

Hamstring Injuries- making return to play decisions

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Southampton FC - 7 years



Hamstring Injuries- making return to play decisions (in football)

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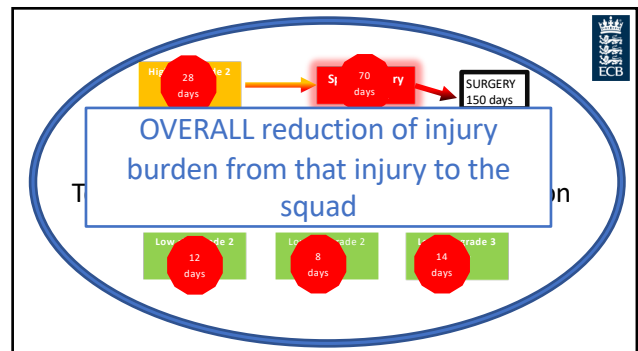
DO NOT TRY THIS IN CRICKET!!!!
(some principals may apply)

Hamstring injuries (any injury?) are sport specific!



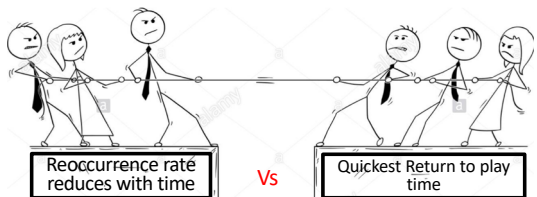
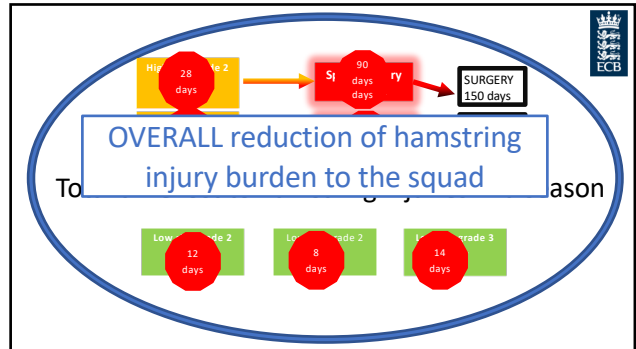
My approach to any injury in elite sport

- Figure out the most “troublesome” injuries in that sport
- Learn about that injury in detail, and “true predictors” of return to play/performance
- Define the “RED BOX” – injury pattern/grade I rather not take risks on
- Define the injury/pattern where I would be happy to push for quicker return
- We know that injury will happen in this sport, no matter how much prevention methods used- be prepared to minimize time loss when this happens.
- Looking at reducing overall injury time loss from that injury to squad
- Prepared to take a calculated risk (!)- depending on situation/player expectations



Hamstring injuries

- Most common in football and explosive sports
- Recurrence rate high- up to 75% in certain types of hamstring injury



Hamstring injuries- Ideally.....

Reoccurrence rate ↓

Return to play time ↓

What is more damaging.....

- Higher reoccurrence rates?
- Slower return to play times?

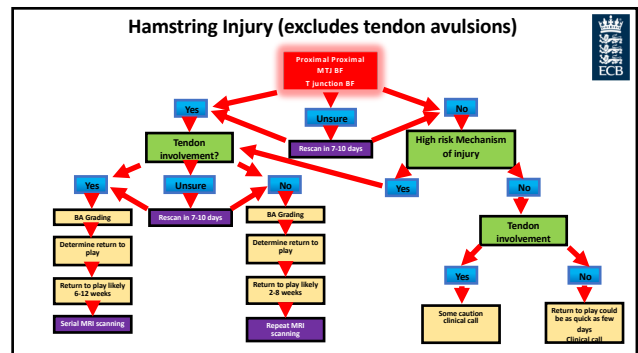
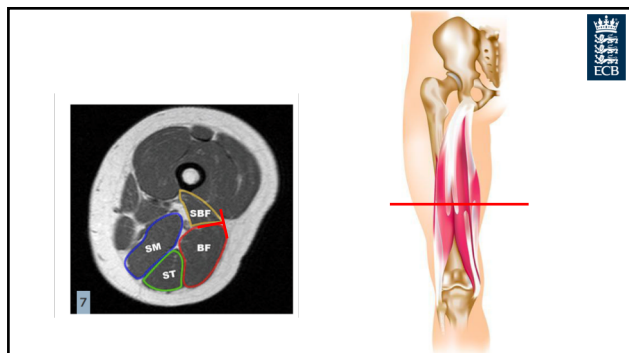
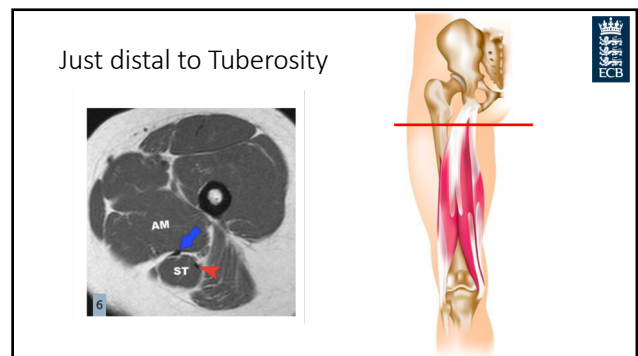
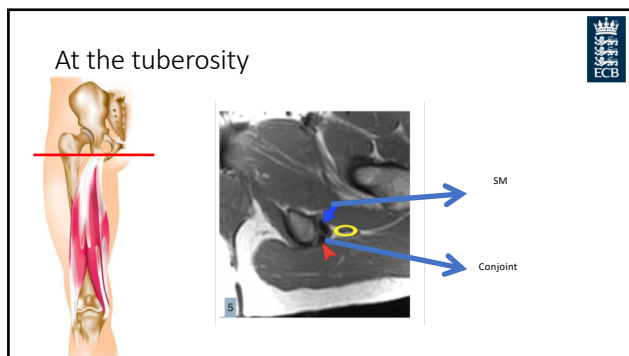
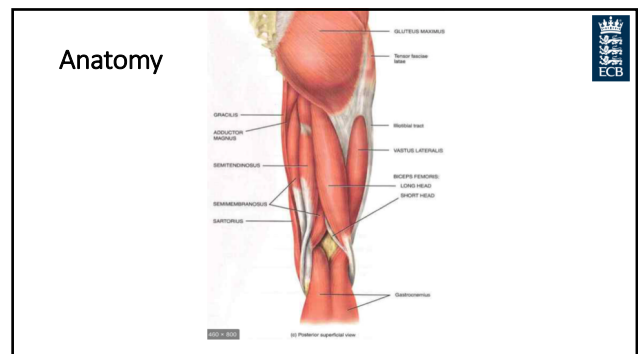
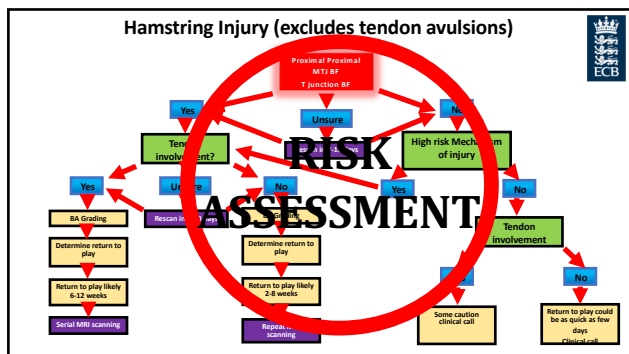
Hamstring injuries- Ideally.....



