Effectiveness of utilizing BFR therapy as treatment for Lateral Epicondylitis

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Objectives

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- ★ Students will have a understanding of the general information related to lateral epicondylitis.
- ★ Students will gain an understanding of what Blood Flow Restriction (BFR) therapy is including its physiological response, application, and treatment parameters
- ★ Compare the effectiveness of BFR therapy with traditional resistance training for tendinopathy.
- ★ Review evidence on the use of BFR therapy for improving pain, function, and grip strength in patients with lateral epicondylitis.
- ★ Understand when BFR therapy is appropriate and how it can be integrated into rehabilitation programs.

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What is a Lateral Epicondylitis?

aka "tennis elbow"

General Information

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Etiology/Epidemiology [1-3]

- Overuse injury due to repetitive strain from tasks/activities that involve loaded and repeated gripping and/or wrist extension.
- Most common cause of elbow symptoms in patients with elbow pain
- Annual incidence of 1-3% in the U.S
- Affects men and women equally (most common in individuals age>40)
- Spontaneous recovery within 1-2 years in 80%-90% of patients

Risk factors [1]

- Smoking
- Obesity
- Repetitive movement >2 hours
- Vigorous activity (managing physical loads over 20 kg)

Evaluation

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Subjective [1-3]

- Typically reports insidious onset
- Commonly occurs 1- 3 days after activity that involved repeated wrist extension
- Pain usually worse with activity and better with rest (lifting, using tools, holding objects)

Evaluation: Objective

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Objective [1,2,4]

- TTP at lateral epicondyle (can be 1-2 cm away)
- Special tests (Mills, Cozen's, Maudsley's, Chair test)

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Differences in Clinical Tests for Assessing Lateral Epicondylitis Elbow in Adults Concerning Their Physical Activity Level: Test Reliability, Accuracy of Ultrasound Imaging, and Relationship with Energy Expenditure

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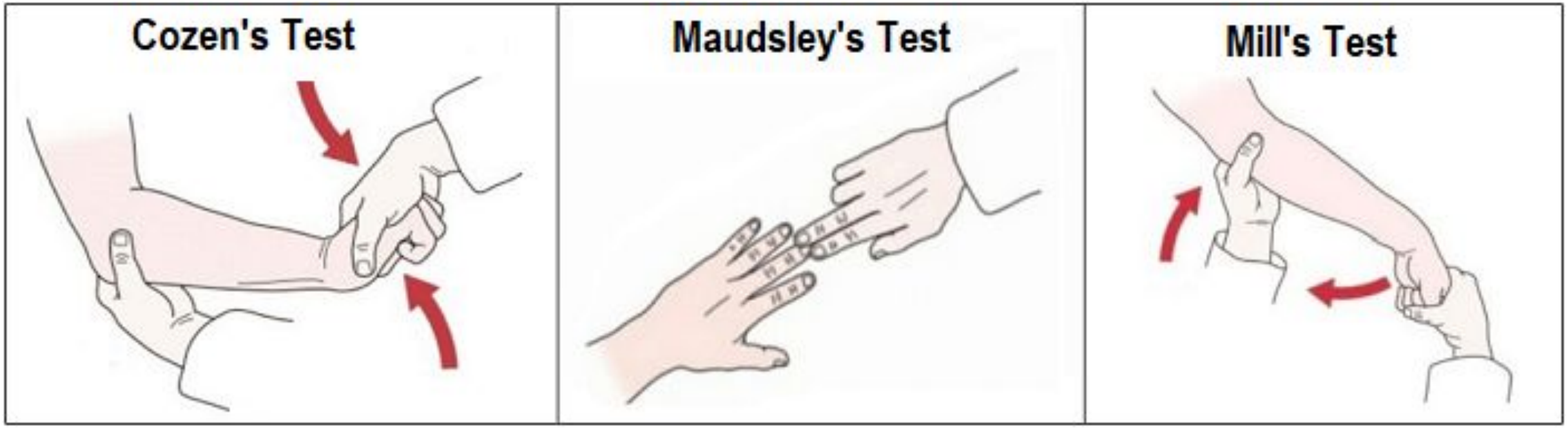
Special Tests



Treatment

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Self Management Strategies [1,5]

- Nonoperative can resolve ~90% of all cases
- Rest
- ICE
- NSAIDs
- *Forearm counterforce straps*

Treatment

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Medical Management [5,6]

- Should be last resort option
- 3 main surgical techniques
  - open, percutaneous, arthroscopic
  - objective is to debride the degenerated/damaged portion of the ECRB without repairing it (tendon release)
- Conservative strategies don't work → invasive techniques (topical nitrates, botulinum toxin, autologous PRP, ABI, and dextrose prolotherapy)

Treatment

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Physical Therapy [7]

