

Identifying technical problems and Prevention of Sports Injuries



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Most Common Sports Injuries

Shin Splints

Ankle Sprains

Hamstring Strain

Dislocated Shoulder

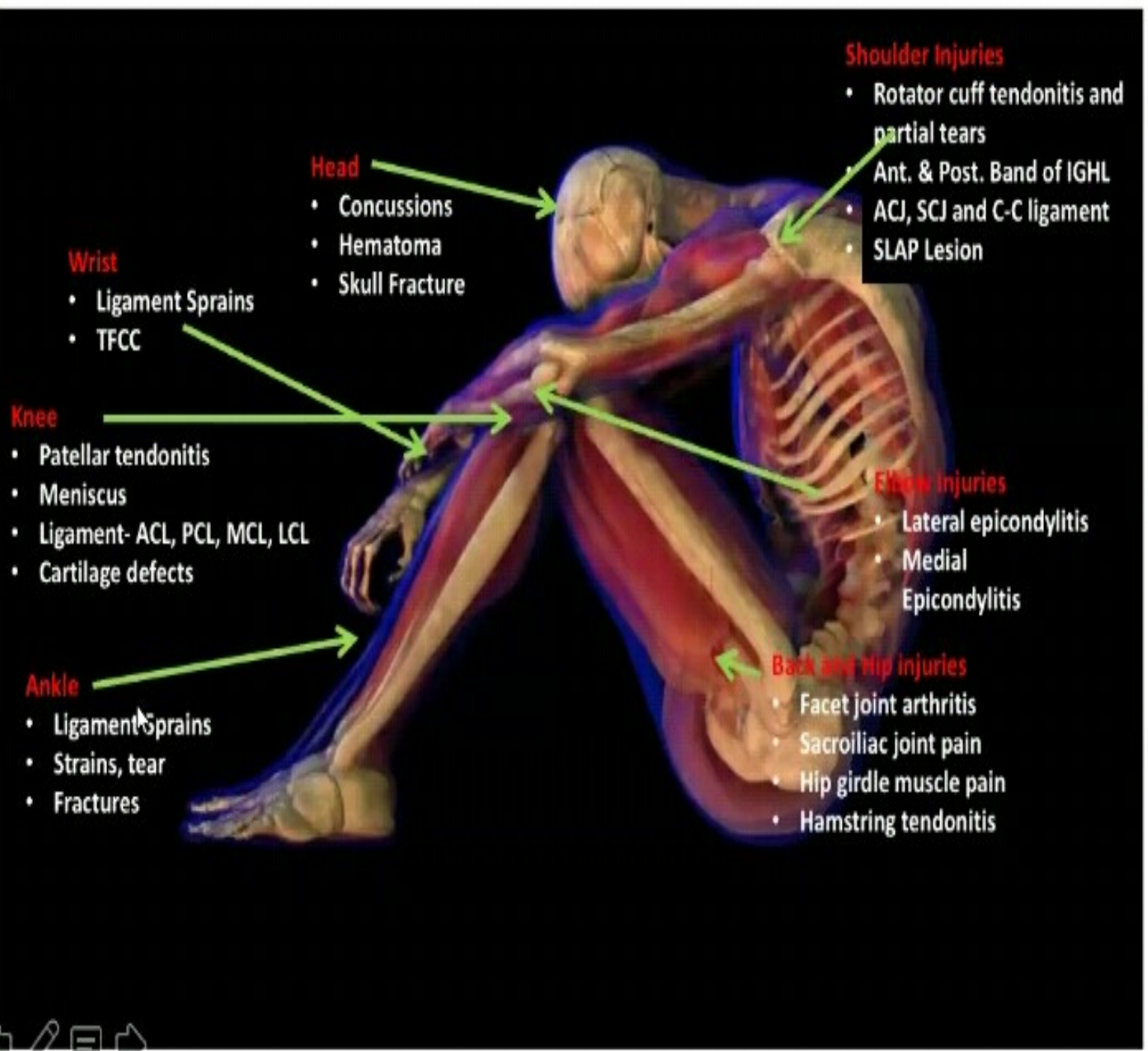
ACL Tear

Groin Pull

Tennis Elbow

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Common Sports Injuries



Injury



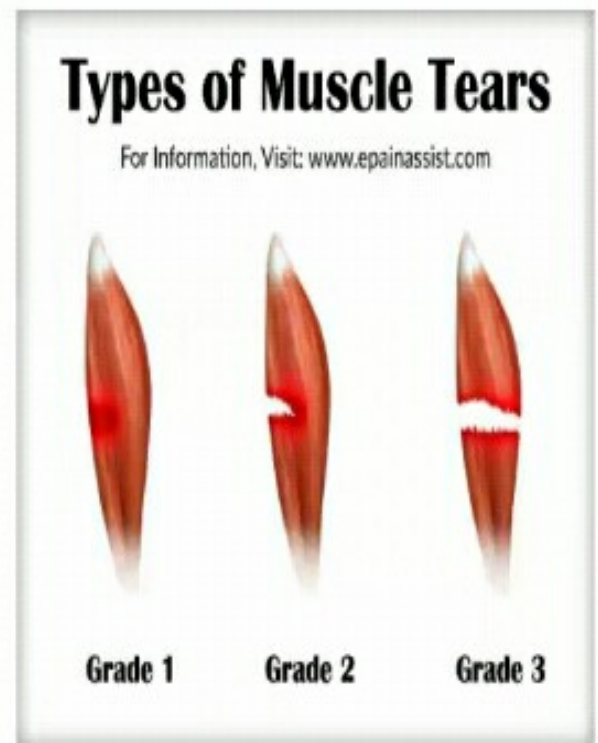
Injury Mechanism



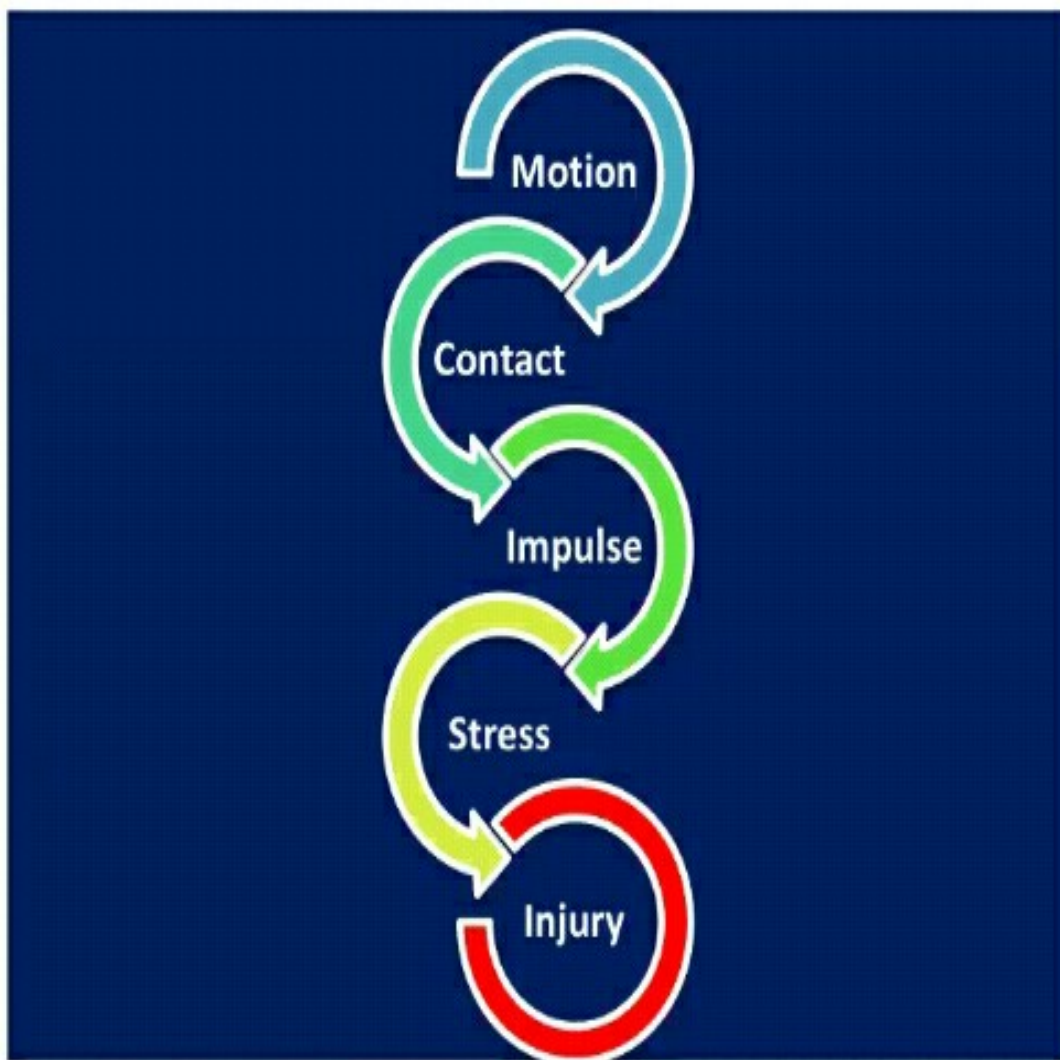
Skeletal Muscle Injuries

Acute Strain:

