



Cryotherapy vs. Whole-Body Vibration Therapy in Regard to Rehabilitation in Patient's Post Anterior Cruciate Ligament Surgery

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Introduction

- In the United States alone, there has been recorded up to 250,000 anterior cruciate ligament (ACL) related injuries every year.
- ACL injuries are most common in athletes who participate in sports with significant amount of jumping, stopping, and sudden changes of direction (CDC – Injury).
- There are a number of significant injuries and problems that may arise with an ACL injury. Most cases require surgery and rehabilitation therapy afterward in order to regain strength and mobility.
- The major question that will be discussed is: does cryotherapy or whole-body vibration therapy provide a more effective rehabilitation process based on flexibility and muscle strength after undergoing ACL surgery?

Background

- The ACL is one of the major support ligaments that surrounds and supports the patella by connecting the femur to the tibia.
- The ACL prevents separation of the femur from the tibia (Hoffman).

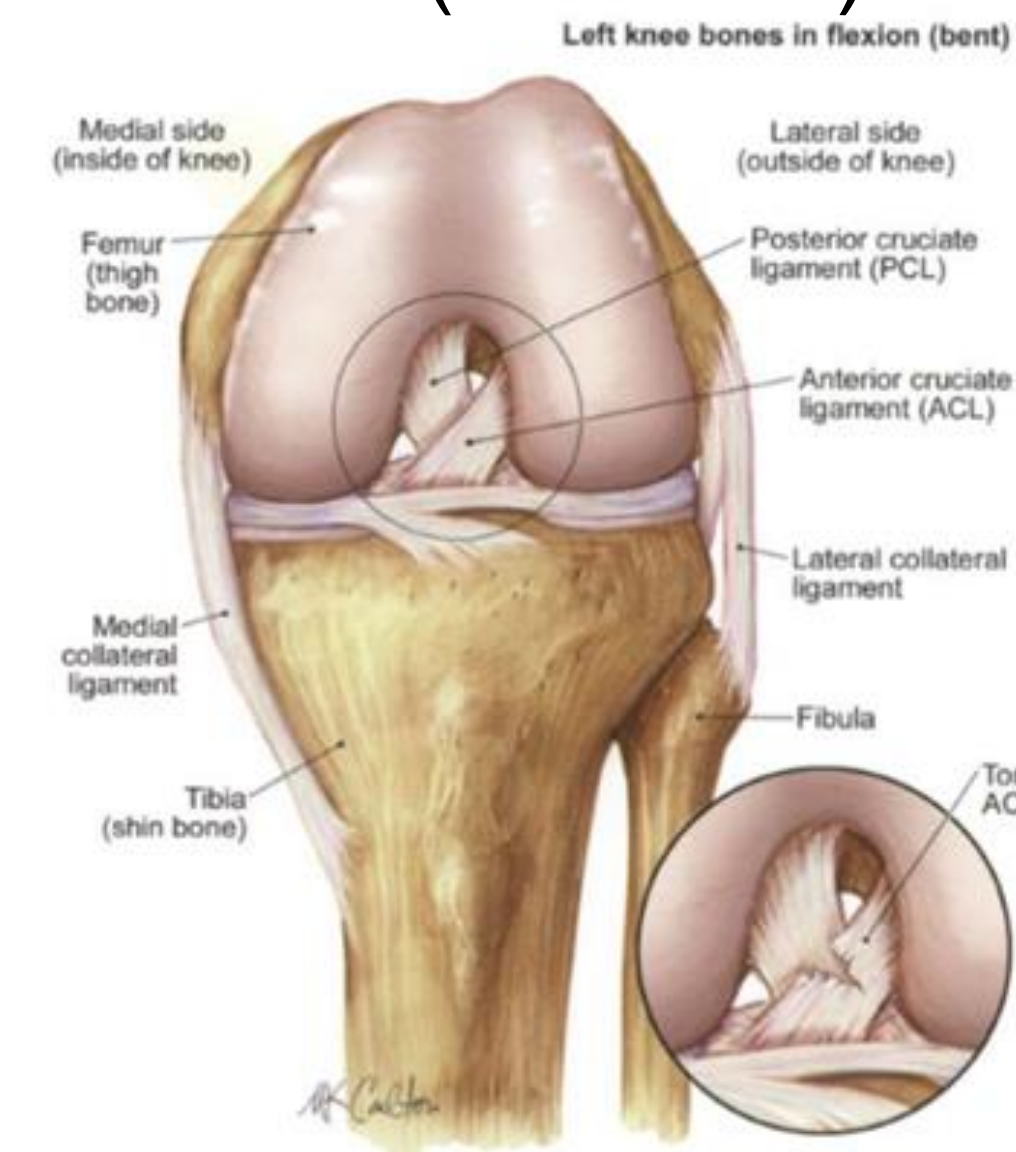


Figure 1. Healthy vs. partially torn ACL “ACL Reconstruction Rehabilitation Protocol”).

- There are a variety of ways an individual can injury his/her ACL and there are several common surgeries that individuals can decide over.