What is more damaging?
• Higher reoccurrence rates?
• Slower return to play times?

Hamstring reoccurrence

- At the same site of last injury - in theory these all should be preventable
- At another site same hamstring muscle group or other side- harder!



Main Factors Determining Return to Play

- High risk injury location? – Red Box
- Tendon involvement
- Mechanism/presentation of Injury/importance of injury
- (The Sport) – not covered in this talk
- **Whats the order of importance?**



High risk injury location? – **Red Box**
The highest risk injuries in the hamstring.....
in football and similar sports



**Proximal Proximal
MTJ BF
T junction BF**

Proximal Proximal MTJ BF T junction BF

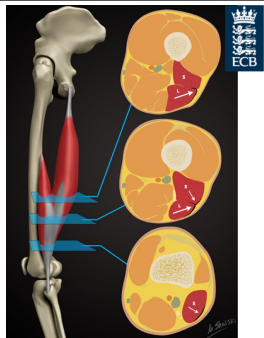
- Highest risk of reoccurrence
- High risk of Progression of injury to a high grade injury (surgery/12weeks)
- Proximal proximal MTJ BF usually associated with injury mechanisms that needs to be repeated within football (eg accel/ decel, sprinting)



Proximal Proximal MTJ BF



T junction BF



T junction BF

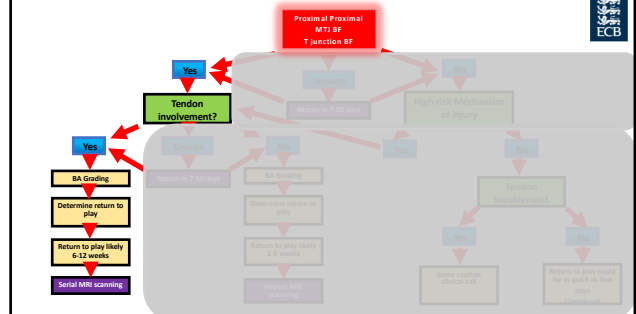


Main Factors Determining Return to Play

- High risk injury location? – Red Box
- **Tendon involvement**
- Mechanism/presentation of Injury
- The Sport



Hamstring Injury (excludes tendon avulsions)



Proximal Proximal MTJ BF T junction BF

Yes

Tendon involvement?

Yes

HIGH RISK!

- These injuries
- Play it safe
 - Wait for complete tendon healing



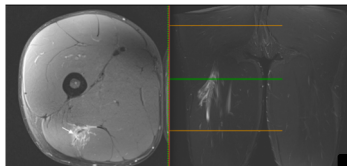
"C" injuries

Grades Muscle Injury Classification ("C" if any characteristics of a higher grade injury are present)

Grade	Description	MRI (Fig 2)
1a	Focal area of muscle pain usually following exertion	MRI normal
1b	Generalized muscle pain following unaccustomed exertion	MRI normal or patchy high signal change throughout one or more muscles
2a	Small myofascial tear	High signal change evident at the fascial border with less than 10% extension into muscle belly
2b	Small muscle-tendon junction tear	Chondrolytic change in T2w
3a	Moderate myofascial tear	High signal change evident at the fascial border with extension into the muscle belly
3b	Moderate muscle-tendon junction tear	High signal change evident at the fascial border with extension into the muscle belly
3c	Moderate mixed intramuscular tear	High signal change evident at the fascial border with extension into the muscle belly
4a	Extensive myofascial tear	High signal change evident at the fascial border with extension into the muscle belly
4b	Extensive muscle-tendon junction tear	High signal change evident at the fascial border with extension into the muscle belly
4c	Extensive mixed intramuscular tear	High signal change evident at the fascial border with extension into the muscle belly
5	Complete disruption of the muscle with retraction	Complete disruption of the muscle with retraction