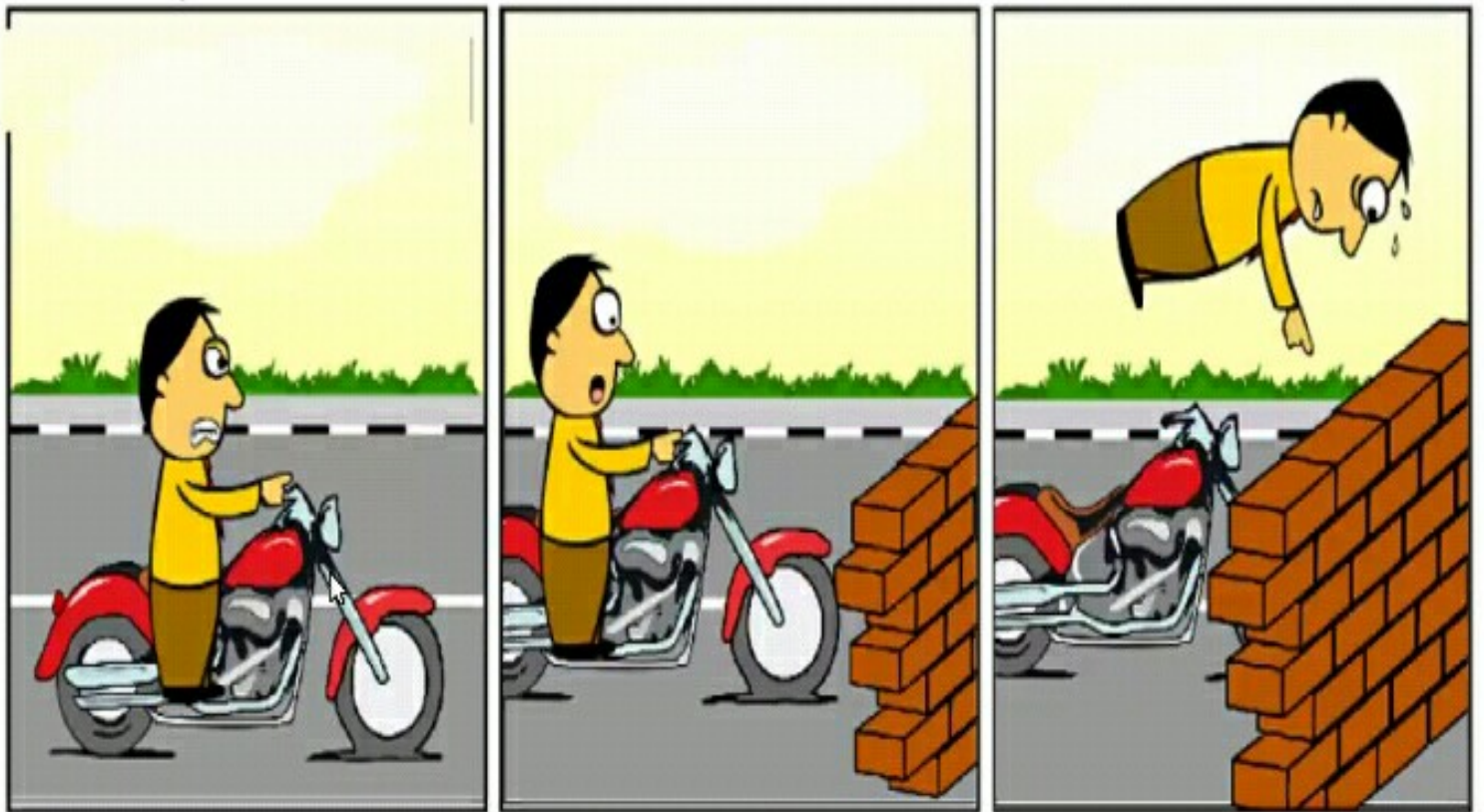
- Results from overstretching a passive muscle or dynamically overloading an active muscle.
 - Mild: minimal structural disruption and rapid return to normal function.
 - Moderate: partial tear in the muscle tissue, pain and some loss of function.
 - Severe: complete or near-complete tissue disruption and functional loss as well as marked haemorrhage and swelling.



