ACTIVFORCE | webinar

Investigating Injuries

Tennis Elbow

Introductions

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PT, DPT

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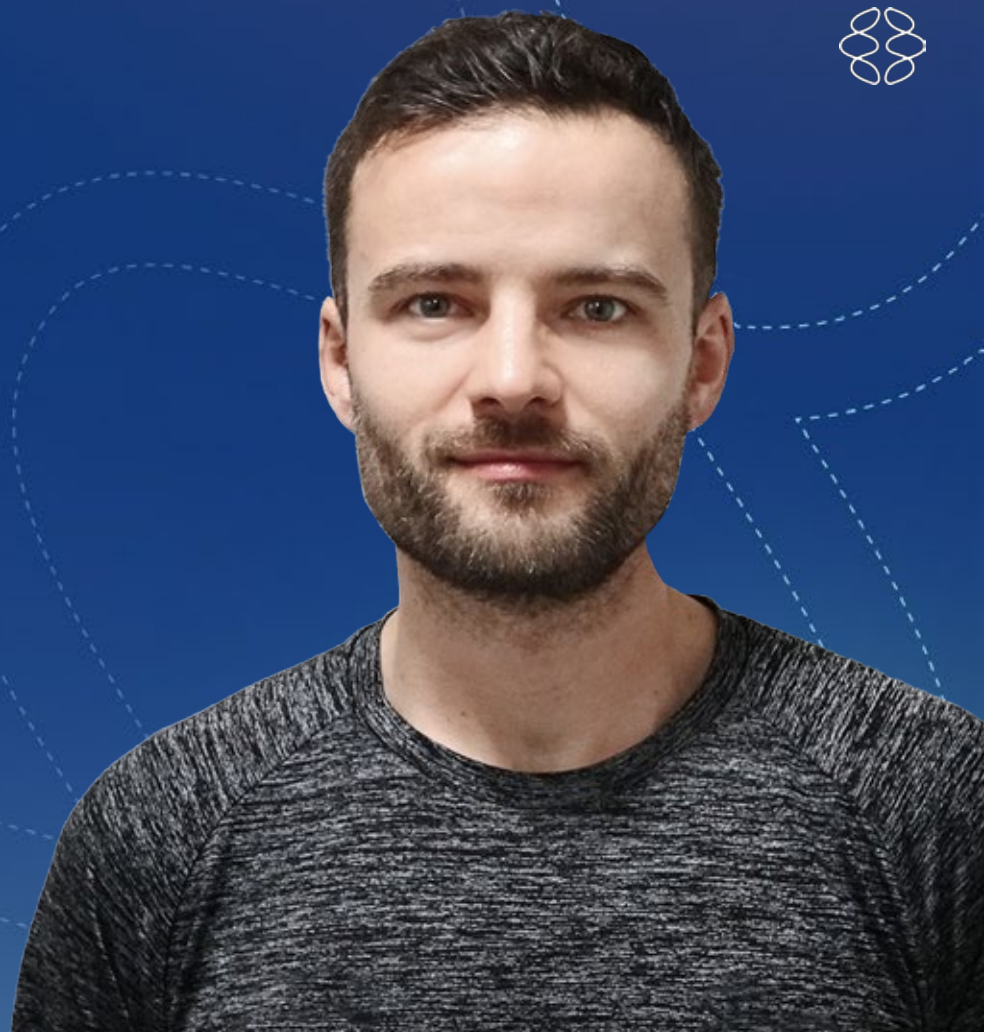

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BSc Physiotherapy, MSc Sports Medicine, & Accredited S&C Coach (UKSCA)

Agenda

- Introduction
- Understanding Tennis Elbow
  - Clinical Presentations & Mechanism of Injury
  - Common Causes and Risk Factors
  - Anatomical Overview
- Clinical Assessment
  - ROM: Shoulder IR/ER, Elbow Flexion/Extension, Forearm Supination/Pronation
  - MMT: Shoulder IR/ER, Elbow Flexion/Extension, Wrist Extension, Grip Strength
- Case Study
  - Data Review and Analysis
- Treatment & Rehabilitation Strategies
- Q&A

Tennis Elbow

Tennis Elbow

- Also known as Lateral Epicondylalgia or Lateral Epicondylitis
- A tendinopathy affecting the common extensor tendon at the lateral epicondyle of the humerus.
- It is caused by excessive or inappropriate loading of the tendon, often linked to repetitive wrist and forearm movements such as gripping, twisting, or swinging.