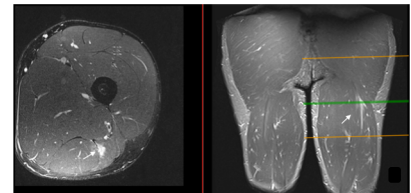
3C BF Prox Prox MTJ

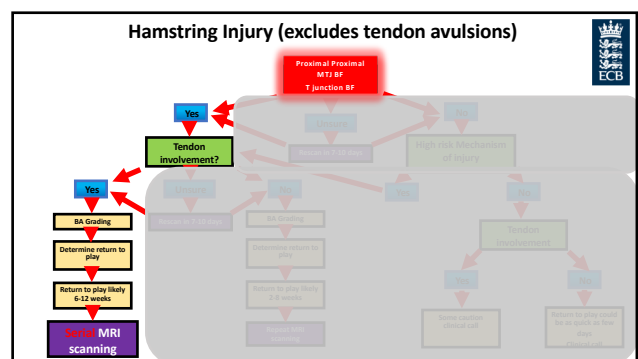
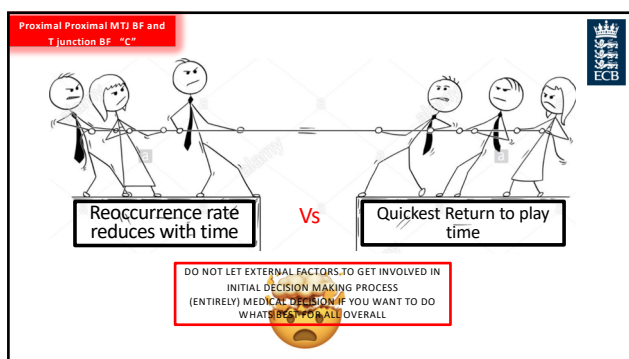
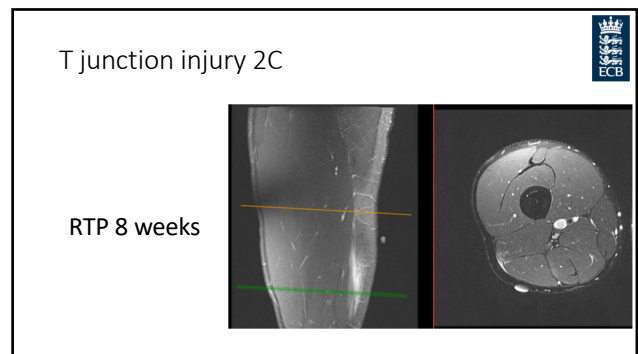
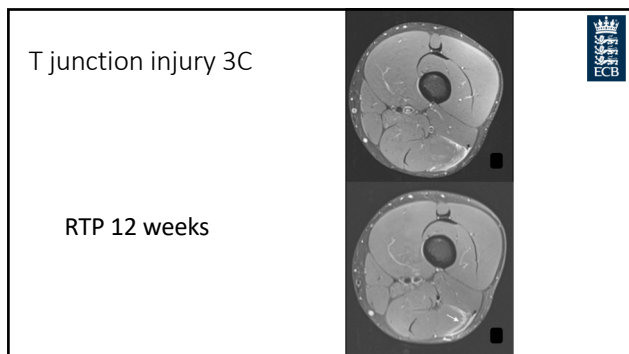
RTP 12 weeks



2C BF Prox Prox MTJ

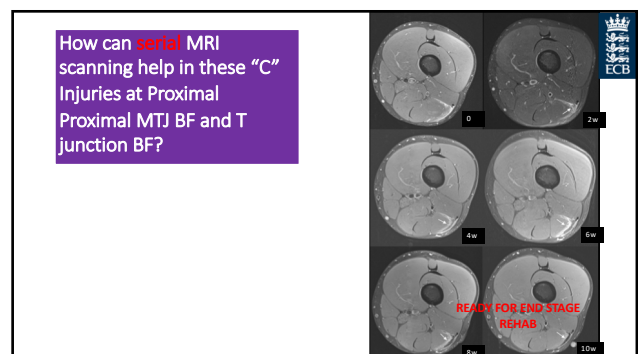
RTP 6 weeks





How can **serial** MRI scanning help in these "C" Injuries at Proximal Proximal MTJ BF and T junction BF?

- What actions will cause it to re-injury while healing?
 - Mechanism of injury
 - High end (high risk) hamstring loading activities (e.g sprinting, Hi acc/decel)
- When do we introduce this in to rehab?
 - When tendon has got sufficient tensile strength to accommodate these activities
 - How do we know when it has sufficient tensile strength? **clinical tests can help but with tendon injuries are misleading**
 - Can we capture the quickest time to capture introduce the high risk activities?
- Reassurance
 - Need for player and clinician?



How can **serial** MRI scanning help in these “C” Injuries at Proximal Proximal MTJ BF and T junction BF?

