



ORIGINAL ARTICLE

## Manual heating of the radial artery (Balbay maneuver) to facilitate radial puncture prior to transradial coronary catheterization



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### KEYWORDS

Cardiac catheterization;  
Manual heating;  
Transradial access

### Abstract

**Objective:** Transradial access is widely used for both diagnostic and interventional cardiac procedures. The use of transradial access offers several advantages, including decreased bleeding, fewer vascular complications, and reduced length of hospital stay and cost. However, the small size of the radial artery limits the size of the equipment that can be used via this approach. In this study we sought to investigate whether preprocedural manual heating of the radial artery facilitates radial artery puncture.

**Methods:** Patients undergoing transradial cardiac catheterization were randomized to subcutaneous nitroglycerin plus diltiazem or manual heating. The study endpoint was puncture score (score 1: easiest – puncture at first attempt; score 2: second attempt; score 3: third attempt; score 4: fourth attempt or more; score 5: puncture failed).

**Results:** Ninety consecutive patients were enrolled in the study, 45 allocated to the drug treatment group and 45 to the heating group. Patients underwent radial artery ultrasound before catheterization. Complications were rare: one hematoma (drug treatment group) and one radial artery occlusion (heating group). Baseline demographic and clinical characteristics were similar. Baseline radial artery diameter was similar in both groups ( $2.41 \pm 0.46$  mm and  $2.29 \pm 0.48$  mm in the heating and drug treatment groups, respectively). However, the median puncture score was lower in the heating group (1; interquartile range 1-2) compared to the drug treatment group (2; interquartile range 1-3;  $p=0.001$ ).

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**PALAVRAS-CHAVE**

Cateterização coronária;  
Aquecimento manual;  
Acesso transradial

*Conclusions:* Preprocedural manual heating of the radial artery facilitates radial artery puncture in patients undergoing transradial cardiac catheterization.

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### Aquecimento manual da artéria radial (manobra de Balbay) para facilitar a punção radial antes da cateterização coronária

**Resumo**

*Objetivo:* O acesso transradial (ATR) é usado habitualmente quer para procedimentos diagnósticos quer de intervenção coronária. O uso de ATR oferece várias vantagens: redução das hemorragias, menos complicações vasculares, menor tempo de internamento e representa menos custos associados. Porém, o reduzido calibre da artéria radial limita o tamanho dos dispositivos que podem ser usados por este acesso. Neste estudo, investigamos se o prévio aquecimento da artéria radial facilita, ou não, a punção radial.

*Métodos:* Doentes submetidos a cateterismo cardíaco por ATR foram aleatorizados para uma administração subcutânea de uma combinação de nitroglicerina e diltiazem ou, em alternativa, aquecimento manual da artéria radial. O *endpoint* do estudo foi o *score* de punção (*score* 1: punção simples à primeira tentativa; *score* 2: punção à segunda tentativa; *score* 3: punção à terceira tentativa; *score* 4: punção à quarta ou mais tentativa; *score* 5: punção radial falhada).

*Resultados:* Noventa doentes consecutivos foram incluídos no estudo – 45 no grupo de tratamento farmacológico e 45 no grupo de aquecimento manual. Os doentes fizeram avaliação ecográfica da artéria radial antes do cateterismo. As complicações ocorreram de forma rara: um hematoma (grupo tratamento) e uma oclusão radial (grupo aquecimento). As características basais demográficas e clínicas foram semelhantes. O diâmetro basal da artéria radial foi semelhante em ambos os grupos ( $2,41 \pm 0,46$  mm e  $2,29 \pm 0,48$  mm nos grupos de aquecimento e de tratamento, respetivamente). No entanto, o *score* de punção foi mais baixo no grupo aquecimento (1; intervalo interquartil 1-2) comparado com o grupo tratamento (2; intervalo interquartil 1-3;  $p=0,001$ ).

*Conclusões:* O aquecimento manual da artéria radial facilita a punção radial em doentes submetidos a cateterismo cardíaco por via transradial.

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**Introduction**

The transradial access approach is effective for cardiac catheterization and percutaneous coronary intervention.<sup>1,2</sup> It is becoming increasingly popular due to lower vascular complication rates, reduced costs, and earlier mobilization.<sup>3-6</sup> Local complications remain low even in high-risk subgroups such as the elderly or obese, females, after acute myocardial infarction or under anticoagulation.<sup>7-10</sup> The transfemoral approach is associated with greater procedural complications, particularly access-site major bleeding, which is becoming an increasingly important issue in the era of more potent antiplatelet and antithrombotic agents used to prevent cardiac ischemia, and is associated with more adverse clinical events, including mortality.<sup>11,12</sup> Although the transradial approach is a demanding technique, with a steep learning curve due to a high number of procedural failures before gaining experience, at present it is the first-line access in many interventional cardiology centers.<sup>13-15</sup> In a comparison of radial and femoral

approaches in patients undergoing coronary angiography or intervention, a lower rate of access-related complications was observed with radial access.<sup>16</sup> In the RIVAL study on patients with acute coronary syndrome, radial artery access reduced the composite primary outcome and mortality.<sup>12</sup> The RIFLE-STEACS study showed that radial access in patients with ST-segment elevation acute coronary syndrome is associated with significant clinical benefits, in terms of both lower morbidity and cardiac mortality.<sup>17</sup> In the MATRIX trial of patients with acute coronary syndrome undergoing invasive management, radial as compared with femoral access reduced net adverse clinical events, through a reduction in major bleeding and all-cause mortality.<sup>18</sup> For these reasons, the radial approach is becoming increasingly popular.

The main problem is the difficulty of the initial puncture of a small and highly reactive artery. Radial spasm increases after subcutaneous injection of lidocaine during local anesthesia, because lidocaine at room temperature is colder than body temperature.

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