Clinical Presentations

- Elbow pain, especially on the lateral side of the elbow: Usually feels like:
  - Sharp or burning
  - Worse when twisting or bending the arm
  - Radiates from elbow to forearm and wrist
- Stiffness
- Pain and weak
- Weakened grip - making it difficult to:
  - Shake hands or grip an object
  - Turn a doorknob
  - Hold a cup of coffee cup

Mechanism of Injury

- Associated with repetitive microtrauma to the extensor tendon attached at the lateral epicondylar region of the humerus, primarily the Extensor Carpi Radialis Brevis (ECRB) being most affected
  - Also involves trauma to:
    - Extensor Carpi Radialis Longus
    - Extensor Digitorum
    - Extensor Digiti Minimi
    - Extensor Carpi Ulnaris

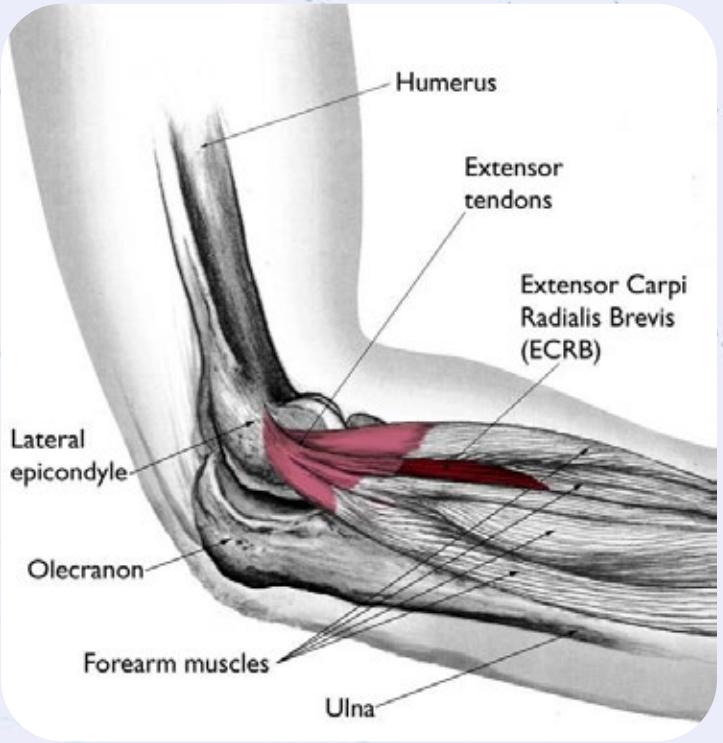
Mechanism of Injury

- Sudden load spikes (big jump in activity volume, intensity, or frequency) can exceed tendon capacity.
- This can trigger a reactive tendinopathy:
  - Tendon cells produce more matrix.
  - Tendon thickens to reduce stress.
- Ongoing overload without recovery can lead to degenerative tendinopathy:
  - Disorganised collagen fibers.
  - Changes in tendon cell structure.
  - New blood vessel growth (neovascularisation).
- In tennis elbow, the common extensor tendon often shows both reactive and degenerative changes.

Anatomical Overview

Key structures involved:

- Extensor Carpi Radialis Brevis (ECRB)
- Extensor Digitorum
- Lateral Epicondyle



Risk Factors

- Acute spike in workload
- Repeated compression forces of the tendon e.g. overpressure into the wrist flexion
    - Occurs in activities like playing backhand in tennis if the wrist extensors and posterior shoulder muscles lack adequate strength/ RFD capabilities

Risk Factors

Manual labour activities

- Exposed to high physical loads, forceful and repetitive activities
- Extreme non-neutral postures of the hand and arms
    - Work:
        - Plumbers, painters, carpenters, butchers.
    - Certain Sports:
        - Playing racket sports
        - Weightlifting
        - Poor form and incorrect equipment
        - Playing for long hours