- Education (RICE during early stages)
- Activity modification (turning palm up when lifting, avoiding lifting)
- Stretching, strengthening exercises (concentric/eccentric exercises)
- Therapeutic ultrasound
- **Blood Flow Restriction (BFR) training**

SCANDINAVIAN JOURNAL OF MEDICINE & SCIENCE IN SPORTS

ORIGINAL ARTICLE

Effects of eccentric training on hand strength in subjects with lateral epicondylalgia: a randomized-controlled trial

J. Söderberg, W. J. Grooten, B. O. Äng

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Blood Flow Restriction (BFR) Therapy/Training

BFR Training: What is it? [8,9]

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- BFR is a therapeutic modality that uses a tourniquet to restrict venous outflow and reduce arterial inflow during resistance exercises.
- Uses **light-load resistance to replicate high intensity resistance training** which can induce muscular hypertrophy with a similar efficacy

BFR Training: How does it work? [8,9]

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- Occlusion places skeletal muscles in a state of hypoxia → fatigues muscles more quickly → recruits type II fibers earlier and is activated at lower loads

Physiological response [10,11]

- The occlusive environment provided by BFR has shown to influence metabolites, hormones, cell signaling, cellular swelling, and intracellular pathways
- Activates rapamycin pathway (mTOR pathway) which crucial for muscle protein synthesis and hypertrophy

BFR Training: Application [9]

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- Cuffs are placed on the UE/LE at proximal shoulder/hip depending on the target treatment area
- Occlusive pressures are calibrated by maximally restricting blood flow to the applied area

BFR Training: Parameters [9]

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- Sets/Repetitions
  - 4 sets (30, 15's) with 30 sec rest in between **most highly used rep scheme*
    - can also do a 20,10's rep scheme
- Frequency
  - 2–3x/week with progressive overload is sufficient for enhanced strength and hypertrophy adaptations
- Intensity
  - Usually at 20-30% of 1RM
- Cuff Pressure
  - 40-80% AOP

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Efficacy for Patient Outcomes

Case Report: Background Info [12]

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- 51 year old male with right lateral elbow pain
- Works as a businessman but has played tennis for the past 10 years (currently plays 2-3x/wk)
- No ROM restrictions
- TTP lateral epicondyle, 7/10 pain with wrist extension with elbow extended
- (+) provocation tests

Case Report: Methods [12]

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- Outcome measures used: 11 point NPRS, Patient Rated Tennis Elbow Evaluation (PRTEE), pain-free grip strength (PFGS)
- 6 week program (soft tissue massage, strengthening, education)
- 1st stage → isolated joint exercises (elbow flexion, wrist extension, supination/pronation with dumbbells) *BFR
- 2nd stage → exercise progressions + multiple joint exercises (wall push-up, standing rows)

Case Report: Results [12]

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- 42% decrease in pain at 3 week follow up; absence of pain at 6 weeks
- Disability decreased from 46% to 26% in PRTEE score after the first 3 weeks of rehabilitation and resulted in 0% at the 12-week follow-up
- A PFGS ratio of 0.73 was recorded at baseline reaching at 0.95 and 1.03 at six- and 12-week follow-ups
- BFR Training
  - Significant improvements in pain, function and self-perceived recovery at 6 and 12 week follow up
  - Immediate decrease in pain sensitivity following BFR exercises

Low-load Resistance Training (LLRT)

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- Randomized Sham-Controlled Clinical Trial [13]
  - Compared low-load resistance training (LLRT) with and without BFR
  - Interventions performed 2x/week for 6 weeks
- Outcome measures used:
  - Pain intensity
  - Patient-rated tennis elbow evaluation (PRTEE) score
  - Pain-free grip strength (PFGS)
  - Global rating of change (GROC)
- Results
  - Significant differences in favor of LLRT-BFR compared to LLRT group for all primary outcomes

BFR training vs Traditional Heavy-Load Resistance Training (HL-RT) [14]

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- HLRT (eccentric loading) is generally considered the “gold standard” for tendinopathy (may not be suitable for all patients)
- LL-BFRT could be a valuable alternative for such groups (lower-intensity method that still promotes muscle and tendon adaptations)
- Traditional HL-RT still provides superior benefits in comparison to LLRT with BFR for strength and hypertrophy
- BFR should be used as an added intervention and not in “replacement” of HLRT

**More research needed directly comparing HLRT and LL-BFRT for individuals with tennis elbow*

Conclusion

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- ★ BFR therapy shows promise as a complementary treatment for tendinopathy, particularly for patients unable to tolerate heavy-load resistance training.
- ★ BFR can induce muscle hypertrophy and tendon adaptations with lower-intensity exercises, making it suitable for individuals with pain, mobility issues, or other health conditions.
- ★ Studies show BFR training significantly improves pain, function, and grip strength in patients with tennis elbow
- ★ BFR is not a replacement for HL-RT but can be used as an adjunctive treatment, particularly for those who cannot engage in high-load training.

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Questions?

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