

Phototherapy to Mitigate Complications of Left Heart Catheterization with Transradial Access (TRA)

James R. Kneller*

Department of Medicine, University of Arizona College of Medicine, Phoenix 1125 South Alma School Road, Suite 310, Chandler, AZ 85286, USA

Abstract

Transradial access is preferred for coronary angiography due to reduced complication risk. Procedural complications still occur, however, including nerve damage and regional pain syndrome. Guidelines for optimal treatment are lacking. This case involves a 74 year-old female referred for diagnostic coronary angiography using right radial access. At two-week follow up, she presented with moderate pain at the vascular access site and with moderate numbness and weakness in the right index finger, suggestive of radial nerve injury. Phototherapy using a set of cutaneous patches (Ice Wave from LifeWave Corp) was used to relieve these symptoms, leading to complete resolution of symptoms. These devices contain natural compounds that reflect back infrared frequencies emitted by the skin. Biologic activity include elevation of glycyl-L-histidyl-L-lysine (GHK), having a plethora of effects. This non-pharmacologic adjunctive therapy may be useful to mitigate the complications of coronary angiography.

Keywords: Cardiac catheterization • Coronary angiography • Transradial access • Complications • Phototherapy

Introduction

Transradial access (TRA) is favored over transfemoral access for performing coronary angiography due to the reduced risk for vascular and bleeding complications. Both intra-procedural and post-procedural complications still occur with management extending into the outpatient setting. Post-procedural non-bleeding complications include radial artery occlusion, pseudoaneurysm, AV fistula, infection and nerve damage versus regional pain syndrome [1]. Guidelines for the optimal treatment of nerve damage and regional pain syndrome are lacking.

Case Presentation

This case involves a 74-year old female with new diagnosis of dilated cardiomyopathy, LVEF 23%, referred for diagnostic coronary angiography to exclude obstructive coronary artery disease as a contributing cause of cardiomyopathy. A right transradial approach was used. The patient presented for follow-up two weeks later complaining of pain at the vascular access site, numbness in her right index finger and loss of pincer strength such that she had difficulty grasping a sheet of paper. A small area of induration, approximate 2.0 mm in diameter, had also developed at the access site. Pulses and Allen Test were normal and symmetric. Diagnostic possibilities include radial nerve damage versus compression resulting from local inflammation and scar formation.

Given the patient's desire for immediate relief and preference for complimentary alternative medicine (CAM), transcutaneous photobiomodulation therapy was administered using IceWave® patches (LifeWave Corp, San Diego, CA, USA). The tan patch (negative polarity) was placed on the site of maximal pain (Figure 1A). Mapping was then performed with the white patch (positive polarity) to identify the site providing greatest symptom relief [2]. With the position

*Address for Correspondence: James R. Kneller, Department of Medicine, University of Arizona College of Medicine, Phoenix 1125 South Alma School Road, Suite 310, Chandler, AZ 85286, USA, E-mail: James.Kneller@bannerhealth.com