Risk Factors

Non-manual labour activities

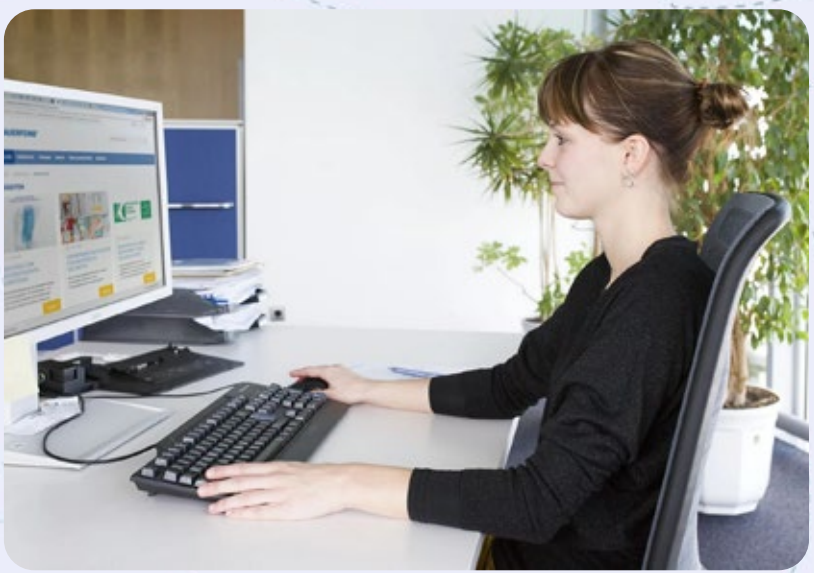
- Repetitive actions involved in computer use, typing, and gripping/squeezing the mouse for long periods of time
- Common in computer or desk work

Age:

- Most common in adults between 30 to 60 years old.

Others:

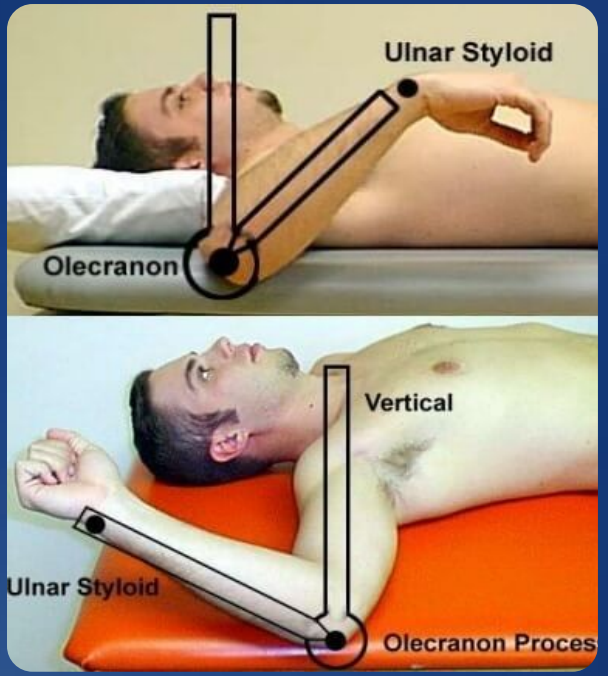
- Smoking, obesity, and certain medications.



Clinical Assessments

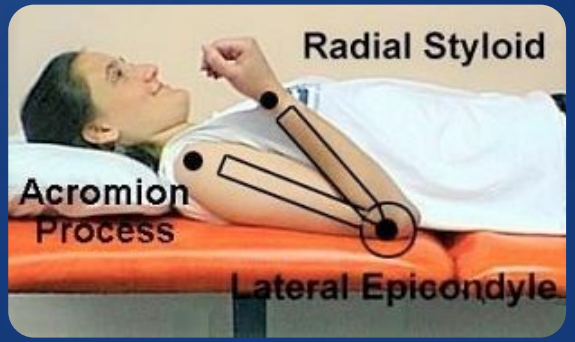
Range of Motion: Shoulder Internal and External Rotation

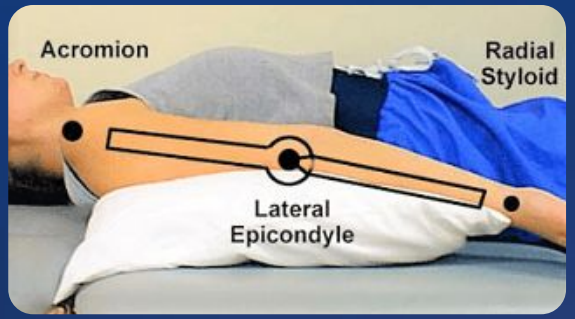
- Can be tested in seated or supine position with the device attached on the wrist



Range of Motion:
Elbow Flexion and Extension

- Can be tested in seated or supine position
- Best tested with the device attached at the wrist