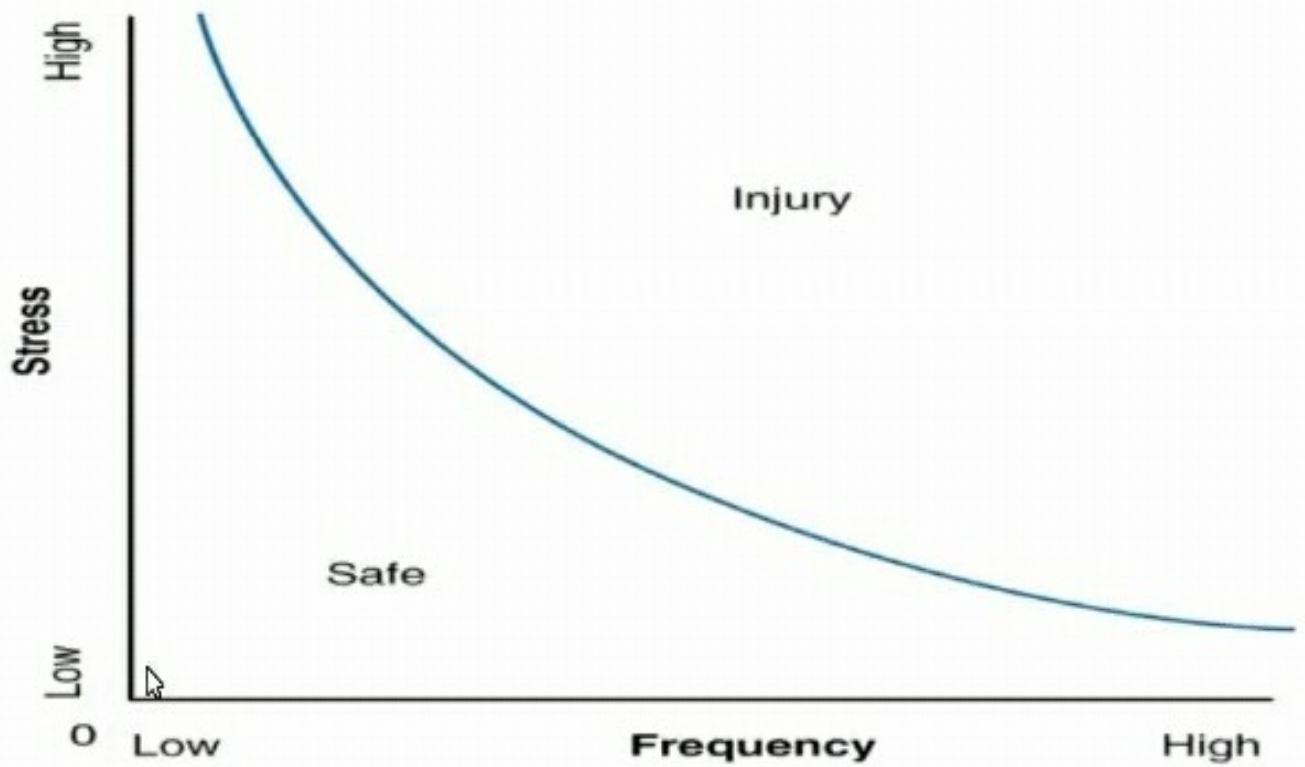
Injury Mechanism



Injury Mechanism



Injury Mechanism



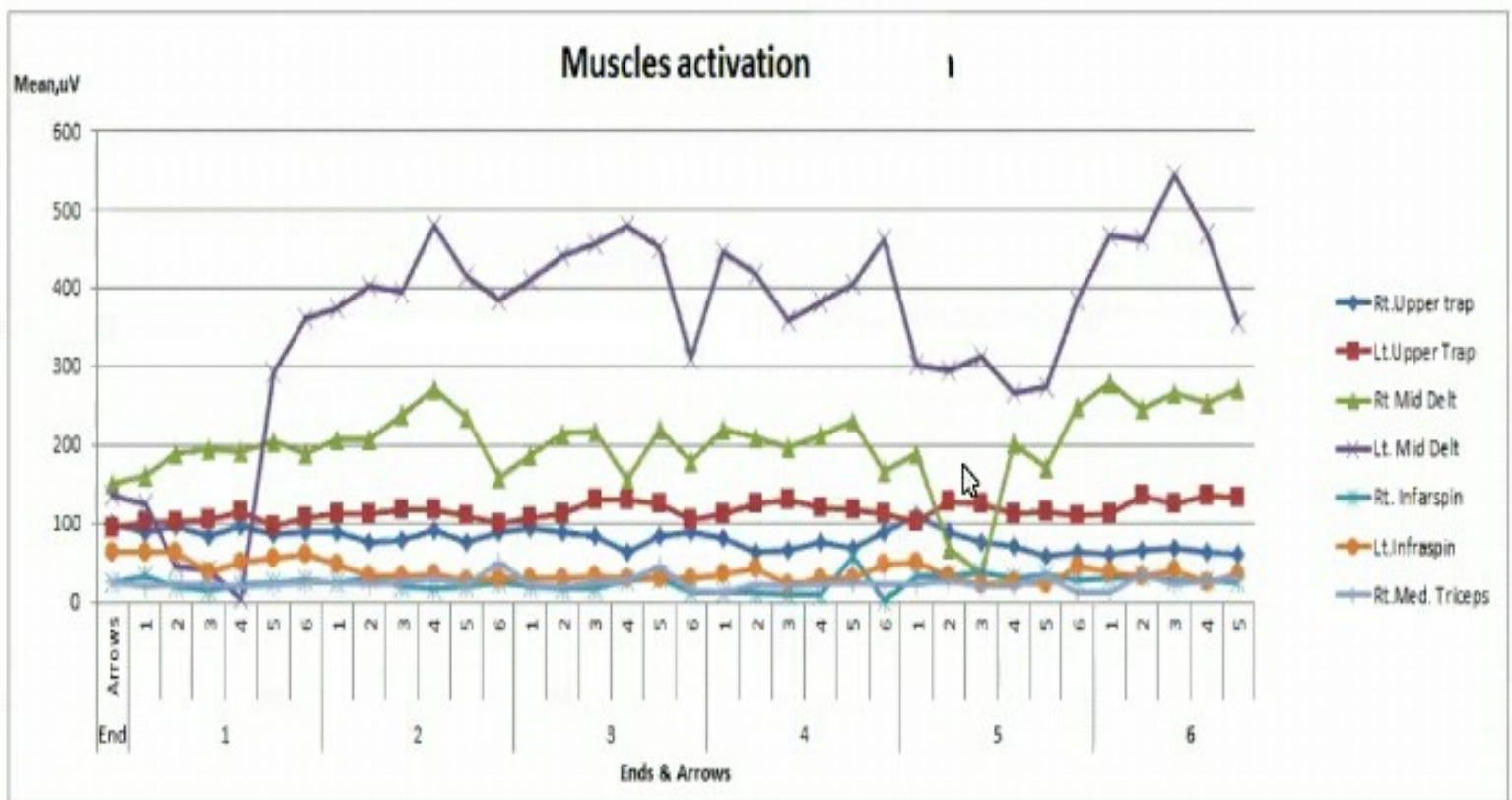
No Quick fix Solutions in sports



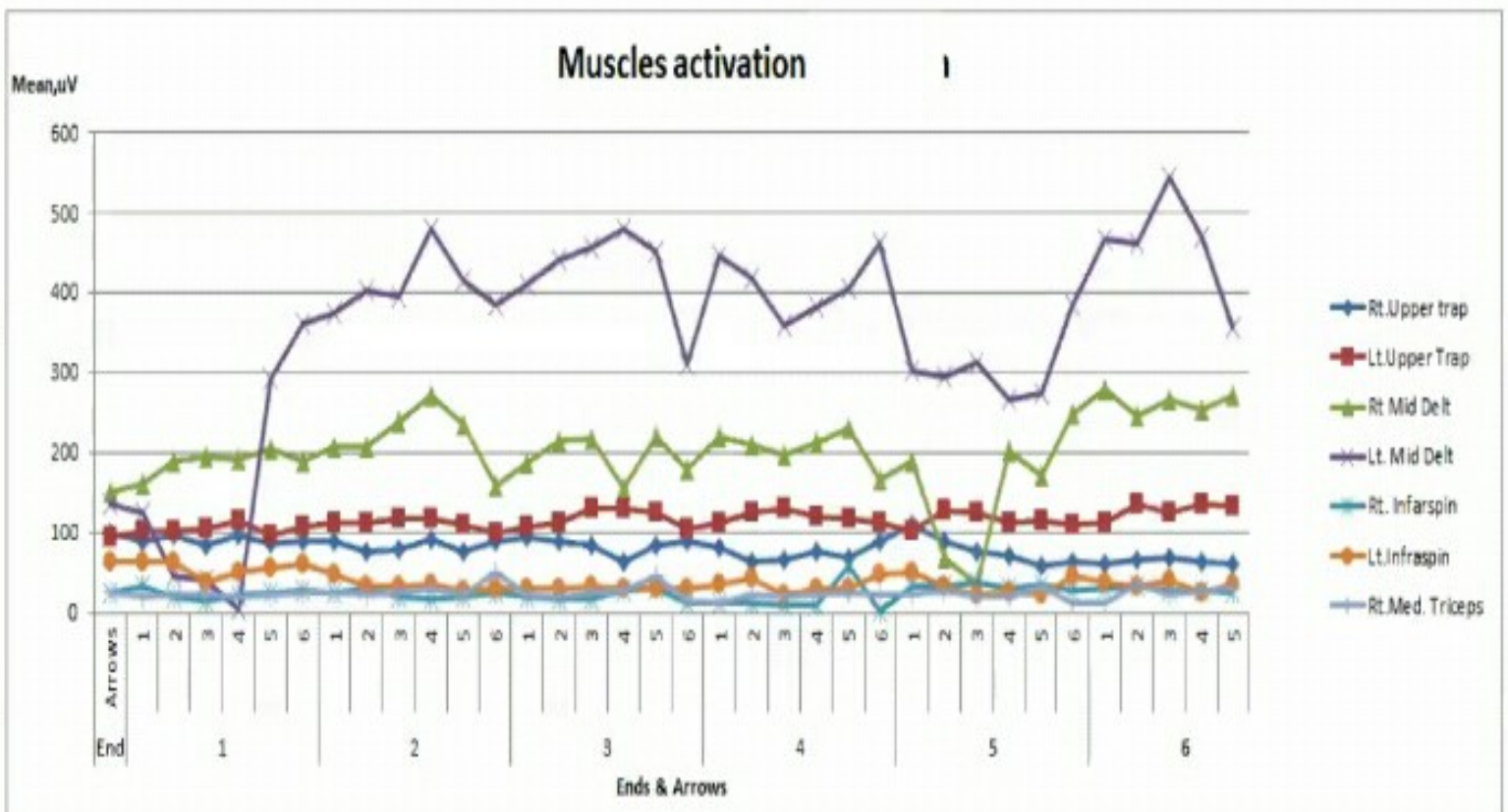
- No quick solutions
- Neural automatisation
- Use and disuse principle
- Ensuring Right mechanics for beginners



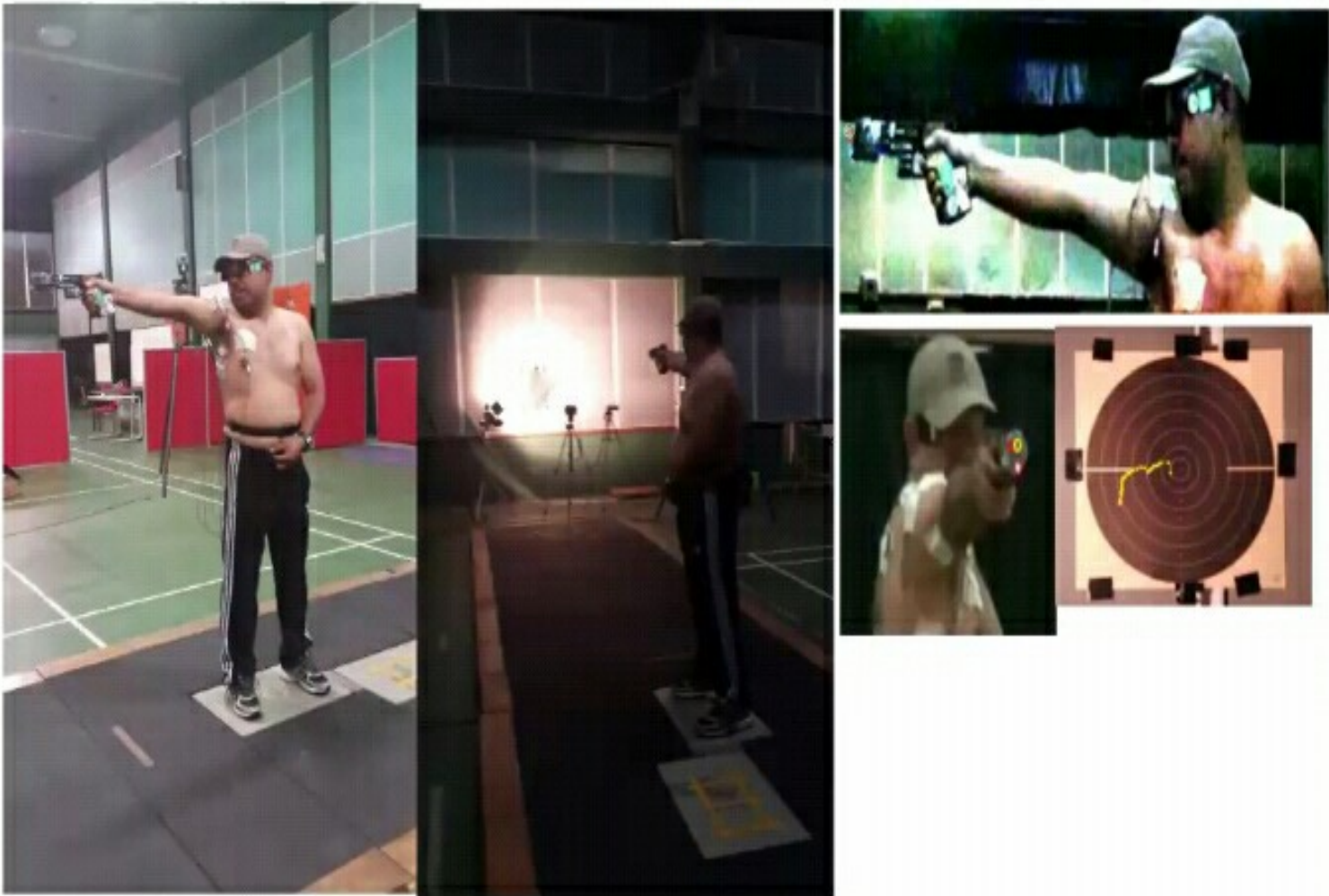
Pattern of Muscle activation in Archer for 36 shots



Pattern of Muscle activation in Archer for 36 shots



Shooter with thoracic outlet syndrome – muscle atrophy (possible nerve impingement)



