Upper Extremity Rehabilitation for Rock Climbers: Assessment, Load Management, and Return to Performance

Dr. Tyler Nelson, DC, MS, CSCS

Dr. Tyler Nelson is a chiropractic physician and rehabilitation specialist based in Salt Lake City, Utah, USA. He is the Clinical Director of Camp4 Human Performance, where he works exclusively with rock climbers, focusing on the evaluation, rehabilitation, and performance development of upper extremity injuries.

Dr. Nelson holds a Master's degree in Exercise Science and is a Certified Strength and Conditioning Specialist (CSCS). Over the past decade, he has developed a niche clinical practice centered on the unique physiological and biomechanical demands of climbing, treating conditions involving the shoulder, elbow, wrist, and fingers.

His work integrates strength and conditioning principles with musculoskeletal rehabilitation, emphasizing objective testing, load management, and sport-specific return-to-play strategies. He regularly teaches courses for healthcare providers and coaches, with a focus on clinical reasoning, uncertainty in diagnosis, and evidence-informed decision-making in clinical populations.

Dr. Nelson is actively involved in research related to youth climbing injuries, particularly periphyseal stress injuries, and is a prospective PhD candidate at Leeds Beckett University. He has contributed to the development of classification systems for finger injuries in adolescent climbers and continues to explore load monitoring and rehabilitation frameworks specific to the sport.

Course content

Day 1 – Shoulder and Elbow

Morning: Clinical Concepts and Injury Mechanisms

- Epidemiology of climbing-related injuries
- Shoulder biomechanics in climbing (end range loading, compression, shear)
- Elbow pathology in climbing (tendinopathy, load intolerance)
- Diagnostic challenges and limitations of orthopedic testing
- The role of language, expectation, and uncertainty in clinical care

Afternoon: Testing and Rehabilitation Frameworks

- Objective strength testing (isometric force, RFD, capacity)
- Introduction to dynamometry (e.g., strain gauge systems)
- Programming principles for rehabilitation
- Load management and progression strategies
- Case studies and clinical reasoning application

Day 2 – Wrist and Fingers

Morning: Tissue-Specific Considerations

- Finger pulley injuries, capsulitis, tenosynovitis
- Wrist pathology in climbers (TFCC, carpal stress injuries)
- Mechanisms of injury in different grip positions
- Growth plate considerations in youth climbers
- Imaging relevance and limitations

Afternoon: Performance Testing and Return to Climbing

- Finger strength assessment (isometric testing methods)
- Differences between passive and active loading strategies
- Capacity testing (critical force, endurance metrics)
- Designing progressive loading programs
- Return-to-climbing criteria and monitoring

Key Themes Throughout the Course

- Rehabilitation is a function of load management, not passive treatment
- Objective data improve clinical decision-making but do not eliminate uncertainty
- Exercise intent drives adaptation more than the tool itself
- Tissue adaptation is specific to the mechanical and physiological stimulus applied
- Climbing demands require integration of strength, coordination, and rate of force development