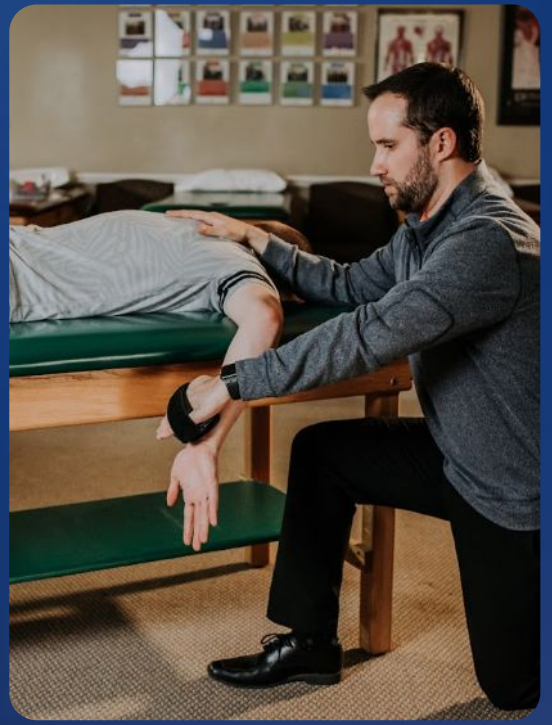


Range of Motion: Forearm Supination and Pronation

- Can be tested in seated position with elbow
- in 90 degrees flexion and neutral rotation

Muscle Testing: Shoulder Internal Rotation

- Can be tested in seated or prone position with shoulder abducted to 90 degrees and elbow flexed to 90 degrees



Muscle Testing: Shoulder External Rotation

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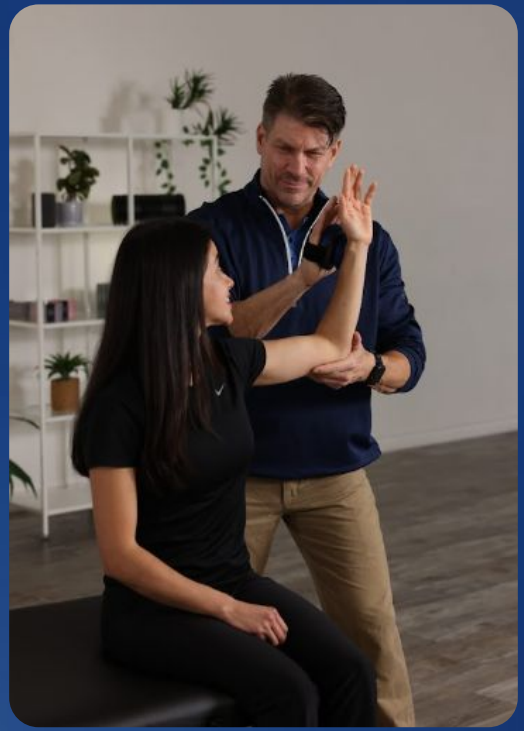
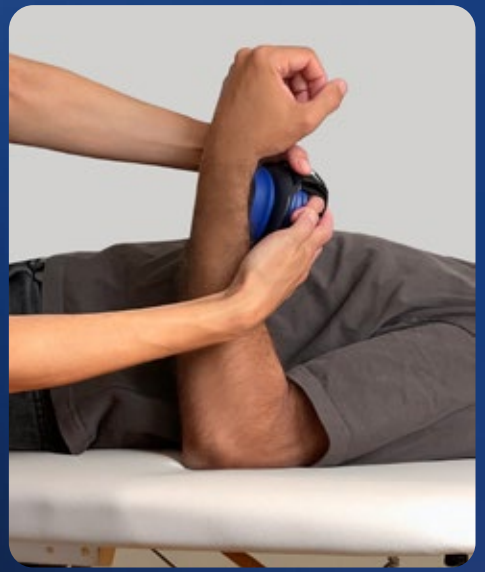
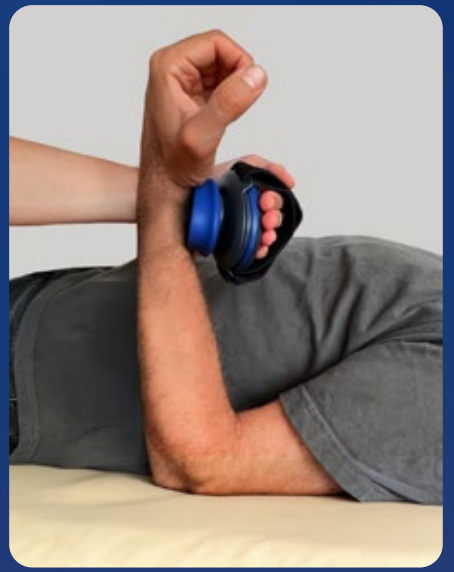