Forward Diagonal Lunge

1

2

3



4

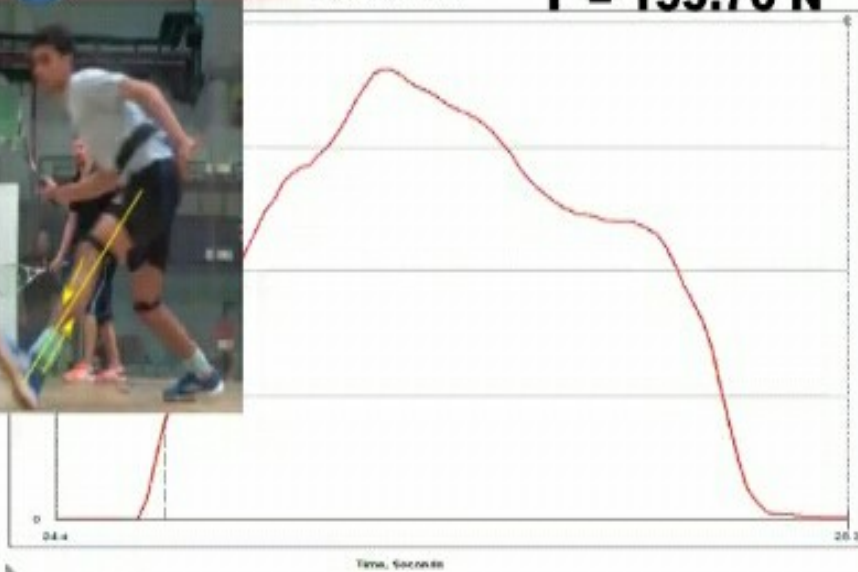
5

6

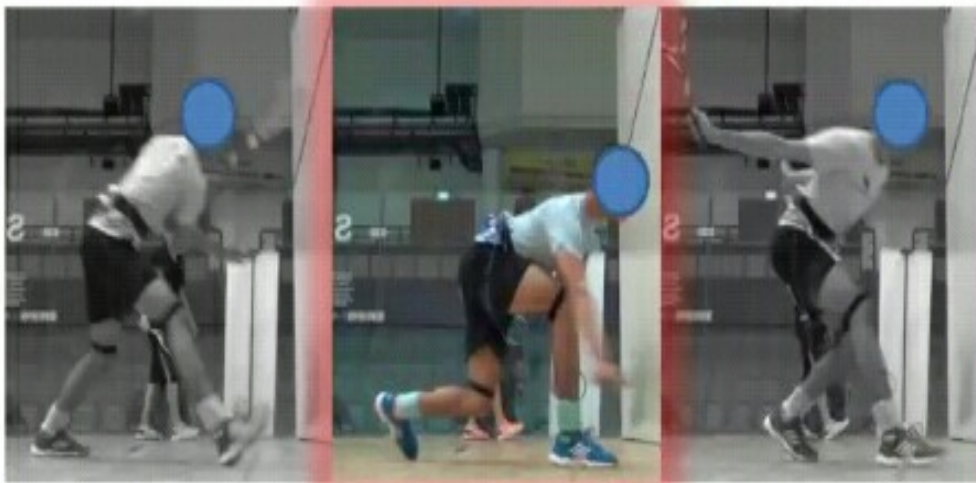
Forward Diagonal Lunge



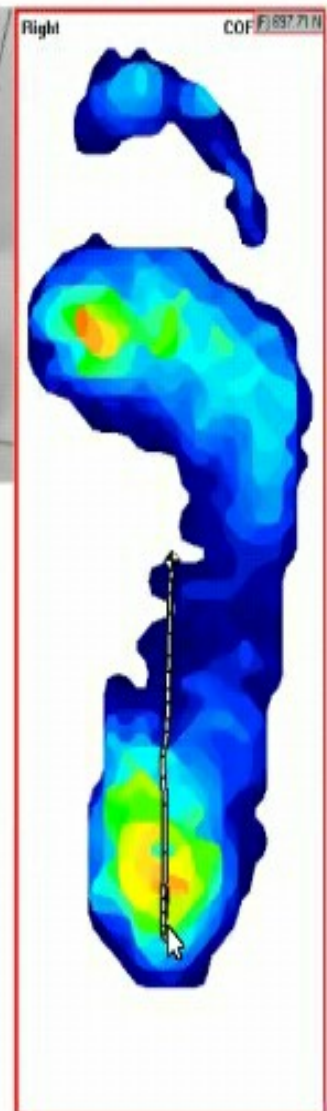
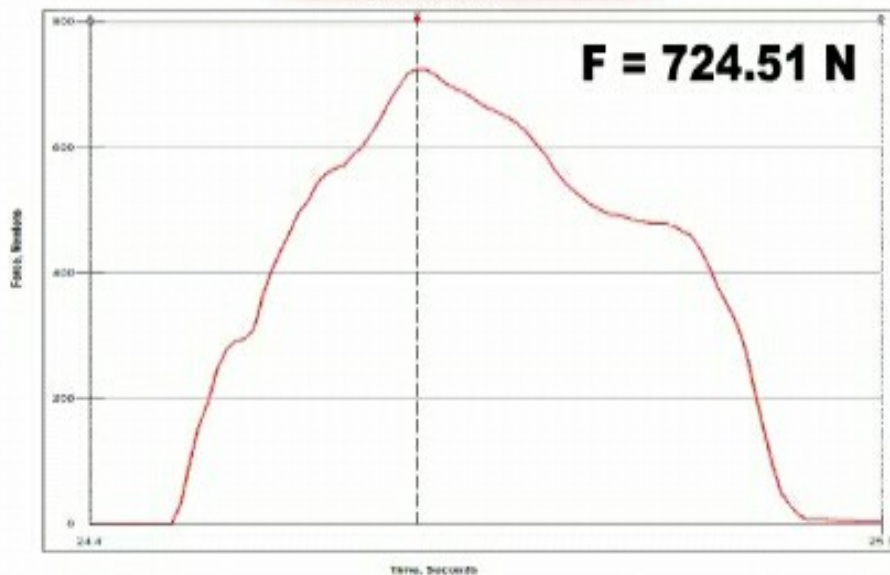
Force vs. Time **F = 155.76 N**



Forward Diagonal Lunge



Force vs. Time



EMG – SHOULDER PAIN IN BUTTERFLY STROKE SWIMMER

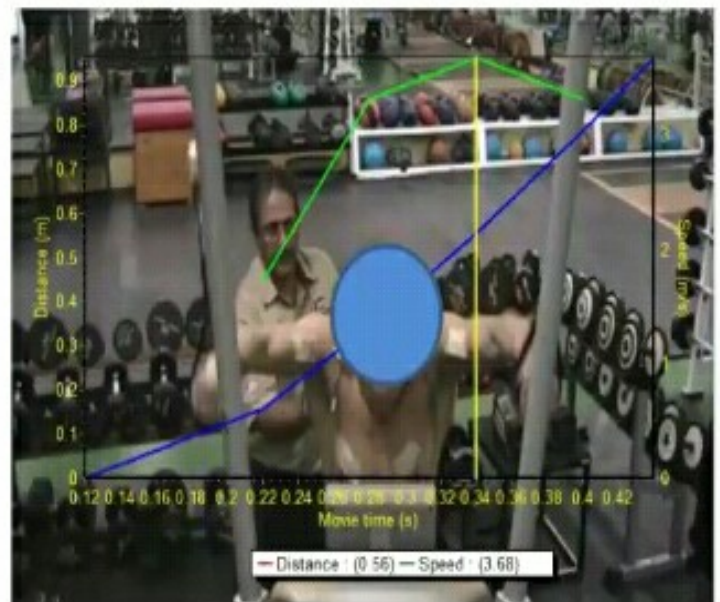
Purpose:

Muscle activity in swimmer – while executing simulated stroke mechanics at different isometric angles.

Methodology

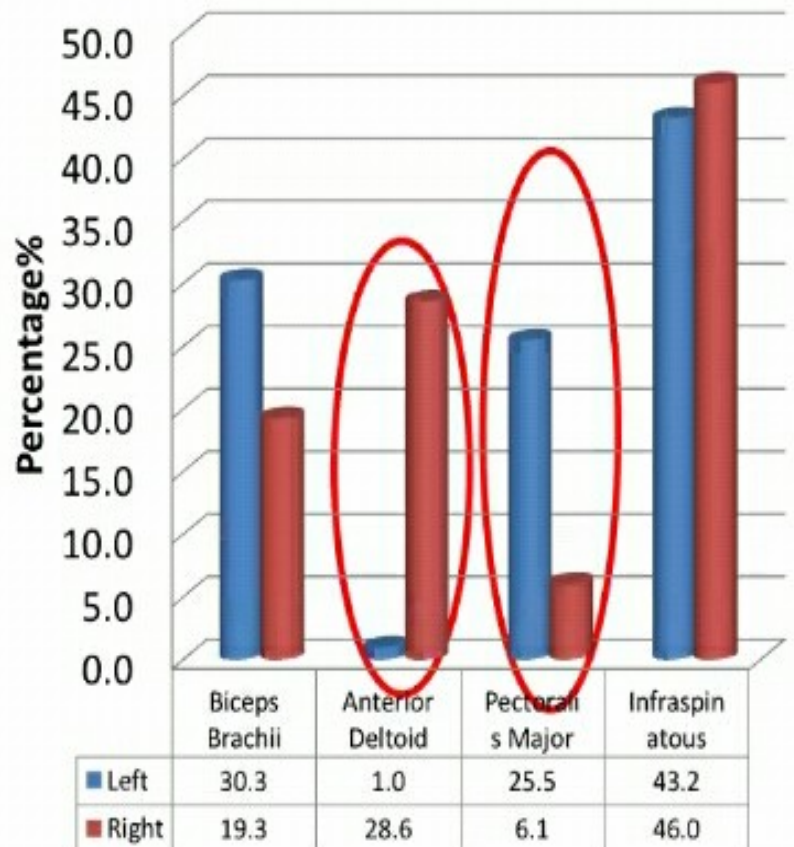
- Eight electrodes placed - right and left
 - Biceps Brachii,
 - Anterior deltoid
 - Pectoralis major
 - Infra spinatous

EMG – shoulder pain in a swimmer (butterfly stroke)



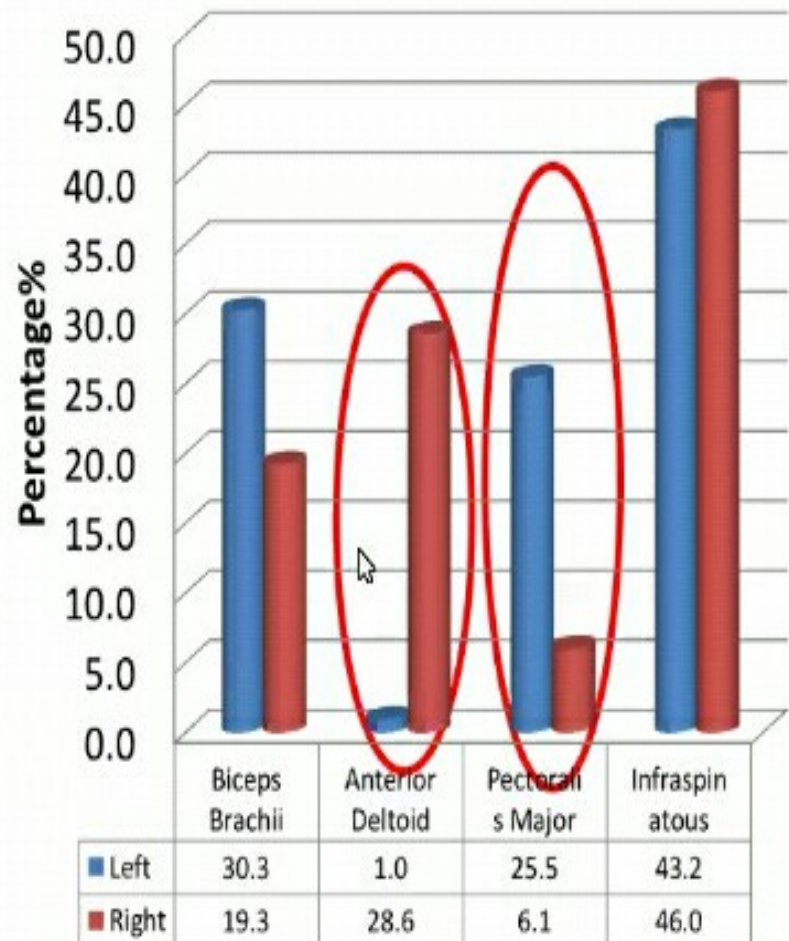
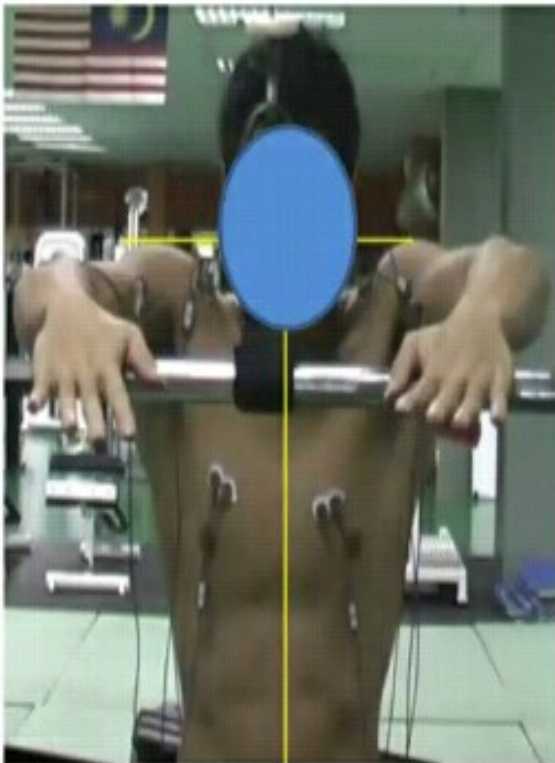
EMG – Swimmer – with DELant pain

