Study Protocol

Title: The Role of Oral Verapamil in Preventing Radial Spasm During Transradial Angiography

ClinicalTrials.gov Identifier: NCT06447688

Sponsor / Responsible Party: Mersin Medicalpark Hospital/ Sefa SURAL

IRB Approval: Mustafa Kemal University Ethics Committee, No: 2022/102

Version Date: 24.10.2022

1. Background and Rationale

Radial artery spasm (RAS) is the most frequent complication of transradial access (TRA) for coronary angiography and interventions. It can cause severe patient discomfort, technical difficulties, and procedural failure. The reported incidence of RAS ranges from 4% to 51%. Preventing spasm is more effective than treating it once it occurs.

Hypothesis: Oral administration of 120 mg verapamil before the procedure reduces the incidence of RAS.

2. Objectives

- **Primary Objective:** To evaluate the effect of oral verapamil on the incidence of clinical and ultrasonographically confirmed radial artery spasm.
- **Secondary Objectives:**
    - To assess the procedural success rate
    - To evaluate contrast volume, fluoroscopy time, and radiation dose

3. Study Design

- **Type:** Prospective, randomized, placebo-controlled clinical trial
- **Location:** Medicalpark Mersin Hospital, Turkey
- **Enrollment Period:** June 2024 – November 2024
- **Sample Size:** 150 participants (75 per group)
- **Randomization:** 1:1 block randomization

4. Participants

Inclusion Criteria:

- Adults scheduled for coronary angiography via radial approach

Exclusion Criteria:

- Abnormal Allen test
- Absent radial pulse
- Previous radial procedure on the same arm
- Hemodynamic instability
- Contraindications to verapamil (e.g., AV block, EF <35%, severe aortic stenosis)

5. Interventions

- **Experimental Group:** 120 mg oral verapamil, 2 hours before procedure
- **Control Group:** Placebo, same schedule

6. Procedures

- Local anesthesia with 2% prilocaine
- Radial puncture using 20 20-G needle
- 6F hydrophilic sheath insertion
- Intra-arterial heparin 5000 IU
- No routine intra-arterial vasodilators are used
- Coronary angiography performed with 6F Judkins catheters
- PCI performed if indicated, with additional weight-adjusted heparin
- Hemostasis with TR Band (patent hemostasis technique)

7. Endpoints

Primary Endpoints:

1. Clinical RAS incidence (≥2 of: forearm pain ≥4/10, pain during catheter manipulation, catheter restriction, pain during sheath removal, difficulty with sheath removal)
2. Ultrasonographic RAS (≥50% lumen narrowing)

Secondary Endpoints:

- Procedural success
- Contrast volume (mL)
- Fluoroscopy time (minutes)
- Radiation dose (DAP, mGy·cm²)

8. Statistical Considerations

- Sample size: 150 (75 per arm), calculated with 80% power and α=0.05
- Normality test: Shapiro–Wilk
- Parametric variables: Student t-test
- Non-parametric: Mann–Whitney U
- Categorical: Chi-square or Fisher exact
- Predictors: Logistic regression

9. Ethics

- Conducted in accordance with the Declaration of Helsinki
- Approved by Mustafa Kemal University Ethics Committee (2022/102)
- Written informed consent obtained from all participants

10. Amendments

No protocol amendments occurred during the study period.

Statistical Analysis Plan (SAP)

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1. Objectives

- **Primary Objective:**
  To evaluate the effect of oral verapamil (120 mg, administered 2 hours before procedure) on the incidence of clinical and ultrasonographically confirmed radial artery spasm (RAS).
- **Secondary Objectives:**
  - To assess procedural success
  - To compare fluoroscopy time (minutes)
  - To compare contrast volume (mL)
  - To compare the radiation dose (DAP, mGy·cm²) between groups

2. Analysis Populations

- **Intent-to-Treat (ITT):** All randomized participants (N=150; 75 per arm) included in the final analyses.
- **Per-Protocol (PP):** Same as ITT since no participants were excluded or dropped out.

3. Sample Size Determination

- Assumptions: RAS incidence 20% in placebo group vs. 5% in verapamil group
- Power: 80%
- Alpha: 0.05 (two-sided)
- Required sample size: 150 participants (75 per arm)
- Software: PASS 11.0

4. Statistical Methods

- **Descriptive Statistics:**
  - Continuous variables: mean ±SD if normally distributed; median (IQR) if not
  - Categorical variables: counts and percentages
- **Comparative Analyses:**
  - **Normality:** Assessed with the Shapiro–Wilk test
  - **Continuous variables:** Student's t-test (parametric), Mann–Whitney U test (non-parametric)
  - **Categorical variables:** Chi-square test or Fisher's exact test, as appropriate
- **Regression Analyses:**
  - Logistic regression was performed to identify independent predictors of RAS
  - Variables considered: age, sex, comorbidities, procedural factors
  - Results presented as odds ratios (OR) with 95% confidence intervals (CI)
- **Significance Threshold:**
  - Two-tailed $p < 0.05$ is considered statistically significant

5. Handling of Missing Data

- No missing outcome data anticipated (all 150 completed the study)
- In the event of missing data, analysis would proceed with available cases; no imputation planned

6. Subgroup and Sensitivity Analyses

- No predefined subgroup analyses
- Sensitivity analyses are not required due to full completion of the study

7. Software

- Data entry and analyses performed using **SPSS version 25.0 (IBM Corp, Armonk, NY, USA)**