Muscle Testing:
Elbow Flexion and Extension

- Best tested in supine position
- Can be tested with or without a strap





Muscle Testing: Wrist Extension

- Can be tested seated with forearm pronated and resting on table or on the tester's arm

Muscle Testing: Grip Strength

- Can be tested seated with elbow flexed in 90 degrees, forearm and wrist in neutral position

Case Study

Objective Examination & Diagnosis

Observation –
Cleared shoulder and cervical spine
Fixed flexion deformity of right elbow from radial head fracture 30 years ago

Range of movement -
Fixed flexion deformity of 10 degrees of the right elbow
Full ROM into flexion
Reduced range at end range supination with a soft end feel

Objective Examination & Diagnosis

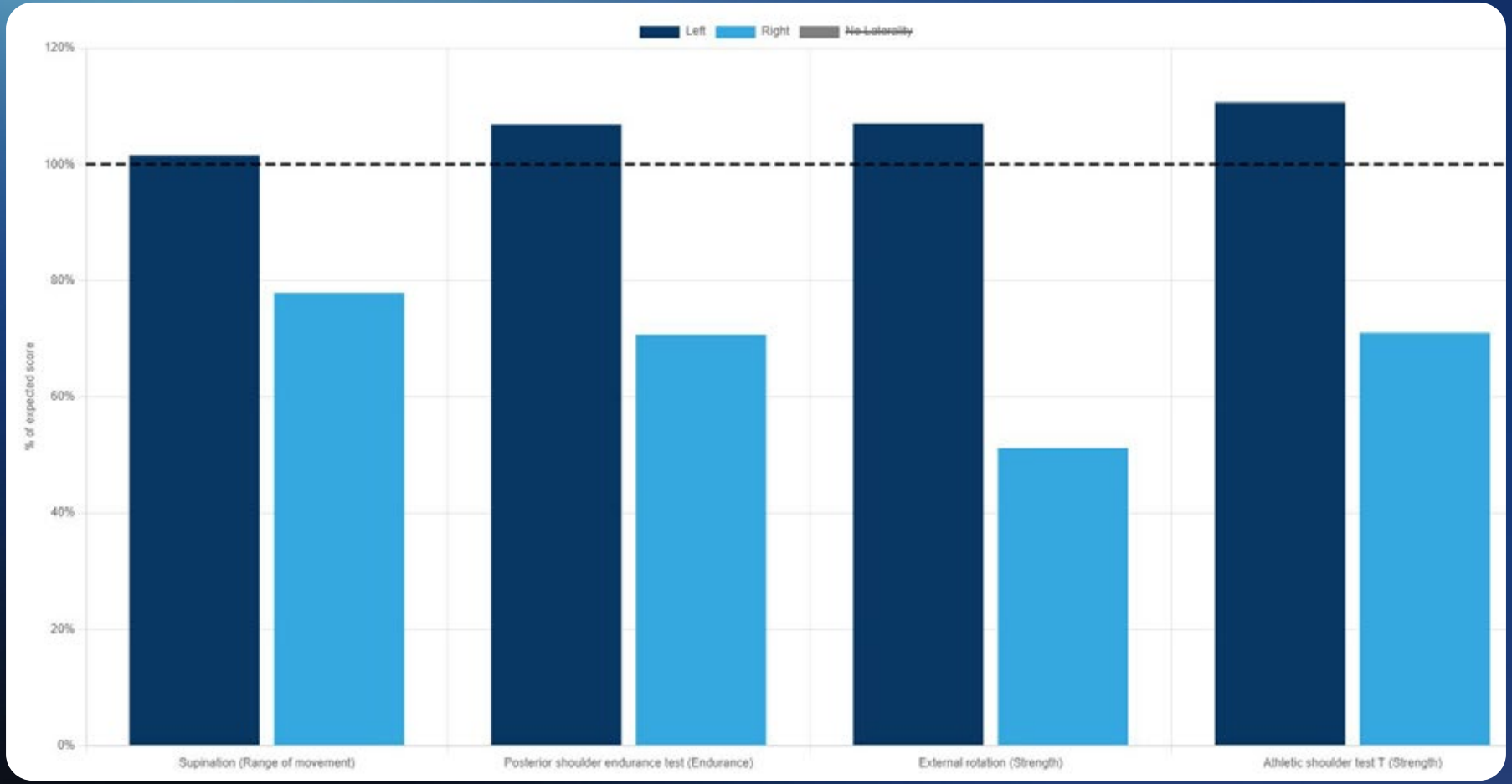
Special tests –

Cozens -ve
Mills -ve
Medial epicondylitis test +ve
Hook test -ve
Biceps squeeze test -ve
Tinnels -ve
Chair sign -ve
Valgus/varus stress test -ve