The figure illustrates the use of serial MRI scanning to monitor C6 injuries at the Proximal Proximal MTJ BF and T junction BF. The top left displays a table of MRI parameters, including T1, T2, T2*, T2rho, and T2s, with corresponding values and units. The top right shows a series of MRI scans at 0w, 4w, 6w, 10w, and 16w post-injury, with a red box highlighting a specific area. The bottom left shows three bar charts: 'Distance in Zones', 'Heart Rate in Zones', and 'Accelerations in Zones'. The bottom right shows a red box with the text 'READY FOR END STAGE MONITOR'.

How can **serial** MRI scanning help in these "C"
Injuries at Proximal Proximal
MTJ BF and T junction BF?

READY FOR END STAGE
REPAIR

ECU

[illegible]

Proximal MTJ BF
T junction BF

Yes

Tendon involvement?

No

Moderate RISK!

These injuries

- Risk of progression to “C” injuries
- Respect
- But more flexibility

Table 1. Summary of British Athletics Injury Classification (* if any characteristics of a higher grade injury are present the injury is graded at the highest grade)		
Grade	Description	MM (Max)
1a	Isol arm or muscle pain usually following routine	MM normal
1b	Generalised muscle pain following non-routine exercise	MM normal or a grade high spinal injury throughout arm or torso muscles
2a	Small muscle-tendon junction tear	High spinal injury distal to the Sacral border with less than 10% extension into muscle fibres Unilateral extension of 0.5 cm Unilateral extension of arm of 0.5 cm High spinal injury of continuous length 0.5 cm long over maximum of 1 cm
2b	Medium-sized tendon tear	MM
2c	High spinal injury distal to the Sacral border with extension into the muscle	High spinal injury cross-sectional length of between 10% and 10% and maximal size High spinal injury of continuous length 0.5 cm, 1 cm and 1 cm
2d	Medium muscle-tendon junction tear	High spinal injury distal to the Sacral border with extension into the muscle High spinal injury cross-sectional length of between 10% and 10% and maximal size High spinal injury of continuous length 0.5 cm, 1 cm and 1 cm Unilateral tear the distal border muscle with the arm 1 cm
2e	Medium sized intratendon tear	High spinal injury distal to the Sacral border with extension into the muscle High spinal injury cross-sectional length of between 10% and 10% and maximal size High spinal injury of continuous length 0.5 cm, 1 cm and 1 cm
2f	High spinal injury distal to the Sacral border with extension into the muscle	High spinal injury cross-sectional length of between 10% and 10% and maximal size High spinal injury of continuous length 0.5 cm, 1 cm and 1 cm
3a	Extensor muscle-tendon junction tear	High spinal injury distal to the Sacral border with extension into the muscle High spinal injury cross-sectional length of between 10% and 10% and maximal size High spinal injury of continuous length 0.5 cm, 1 cm and 1 cm
3b	Extensor intratendon tear	High spinal injury distal to the Sacral border with extension into the muscle High spinal injury cross-sectional length of between 10% and 10% and maximal size High spinal injury of continuous length 0.5 cm, 1 cm and 1 cm
4	Full thickness tear of muscle	Complete discontinuity of the muscle with contraction
5	Full thickness tear of tendon	Complete discontinuity of the tendon with contraction

2B Prox Prox BF injury



An axial MRI scan of the brain, likely a T2-weighted or FLAIR sequence, showing a hyperintense (bright) area in the right hemisphere, consistent with a proximal brain injury. The surrounding brain tissue appears normal.

Proximal Proximal MTJ BF and T junction BF "B"

Reoccurrence rate reduces with time Vs Quickest Return to play time

- Risk of progression to "C" injuries
- Respect
- But more flexibility
- Debate optimum RTP!!!

Proximal Proximal MTJ BF and T junction BF "B"

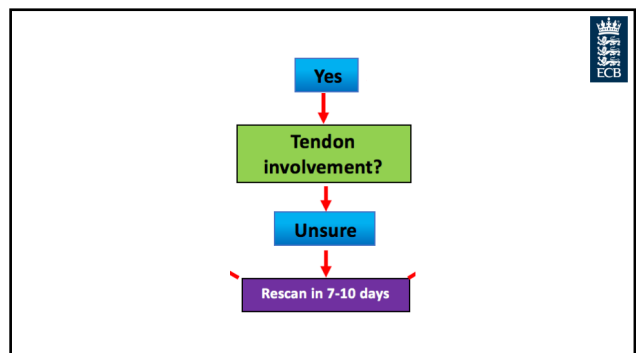
Bring all the other factors in determining quickest and safest return

- Previous history
- Clinical testing
- Maturity
- Age
- Screening data
- Etc etc etc

Proximal Proximal MTJ BF and T junction BF "B"

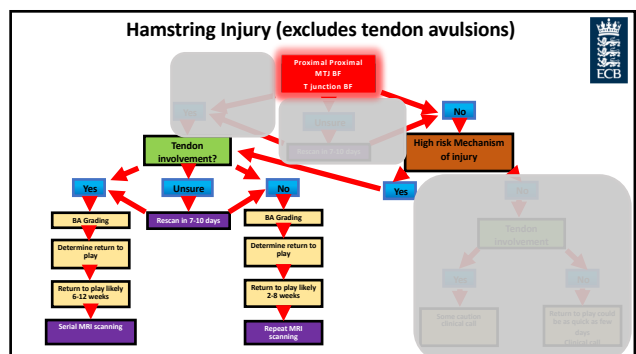
Repeat MRI scanning?