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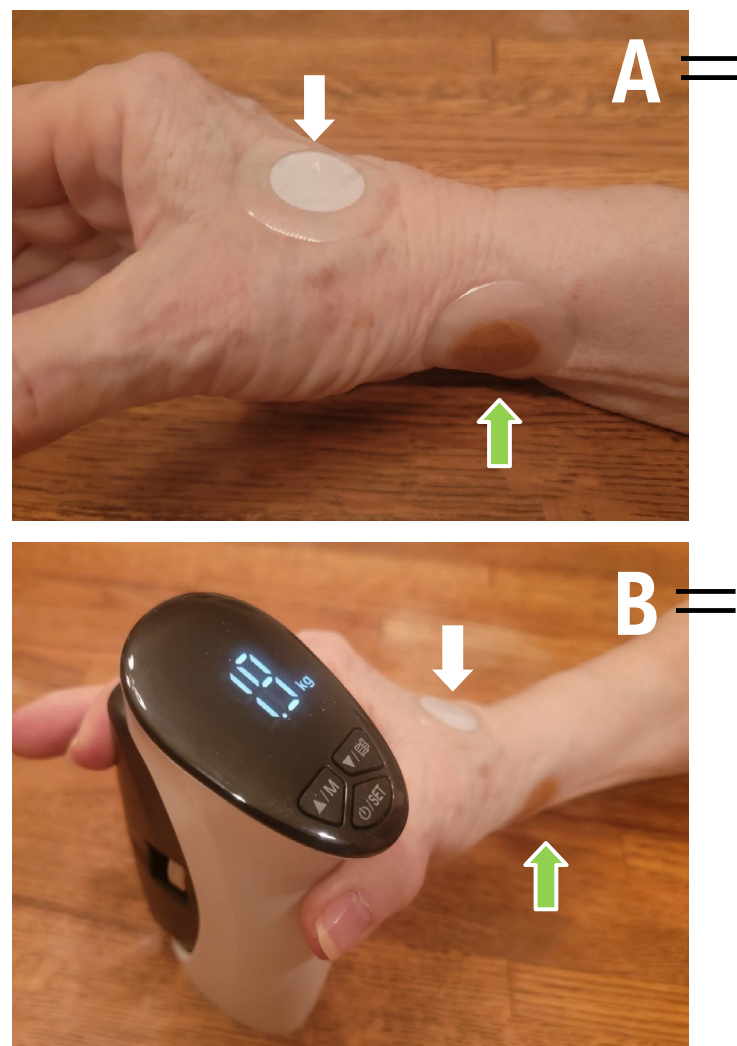


Figure 1. IceWave® wearable phototherapy apparatus with optimal positioning for symptom relief (A) Tan patch with negative polarity placed on the site of vascular access (green arrows). (B) White patch with positive polarity placed in the webspace between the thumb and index finger (white arrows). Digital gripometer used for strength testing before and after application of the LifeWave patches. See text for details.

of the tan patch fixed, the white patch was applied 3-4 cm proximal and distal to the tan patch on both the palmar and dorsal aspects of the forearm. After 20 sec at each site, the patient was assessed for pain, numbness and pincer strength relative to her symptoms immediately prior to application of the patches. The most effective site was over the web space of the thumb and index finger (Figure 1). On a ten point scale, pain was reduced from moderate (4/10) to minimal (1/10). Numbness was tested using two point discrimination, which improved from 3 mm to 1 mm with the patches applied. Maximum finger flexion improved from 110° to 150°. Using a hand grip strength dynamometer (Figure 1B), pincer strength was 2.8 kg in the left hand and 1.6 kg in the right hand. Following application of the patches, right pincer grip strength increased to 2.2 kg. Results were sustained over 24 hours. The patches were removed at that time and the patient reported ongoing benefit over the subsequent three days without patches.

Discussion

Phototherapy with the IceWave® pain relief system consists of two adhesive skin patches, each measuring 34 mm in diameter. Both patches are non-transdermal, meaning no chemicals, drugs or other substances are absorbed through the skin. The patches contain a proprietary blend of plant based amino acids, water, oxygen and natural organic compounds [3]. The patches stimulate the skin by reflecting specific wavelengths of visible and infrared light, which are biologically active throughout the body [4]. Molecular mechanisms include elevation of glycy-L-histidyl-L-lysine (GHK) [4], which is known to activate stem cells, increase collagen, elastin and glycosaminoglycan synthesis, support the function of dermal fibroblasts, stimulate blood vessel and nerve outgrowth, while exerting powerful anti-inflammatory activity [4]. The IceWave® system may improve both musculoskeletal and neuromuscular pain [5]. Cardiovascular benefits of LifeWave® devices include improved heart rate variability and autonomic function [3], improved microvascular circulation, increased glutathione and carnosine levels and lean body composition [6].

Conclusion

Wearable phototherapy devices may be a useful non-pharmacologic therapy for mitigating symptoms resulting from complications of interventional cardiology procedures.

Disclaimer

Wellness products from LifeWave, Inc., including the IceWave® phototherapy apparatus have not been evaluated by the FDA and are not intended to treat medical conditions.

Acknowledgement

None.

Conflict of Interest

None.

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