Palpation –

Tender on palpation of the lateral epicondyle and common extensor tendon

Test	Unit	Expected	Left %	Right %	No Laterality %	Select
Pronation (Elbow)	Degrees	74.0	123.0%	125.7%	-	☐
Supination (Elbow)	Degrees	68.0	101.5%	77.9%	-	☑
Push up (Elbow)	Repetitions	13.0	-	-	92.3%	☐
Posterior shoulder endurance test (Shoulder)	Repetitions	58.0	106.9%	70.7%	-	☑
Flexion (Elbow)	Newtons	166.2	158.2%	163.1%	-	☐
Extension (Elbow)	Newtons	112.8	156.0%	161.3%	-	☐
Internal rotation (Shoulder)	Newtons	108.0	115.7%	135.2%	-	☐
External rotation (Shoulder)	Newtons	84.0	107.1%	51.2%	-	☑
Athletic shoulder test T (Shoulder)	Newtons	60.6	110.6%	71.0%	-	☑


Left
Right
No Laterality
120%
100%
80%
60%
40%
20%
0%
% of expected score
Supination (Range of movement)
Posterior shoulder endurance test (Endurance)
External rotation (Strength)
Athletic shoulder test T (Strength)

Problem List

Top 3 deficits

- Very low calorie consumption for levels of exercise
- Likely low energy availability
- Reduced **range of movement** into elbow supination
- Reduced elbow **endurance**
- Reduced external rotation and long lever **strength**

Rehabilitation

Patient Roadmap

Range of movement

- Supination 68 degrees

Strength

- External rotation 84 Newtons
- Athletic shoulder T test 67 Newtons

Endurance

- Push up test 13 reps
- Posterior shoulder endurance test 58 seconds

Block 1

Objectives:

- Improve energy balance via nutritionist referral
- Increase range of movement into supination to 100%

Elbow Range of movement Supination

Target exercise

Exercise	Sets	Reps	Load	Rest	Frequency	
Eccentric pronation	4	10	3-5 RIR	30	3	
Eccentric supinated pull up	4	10	3-5 RIR	30	3	
Soft tissue massage of pronators	NA	NA	NA	NA	2	

Total sets per week: 24 Add Exercise

RIR = repetitions in reserve

SIR = seconds in reserve

Eccentric pronation

Back

Eccentric supinated pull up

Back

Soft tissue massage of pronators

Back

Block 2

Objectives:

- Increase elbow endurance to 13 push ups in 30 seconds
- Increase posterior shoulder endurance to 58 seconds

Elbow Endurance Push up

Regression 1

Exercise	Sets	Reps	Load	Rest	Frequency	
Kneeling push up	3	15	3-5 RIR	60	3	
Dumb bell bench press	3	15	3-5 RIR	60	3	

Total sets per week: 18 Add Exercise

Shoulder Endurance Posterior shoulder endurance test

Target exercise

Exercise	Sets	Reps	Load	Rest	Frequency	
Reverse fly	3	15	3-5 RIR	60	3	
Side lying reverse fly	3	15	3-5 RIR	60	3	

Total sets per week: 18 Add Exercise

RIR = repetitions in reserve

SIR = seconds in reserve

Dumb bell bench press

Back

Reverse fly

Back

Kneeling push up

Back

Side lying reverse fly

Back

Block 3

Objectives:

- Increase strength into shoulder external rotation
- Improve strength in long lever/tennis specific positions

Shoulder Strength External rotation

Target exercise

Exercise	Sets	Reps	Load	Rest	Frequency
Knee supported external rotation	3	6	1-3 RIR	120	2
Prone external rotation	3	6	1-3 RIR	120	2

Total sets per week: 12 Add Exercise

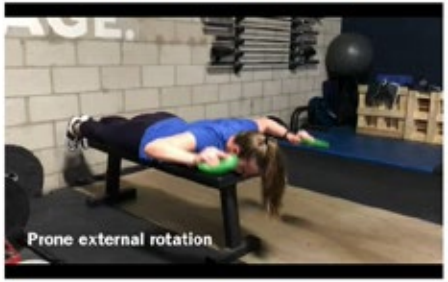
Shoulder Strength Athletic shoulder test T