- Depending on severity of injury and initial return to play estimate a scan a repeat scan 7-14 days after injury
 - Ensure healing despite loading
 - Ensure not under or over called initially
 - May speed up return
 - Give reassurance
 - Individual decision



Main Factors Determining Return to Play

- High risk injury location? – Red Box
- Tendon involvement
- **Mechanism/presentation of Injury**
- The Sport

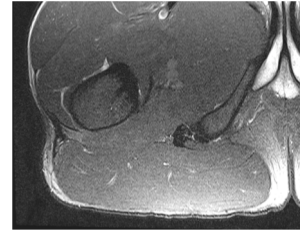


High Risk Injury Mechanism consideration....

- An action needed repeatedly in football- sports specific
- An action that needs to be regularly performed under fatigue
- Sprinting
- Acceleration
- Deceleration
- Did they play on? How long? What are there metrics after injury?
- Presentation - tightness. NO MOI

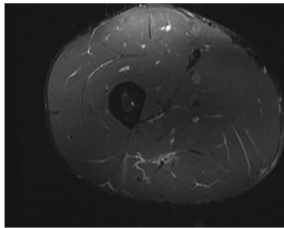
High Risk Injury Mechanism- Sprinting

Semitendinosus tendon "C" injury



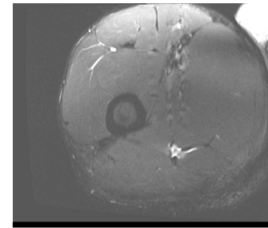
High Risk Injury Mechanism- tendon injury

Semitendinosus injury 21 days after initial



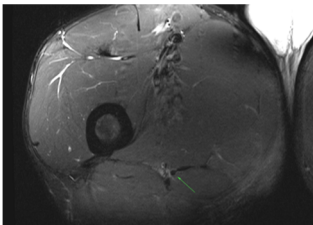
High Risk Injury Mechanism

Semitendinosus re-injury

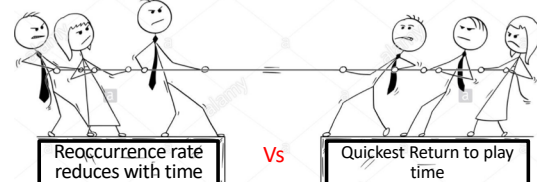


High Risk Injury Mechanism

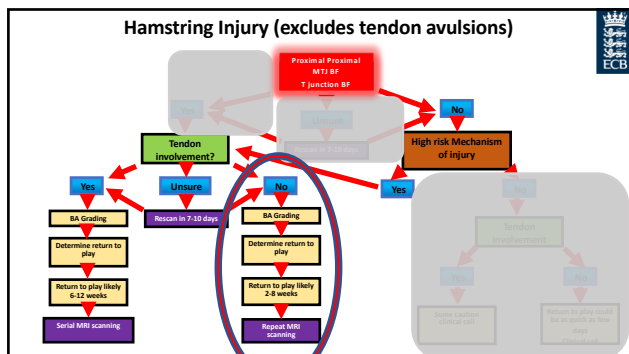
Semitendinosus tendon healing



High Risk Injury Mechanism- tendon injury



DO NOT LET EXTERNAL FACTORS TO GET INVOLVED IN INITIAL DECISION MAKING PROCESS (ENTIRELY) MEDICAL DECISION IF YOU WANT TO DO WHAT'S BEST FOR ALL OVERALL

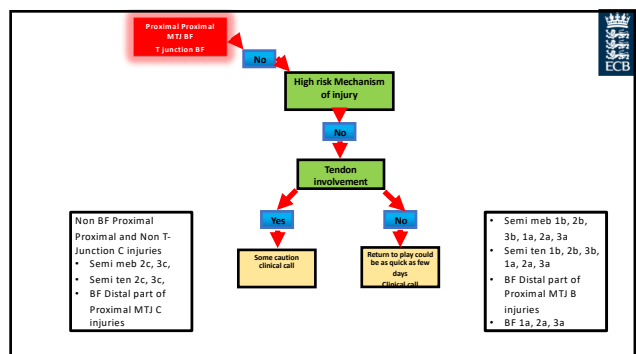
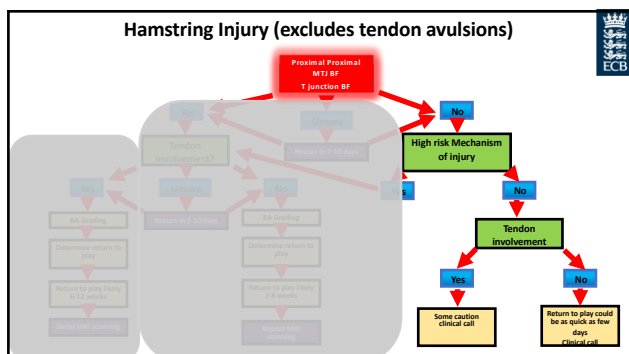
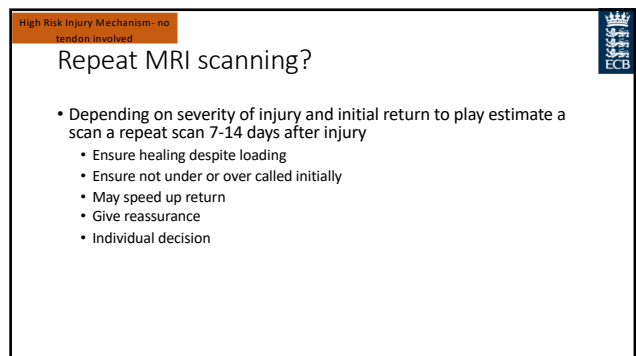
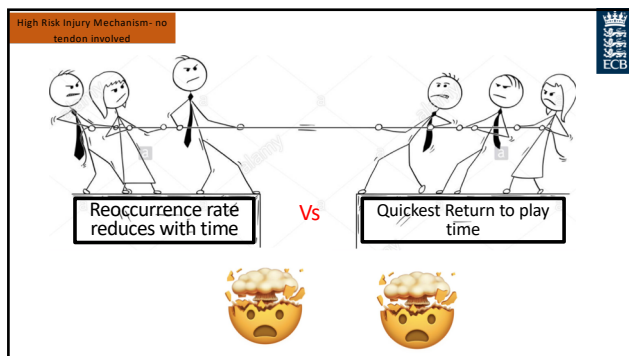