- 1). Patellar Tendon Autograft
- 2). Hamstring Tendon Autograft
- 3). Donor Tissue Allograft (Cluett)

- After undergoing ACL surgery, rehabilitation therapy is required. Most facilities require a standard protocol therapy, while others will incorporate other therapeutic techniques like cryotherapy and whole-body vibration therapy to accelerate the recovery process.

Whole-Body Vibration Therapy (WBV)

- WBV therapy is a technique that has been used that has shown to increase muscle strength, stability, and flexibility by causing the muscles to contract and relax based on the programmed vibration patterns and intensity (Fanous).
- Several studies have been completed to specifically assess how WBV affects post-operative ACL patients in regard to their flexibility and muscle strength when combined with standard protocol therapy.

Study 1: Van Den Tilaar 2006

- 19 participants were randomly split into the intervention group that received WBV or the control group. Their results specifically looked at flexibility and after four weeks, the control group gained an average of 12.4 degrees in his/her range of motion, while the intervention group gained an average of 26.8 degrees in the range of motion.

Study 2: Seixas et al. 2020

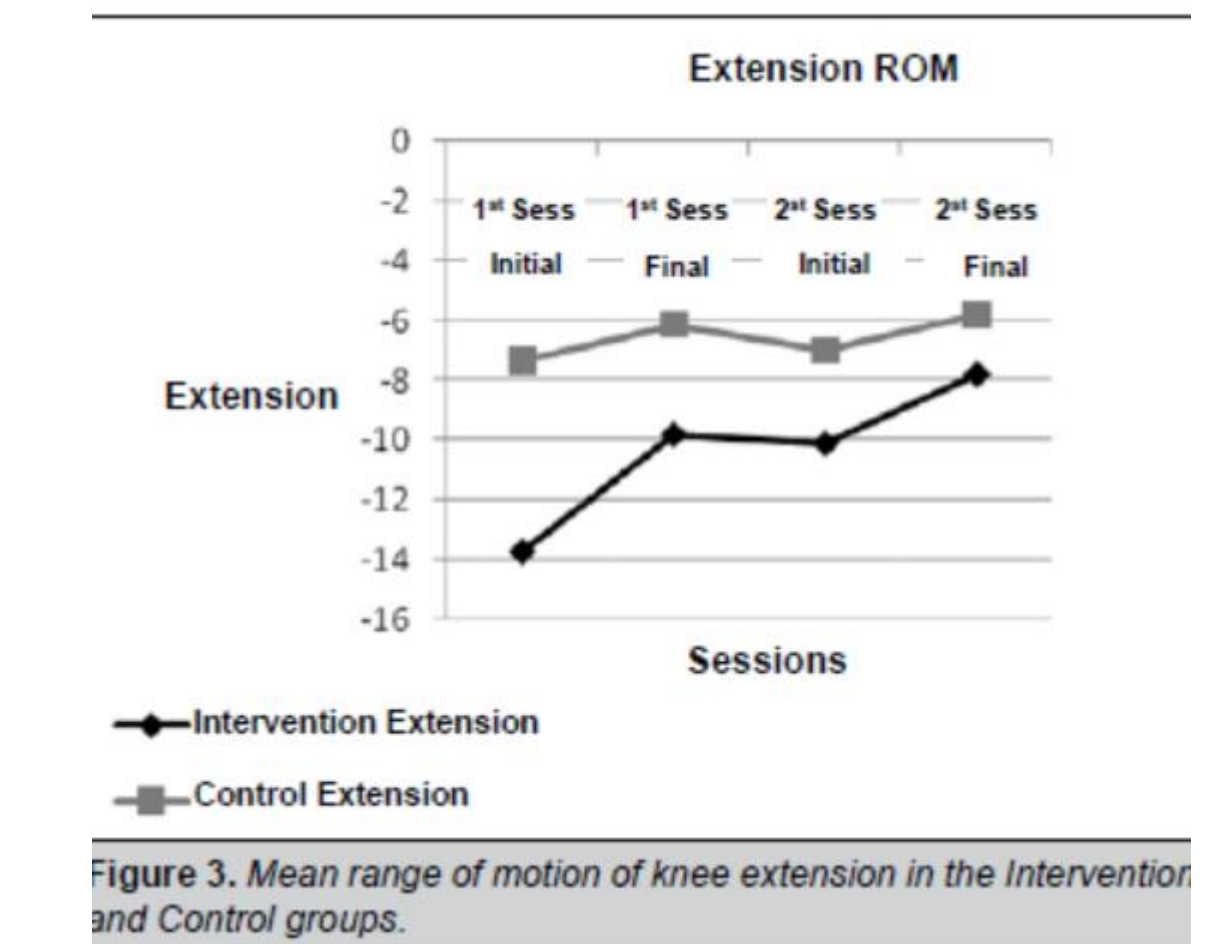
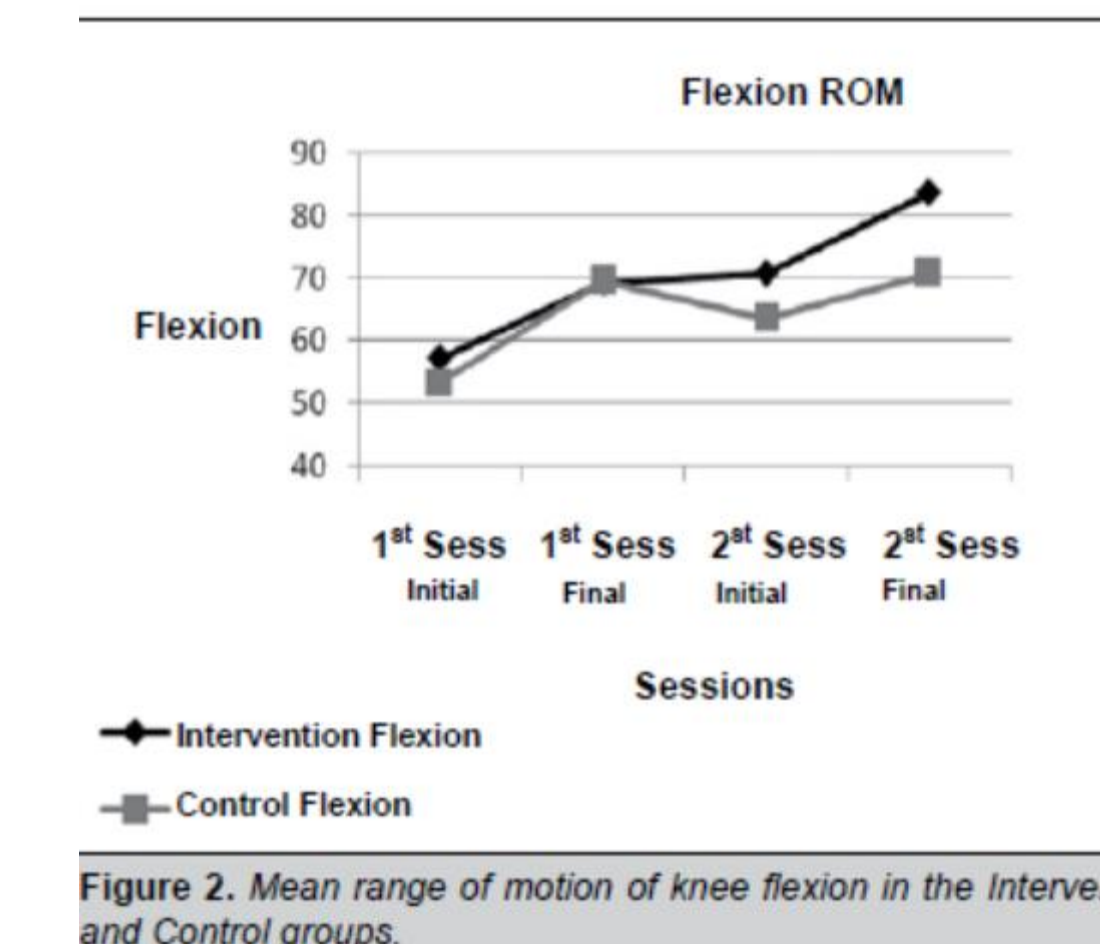
- This meta-analysis study took 10 various studies that assessed the impact of a single session as well as multiple sessions on muscle strength post-ACL surgery. Overall, the studies that were presented in this research demonstrated a positive outlook on WBV in regard to improving muscle strength after ACL surgery.

