

EFFECTS OF BLOOD FLOW RESTRICTION ON QUADRICEPS FUNCTION POST-ACL RECONSTRUCTION: A SYSTEMATIC REVIEW

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ABSTRACT

Objective: Examine the available evidence regarding Blood Flow Restriction (BFR)-mediated physical therapy versus traditional physical therapy with respect to quadriceps function in patients undergoing Anterior Cruciate Ligament (ACL) surgery.

Methods: Online databases Pubmed and Embase, and hand searches, were used to locate available research published on BFR use for quadriceps function post-ACL reconstruction.

Results: Six studies qualified for inclusion into this systematic review. BFR was shown to be more effective than traditional PT at reducing loss of quadriceps cross sectional area (CSA) post-operatively [1,2]. Higher exercise volumes were seen in single bouts of BFR therapy [3]. The studies examining BFR modalities prior to surgery, or using intermittent BFR saw no significant differences between groups [4, 5,6].

Conclusion: Based on the published evidence evaluated in this systematic review, there appears to be conflicting evidence in terms of the effectiveness, or advantage, of administering BFR-mediated physical therapy as compared to traditional physical therapy in regards to quadriceps integrity following ACL reconstruction. Additional research is required to determine a more reliable timing of BFR-mediated physical therapy for improved patient outcomes.

Keywords: blood flow restriction, anterior cruciate ligament, ACL, physical therapy, quadriceps function

INTRODUCTION

Blood flow restriction is the application of a pneumatic cuff to the proximal part of a limb, which is then inflated to a predetermined pressure. The BFR stimulus may be constant throughout all exercise or for a set amount of time, which is known as continuous restriction, or the cuff may be deflated periodically, known as intermittent restriction. Since the late 1990's, it has been shown that a restriction of blood flow to a limb combined with exercise at light loads can yield increases in muscular strength, with reduced amounts of mechanical stress placed on the joint being used [7]. It has also been shown that an application of a blood flow restriction (BFR) stimulus, without exercise, to unloaded lower extremities can lead to a reduction of disuse atrophy in unweighted musculature [8]. More recently, applying a BFR stimulus combined with knee extension exercise has been shown to significantly increase knee extensor 1-repetition maximum strength (1-RM), and cross-sectional area (CSA) similarly to heavy load training [9, 10]. Mechanistically, BFR combined with exercise has been shown to reduce the expression of myostatin, which is a known regulator of muscle protein synthesis, while activating the expression of mTORC1