High Risk Injury Mechanism- no tendon involved

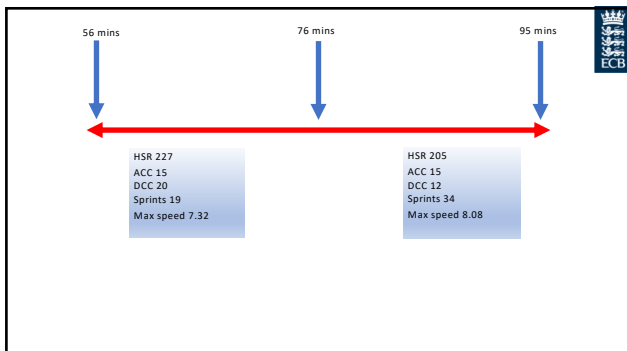
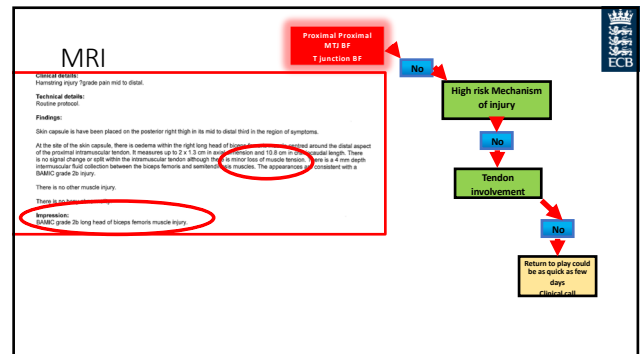
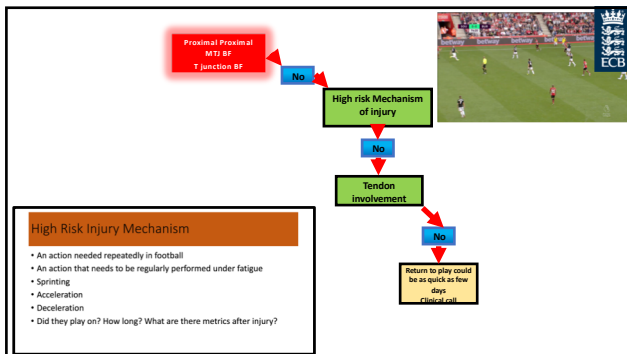
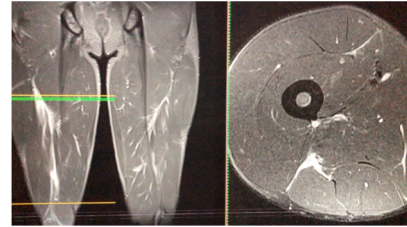
- 1a, 2a,3a injuries
- And non BF prox prox MTJ or T junction 1b, 2b, 3b

Table 1. Summary of British Athletics Muscle Injury Classification (*) If any characteristic of a higher grade injury are present the injury is graded at the highest grade.

Grade	Description	MTJ Day 2
1a	Small muscle pain usually following routine training, muscle pain following unaccustomed exercise	MTJ
1b	Small muscle pain	MTJ
2a	Small muscle pain	MTJ
2b	Small muscle pain	MTJ
3a	Small muscle pain	MTJ
3b	Small muscle pain	MTJ
4a	Small muscle pain	MTJ
4b	Small muscle pain	MTJ
5a	Small muscle pain	MTJ
5b	Small muscle pain	MTJ
6a	Small muscle pain	MTJ
6b	Small muscle pain	MTJ
7a	Small muscle pain	MTJ
7b	Small muscle pain	MTJ
8a	Small muscle pain	MTJ
8b	Small muscle pain	MTJ
9a	Small muscle pain	MTJ
9b	Small muscle pain	MTJ
10a	Small muscle pain	MTJ
10b	Small muscle pain	MTJ
11a	Small muscle pain	MTJ
11b	Small muscle pain	MTJ
12a	Small muscle pain	MTJ
12b	Small muscle pain	MTJ
13a	Small muscle pain	MTJ
13b	Small muscle pain	MTJ
14a	Small muscle pain	MTJ
14b	Small muscle pain	MTJ
15a	Small muscle pain	MTJ
15b	Small muscle pain	MTJ
16a	Small muscle pain	MTJ
16b	Small muscle pain	MTJ
17a	Small muscle pain	MTJ
17b	Small muscle pain	MTJ
18a	Small muscle pain	MTJ
18b	Small muscle pain	MTJ
19a	Small muscle pain	MTJ
19b	Small muscle pain	MTJ
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25a	Small muscle pain	MTJ
25b	Small muscle pain	MTJ
26a	Small muscle pain	MTJ
26b	Small muscle pain	MTJ
27a	Small muscle pain	MTJ
27b	Small muscle pain	MTJ
28a	Small muscle pain	MTJ
28b	Small muscle pain	MTJ
29a	Small muscle pain	MTJ
29b	Small muscle pain	MTJ
30a	Small muscle pain	MTJ
30b	Small muscle pain	MTJ
31a	Small muscle pain	MTJ
31b	Small muscle pain	MTJ
32a	Small muscle pain	MTJ
32b	Small muscle pain	MTJ
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40a	Small muscle pain	MTJ
40b	Small muscle pain	MTJ
41a	Small muscle pain	MTJ
41b	Small muscle pain	MTJ
42a	Small muscle pain	MTJ
42b	Small muscle pain	MTJ
43a	Small muscle pain	MTJ
43b	Small muscle pain	MTJ
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62a	Small muscle pain	MTJ
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67a	Small muscle pain	MTJ
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70a	Small muscle pain	MTJ
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75b	Small muscle pain	MTJ
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100a	Small muscle pain	MTJ
100b	Small muscle pain	MTJ