EMG at Pull (Isometric at 80°)



EMG – Swimmer – with DELant pain

EMG at Pull (Isometric at 80°)





Butterfly front view



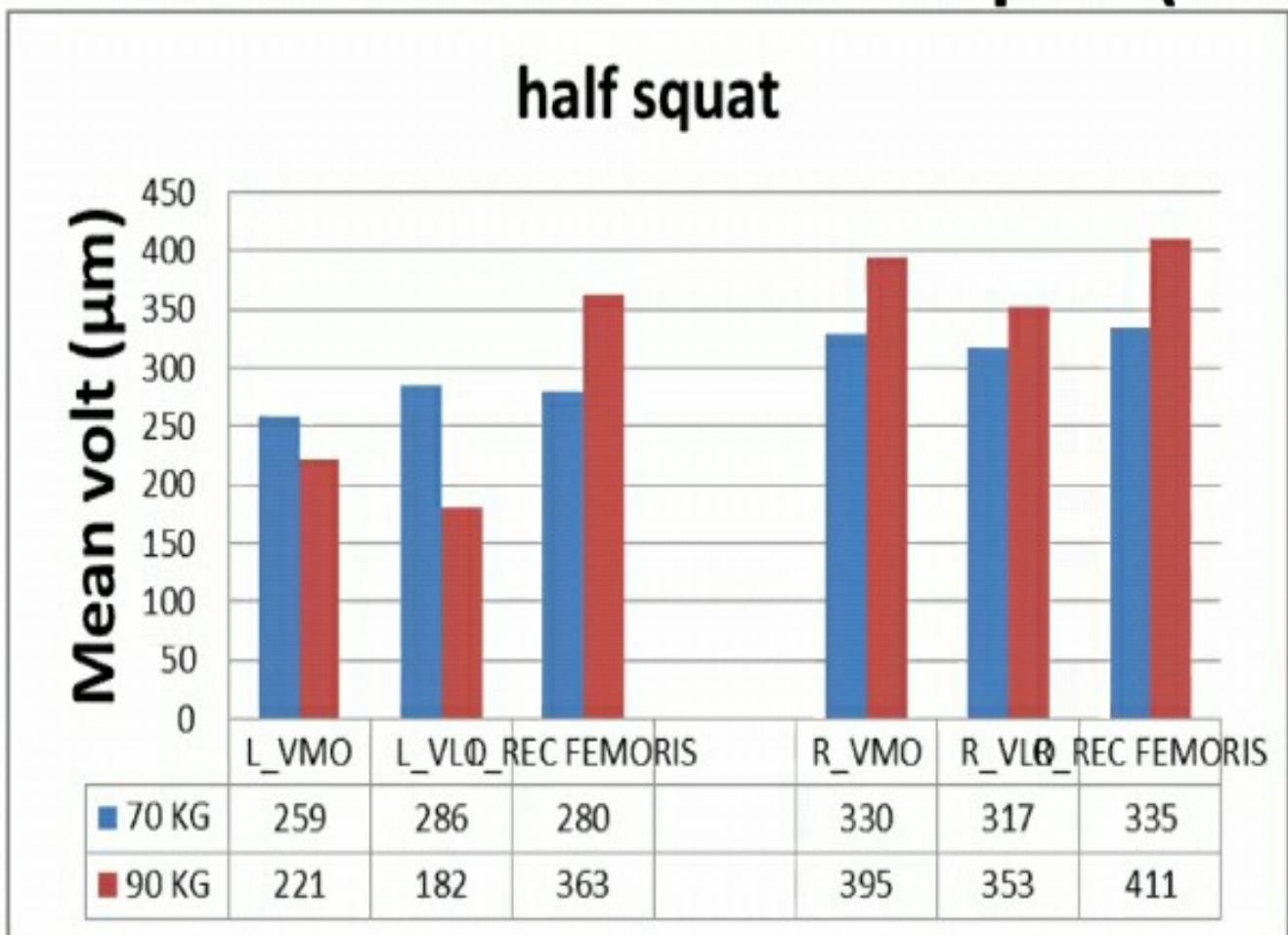
Elbow angle – wrist position



Free style – Shoulder internal rotation

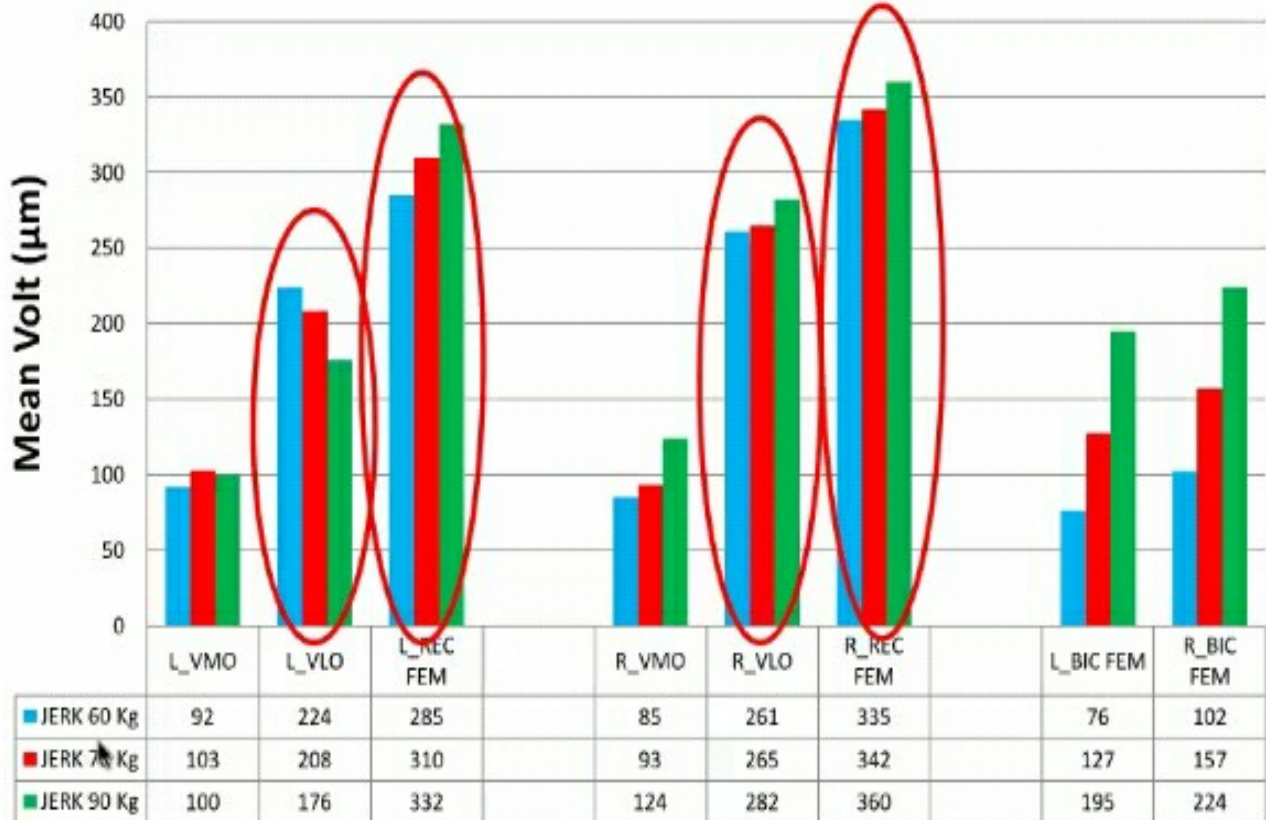
EMG –following vastus lateralis tear and rehabilitation

Muscle activation in Half squat (Back)



EMG – FOLLOWING VASTUS LATERALIS TEAR AND REHABILITATION

CLEAN & JERK



Clean and Jerk



SET UP



DIP/DRIVE



SPLIT/LUNGE



RECOVERY

Badminton Player - shoulder injury

BACKGROUND:

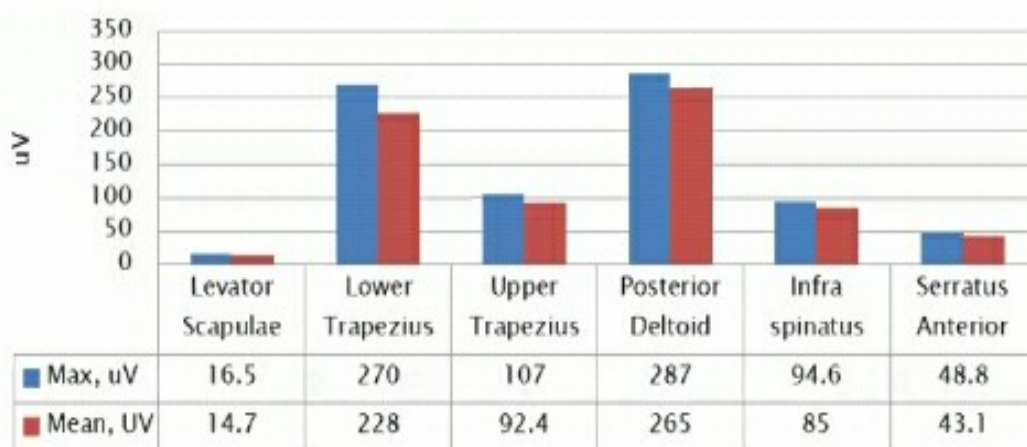
- Right shoulder surgery – 5 months ago
- Bankart shoulder arthroscopy (repair), resection, and debridement done.
- Under going rehab at ISN.

