Course 5

Traumatology and sports injuries

Types, risk factors, prevention and return to play

Learning objectives of the course

Upon completion of this course, the student will be able to:

- Classify the main types of sports injuries (muscle, ligament, tendon, bone).
- Identify intrinsic and extrinsic risk factors.
- Implement primary and secondary prevention strategies.
- Apply immediate management for acute injuries (RICEP protocol).
- Know the principles of gradual return to play (RTP) after injury.

Introduction: injury, an omnipresent risk in sport

Whether in amateur or high-level sport, injury is part of the coach's daily reality. The goal of sports traumatology is not to turn the coach into an orthopaedic physician, but to provide the keys to:

- Prevent the occurrence of injuries.
- Recognise immediate severity.
- Act correctly on the field.
- Organise the progressive return to training after injury.

1. Types of sports injuries

According to the tissue affected, four main families are distinguished.

1.1 Muscle injuries

Type	Mechanism	Example	Severity
Contracture	Painful involuntary contraction without structural damage	Hamstrings at end of exercise	Mild
Strain (grade 1)	Partial tear of a few fibres	Sprint, acceleration	Moderate
Partial tear (grade 2)	Tear of a significant number of fibres, haematoma	Sudden change of support	Severe
Complete rupture (grade 3)	Complete loss of continuity, sometimes retraction	Maximal load lifting	Very severe (often surgical)

Frequent locations: hamstrings (sprint, football), quadriceps (football, jumping), adductors (football, hockey), calves (tennis, running).

1.2 Ligament injuries (sprains)

Definition: stretching or tear of a ligament (tissue connecting two bones).

Grades:

Grade 1: stretching (micro-tears, moderate pain, no instability).

Grade 2: partial tear (pain, oedema, moderate laxity).

Grade 3: complete tear (major instability, significant oedema).

Locations:

- Ankle (lateral external ligament) – most common.
- Knee (ACL – anterior cruciate ligament, PCL, collaterals).
- Wrist, thumb (skier).

1.3 Tendon injuries (tendinopathies)

More often chronic than acute.

Tendinopathy = pain and degeneration of the tendon without frank inflammation (tendinitis is often a misnomer).

Mechanism: repetition of micro-trauma with defective repair.

Tendon	Associated sport
Patellar tendon (jumping)	Basketball, volleyball (jumper's knee)
Achilles tendon	Running, sports with weight-bearing
Rotator cuff (shoulder)	Swimming, tennis, throwing
Lateral epicondyle (tennis elbow)	Racket sports

1.4 Bone injuries

Type	Mechanism	Example
Acute fracture	Violent trauma (impact, fall)	Clavicle fracture in rugby
Stress fracture	Repetitive stress without repair	Metatarsal in runners, tibia (advanced shin splints)

Stress fractures: very common in female athletes (triad, RED-S), runners and military personnel. Locations: tibia, metatarsals, femoral neck (severe), pubis.

2. Risk factors for injuries

We distinguish intrinsic factors (related to the athlete) and extrinsic factors (related to the environment).

2.1 Intrinsic factors

Factor	Example
Previous injury	The main risk factor (risk ×2 to ×5)
Age	Growth (youth) or senescence (veterans)
Sex	Women: higher ACL risk; men: higher muscle injury risk
Morphology	Genu valgum, cavus/planus foot, muscle imbalance
Strength and flexibility	Gluteal weakness, hamstring tightness

Fatigue	Poorly managed load → ligamentous laxity
Hormonal status (women)	Menstrual cycle variations, contraception

2.2 Extrinsic factors

Factor	Example
Training load	Sudden spike (ACWR > 1.3)
Surface	Artificial turf (higher ACL risk than natural grass)
Equipment	Worn shoes, inappropriate studs
Environment	Cold (less elastic), heat (fatigue)
Level of opposition	Match > training

Major factor: high acute load relative to chronic load (ACWR, seen in Course 3) is predictive of injuries.

3. Primary prevention

Primary prevention aims to avoid the occurrence of a first injury.