MOI

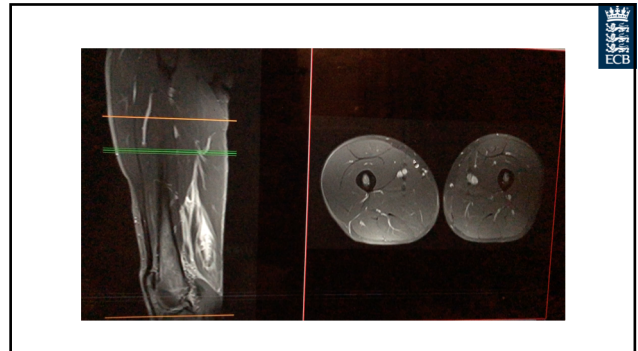
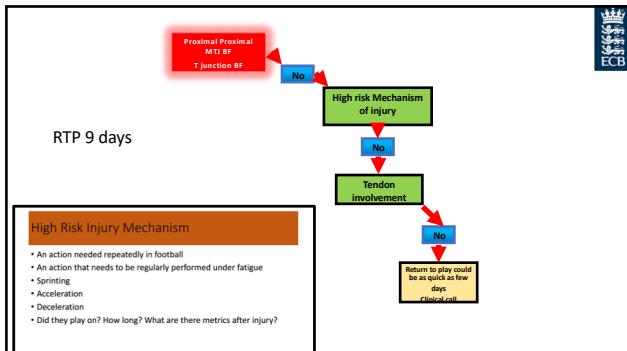


In his favour

- Played on for 20 mins with arguably better outputs
- MOI
- Location of injury

Against him

- MTI injury
- Potentially second muscle injury in the last two weeks

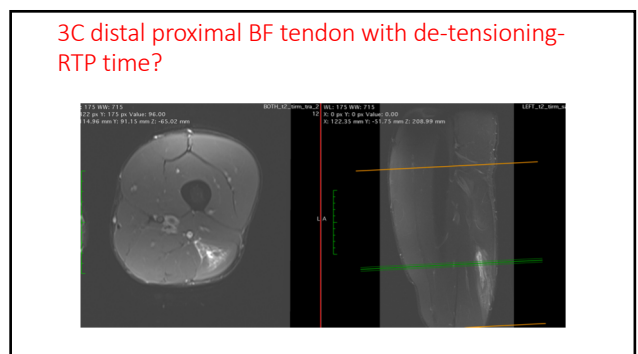


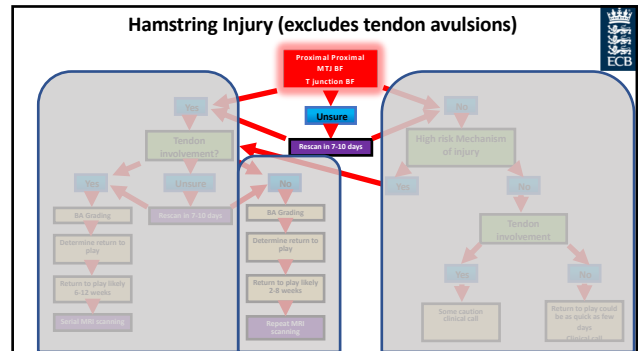
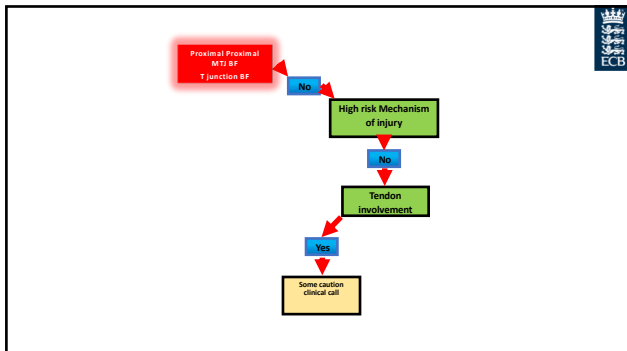
MRI.....

- Semimeb distal end of proximal tendon
- 3C
- De-tensioning
- Presented with tightness in hamstring, cannot recall injury....