Badminton Player - shoulder injury

Isometric Voluntary contractions



Right shoulder Isometric – Lateral external rotation



Dynamic swing movements with shuttle badminton racquet



Dummy action – back swing and forward swing without shuttle

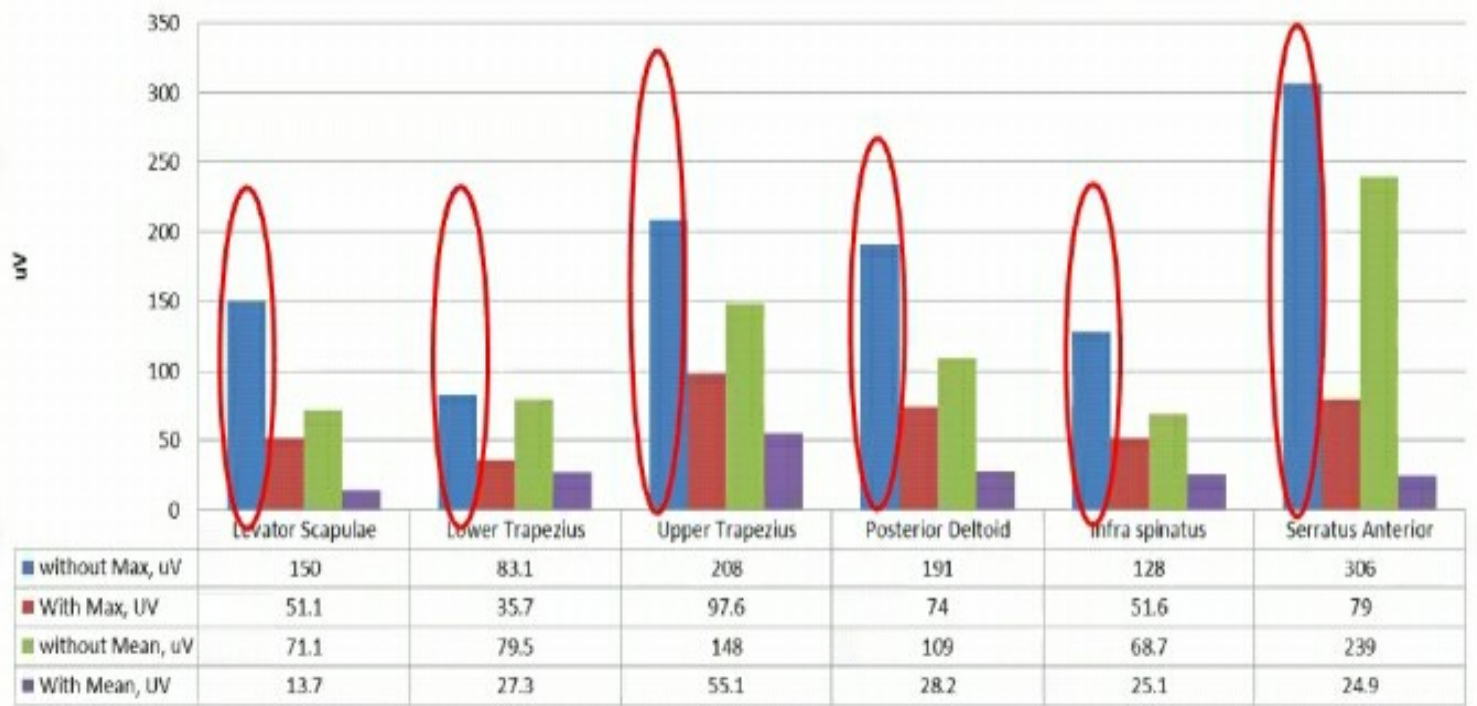
Dynamic swing movements with shuttle badminton racquet



Back swing and forward swing with shuttle

Dynamic swing movements with shuttle badminton racquet

With and without shuttle - Over head swing/shots

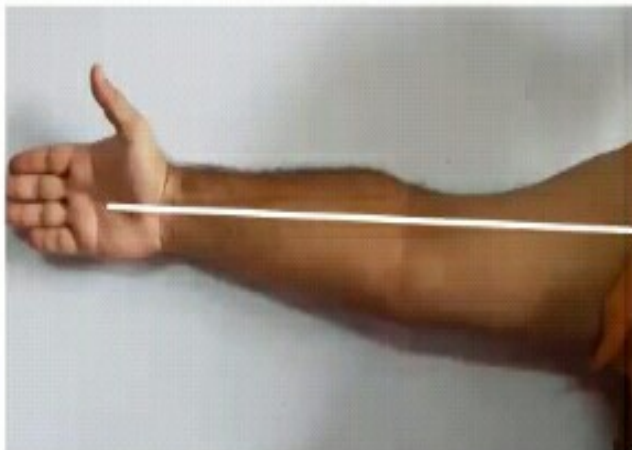
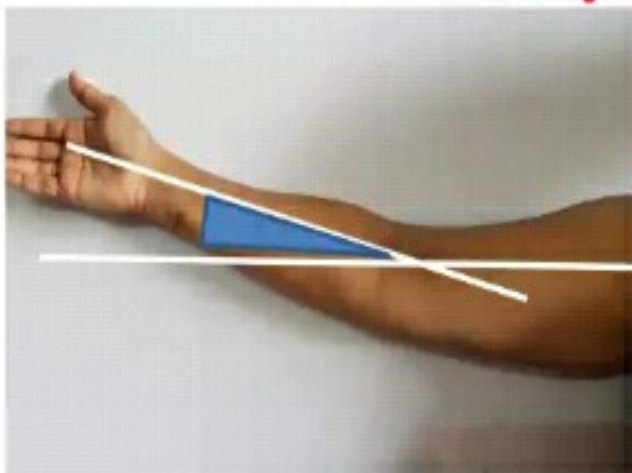


Dynamic swing movements with shuttle badminton racquet



Dummy action – back swing and forward swing without shuttle

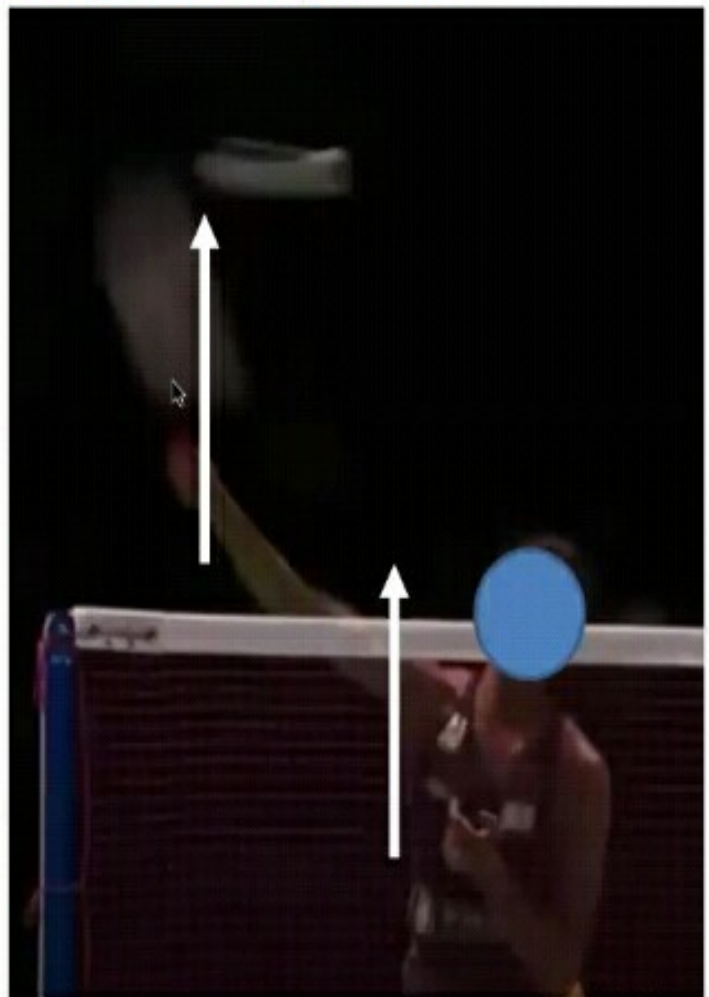
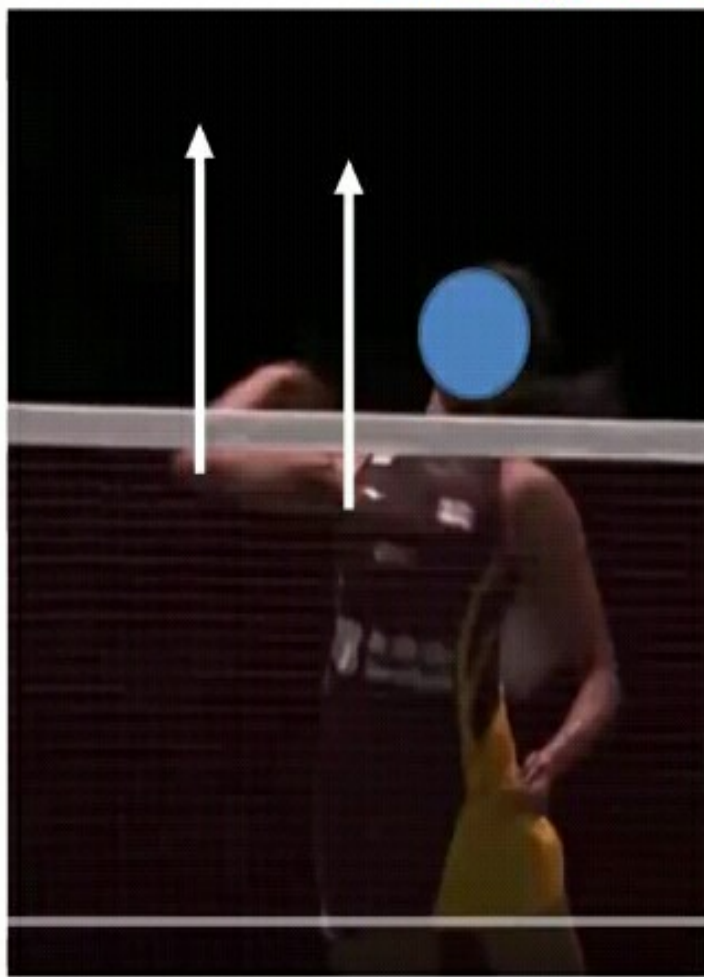
Upper extremity structure in men/women