Target exercise

Exercise	Sets	Reps	Load	Rest	Frequency
Single arm fly	3	6	1-3 RIR	120	2
Towel slider to T	3	6	1-3 RIR	120	2

Total sets per week: 12 Add Exercise

Prone external rotation



Back

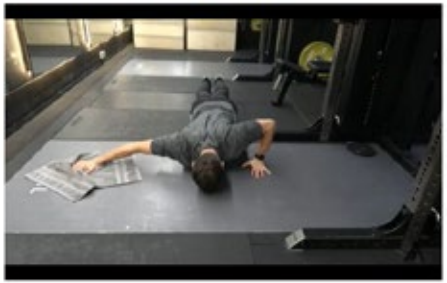
Single arm fly

Back

Knee supported external rotation

Back

Towel slider to T



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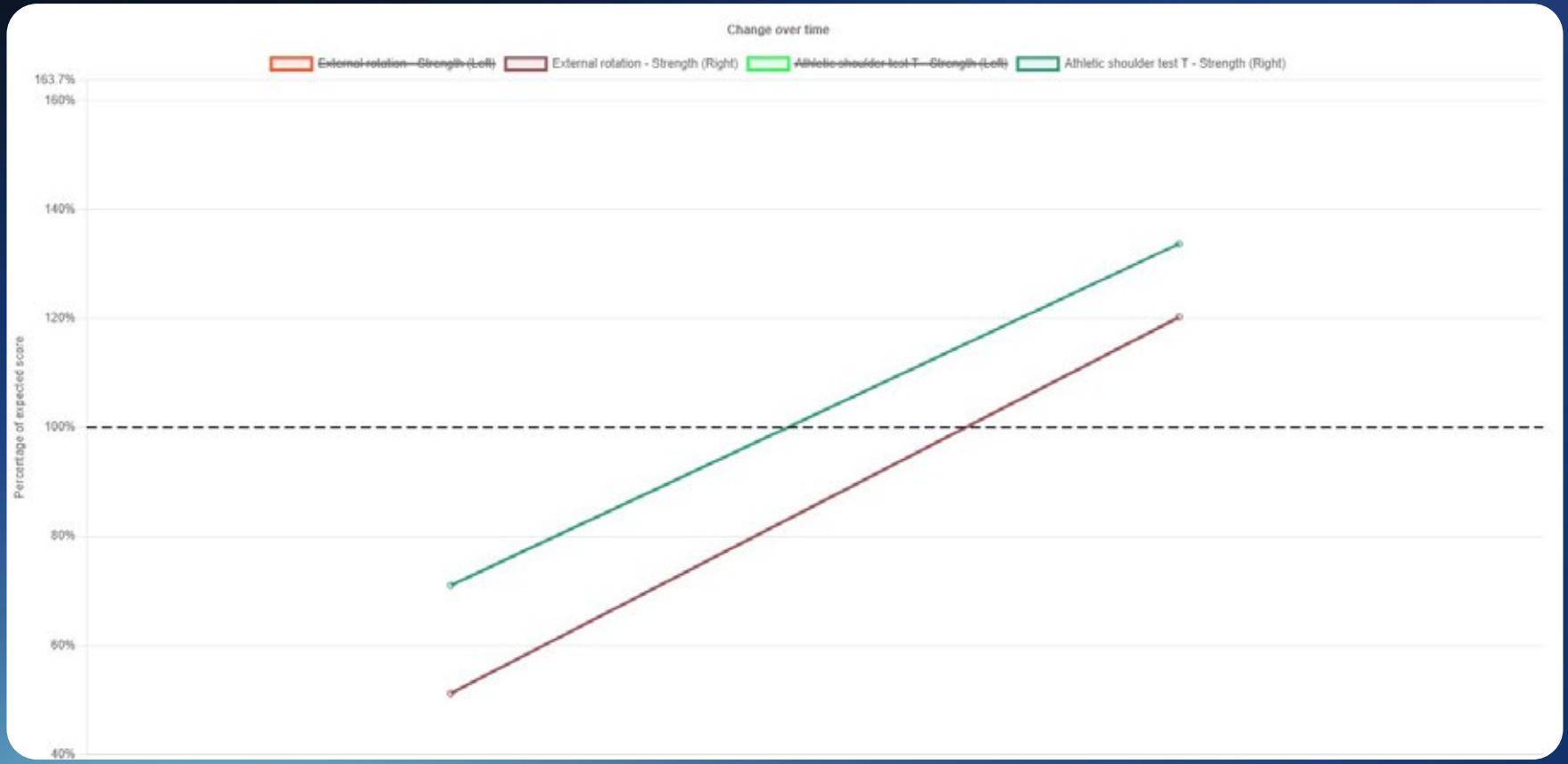
Test Results