Cryotherapy

- Cryotherapy is a therapeutic technique that uses extremely cold temperatures to kill irritated nerves in order to treat pain. This is a relatively safe and effective treatment used reduce inflammation, increase blood circulation, and reduce pain in effective areas (Shiel).
- Several studies were conducted to assess how cryotherapy, in addition to standard protocol, would affect the flexibility and muscle strength of individuals who have just undergone ACL surgery.

Study 1: Dambros et al. 2012

- This study took 100 participants to determine if cryotherapy would increase range of motion of the knee. Some of the results are depicted to the right.



Study 2: Raynor et al. 2005

- This meta-analysis study took four different research findings and none of which reported any significant increase in range of motion flexibility of the knee.

Study 3: Hart et al. 2014

- This cross-sectional study took 30 patients post-ACL surgery and assessed them four times over a two-week period. Based on the effect size outcomes and P values, they determined that cryotherapy increased muscle strength when it accompanied standard therapy.

Analysis/Conclusion

- The number of ACL injuries continue to rise and most of the time surgery is inevitable. The first day post-surgery is when most people begin the rehabilitation process and two of the methods to attempt to decrease recovery time are cryotherapy and whole-body vibration therapy. Researchers have found that these two methods have successfully shown to accelerate the patient's flexibility as well as strength in the lower limbs. There was little distinction of which was more beneficial; however, WBV showed slightly more promise as compared to cryotherapy since some of the studies were unable to prove success in cryotherapy. Future research would be beneficial and should be conducted to directly compare these two therapeutic techniques.

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