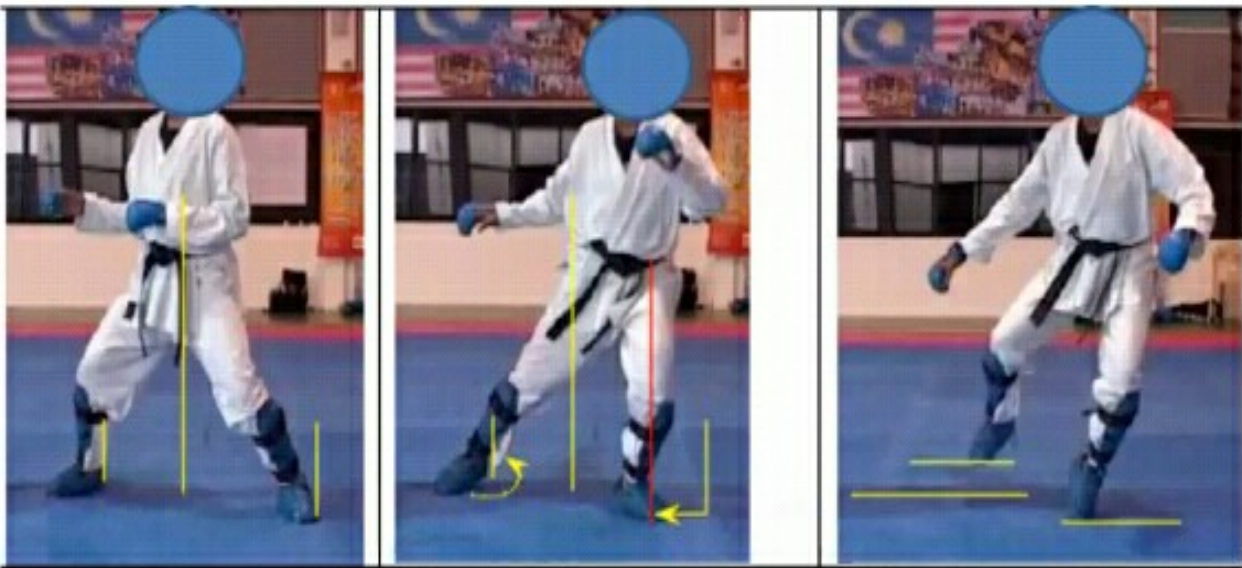
Women Upper – shoulder Internal rotation



Women Upper – Force application away from pivot joint



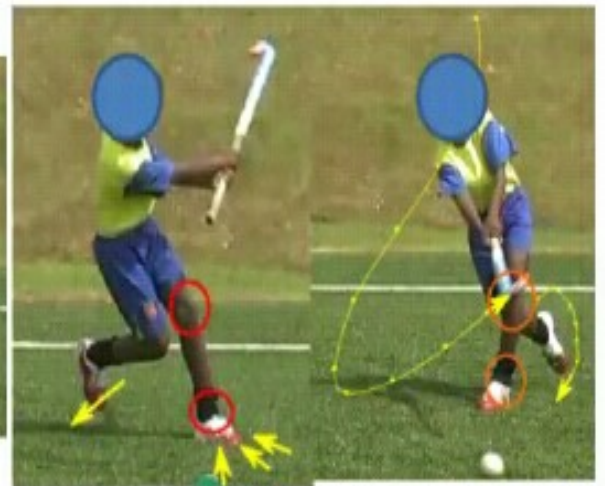
Women Lower extremity structure



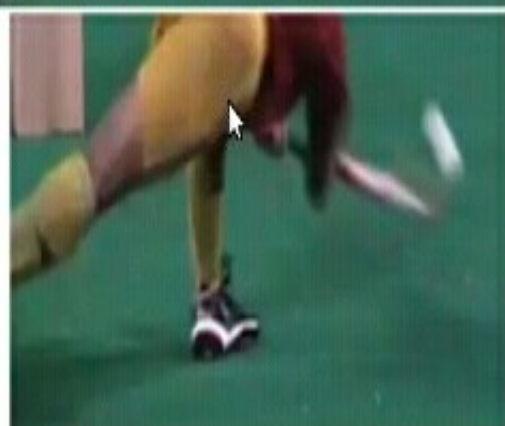
Beginners and equipments



- Novice performer
- Teaching the technique
- Selecting the drills for training



Foot rolling – Drag flicker



PC FLICKER- FRONT



PC FLICKER- FRONT



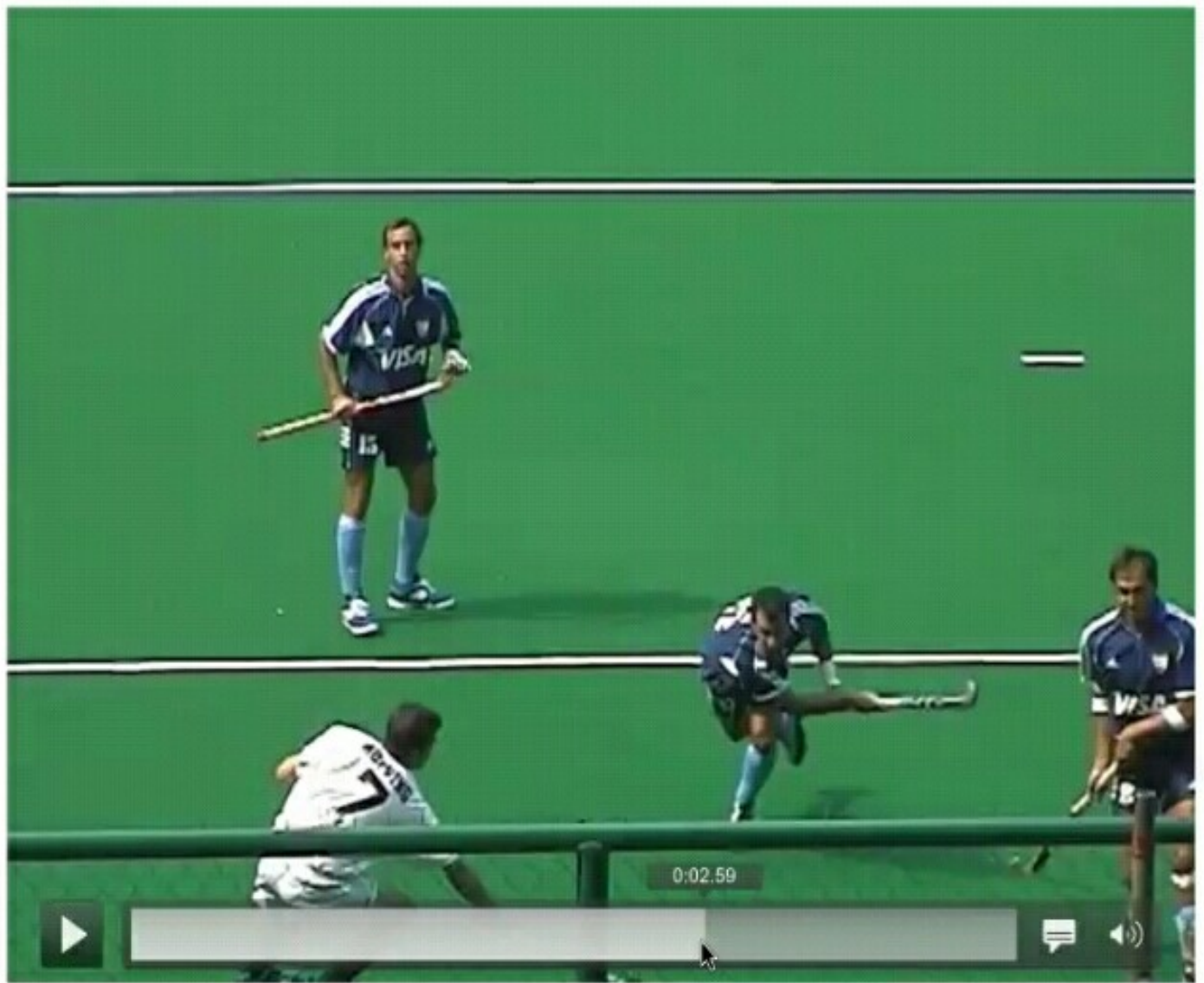
PC FLICKER- FRONT



PC FLICKER- FRONT



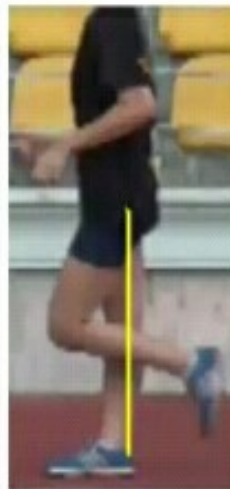
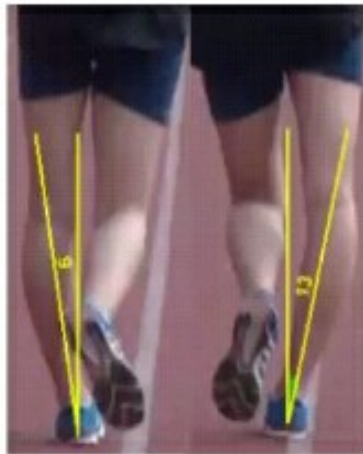
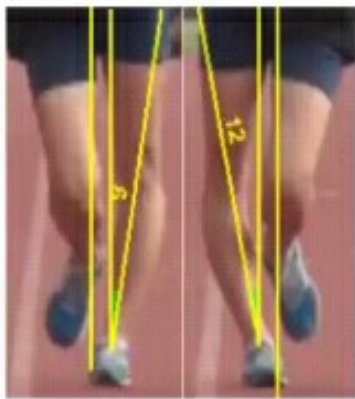
PC FLICKER- FRONT



PC FLICKER- SIDE



Walker – with anterior knee pain



Main issue :

During the mid stance phase (weight bearing), the orientation of tibia is lateral and away from the middle of ankle joint line.

In case of right and left leg the deviation is 12 - 13 degrees and 9-10 degrees respectively to through the middle of patella.

Main issue :

During the mid-stance phase (weight bearing), the heel does have a contact with the ground. Though the body moves forward and ahead of heel line – the heel is still in contact with the ground – thus hyper extending the knee joint which pull the patella medially upwards.



