cocktail of nitroglycerine and verapamil during transradial coronary procedures.

Materials and methods: 200 patients were randomized into two groups to compare 8 mg of nicorandil and cocktail (mixture of normal saline, 5 mg of verapamil and 200 μg of nitroglycerin). Radial artery spasm and patient comfort in both the groups were assessed.

Results: Radial artery spasm and conversion rate to femoral access were statistically insignificant comparing both groups. None of the patients in the Nicorandil group had pain or burning sensation during its administration whereas all patients who received cocktail had pain and burning sensation in spite of aspirating blood and mixing cocktail thoroughly with blood.

Conclusions: Nicorandil is a superior vasodilator and can be considered as a better alternative to the conventional cocktail of nitroglycerine and verapamil without any adverse effects as it gives more comfort to the patient by avoiding pain and burning sensation during its administration.

Introduction

Currently transradial approach for coronary angiography and interventions has progressively gained popularity and has been shown to be an effective and safe alternative to femoral approach. The advantages with the radial artery approach include less vascular complications1 and increased patient comfort after the procedure initially because of immediate ambulation2. In particular, use of the radial approach is safe and effective for patients with obesity, aortoiliac disease, therapeutic anticoagulation and spinal problems. This approach is still used as an alternative in many centers because of the associated radial artery spasm (RAS)3. Various studies have shown that administration of a variety of intra-arterial vasodilators including calcium channel blockers, organic nitrates, and α-blockers, alone or in combination, compared to heparin alone, significantly reduce the incidence and severity of RAS in patients undergoing transradial coronary angiography and angioplasty4. However, even after the use of a vasodilator RAS has been reported in 4 to 20% of the patients undergoing transradial coronary angiography.

Various vasodilators recommended for the prevention of RAS include calcium channel blockers, organic nitrates, and α-blockers. Recently it was hypothesized that nicorandil would be more potent...

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than other vasodilators during transradial coronary angiography. Nicorandil a nicotinamide nitrate exerts a dual vasodilator effect, first as a nitrovasodilator and second as a K-ATP channel opener. Previous studies have shown that K-ATP channel openers exist in the vascular smooth muscle cause vasodilation and attenuate constriction of alpha 1 selective agonist (phenylephrine) in the radial artery. Hamilton et al. also showed that nicorandil is very effective in inhibiting vasoconstriction in response to phenylephrine in the radial artery. Therefore nicorandil would be more potent than other vasodilators during transradial coronary angiography because of its dual effect.

The present study was a prospective randomized study carried out to compare various effects of nicorandil to those of conventional cocktail (nitroglycerin plus verapamil) used during transradial coronary angiography (CAG) and percutaneous transluminal coronary angioplasty (PTCA).

Materials and methods
From July 2007 to February 2008, 200 patients who underwent coronary angiography and angioplasty were enrolled in this prospective study at Amrita Institute of medical sciences, Kochi. Patients were randomized into two groups for transradial coronary procedures. Patients who received nicorandil were called the nicorandil group and patients who received a cocktail were referred to as the cocktail group.

All procedures were planned as diagnostic coronary angiography or angioplasty. Patients with absence of a pulse in the radial artery were excluded. In all patients, the right radial artery was punctured using an 18 G entry needle at 1-2 cm proximal to the styloid process after local anesthesia with 2% lidocaine. After the radial artery puncture, we used a 0.035” hydrophilic guidewire and a 10-cm long 5F sheath was advanced over the guidewire into the radial artery. Every patient, in both groups, received 5000 units of heparin and 10 ml of a cocktail (mixture of normal saline, 200 µg of nitroglycerin and 5 mg of verapamil) or 8 mg of nicorandil which was diluted in 5 ml of normal saline which were given through the sheath. During coronary catheterization, the procedure time was calculated and hemostasis of the radial puncture site was obtained with a compression dressing using gauze for 4 hrs.

Results
Baseline characteristics of both study groups are listed in Table 1. There were no statistically significant differences in age, gender, risk factors or procedure time between the two groups.

Three cases who received Nikorandil were converted to femoral access: one due to radial artery spasm during CAG and two due to poor guiding support during PTCA. In the cocktail group conversion rate to femoral access remained three: two cases due to radial artery spasm (one during CAG and one during PTCA) and one due to poor guiding support during PTCA.

The two groups did not differ significantly in baseline systolic (SBP) or diastolic blood pressure (DBP) (SBP, P = 0.18; DBP, P = 0.39). No significant differences in the mean change of SBP and DBP were observed between the two groups after the administration of nikerandil or cocktail (SBP, P = 0.11; DBP, P = 0.34).

The mean procedure time for CAG in cocktail group was 9.1±4.3 min and Nikorandil group was 9.7±6.3 min whereas the mean procedure time for PTCA in cocktail group was 26.4±9.36 min and Nikorandil group was 29.54±8.2 min which were statistically insignificant.

None of the patients in the Nikorandil group had pain or burning sensation during its administration whereas all patients who received cocktail had pain and burning sensation inspite of aspirating blood and mixing cocktail thoroughly with blood.

Discussion
RAS is still a major concern during transradial approach. Therefore, to prevent RAS administration of intra-arterial vasodilator is mandatory. Even though the nature of the spastic characteristics of the radial artery remains unknown several studies have demonstrated that the marked muscle mass and high density in alpha adrenergic receptors in the radial artery may be the cause of RAS. In addition, the radial artery also has a higher response rate to norepinephrine, 5-hydroxytryptamine, angiotensin II, and endothelin.

Verapamil alone or in combination with nitroglycerin as a cocktail, has been the standard vasodilator during the transradial coronary procedure. Verapamil- nitroglycerin cocktail is associated with
S wave in Pulmonary Embolism, a new ECG sign to aid thrombolysis


References

Conclusion

Nicorandil is a superior vasodilator and can be considered as a better alternative to the conventional cocktail of nitroglycerine and verapamil without any adverse effects as it gives more comfort to the patient by avoiding pain and burning sensation during its administration.

Pain and burning sensation in the forearm immediately after the injection. Hence it is advised to mix with the blood thoroughly with cocktail prior administration. In spite of this all our patients in the cocktail group experienced pain and burning sensation in the arm whereas none of the patients in the Nicorandil group had pain or burning sensation during injection of the drug.

There was no statistically significant difference in the occurrence of symptomatic RAS requiring conversion to femoral access in the two groups. The short mean procedural time and the long half-lives of nicorandil (40–80 min) and verapamil (110 min) must have been important factors to result in similar spasmolytic effects on the incidence of RAS.

Nevertheless, Nicorandil was superior in avoiding pain and burning sensation during the administration making the procedure more comfortable to patient.

Abstract:

Acute pulmonary embolism is a devastating disease that often leads to mortality. Previous investigators have found that thrombolysis reduces mortality in men but not significantly in women with pulmonary embolism. Many of the previous studies are with tenecteplase and alteplase. Here, we describe intra-arterial venous thrombolysis with streptokinase in seven patients with pulmonary embolism. Low voltage QRS complexes are reported as an end point for thrombolysis in acute pulmonary embolism. We also describe a patient who had new onset S wave that disappeared after successful pulmonary embolectomy. Probably, the S wave is a marker of main pulmonary artery branch occlusions. We propose a new sign for noninvasive assessment of need for thrombolysis in pulmonary embolism. New onset S wave in Lead I in pulmonary embolism can be used as a new sign for deciding on thrombolysis. We propose a new sign for noninvasive assessment of need for thrombolysis in pulmonary embolism.