3.1 Validated programmes

Programme	Sport	Content (warm-up: running, strengthening, stabilisation, eccentric)	Effectiveness
FIFA 11+	Football	Running, strengthening, stabilisation, eccentric	Injury reduction −30 to 50%
HarmoKnee	Football (girls)	ACL prevention	−70% ACL
PEP	American football, basketball	Jumps, landing, change of direction	−40% knee injuries

3.2 General prevention principles

- **Complete warm-up**: 15-20 min, including muscle activation, joint mobility, proprioception.
- **Eccentric strengthening**: hamstrings (Nordic hamstring), triceps surae.
- **Proprioceptive training**: unstable board, controlled landing.
- **Load management**: no increase >10% per week, unloading weeks.
- **Recovery**: sleep, nutrition, hydration.

4. Immediate management – RICEP protocol (evolution of RICE)

The old RICE protocol (Rest, Ice, Compression, Elevation) has been replaced by RICEP (Rest, Ice, Compression, Elevation, Protection) or more recently POLICE (Protection, Optimal Loading, Ice, Compression, Elevation). For coaches, we remember:

What to do in the first 48 hours

Step	Action	Precision
Protection	Immobilise the limb, avoid painful weight-bearing	Crutches if necessary
Relative rest	Do not aggravate the lesion, but avoid strict immobilisation (except fracture)	Pain-free movements as early as day 2
Ice	15-20 min every 2 hours (never directly on skin)	Local anti-inflammatory, analgesic
Compression	Moderate elastic bandage, no tourniquet	Limits oedema
Elevation	Limb elevated (> heart level)	Promotes venous return

What NOT to do – the "AVOID" protocol (adapted):

A = **Avoid NSAIDs in first 48 hours? (controversial, leave to physician)**

V = Vasodilation (heat, deep massage, alcohol) – prohibited.

O = Overload – avoid forced walking.

I = Immobilisation without medical indication.

D = Delayed movement – avoid early return.

Note: NSAIDs (ibuprofen, etc.) are often used, but they may delay tendon and muscle healing. The physician will decide.

When should you consult a physician urgently?

- Visible deformity (fracture, dislocation).
- Complete inability to bear weight or move a limb.
- Extensive haematoma and very intense pain.
- General signs (fever, chills).
- Suspicion of severe injury (ACL, complete tendon rupture).

5. Return to play (RTP)

5.1 General principles

Return to play must be gradual, pain-free and medically cleared. Premature return increases the risk of recurrence.

Steps of progressive return (example for lower limb muscle injury)

Step	Activity	Criterion for progression
1	Pain-free active mobility, cycling without resistance	Full range of motion, no pain
2	Normal walking without limp	Able to walk 30 min without pain
3	Slow running, then progressive accelerations	No pain during sport-specific movement
4	Jumps, changes of direction	Symmetrical strength, control
5	Return to team training at reduced intensity	No fear, no protective behaviour
6	Match or competition	Medical and coach clearance

Typical duration: mild strain: 7-14 days; significant tear: 3-6 weeks; surgical ACL rupture: 6-9 months.

5.2 Objective return criteria (indicators for the coach)

- **Pain**: absent on palpation and during effort.
- **Strength**: symmetrical to the contralateral limb (e.g., isokinetic dynamometry if available).
- **Proprioception**: controlled landing, single-leg test.
- **Fear**: Tampa scale (kinesiophobia) – if high, psychological work needed.
- **Medical clearance**: essential after a severe injury.

Rule: never rush a return for a competitive deadline. A missed match is better than a season ruined by a recurrence.

6. Secondary prevention (after injury)

Secondary prevention aims to avoid recurrence or chain injuries.

6.1 Why is recurrence so frequent?

- Residual weakness of the muscle or tendon (up to 6 months).
- Altered movement pattern (compensation).
- Loss of confidence, fear → unloading of the limb.
- Too early return.

6.2 Secondary prevention programme

Component	Example
Specific strengthening	Eccentric hamstrings (Nordic) after a strain
Proprioception	Work on trampoline, balance board, unstable surface
Movement control	Video analysis of running, jumping
Load management	Slower progression than a naive athlete
Extended monitoring	Daily questionnaire for 3 months

Appendix: Field card – Management of an acute injury

Situation	Action
Sudden pain during effort	Immediate stop, rest
Swelling / haematoma	Ice + compression + elevation
Visible deformity	Immobilise, do not reduce, call emergency
Inability to bear weight	Crutches, medical advice
Frequent recurrence	Strengthening + proprioception + load management

Message to athletes: “Do not play with pain – an injury treated early heals faster.”