Weeks 1-6

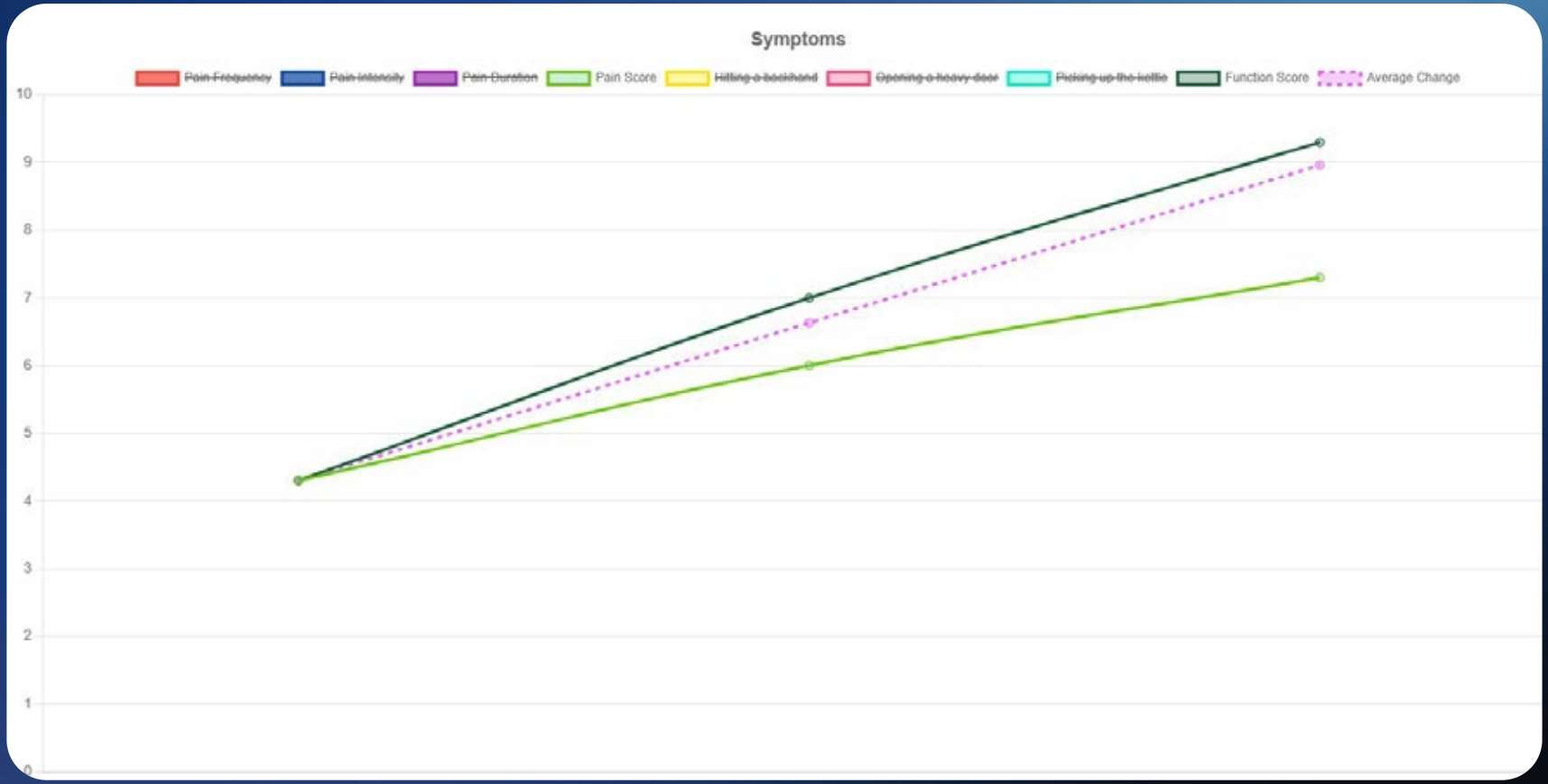
Range of movement and endurance

Week 7-12
Strength



Symptoms

Weeks 1-12
Pain and function



Questions?

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References

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