Swimmer – Hyper extension of knee



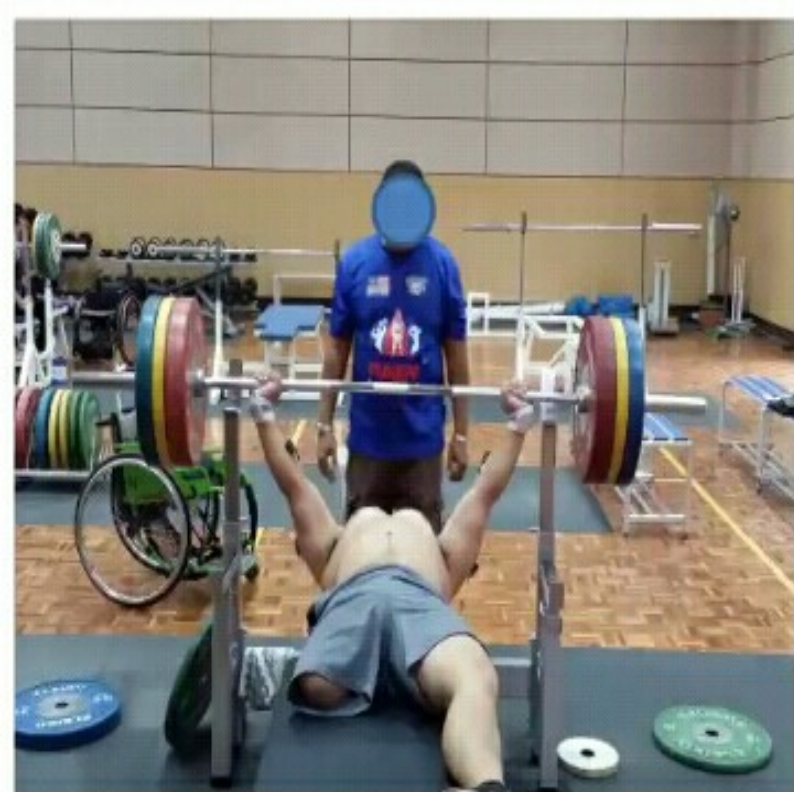
Main issue :

Knee flexed during take off – reduces linear speed of the swimmer during take off
The rotatory force generated by leg tends to drop the body almost at vertical line –reducing the speed

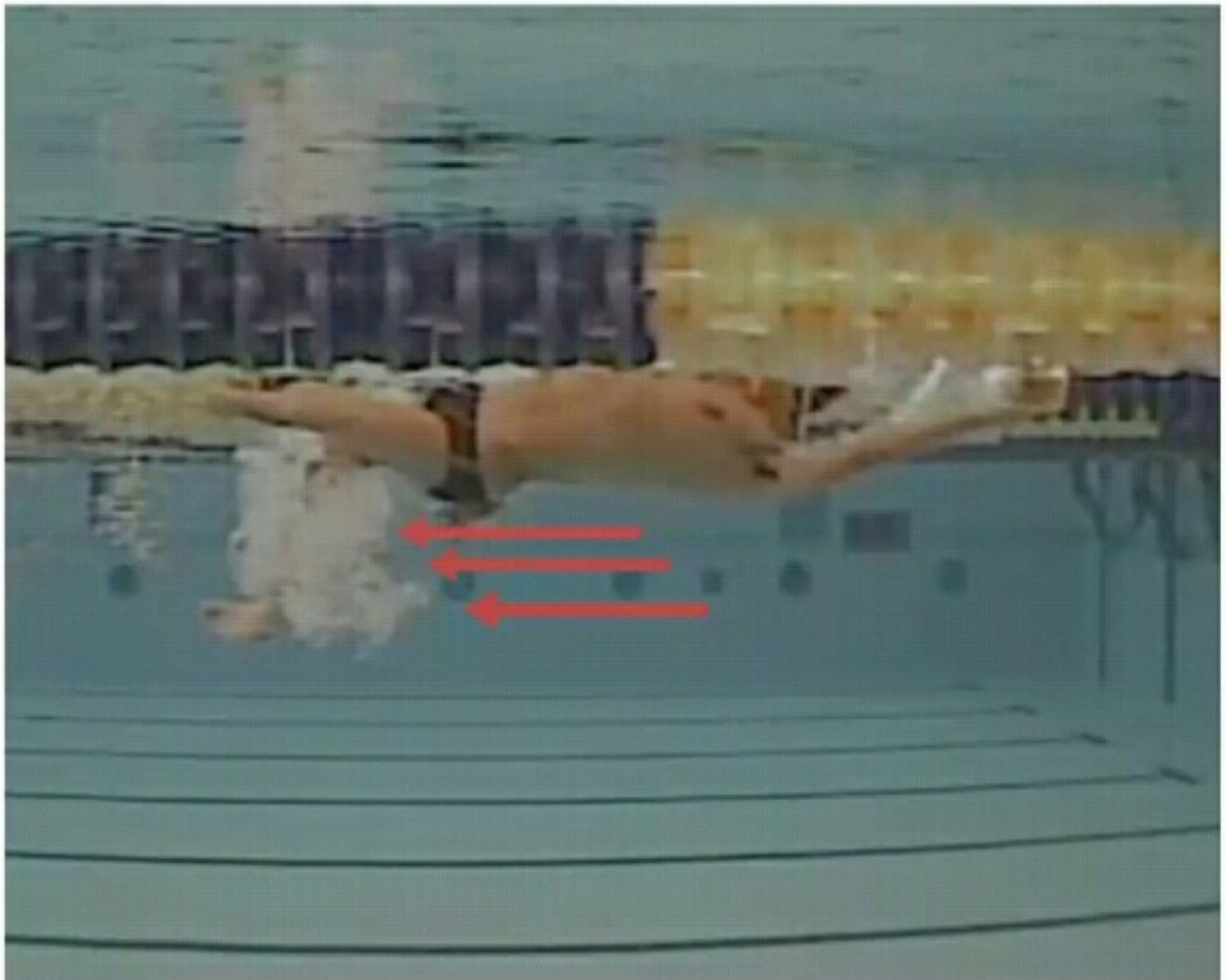
Main issue :

Knee flexion angle less at take off – hence needs to generate vertical force
CG raised up
Hyper extension of knee – leading to ecc contraction of hamstrings which inhibits knee to flex

Imbalances and injury



Drag effect - performance



Case – Low back pain



- During the left leg mid stance the left shoulder is dropped.
- The left foot is planted straight almost in line with the hip joint whereas the right leg is planted diagonally and almost crosses the groin line.
- During the push phase - toe off – the toes pivot medially creating an internal rotation of the hip joint in the left leg.

AMPUTEE – RUNNING MECHANICS



Lever type encountered :

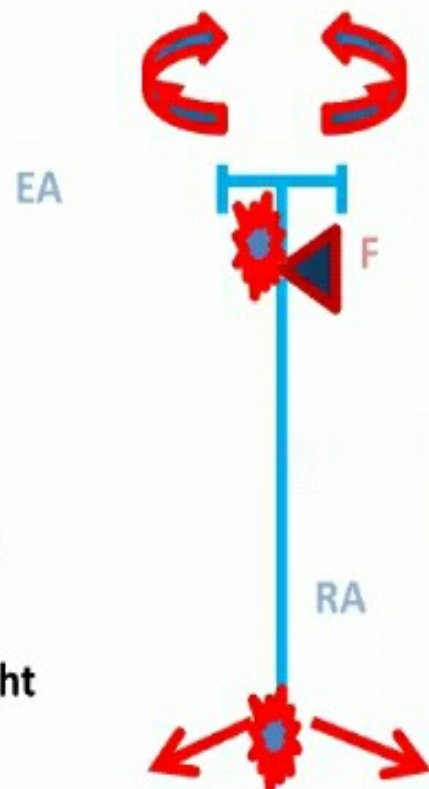
Lever type-
1st order lever



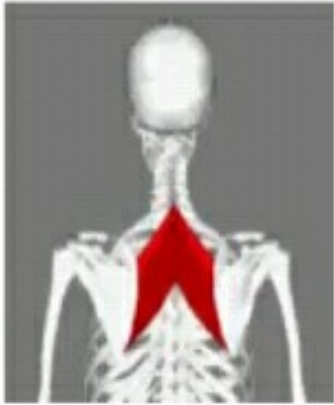
Tandem Bike

EA= Effort put in retractors, protractors and stabilizer of scapulo-thoracic joint.

RA= Length & Weight of the top tube, frame, body weight (pilot + stoker), tail swing forces

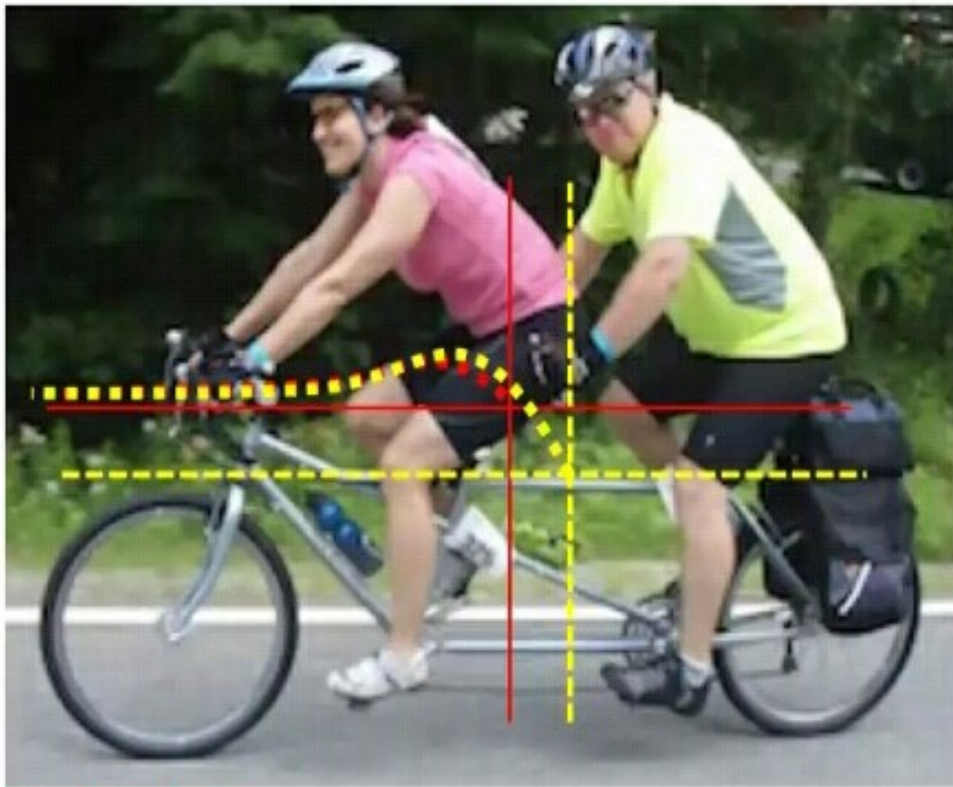


Rhomboid Muscle:



- rhomboids, are rhombus-shaped muscles associated with the scapula and are chiefly responsible for its retraction. There are two rhomboid muscles:
- Rhomboid major muscle
- Rhomboid minor muscle

Concepts: :



Heavier the stoker –

The CG & proportion of weight distribution across the cycle varies.

The angle of initial force & peak force application varies.

CONCLUSION

- A comprehensive approach - which accounts for the events leading to the injury situation (playing situation, player and opponent behaviour), as well as to include a description of whole body and joint biomechanics at the time of injury are essential for effective mechanics analysis.
- Basic understanding of the internal and external risk factors as well as the inciting event (the injury mechanism).
- Early Technique correction and specific training programmes would significantly reduce the incidence of injuries.
- Coaches are the one who should realize the technical issues – but unfortunately they do not have enough sports science support.