

Midportion achilles tendon microcirculation after intermittent combined cryotherapy and compression compared with cryotherapy alone: a randomized trial.

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BACKGROUND: The effect of combined cryotherapy/compression versus cryotherapy alone on the Achilles tendon is undetermined. **HYPOTHESIS:** Standardized combined cryotherapy/compression changes in midportion Achilles tendon microcirculation are superior to those with cryotherapy during intermittent application. **STUDY DESIGN:** Controlled laboratory study. **METHODS:** Sixty volunteers were randomized for either combined cryotherapy/compression (Cryo/Cuff, DJO Inc, Vista, California: n = 30; 32 +/- 11 years) or cryotherapy alone (KoldBlue, TLP Industries, Kent, United Kingdom: n = 30; 33 +/- 12 years) with intermittent 3 x 10-minute application. Midportion Achilles tendon microcirculation was determined (O2C, LEA Medizintechnik, Giessen, Germany). **RESULTS:** Both Cryo/Cuff and KoldBlue significantly reduced superficial and deep capillary tendon blood flow within the first minute of application (43 +/- 46 arbitrary units [AU] vs 10 +/- 19 AU and 42 +/- 46 AU vs 12 +/- 10 AU; P = .0001) without a significant difference throughout all 3 applications. However, during recovery, superficial and deep capillary blood flow was reestablished significantly faster using Cryo/Cuff (P = .023). Tendon oxygen saturation was reduced in both groups significantly (3 minutes Cryo/Cuff: 36% +/- 20% vs 16% +/- 15%; KoldBlue: 42% +/- 19% vs 28% +/- 20%; P < .05) with significantly stronger effects using Cryo/Cuff (P = .014). Cryo/Cuff led to significantly higher tendon oxygenation (Cryo/Cuff: 62% +/- 28% vs baseline 36% +/- 20%; P = .0001) in superficial and deep tissue (Cryo/Cuff: 73% +/- 14% vs baseline 65% +/- 17%; P = .0001) compared with KoldBlue during all recoveries. Postcapillary venous filling pressures were significantly reduced in both groups during application; however, Cryo/Cuff led to significantly, but marginally, lower pressures (Cryo/Cuff: 41 +/- 7 AU vs baseline 51 +/- 13 AU; P = .0001 and KoldBlue: 46 +/- 7 AU vs baseline 56 +/- 11 AU; P = .026 for Cryo/Cuff vs KoldBlue). **CONCLUSION:** Increased tendon oxygenation is achieved as tendon preconditioning by combined cryotherapy and compression with significantly increased tendon oxygen saturation during recovery in

contrast to cryotherapy alone. Both regimens lead to a significant amelioration of tendinous venous outflow. **CLINICAL RELEVANCE:** Combined cryotherapy and compression is superior to cryotherapy alone regarding the Achilles tendon microcirculation. Further studies in tendinopathy and tendon rehabilitation are warranted to elucidate its value regarding functional issues.