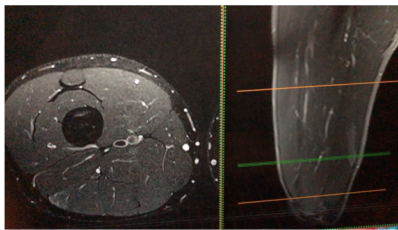


- 13th July injury
- 6th august completed HS RTP testing
- Trained 13th August

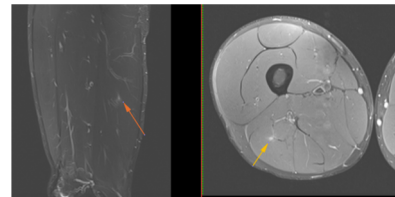




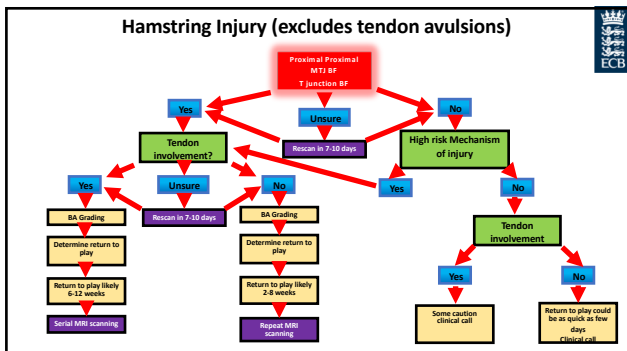
Unsure location of injury



RTP 10 days

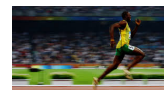


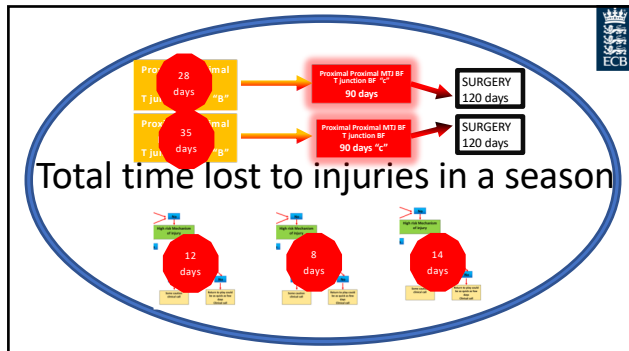
Hamstring Injury (excludes tendon avulsions)



Main Factors Determining Return to Play

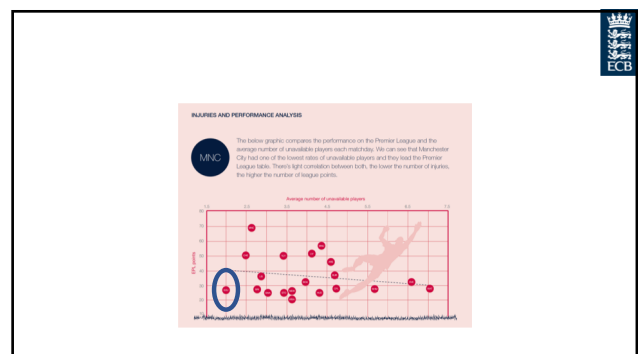
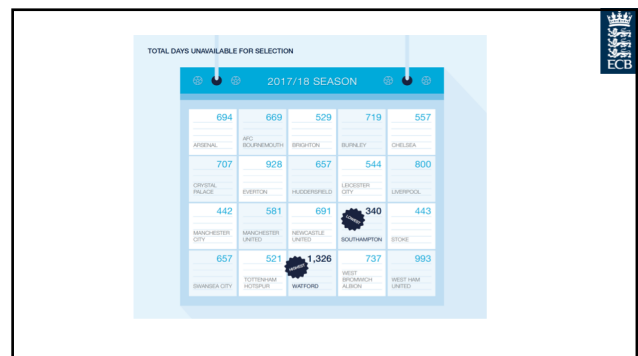
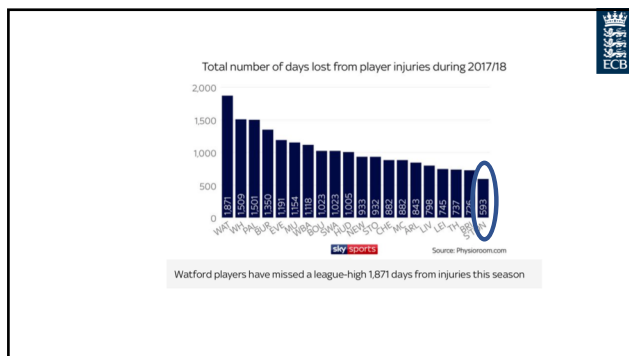
- High risk injury location? – Red Box
- Tendon involvement
- Mechanism/presentation of Injury
- The Sport





Hamstring reoccurrence

- At the same site of last injury - in theory these all should be preventable
- At another site same hamstring muscle group or other side- harder!



Hamstring re-injury risk

- Good rehab
- **It's the after care**
 - Attention to detail- load etc
 - "Yellow flags: in at risk players
 - Discussions with management
 - Psycho-social
 - Etc etc
- Steve Wright and team



Summary

- Remember the two high risk injuries – “Pick your battles”
 - Proximal proximal MTJ biceps femoris
 - T-junction of Biceps femoris
- **DEFINE THE RED BOX FIRST**
- MRI useful
- **The grading systems are certainly not only predictor – remember the grading may have not been done for your now sport**



Summery

- Role of how player presents to you- MOI, initial presentation important
- Every muscle group (and muscle) behaves differently- individualised approach - Hamstring vs quad vs adductor. Grading system not applicable for this muscle group
- Players sport and relationship to the injury mechanism is important – cricket vs football

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